TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

**Macroarea di Medicina**
Dipartimento di Biomedicina e Prevenzione
Dottorato di Ricerca in Scienze Infermieristiche e Sanità Pubblica
Coordinatore: Prof. Ercole Vellone

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**Dottorando**: Dott. Andrea Gazzelloni

**Tutor**: Prof. Maria Grazia De Marinis, Prof. Michela Piredda, Dott. Marco Sguanci

**Titolo tesi: USE OF VIRTUAL REALITY IN NURSING EDUCATION**

## ABSTRACT

### Introduction

Nursing simulation is a teaching method that supports and integrates student learning, along with clinical training and formal teaching without overlapping or replacing them. Virtual reality (VR) is one of the most recent technologies applied to nursing simulation. The added value of VR consists precisely in the immersion and in the sense of presence (the feeling of being there) that it can generate, allowing people to learn from the experience they are living as if it were happening in real life. Virtual Reality can create standard, reproducible and controllable environments. This provides an opportunity for nursing students to practice skills and learn clinical procedures in safe, interactive environments with no risk to patients. The objectives of the doctoral work were: 1) to evaluate the effectiveness of the use of 360° videos compared to standard video (2D) in terms of acquisition of knowledge and self-esteem and satisfaction in learning; and 2) to evaluate the effectiveness of using simulation with Immersive Virtual Reality (IVR) compared to standard simulation (low-medium fidelity mannequin) with respect to the acquisition of technical skills in performing a procedure, workload perceived, and to self-esteem and satisfaction in learning.

### Methods

Three studies were conducted in this doctoral project: a scoping review on the 360° video applied to nursing education; a multi-site randomized controlled trial in three different nursing schools in Rome (Italy), to evaluate the effectiveness of the 360-degree video compared with standard video (2D) to improve Cardiopulmonary Resuscitation (CPR) knowledge, satisfaction, and self-confidence in learning in first-year nursing students; a pilot randomized crossover controlled trial conducted with second-year students in one nursing school in Rome (Italy), to to evaluate the effectiveness of simulation with Immersive Virtual Reality (IVR) compared to standard simulation to train in Electrocardiogram (ECG) procedure.

### Results

Scoping review. A comprehensive electronic search of five electronic databases (PubMed, Embase, Web of Science, CINAHL, and Scopus) was conducted from their inception to December 2021. Five studies met the inclusion criteria and were considered in this review. These studies encourage the use of this VR technology, although the difference in terms of knowledge was not statistically significant.

Multi-site randomized controlled trial. Ninety-six students participated and results of Satisfaction and Self-Confidence were statistically significant. The 360-degree videos may have many advantages, especially in nursing education, but further research is necessary to explore their effectiveness in terms of learning outcomes, as well as how to improve their educational potentiality.

Pilot randomized crossover controlled trial. Thirty-one students participated. Skills were higher in the Immersive Virtual Reality Simulation group, but the difference was not statistically significant. Satisfaction was higher in the Standard Mannequin-Simulation group, with a statistically significance difference.

**Conclusions**

Further research is necessary to explore the advantages of the 360° video as learning method in nursing education and to better understand how to evaluate this immersive experience to guarantee the effectiveness in terms of learning outcomes, as well as how to improve their educational potentiality. Finally, further multicenter large-scale trials should evaluate the effectiveness of Immersive Virtual Reality compared to standard simulation, and the impact on learning outcomes of nursing students.

**Keywords**: 360° Video, Virtual Reality, Nursing Students, Education, Training, Electrocardiography.