

Virtual Reality as a new frontier for professional teacher training: the VRTEACHER application

Kalliopi-Evangelia Stavroulia^{1,2}, Christos Kyrilitsias², Lefteris Ioannou², Giannis Georgiou², Despina Michael-Grigoriou², Andreas Lanitis^{1,2}

¹*CYENS Centre of Excellence*

²*Dept. of Multimedia and Graphic Arts, Cyprus University of Technology*

Corresponding author: k.stavroulia@cyens.org.cy

Keywords: VRTEACHER, Virtual reality, Teacher training

1. Introduction

This paper presents a novel Virtual Reality (VR) training approach for teacher empowerment using a VR training application developed under the VRTEACHER project. The VRTEACHER project was conceived to address the urgent need for innovative approaches to teacher training within the constantly evolving educational landscape, the unprecedented challenges for educators brought by the pandemic worldwide and the lack of hands-on training experiences for teachers. The project aimed to revolutionize teacher education and strengthen the profile of the teaching profession by offering an alternative training paradigm based on VR technology, offering immersive training experiences for educators with virtual scenarios that replicate real-world classroom situations as documented by teachers and education experts through focus groups. Emphasis was given to teachers' empathy-building through the ability to change the user's perspective and experience the same incident both from the eyes of the teacher and from the eyes of students, enabling trainee teachers to empathize and understand their student's viewpoint. Experiencing the scenarios from the student's viewpoint was crucial for the effectiveness of the VR training fostering teacher trainees' emotional connection and understanding increasing their empathy (Hadjipanayi et al. 2024) and compassion (Ventura et al., 2020; Stavroulia & Lanitis, 2023; Wang et al., 2024).

VRTEACHER adds a unique dimension to teacher education, offering a hands-on, experiential training tool that complements theoretical knowledge and classroom practice. By pushing the boundaries of traditional teacher training and leveraging the potential of VR technology, VRTEACHER contributes to the ongoing innovation and advancement of teacher education practices. More information and the application are available on the project's official website <https://www.vrteacher.eu/>.

2. VRTEACHER application

2.1. Technical specifications

The VRTEACHER multilingual application (in English, Greek and Spanish) runs on smartphone VR headsets in conjunction with any Android mobile device with Android version 7.0 (API level 24) or newer and requires 604 MB of device storage. The Android phone should also meet the minimum requirements for VR which mainly include the existence of a gyroscope sensor. The use of smartphone-based VR headsets minimizes the hardware cost, allowing the widespread deployment and use of the application. The application was developed using UNITY (version 2020.3.22).

The main menu of the VRTEACHER application consists of four sub-categories (Figure 12) Scenarios, 2) Instructions, 3) About the VRTEACHER project and 4) Settings. By pressing the “scenarios” tab users are instructed to insert their smartphone in a VR headset so that they can visualize the three scenarios that have been developed.



Figure 1. (i) VRTEACHER application main menu. (ii) Settings tab. (iii) Scenarios tab. (iv) Instructions to place the phone into the VR headset.

2.2 Scenario cases

The VR application offers three scenarios, which are presented in Figure 2. The user can experience each scenario both from the teacher's perspective and the virtual student's perspective (Figure 3: 1-7), gaining a deeper understanding of the problem and the student's viewpoint. Additionally, the inner voice technique was used to refer to teachers' internal thoughts and reflections during the time that the incidents occurred in class to enhance the user's immersive experience (Figure 3: 1). At the end of the scenario a mentor appears providing feedback to the teacher trainee (Figure 3: 8).

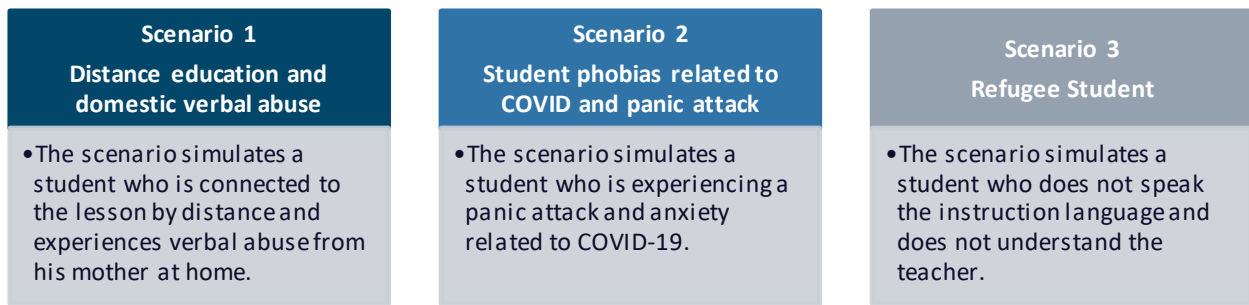


Figure 2. The three scenarios developed under the VRTEACHER project.



Figure 3. (i) Through the eyes of the teacher for all three scenarios and teacher's inner voice. (ii) Student avatar in scenario 1. (iii) Through the eyes of the student in scenario 1, in his room with his mother. (iv) Student avatar in scenario 2. (v) Through the eyes of the student seeing particles of COVID-19 in the class. (vi) Student avatar in scenario 3. (vii) Through the eyes of student refugee. (viii) Avatar of a mentor providing feedback to the trainee.

Interaction within the virtual classroom is gaze-based. Gaze input indicates where the user is focusing, with a cursor indicating the direction of the gaze. Eye gaze input requires minimal effort from the user, as it enables interaction with the virtual world without the need for physical movements or additional hardware. During the VR experience, users are required to use eye-gaze to initiate actions (Figure 4:1) and/or answer multiple-choice questions (Figure 4:2,3) that assess teachers' readiness in appropriately handling various situations depicted in the implemented scenarios.

2.3 VRTEACHER Application Impact

The VRTEACHER application was implemented across the partner countries training more than 300 in-service and pre-service teachers (Stavroulia et al., 2023). The ANOVA results demonstrated that the VR implementation significantly improved participants' attitudes towards remote and blended learning, inclusive education, and cultural intelligence. Metrics were assessed at three points: before implementation, immediately after, and long-term, four weeks post-implementation. The results also demonstrated a statistically significant difference between the three points related to perspective change. Equally important, the results indicated that the VR intervention had a long-lasting impact on the participants, as the positive change in attitude not only persisted over time but continued to improve.

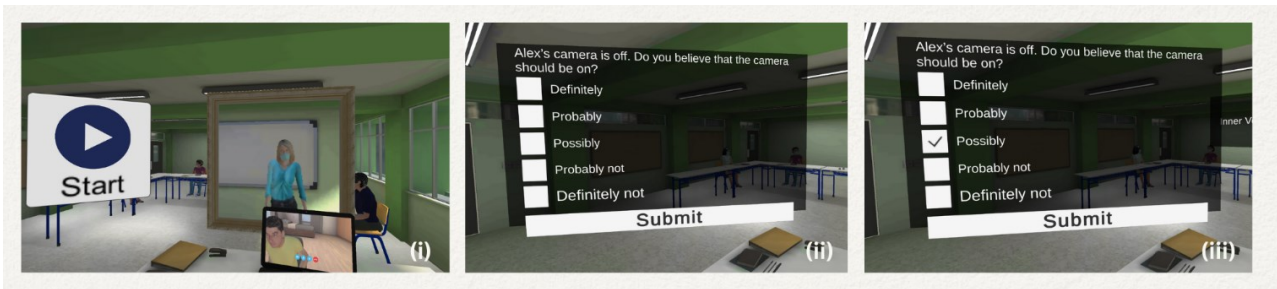


Figure 4. (i) Start button to begin the scenario. (ii) Unanswered question during the scenario. (iii) Selection of answer after looking for some minutes.

3. Conclusions

The VRTEACHER project addressed the need for novel technology-based hands-on training experiences in teacher education contributing to advancing innovative VR-based teaching practices. The VR application was implemented and evaluated providing evidence of its added value as part of teacher training curriculum. The VRTEACHER application is accessible for use, aiming to inspire new initiatives in the field. Furthermore, this work is ongoing, and the team aims to update the application in line with current trends such as Artificial Intelligence (AI) for more dynamic and adaptive experiences that respond to user's behavior and enrich it with new scenarios reflecting real-life in-class incidents experienced by educators.

Acknowledgement

This project was supported by the Erasmus+ programme of the European Union through the project VRTEACHER Virtual Reality-based Training to improvE digitAl Competences of teachERs, Grant Agreement number: 2020-1-CY01-KA226-SCH-082707.

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