Chapter 30
The Use of Discrete-Event Simulation for Business Education:
Learning by Observing, Simulating and Improving

Marijana Zekić-Sušac
https://orcid.org/0000-0001-6322-1917
University of Osijek, Croatia

Adela Has
University of Osijek, Croatia

Marinela Knežević
University of Osijek, Croatia

ABSTRACT

A new teaching approach is presented which integrates observational learning through field teaching of business processes and simulation modeling in order to increase students' learning outcomes and acceptance of computer simulation technology. The teaching method, called LOSI (learning by observing, simulating, and improving), was conducted at a Croatian high education institution. The efficiency of the LOSI approach was investigated by conducting a survey based on the technology acceptance model (TAM). The indicators of ease of use, usefulness, and enjoyment in participating in LOSI were collected along with students' grades and their intention to use this technology in future work and education. The inter-relations among variables were analyzed by statistical tests. The results revealed that students find LOSI easy to use, useful in achieving learning outcomes, and highly enjoyable, while the ease of use and enjoyment is positively associated to usefulness (i.e., learning outcomes).

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INTRODUCTION

Computer simulation modeling is included in university curricula worldwide due to its many benefits. Qian (2016) observes that computer simulations in higher education include three main components: technical affordances, learning opportunities, and learning outcomes. Simulations improve students' analytical thinking ability, problem solving, and creativity (Jadrić et al., 2014). However, using computer simulation tools in business classes can be problematic if the students do not have enough prior knowledge of the business processes they must simulate. This chapter presents a new teaching approach that integrates observational learning through field teaching and simulation tools at a Croatian institution of higher education, to increase students' acceptance of computer-simulation technology and learning outcomes. Called LOSI (Learning by Observing, Simulating, and Improving), the approach was implemented with real business processes. At the beginning of the course, students were taken to field teaching in three different companies where the company managers introduced them to the business processes on site: (1) a natural-gas-distribution company, (2) a food-production factory (bakery products), and (3) a winery. The students were able to see the processes, ask questions, take notes on the process entities, duration, dynamics, and costs, and even try to assist in some processes. After the field teaching, their assignment was to create simulation models of the business processes they had witnessed by using one Arena Simulation tool. In the final stage of the LOSI approach, the students were asked to propose improvements to the business processes they had modeled. At the end of the course, survey was conducted to gather information on students' intentions to use this technology in the future. The chapter provides an overview of previous research in the area of computer-simulation tools and Technology Acceptance Model (TAM) theory used in this research, followed by the methodology description, results, and discussion of benefits and limitations of the suggested teaching method for business schools.

BACKGROUND: THEORY AND PREVIOUS RESEARCH

All simulation models are simplifications of reality (Zeigler, 1976). According to Greasley (2003), simulation provides a way of experimenting with a model of an organizational system in the attempt to understand its behavior under several scenarios. Borshchev and Filippov (2004) defined the simulation model as a set of rules that describe how the system being modeled will change in the future, given its present state. Van der Aalst (2010) described the computer simulations as attempts to imitate real life or hypothetical behavior on a computer, in order to explore how to improve processes or systems and to predict their performance under different circumstances.

Simulation models are based on mathematical models that can be divided into static and dynamic simulation models (Greasley, 2017). Static simulation models are the representation of the system at a certain time, while dynamic simulation models represent system changes over time (Law & Kelton, 1991). The dynamic simulation model can be divided into continuous and discrete simulation model types. In this chapter, the discrete simulation is used to model a system that can be represented by a series of events (Greasley, 2017). According to Law and Kelton (1991), discrete-event simulation refers to modeling of a system as it evolves over time by a representation in which the state variables change instantaneously at separate points in time. Borshchev and Filippov (2004) define discrete-event modeling as the approach based on the concept of entities, resources, and block charts describing entity flow and resource sharing. The basic elements of discrete simulations are entity, event, activity, and process.