

## Guest editorial: Virtual reality in teacher education: Innovations, opportunities, and challenges

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**ABSTRACT:** Virtual reality (VR) in teacher education remains a relatively under-researched topic. This special issue contributes to this field of knowledge by presenting 6 papers from various educational settings. These studies ranged from meta-analysis, replication research, to quasi-experimental research. By drawing on empirical data and evidence gathered from participants at different levels, the findings presented in these papers offer valuable insights and have the potential for generalization. In the end of this editorial, we discussed two major observations emerge from the editing process of this special issue.

**Keywords:** Virtual reality, Teacher education, Meta-analysis, Replication research, Quasi-experimental research

### 1. Introduction

The release of Apple Vision Pro is a remarkable step towards the brave new world of the Metaverse (Chen et al., 2023; Wu et al., 2024). The Metaverse is envisaged as the next-generation internet that supports real-time, multisensory, and immersive virtual environments that allow multiple users to interact simultaneously (Peña-Rios & Wu, 2023). To realize this paradigm shift of the internet, the development of various enabling technologies is essential, such as 3D, 5G, blockchain, artificial intelligence, and more.

Among others, virtual reality (VR) has emerged as a crucial technology for creating immersive and interactive experiences within digitally simulated environments (Pegrum & Lan, 2023). This technology has great educational implications for learning and teaching. In fact, over the past decade, educators and teachers have extensively explored the various use of VR from learners' perspectives (Zou et al., 2023). A wide array of affordances has been reported, including immersion, interactivity, authenticity, and motivation (e.g., Lan et al., 2024; Lee et al., 2024). In the meantime, various challenges have been reported when using VR in student learning, such as health issues, psychological factors, and technical difficulties (e.g., Wu et al., 2023).

To maximize the benefits of VR in education, effective pedagogical training and support is also vital for both pre-service and in-service teachers to actively choose, creatively implement, and critically assess the application of VR in their teaching methods (Lan, 2020; Wu et al., 2024). However, compared to student learning, the effective use of VR from teachers' perspectives seems to be less researched or emphasized. As such, this special issue aims to collect international practices and research findings to offer suggestions to teacher educators for preparing pre-service and in-service teachers to make informed judgments about when, where, and how to use technology in their future teaching.

### 2. This special issue

This special issue openly invited contributions from researchers, educators, and teachers to share their thoughts and experiences for future-oriented teacher education. In total, we received 48 submissions from different parts of the world. With several rounds of rigorous external reviews, only 6 papers were accepted to present different aspects.

The first paper "Instructional design guidelines for virtual reality-based teacher training: A meta-analysis" by Li et al. presents a meta-analysis of existing instructional practices of VR and teacher education. They reviewed 58 key papers from 2013 to 2023 based on the NLN Jeffries simulation theory. The review highlights moderating factors in VR teacher training and recommends some guidelines for future VR teacher training, highlighting the role of variety of tasks, the level of immersion and presence, and timely feedback.

The second paper "Re-examining factors in AR/VR teacher training: A replication study" by Kohnke and Fount is a replication study of Buchner and Hoffman's (2022) work. It extends the original study by using non-

parametric Mann–Whitney U tests on the original dataset. The paper suggests that age is a key variable in shaping teachers' acceptance and adoption of VR. Moreover, versatile teacher training tasks should be provided to support teachers in developing deep understanding and sharpening their practices of integrating this new technology into instruction.

The third paper “Combining Immersive Virtual Reality with CLIL and TPR to enhance English as Foreign Language Learners' language acquisition” by Chen and Liu comes from Taiwan. It focuses on the integration of VR, Total Physical Response, and Content and Language Integrated Learning. The study offers practical pedagogical suggestions for teacher educators to consider when training language teachers for constructing vocabulary learning experiences in VR settings.

The next paper “Impact of 360° VR on empathy of pre-service teachers: An experimental study” by Hu et al. is an innovative practice to focus on the exploration of psychological aspect of teachers – empathy. Three training groups were organized: one using immersive VR, one group used 2D videos, while the other used PowerPoint slides. Results suggested the positive effects of VR in fostering empathy among teachers and highlight the role of immersion. They also reported physical discomfort negatively impacted the development of empathy.

The fifth paper “Using web-based simulated classroom to develop pre-service teachers' learning oriented assessment practice” by Wei et al. examines the impact of web-based VR on teachers' self-efficacy in assessment practices. Compared to the use of 3D, immersive VR environments, this study made attempts to use 2D, web-based VR. The findings suggested that this technology, with its less sophisticated technical requirements, can be more accessible and useful for teachers without strong technical backgrounds.

The final paper “An exploration of preservice teachers' use of immersive VR to design English lessons” by Wu and Chun explores pre-service language teachers' use of VR in designing VR teaching experience. Through 8-week explorations, the study provides valuable suggestions for preparing pre-service teachers to integrate VR into their teaching. In particular, it stresses the balance between guidance and learner autonomy in iVR scenarios, fostering a community of inquiry.

### 3. Conclusion

In compiling the current special issue, we have gathered some insights that we are eager to share with our readers for future research purposes.

First, the guest editors carefully selected a single meta-review for inclusion. This decision was grounded in the extensive editing expertise of the four guest editors, who hold editorial positions at several leading journals, such as *Computers & Education*, *Computer Assisted Language Learning*, *IEEE Transactions on Learning Technologies*, *Computers & Education: X Reality*, among others. From our editing experiences, there seems to be a misconception: literature reviews can serve as a shortcut to academic publication, as long as sophisticated analytical software is employed. This perception is particularly prevalent especially with the pressure from today's “publish or perish” culture. However, educational research is never about the use of analytical software, but it should make meaningful contributions to theoretical, pedagogical, or technological development. In addition, based on our observations, doctoral students and novice scholars seem to be fonder of conducting review studies, possibly due to the lack of empirical data from students or teachers. This is, of course, understandable, however, the lack of comprehensive knowledge and an overarching understanding of the research field can limit their understanding of the past, current, and future trajectories of the topics they review. As such, we were exceptionally selective of such papers in this special issue, resulting in only one representative study chosen for our readers. We hope that this paper can serve as a sample for researchers and students to inspire them to conduct high-quality, informative, and comprehensive review studies.

Second, innovative perspectives and methodological approaches are encouraged in technology-enhanced learning studies. In this special issue, the papers made use of diverse theoretical frameworks (e.g., empathy) and methodological techniques (e.g., meta-analysis, replication) to present and interpret their findings. Also, when conducting quasi-experimental research, there has been a trend towards including more than one control group in contrast to a single experimental group who usually focuses on textbook learning. Instead, studies like Hu et al. in this issue compared three distinct learning teaching conditions: VR vs. videos vs. PowerPoint slides. Such comparisons provide deeper insightful, as these instructional conditions are quite common in contemporary classroom teaching, thereby offering more practical implications. We expect that future research will continue to make such valuable contributions.

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Perhaps in the near future, the question for teachers will no longer be whether to use VR, as VR technology may become as normalized as computer and mobile technologies. We hope that this special issue is a starting point to inspire more teacher educators to research the effective ways to incorporate various new technologies, not limited to VR, and update current teacher training programmes to prepare teachers for futuristic teaching (Lee & Wu, 2024).

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