Chapter 2.3

Model–Facilitated Learning Environments:
The Pedagogy of the Design

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ABSTRACT

The purpose of this chapter is to discuss how instruction, technology, and models converge to create online model-facilitated learning environments. These instructional environments are designed in such a manner that the interaction with the model on the computer network is essential to the learning experience. The idea is to use these models to maximize the pedagogical power that helps students construct conceptual mental representations that lead to a greater degree of retention and overall recall of information. How students will act and learn in a particular environment depends on how the instructional designer creates the environment that maximizes their learning potential, considering the interrelationships between the learning experience, the technology, cognition, and other related issues of the learner.

CHAPTER OBJECTIVES

The reader will be able to:

- Discuss models
- Describe online model-facilitated learning
- Find evidence that supports decisions to design online model-facilitated learning experiences
- Define complex systems and their association with online model-facilitated learning
- Understand the role of collaboration in the design of online model-facilitated learning

- Consider specific issues and challenges in designing online model-facilitated learning experiences

INTRODUCTION

You are, once again, preparing your lesson plans for a fall semester online science class. For the past two years, your students have expressed problems learning certain scientific principles, and their opinions have been substantiated in their overall test scores. You are trying to decide how to revise your instruction to teach some of the more complex scientific concepts. To your credit, you are aware of the challenge and are willing to consider alternative instructional methods. You become curious about *model-facilitated learning* after reading Hestenes (1987, 2006) describe a decade of successes using modeling in physics, chemistry, and physical science classrooms. In addition, today's powerful computers allow you to go beyond traditional methods of instruction by breaking down the limitations and constraints of conventional methods of teaching and assessment. They give you the capability to use electronic applications and processes to deliver the content, and situate learners in a domain of information and a set of circumstances that maximize the cognitive potential of learners. By creating these online learning environments, you can give the students the opportunity to use computer-based models and simulations to explore, and better comprehend and communicate complex ideas (Maier & Gröβler, 2000). In an extensive review of the literature to examine computer-mediated communication in educational applications, Luppicini (2006) reported that learners in online courses did just as well as face-to-face courses, therefore, it seemed a favorable alternative.

Online model-facilitated learning has its roots in the learning sciences, an interdisciplinary field of study that focuses on building innovative learning environments that incorporate multimedia and computer-based technology. Therefore, we define online model-facilitated learning as an instructional experience whereby the instructional materials and resources are managed and run on a computer system. The system is connected by a network of devices that are used and manipulated by the students to support and enhance their participation in the learning experience. Students are placed in experiences that allow them to learn with and from other students in a system that uses a model. The model is the artifact structurally designed and created to represent or to demonstrate a theoretical construct of a system or some chosen phenomenon. The instruction is designed in such a manner that the interaction with the model on the computer network is essential to the learning experience. The instructors and students may or may not be geographically separated.

The intent of this chapter is to discuss how instruction, technology, and models converge to create online model-facilitated learning environments, and discuss the pedagogical structures within which they operate. More specific objectives for the chapter are:

a. Define models and their function in online model-facilitated learning
b. Develop a theoretical platform and related principles as these apply to online model-facilitated learning
c. Apply pedagogical principles to teaching and assessment in online model-facilitated learning

MODELS

Models are instructional tools that teachers can use to enhance the human cognitive power (Kozma, 1987) and enhance higher order thinking as they "function as intellectual partners with the learner" (Jonassen, 1996, p. 9). They are used to provide a learning situation that is more contextually bound than most conventional instructional approaches

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