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Enhancing Online Graduate Education Experience Using Immersive Learning Environments

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Abstract. Online education has become very popular after the COVID-19 pandemic, and many universities deliver graduate programs online to students from different locations worldwide. Online education provides several advantages and allows graduate students to learn anywhere, anytime, with reduced financial costs. However, challenges have been identified with online education, such as fewer opportunities for social interaction (e.g., collaborative learning, student-faculty interaction, active teaching practices, and quality discussions with peers). Lack of meaningful engagement can lead to higher dropout rates due to reduced motivation and increased distance between students, institutions, and instructors. This presentation will analyze how virtual reality (VR) and augmented reality (AR) can provide immersive experiences that enhance graduate student learning by incorporating active engagement, social interaction, and other elements often lacking in online learning environments.

Keywords: Immersive Learning Environment, Virtual Reality, Augmented Reality.

1 Introduction

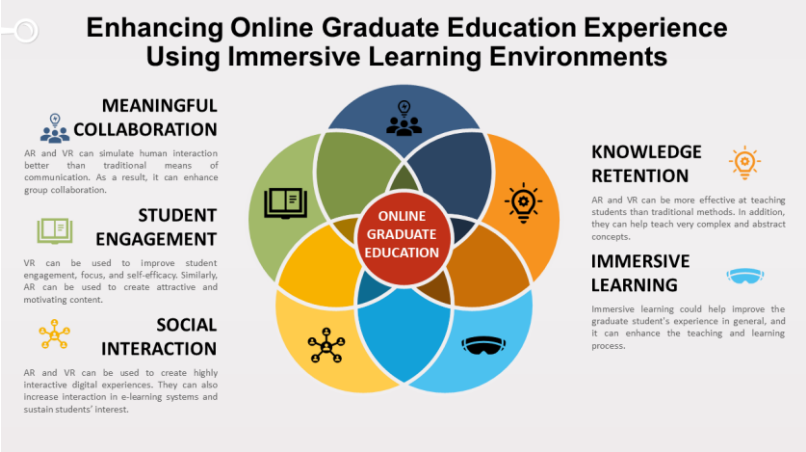

Fig. 1. Relationship between online graduate education and social interaction, student engagement, meaningful collaboration, knowledge retention, and immersive learning.

This article demonstrates how the ADDIE model can be applied iteratively in immersive learning environments for online graduate education. It also examines how immersive learning environments might increase social interaction, engagement, and collaboration and improve knowledge retention in online graduate education.

2 The ADDIE Model

2.1 Analysis

The analysis phase guides all the design decisions and determines whether the immersive learning environment will succeed or fail. Important considerations for immersive learning in the analysis phase include the instructional goal, the resources, the cost, and the technology available to the users [1-3]. Student considerations (convenience, technical issues, and pedagogical preferences) [4] and educator considerations (the learning curve that novice developers face and the rapid speed of advancing technology) also require important considerations [5].

2.2 Design

The designing phase has a huge effect on the effectiveness of the user experience [6]. It focuses on designing practice and requires three levels of decisions: determining the performance objectives (what the learner should be able to do), creating the virtual world that the learner will be immersed in to give the learner the opportunity to practice and determining how success will be measured [3].

2.3 Development

Irrespective of the platform used to develop the immersive learning environment, the design strategy should be based on real-world problems and involve authentic practice opportunities. Before developing, important considerations are the learning goal, the added value of using the immersive learning environment, the technology that best meets the learning goal, and the development parameters and resources available for development [3-5].

2.4 Implementation

Implementing immersive learning requires careful planning of the teaching sequence and alignment of learning objectives with learning activities and performance assessment while focusing on the learner [7]. Immersive learning environments could require a paradigm shift for even students who are used to playing video/mobile games because it would have consequences on their academic success [3].

2.5 Evaluation

Evaluation could be achieved by evaluating the immersive learning environment or how it improved students' performance. Adequate planning is required regarding what data is collected in the learning environment and how success is reported to the student (e.g., feedback; success metrics such as a progress bar, satisfaction rating, a score; and/ or motivating achievements such as badges) [3].

3 Pedagogical Strategies for Immersive Learning Environments

This article positions two main use cases of immersive learning environments in online graduate education: (1) they could help improve the experience of the graduate student in general, and (2) they could be used to enhance the teaching and learning process. For example, to improve the student experience, Manchester Metropolitan University used AR instead of printed materials to advertise its program, leading to an innovative, interactive, and immersive experience for students [8].

3.1 Addressing social interaction

Augmented reality (AR) can be integrated into online classrooms using interactive interfaces to enhance interactions between the instructor and students, improve collaborative tasks, and increase student motivation [9], [10]. For instance, AR was implemented in an e-Learning system so that students can be engaged and dropout rates can be reduced [11]. Virtual reality (VR) worlds can also be used to simulate face-to-face interactions by facilitating real-time lectures and collaborative learning activities between online students and their instructors [12], [13].

Avatars, whether cartoon-based or photo realistic-based, can be used within the immersive learning environment to increase the sense of social presence [14-15]. In rolling out VR learning environments featuring a

high-fidelity professor avatar to MSC students [13] reported that it provided similar qualities of education and communication and successfully simulated face-to-face learning.

3.2 Addressing collaboration

Immersive learning environments can be used to increase collaboration in online graduate students synchronously and asynchronously because they can simulate human interaction better than the traditional format of communication between students and instructors [12, 16-17]. Several VR tools (for example VRChat and multiplayer VR games) and AR applications can effectively support collaboration, problem-solving, and providing remote guidance in online learning environments [16-17]. As an example, a mobile device-based AR prototype was found to be an effective educational tool in design education [18].

3.3 Addressing Student Engagement and Focus

VR can be used in online graduate education to improve student engagement, focus, and self-efficacy by walking students through the learning experience and delivering a richer learning experience [6, 19]. Similarly, AR (AR books, AR apps, and so on) can be used to create attractive and motivating content to increase student autonomy and engagement compared to traditional notes and videos [20].

3.4 Enhancing Comprehension and Information Retention

Immersive learning environments can enhance students' motivation for learning and increase long-term memory retention and comprehension among students [21]. Using high-fidelity avatars in VR learning environments led to students scoring 30% higher than those who used web-conferencing services for the same content presented by the same instructor [13].

4 Conclusion

Immersive learning environments can enhance the online graduate education experience by allowing for interpersonal communication and student interaction lacking in traditional online learning environments [13]. VR/AR technologies can be used as a stand-alone teaching and learning tool or supplementary activities in the online learning environment.

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