DOI: https://doi.org/10.3217/978-3-85125-657-4-29

Engage, Immerse, and Innovate: Best Practices in Immersive Teaching

Andreas Dengel[1] and Kristina Bucher[2]

[1] University of Passau andreas.dengel@uni-passau.de
[2] University of Würzburg kristina.bucher@uni-wuerzburg.de

Abstract. Research in terms of immersive learning has made great advancements in recent years. Still, the integration of augmented and virtual reality technologies in the classroom depends on teachers. By comparing two seminars designed for pre-service teacher education, this paper presents evaluated strategies which promote the fostering of competencies in terms of immersive teaching and learning. We propose the best practices engagement by design (practice-oriented teaching), immersion (hands-on experiences in virtual and augmented environments), and innovation (starting the design process from the learning content/research question and then experiment with the new technology).

Keywords: Immersive Teaching, Teacher Education, Educational Virtual Environments, Teaching, Higher Education

1 Immersive Teaching: Using Immersive Technology in the Classroom

When thinking about the integration of immersive technologies in the classroom, teachers have to be considered as one of the crucial factors for its success. Even though teachers are rarely the ones to develop educational virtual environments (EVE), it can be assumed that they have an important role in the process of immersive learning: It is their task to select (considering didactical and methodical design) and supply (integration in the classroom) the immersive educational material that can then be used actively by the learner [1].

Regarding this role of the teacher, the process of immersive teaching can be understood as a set of skills enabling a teacher to evaluate and select existing immersive learning environments with regards to their prospective educational benefits for a given target group. The target group may be heterogeneous in terms of age, previous knowledge, motivation, cognitive skills, etc.

As there are several obstacles for the integration of augmented (AR) and virtual reality (VR) in the classroom, teacher preparation programs on immersive technology adaption are important for fostering such immersive teaching skills [2]. A central question for research on immersive teaching is, therefore: "How can we prepare pre-service teachers for the use of AR and VR in their teaching?" This paper focuses on best-practice-guidelines derived from the comparison of two independently developed immersive teaching seminars for pre-service teachers.

DOI: https://doi.org/10.3217/978-3-85125-657-4-29

2 Lessons Learned from Preparing Pre-Service Teachers for Immersive Teaching

We compared two seminars from the universities Würzburg (AR/VR, 27 students, 19 finished) and Passau (VR, 9 students, 5 finished), Germany. The seminars targeted pre-service teachers and followed a learning by design approach [3]. The students started by gathering experiences with immersive media; they then thought of a suitable research question/content and started developing an immersive EVE prototype, complemented by an evaluation phase with undergraduate students/middle school students. By comparing the results from group-interviews, participant observations, and online evaluations, we summarized three best-practice-guidelines for fostering immersive teaching skills:

- *Engagement by Design*: Students reported a high emotional involvement in designing their own educational experiences [-]. It motivates students to learn more ("practice-oriented") and creates continuing interest in using, developing, and experiencing immersive educational virtual environments ("want to do more"). While also reporting a lot of workload in both seminars, students emphasized how important designing their own environments was.
- *Immersion by Hands-On Experiences*: Using existing EVEs helps to learn about the possibilities, limitations, and obstacles of immersive learning. These experiences determine the acceptance of immersive technology as part of the classroom, and increase motivation ("I had so many things in mind").
- *Innovation by De-Fragmentation*: Starting the design process from a learning content/research question allows students to experiment with the technology while keeping pedagogical/content questions in mind. Connecting pedagogical, technological, and content knowledge in interdisciplinary workgroups may enhance self-efficacy ("I have the feeling I am capable now").

There are a lot more things to consider when creating immersive EVEs; we tried to summarize the main objectives that our approaches had in common. While we are aware of the limitations of the small sample size and the used methods, these guidelines may help researchers and practitioners in designing studies and courses targeting immersive teaching and learning processes.

References

1. Dengel, A., Mägdefrau, J.: Immersive Learning Explored: Subjective and Objective Factors Influencing Learning Outcomes in Immersive Educational Virtual Environments. In: 2018 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE), Wollongong, Australia, 608–615 (2018)
2. Bucher, K., Grafe, S.: Designing Augmented and Virtual Reality Application with Pre-Service Teachers. 10th International Conference on Virtual Worlds and Games for Serious Applications (VS-Games), Würzburg, Germany (2018)
3. Koehler, M.J., Mishra, P., Yaha, K.: Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology, Computers & Education, Vol. 49, Iss. 3, 740–762 (2007)