Chapter 12

CSI4FS®: A Markerless Augmented Reality Game – A Novel Approach to Crime Scene Investigation Training

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ABSTRACT

This chapter describes the development of a game-based markerless augmented reality smartphone application (CSI4FS®) that complements traditional crime scene investigation training. The intent is to make a strong case for the use of augmented reality in a forensic science training environment. It includes a brief outline of the issue followed by a history of augmented reality in education and training, simulation use in high-risk professions generally and in education specifically, and augmented reality use in crime scene investigation. Both marker-based and markerless technologies are discussed, followed by a description of the augmented reality application and some of the challenges involved in the creation of that application. Overall, the purpose of this chapter is to introduce a potential solution that will help college students learn crime scene investigation techniques more effectively than with the more traditional training methods.

INTRODUCTION

The body just lay there – still and lifeless! There was blood everywhere… but blood spatter never looked like this! It was her third day on the job and there had not been accurate preparation for this. Nothing she learned so far was really useful… because the real crime scene bore almost no resemblance to the training scenarios chosen by her instructor. Every crime scene she had encountered in training was staged within the walls of the same three rooms.
On television, crime scene investigation (CSI) is often portrayed as glamorous and even mysterious to some extent. Television investigators seem to have all manner of equipment and resources at their disposal and recreating the crime scene in a laboratory environment or testing all the collected samples happens within a few minutes or hours. The popularity of such television shows as CSI (aired October, 2000) and NCIS (aired September, 2003) have created what is known as the CSI Effect: the belief that forensic science is more than it really is. The CSI Effect causes problems in the judicial system because juries often have a higher expectation of forensic science than actually exists – which hinders the prosecution, while those same juries simultaneously hold an unrealistic expectation of forensic science’s reliability – which hinders the defense (Schweitzer & Saks, 2007; Weaver, Salamonson, Koch, & Porter, 2012).

While the CSI Effect has been a problem for the legal system, it has certainly been good business for forensic science graduate programs across the U.S. In 2004, the Forensic Science Education Program Accreditation Commission (FEPAC) was formed. In 2005 there was only one FEPAC-accredited master’s degree program in the U.S., but by 2017 there were 19 accredited graduate programs at the master’s level and 26 accredited undergraduate programs (FEPAC, 2017). There is a drawback to this also, though. Students entering forensic science programs expect to use the high-tech equipment that has lured them into this profession having first seen it on television. Where crime scene investigation education and training is concerned, the reality often does not meet their expectations and the staged sets are rarely a reflection of what they encounter in the field.

This chapter will describe the traditional crime scene investigation training practice at a mid-Atlantic academic institution, describe the use of augmented reality in education and training generally and in crime scene investigation specifically, compare and contrast the two main types of augmented reality applications, discuss the use of game-based augmented reality for training, and then discuss the development of a markerless game-based augmented reality smartphone application for crime scene investigation training.

BACKGROUND

In higher education, crime scene investigation training has traditionally taken place within a full-immersion simulation – a house or other facility where staged sets are created by the instructor for that specific purpose. The biggest drawback to this traditional method, however, is that the sets are staged. The trainer creates the specifics; the trainer creates the reality – and scenarios are limited because tight course scheduling means that the instructor can only cover the basics of investigation. The settings are largely static and rarely represent what is truly encountered by investigators. Further, after each training session, the staged sets must then be recreated and reset for the next group – both of which are time-consuming tasks. The question most often not asked is whether this method of training actually helps the student to learn.

To process a crime scene thoroughly, six steps must be taken sequentially in order to preserve evidence suitable for analysis and later probative purposes in court (adapted from Gardner and Bevel, 2009):

1. **Assessing**: Although this is the first step of an investigation, it is continuous and ongoing. First, a perimeter is established to bring the crime scene under control. Often, a second perimeter is established within the first one so that police and other emergency responders who have a purpose at the scene do not arbitrarily enter or damage the scene further. Factors such as the size of the crime
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