

# Serious Applications in a First-Person Shooter Style Game in Virtual Reality

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Figure 1: Displacement in the Virtual and Real World

## Abstract

Armed conflicts have become increasingly common in urban environments, often occurring in confined spaces with the presence of many people. In such situations, it is imperative that military personnel are prepared for this reality, where mistakes can cost lives. This study examined the use of Virtual Reality as a support tool in decision-making during Close Quarters Combat. Two virtual environments were used: one for training and another to verify target identification. The study found positive results, which support the use of virtual reality for this purpose.

## CCS Concepts

• **Applied computing** → **Interactive learning environments; Military; Computer-assisted instruction.**;

## Keywords

Serious Games, Virtual Environments, Virtual Reality

## 1 Introduction

Virtual reality is a technology with applications across various fields of knowledge, particularly in military training. For instance, flight simulators have long been established as valuable tools. Such tools allow users to maintain their training levels at a lower cost compared to using an actual aircraft, while also providing greater safety.

Despite its promise, virtual reality does not yet encompass all the skills necessary to maintain a soldier's readiness. However, the cognitive conditioning gained through VR is quite significant, as the mental effort required of a soldier training in VR is not inferior to that demanded in real-world training [2].

### 1.1 Objective

Thus, this study aims to contribute to academia by considering the use of VR focused on frontline combat elements. The primary research objective is to examine Virtual Reality as a support tool in decision-making during modern combat. To achieve this objective, the study investigated the use of virtual reality in preparing military personnel for decision-making and evaluated whether a VR simulation in a combat scenario is effective in training and optimizing military learning for positive target identification, which is crucial for decision-making in urban combat situations.

## 2 Materials and Methods

The research conducted for this study followed a mixed-methods approach, incorporating both qualitative and quantitative data. Different methods were employed to process the data based on its origin. The virtual environments were developed using the Unity platform, and a replica of a long gun was 3D printed to allow the attachment of virtual reality headset controllers.

By analyzing the qualitative and quantitative data together, we obtained answers to the research questions and thus achieved the study's objective, which is to evaluate VR as a support tool in decision-making during modern combat.

The experiment involved 4 instructors and 8 trainees, all male, who volunteered with an average age of 36.5 years for the instructors and 33.75 years for the trainees. The participants were selected from the Special Operations Battalion of the Brazilian Marine Corps, the Tonelero Battalion, a unit specialized in Close Quarters Battle (CQB) within the Marine Corps. Within this target group, the sample consisted of Amphibious Commandos with considerable CQB training experience.

Regarding the ease of using the tool, all the instructors noted that the trainees did not experience difficulties in using it. They indicated that it was easy to conduct evaluations through the tool and that it could be effectively used for learning. Similarly, all the trainees found the equipment easy to use and quickly adapted to the virtual environment.

In terms of cognitive gains, the data showed that the initial virtual environment adequately prepared participants for the evaluation environment. Those who underwent training and were then employed in tasks requiring this type of knowledge performed significantly better than those who did not participate in the simulation.

## 3 Conclusion

With all the data collected, we can analyze the results to answer the research question. Considering the positive feedback across the various aspects studied, both from instructors and trainees, it can be concluded that the simulation of a combat scenario can be effectively used for training purposes.

As the simulation experienced by the volunteers caused only mild discomfort at most, it was confirmed that the intended simulation can be executed safely and comfortably for the participants.

Finally, the study assessed whether VR could prepare military personnel for decision-making. The trainees achieved satisfactory results in this study, similar to those reported in other studies in the literature, such as Varela [3] and Liu [1]. Thus, for the experiment conducted with this specific group, a positive response was confirmed for the research questions, and it was validated that a virtual environment applied to frontline combat elements can provide cognitive benefits and assist in decision-making.

This study presented a small piece of the puzzle that is preparing military personnel for deployment in this new reality. Here, we explored VR as a support tool in decision-making during modern combat, and with the positive results obtained, the research questions were confirmed, and Virtual Reality was validated as a support tool in decision-making in Modern Combat.

However, some limitations prevented a broader scope of the study, such as the availability of VR equipment and the operational schedule of the Battalion. Despite these limitations, the objectives were confirmed, paving the way for future studies, such as exploring the use of VR at the team level

## References

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