Chapter 1.6

Educational Simulations:
Learning from the Past and Ensuring Success in the Future

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ABSTRACT

Learn-by-doing simulations can provide tremendously effective learning. This chapter examines previous and current work in the area of educational simulations and looks ahead toward several potential futures in the field. The chapter includes a number of simulation-based success stories and case studies from past years, along with a discussion of why they worked as well as what could have been done better. It also describes approaches to ensure that a simulation is educationally effective while still being engaging and even entertaining. In addition, the chapter includes a design and development process that can be followed in order to maximize the educational value and usability of a simulation.

INTRODUCTION

Learn-by-doing simulations can provide tremendously effective learning: they allow learners to practice skills in a realistic environment in a safe way, free of real-life consequences after mistakes. They also can be incredibly engaging for learners, providing an immersive environment that can feel like a game in many ways. This method is particularly well-suited for corporate training situations in which the end goal for learners is based on the development of skills rather than simply the acquisition of knowledge, and also has numerous

potential applications in university courses. Additionally, well-designed educational simulations allow learners to experiment in a simulated world in ways that real life would not allow.

In this chapter, we will examine previous and current work in the learn-by-doing simulations area and look ahead toward several potential futures in the field. The chapter will include a number of simulation-based success stories and case studies from past years, along with a discussion of why they worked as well as what could have been done better. We will also describe approaches to ensure that a simulation is educationally effective, particularly by providing coaching and feedback mechanisms, while still being engaging and even entertaining. In addition, the chapter will include a design and development process that can be followed in order to maximize the educational value and usability of a simulation.

SIMULATIONS VS. GAMES

Over the past several years, there has been significant interest in the use of games and gaming technologies for learning purposes. Not only could games provide new and exciting ways to learn, but they would suit the younger generation of "Digital Natives" (coined by Prensky, 2001), who are comfortable with technology and tend to enjoy and expect a fast-paced, interactive experience.

One question that has arisen is what constitutes a game rather than a simulation. Prensky (2001) notes that "simulations are not, in and of themselves, games—they need…fun, play, rules, a goal, winning, competition, etc.", and that simulations may be boring and non-gamelike. There has been strong interest through the decade from corporations, looking to provide interesting training that resonates with their learners—and turning to game-based models.

Many of the attempts at game-based learning in the corporate world, however, have focused on the "game" elements rather than the learning.

For example, some companies have implemented training in the form of "Jeopardy!"-style games, where learners must answer questions (or, more technically, provide questions in "Jeopardy!" format). This type of learning is indeed a game, and can often be fun for the learner. But what is often lost in this style of training is their effectiveness when it comes to improving learners' performance on the job, which, after all, is the goal of the training. Many "educational games" are fun and lend themselves well to the memorization of facts—but fact memorization does not necessarily transfer well to improved job performance. Learn-by-doing simulations, which will be the focus of the remainder of this chapter, have the ability to incorporate elements that make games fun (including those mentioned by Prensky above), but in a realistic environment in which the learners' experiences will transfer to their real-life jobs.

EARLY HISTORY OF LEARNING SIMULATIONS

Research on the idea of learning by doing, rather than by memorizing, is certainly not new; it dates back at least to the work of John Dewey (1899), and more recent work on situated learning by Brown, Collins, and Duguid (1989) and Lave and Wenger (1991) has further demonstrated the effectiveness of learning-by-doing methods. Computer-based simulations of various types have been developed for many years. Yet the idea of educational learn-by-doing simulations—simulations designed based on learning theory—became popular much later, in the late 1980s, when Roger Schank formed the Institute for the Learning Sciences (ILS) at Northwestern University in Evanston, Illinois. ILS was formed with funding from Ameritech, IBM, and Andersen Consulting (now Accenture), among others, and brought together researchers from the areas of education, computer science (particularly artificial intelligence), and cognitive

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