



Simulating Classroom Chaos: The Design of a Social VR Environment for Teacher Education

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Abstract. This design-strategy-paper describes an easily accessible work-in-progress platform for teacher education programs. Classroom disruptions present significant challenges for educators, affecting teaching efficacy and student outcomes. Effective classroom management (CRM) is essential, but practical training exercises are often limited by logistical or organizational constraints. Immersive technologies like virtual reality (VR) offer a promising solution by simulating realistic classroom scenarios in a safe, controlled environment. However, the adoption of VR in teacher training is often hindered by technical or financial barriers. This project is developing an accessible, user-friendly Social VR-based CRM training solution to overcome these challenges. We are designing a VR task focused on managing classroom disruptions, where trainees will interact with virtual pupils in a realistic setting. The scenario will address common disruptions such as off-topic talking, allowing trainees to practice strategies like eye contact, physical proximity, and verbal cues. Meta Quest 3 headsets, paired with Hubs, formerly Mozilla Hubs, will provide an immersive experience. Hubs is an open-source platform that will support cross-device compatibility, making the training accessible on VR headsets, laptops, tablets, and smartphones. This VR-based training will offer a low-threshold, interactive environment that enables teacher trainees to practice and refine their CRM skills. By making CRM training more accessible and engaging, this project aims to align with modern pedagogies, preparing educators to effectively manage classroom disruptions and foster positive learning environments.

Keywords: Classroom Management, Social Virtual Reality, Teacher Education.

1 Introduction

Disruptive behavior in the classroom poses a significant challenge for educators, deeply impacting both students and teachers. It erodes emotional well-being, diminishes learning outcomes, and disrupts the overall efficacy of teaching practices [1, 2]. Addressing this issue requires teachers to develop a robust skill set in classroom management (CRM), a cornerstone of effective pedagogy. CRM involves creating and maintaining order, engaging learners, and fostering an environment of trust, respect, and cooperation. Mastery of these competencies enhances teaching and contributes to cultivating a positive and productive classroom climate. Consequently, CRM remains a key focus in both educational research and teacher training programs [3].

Nonetheless, despite the recognized demand for classroom management training, practical exercises “in the field” are hard to realize due to organizational, ethical and logistical hinderances [3, 4]. Immersive approaches, such as virtual reality (VR), have shown great promise in addressing this need. By simulating realistic classroom scenarios, VR offers trainees a controllable safe space to experiment, build confidence, and develop resilience in managing classroom disruptions.

However, despite its potential, the adoption of such technologies in teacher training needs to be pro-actively pursued [5]. Time constraints and a lack of capacities for advanced training can prevent teachers (trainees) from fully engaging with these innovative approaches. Without solutions that are straightforward and easy to use, the

potential benefits of VR remain out of reach for many aspiring educators. These challenges underscore the pressing need for low-threshold, user-friendly tools tailored to the realities of teacher preparation.

Our project seeks to bridge this gap by developing and implementing a practical solution within the scope of a teacher training seminar. By focusing on accessibility and simplicity, we aim to empower teacher trainees to engage with CRM exercises in a meaningful and immersive way, without being hindered by technical or financial obstacles. Such an approach not only supports the development of essential teaching skills but also aligns with participatory, technology-enhanced pedagogies that prepare educators for the diverse and evolving demands of modern classrooms.

Through the creation of intuitive, VR-based simulations, we aim to provide teacher trainees with a powerful resource to tackle classroom disruptions confidently. This initiative not only contributes to innovative teaching practices but also reinforces the broader mission of equipping educators to navigate the complexities of contemporary education with competence and creativity [6].

2 Related Work

The integration of classroom management (CRM) into the regular curricula of teacher training programs has evolved significantly over the past decades. Although CRM is a core teaching competency [7, 8], it was not always systematically embedded in academic training structures [3]. Recognizing its critical importance, modern teacher education increasingly prioritizes the acquisition of CRM skills, and research interest in this area has grown steadily over time [9].

Despite this progress, many prospective teachers still feel unprepared to meet the practical challenges of managing classrooms effectively [10]. Developing CRM expertise extends beyond declarative knowledge; it requires hands-on, application-oriented learning, as well as situational awareness and confidence in pedagogical decision-making [10].

To meet these needs, authentic, context-rich experiences that simulate real-world teaching scenarios are essential. Situated learning approaches, which immerse future educators in complex, practice-oriented contexts, have proven particularly effective [11]. These methods foster critical diagnostic and reflective skills necessary for navigating diverse and dynamic classroom environments [11].

However, many initial teacher training programs lack opportunities for such practical application, leaving novice educators feeling underprepared, especially when handling disruptive student behavior [12]. To address these gaps, teacher education programs employ various situated learning methods, including text vignettes [13], videotaped role-plays with reflective analysis [14], and video-based formats for self-evaluation or observation of experienced educators [10]. Among these, video-based approaches stand out for their ability to provide structured reflection and bridge the gap between theoretical knowledge and its practical application (e.g., [15-17]).

Beyond traditional methods, virtual reality (VR) is emerging as a transformative tool for CRM training [18]. For instance, Lugin et al. [3] introduced a collaborative VR system featuring a virtual classroom with semi-autonomous student avatars. Trainee teachers, equipped with head-mounted displays (HMDs) and headphones, practiced managing disruptions in immersive settings while instructors monitored and guided sessions via desktop consoles. Similarly, Kugurakova et al. [19] evaluated VR-based CRM scenarios that simulated complex verbal and nonverbal classroom interactions, demonstrating VR's potential to accelerate skill acquisition and enhance conflict resolution and sociolinguistic competencies. Cárdenas et al. [19] developed a Unity-based VR training program organized into four stages – introduction, conflict analysis, group discussion, and feedback – showing reduced trainee anxiety and improved reflective problem-solving skills.

However, existing VR systems often rely on locally installed applications developed with game engines such as Unreal Engine and Unity, requiring tethered HMDs, high-performance hardware, and dedicated setups. These logistical and technical demands limit their accessibility in schools and universities lacking specialized resources. To expand the reach of CRM training, future developments must focus on creating accessible, flexible, and resource-efficient VR simulations that can be seamlessly integrated into teacher training programs.

3 Implementation

The implementation of a classroom management exercise in an easily accessible virtual social virtual reality environment requires several considerations regarding the design of instructional tasks, avatar of teacher training students, the pupil's avatars or agents, and the environmental classroom, as well as regarding the input and output signal cues that is required to interact with the virtual pupils and which need to be implemented in an accessible software architecture.

3.1 Apparatus

Our experiment will use Meta Quest 3 head-mounted displays (HMDs) with spatial audio and 6-degree-of-freedom controllers for gestures. Connectivity will be provided through campus WiFi, ensuring stable access. Observing students will join via laptops, tablets, or smartphones to view the exercise and participate in discussions (see Fig. 1), following a model similar to [19].

We will use Hubs, an open-source social VR platform (formerly Mozilla Hubs), now managed by the Hubs Foundation and hosted on a German subscription-based server. This allows for private modifications, enabling interactive 3D models, voice-based inputs, and head orientation tracking to replace eye-tracking hardware.

The virtual classroom will be accessible via a public URL, making it platform-agnostic for VR headsets, tablets, smartphones, desktops, and laptops, ensuring inclusive participation. This setup combines advanced hardware with a flexible software platform, creating an interactive, immersive training environment that enhances classroom management skills and collaborative learning.

3.2 Instructional Task Design: Scenario

Our instructional task focuses on fundamental classroom management strategies through a practical, realistic scenario. Instead of extreme cases, we selected a common classroom challenge: two students repeatedly disrupting the lesson by speaking off-topic, distracting peers and the teacher. Teacher training students must identify and apply strategies to manage the disruption while maintaining a positive classroom atmosphere. The scenario unfolds within a seminar, guided by brief textual descriptions and verbal triggers (e.g., prompts for students to start an exercise). To keep the focus on core skills, interaction inputs are limited to eye contact (head rotation), movement, ignoring behavior, or issuing verbal calls to order [19]. A flexible behavior tree allows students to repeat activities as needed, either by choice or instructor guidance. This adaptability encourages experimentation, reflection, and iterative learning without a rigid, linear structure.

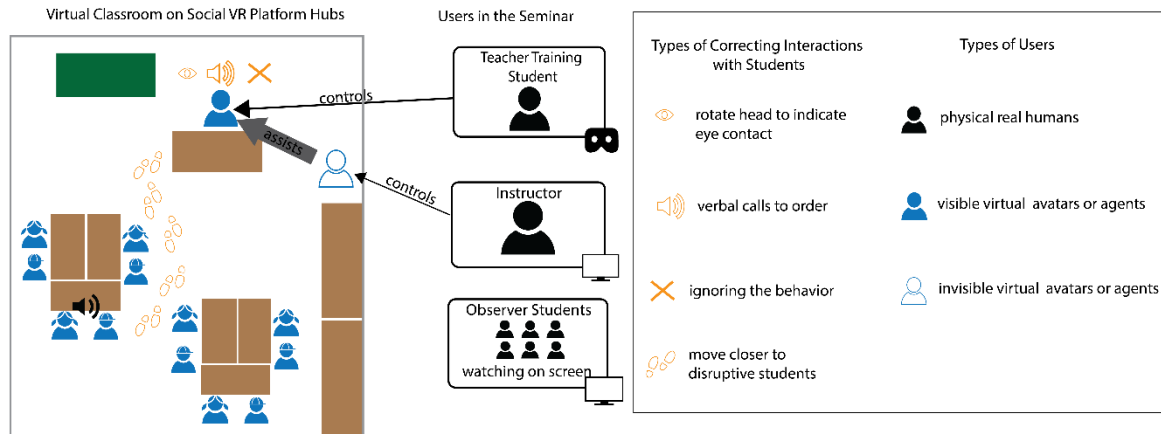


Fig. 1. Scenario Architecture Diagram.

3.3 Avatars: Teacher Training Students and pupils

The avatars in our virtual classroom are designed as low-fidelity 3D models to ensure compatibility across various devices, including VR headsets, smartphones, tablets, and desktops (see Fig.2) using an avatar generator specifically for Hubs¹. Each avatar is clearly distinguishable by role – virtual pupils, teacher training students, the seminar instructor, and other participants—allowing for easy identification within the environment.

To facilitate meaningful interaction, avatars are designed to be easily recognizable as active participants. They can signal their availability through location and orientation and interact with the virtual space by manipulating objects. Avatars are capable of smooth movement and teleportation, and VR-HMD users can use hand models to perform gestures. Head orientation tracking further enhances communication by allowing users to see where others are looking, imitating eye contact to improve engagement. These design features ensure an immersive and realistic environment for teacher training students to practice and refine their classroom management strategies.

¹ Hubs Avatar Maker: <https://mozilla.github.io/hackweek-avatar-maker/> (Accessed: 2025-01-17)

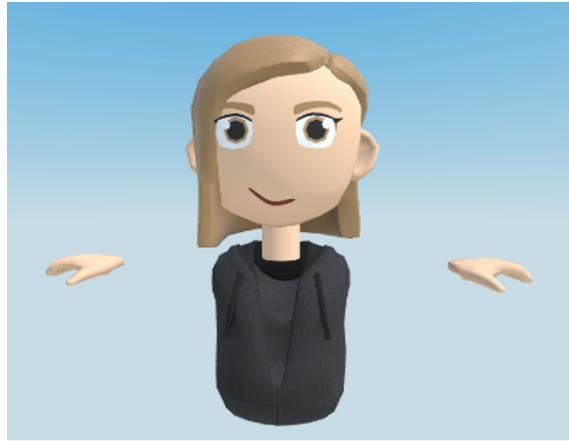


Fig. 2. Exemplary avatar design for pupils.

3.4 Environmental Classroom

We must carefully design the scenario to ensure the surroundings are appropriate for the exercise. Collaborating with a teacher training seminar focused on managing elementary school classroom disruptions requires designing a fitting and plausible environment which is in our case an elementary classroom. This virtual environment must involve flexible table and chair arrangements and separate workstations to meet diverse learning needs, often including features like hearing protection. Elementary classrooms also feature decorative elements like alphabet posters, bookshelves, and tabletop games to create a child-friendly environment. We emphasize a structure with good air circulation, lighting, and flexible furniture to support an engaging learning space [20].

3.5 Future work

In the upcoming semesters of 2025, we will implement our task in a teacher training seminar and evaluate it through a user study, assessing user experience [21], perceived learning outcomes [22, 23], and (social) presence [24] via self-assessment questionnaires and instructor evaluations. Given that both the learning environment and classroom management are fundamentally shaped by social interactions and pedagogical practices—elements that the Social VR learning setting inherently incorporates—this instructor evaluation aims to assess students' self-efficacy beliefs regarding their pedagogical competence in managing classroom situation [25]. To ensure effectiveness, we will test the system in various classroom management scenarios with teacher education students through 2025 and 2026, refining interactions, disruptions, and usability based on participant feedback. Once a stable framework is established, we will expand our work by introducing more fine-grained instructor controls and broader input modalities. Only then will we extend our research to vocational training and higher education, ensuring adaptability before wider deployment. This structured approach will enhance the versatility, accessibility, and impact of immersive VR-based teacher training.

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