Chapter 5
Knowledge Spaces for Online Discovery Learning

Roger W. McHaney
Kansas State University, USA

ABSTRACT

Constructivist learning environments have been enhanced with emerging digital infrastructures, particularly those based on Internet and Web 2.0 technologies. In this chapter, the impact of these technologies on a constructivist-rooted pedagogy known as discovery learning is discussed in detail. Specifically, the use of knowledge spaces for online discovery learning is explored within the context of case-based learning, incidental learning, learning by exploring/conversing, learning by reflection, and simulation-based learning. This chapter first provides a theoretical rationale for enhancing these approaches and then describes several low cost and free tools that can be used in each of the five areas. Technology implementation and practitioner-oriented examples are provided for each with a particular emphasis on Web 2.0 applications in higher education venues.

INTRODUCTION

Emerging digital infrastructures, particularly those based on Internet and Web 2.0 technologies, have enabled significant advancements in constructivist learning environments. Students and teachers are finding numerous low cost and free tools suited to the construction of meaningful digital artifacts embodying the idea that reality is manifest in human thought. According to constructivist views, each new concept is mediated by previous constructions of reality. Human cognitive development, therefore, is a continually adaptive process of assimilation, accommodation, and correction (Piaget, 1972). Additionally, a social element can be added to constructivism suggesting socialization plays an important role in human cognitive development. This dialectical learning process shapes technology which in turn influences human interaction and enhances understanding (Bijker, 1995). In other words, humans change in response to their use of technology, and technology changes in response to human use (Lemke, 1993). A mutually beneficial ecosystem results in which knowledge is developed, shared, and enhanced. The conjoined processes of teaching and learning are integral elements in this construction (Ryder, 2009).

DOI: 10.4018/978-1-61350-320-1.ch005

Copyright © 2012, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

Whereas learning theory is a belief that knowledge is assimilated according to particular mechanisms, pedagogy refers to strategies of instruction and teaching methods useful in implementation of learning, generally approached from the perspective of the teacher. Often this means developing a style of instruction to support student learning. Learning theories do not offer descriptions of teaching nor do they provide instructional approaches for classroom use. Instead they are philosophical approaches that enable and facilitate learning. Practical use of learning theories can be manifest through pedagogies. Several of which are consistent with constructivist learning theory. Among these constructivist-rooted pedagogical approaches are team learning, service learning, experiential learning, and discovery learning.

This chapter specifically explores the constructivist-rooted pedagogy, discovery learning, when applied to knowledge spaces. First, overviews of constructivism and discovery learning concepts are provided. Next, examples of how knowledge spaces enhance discovery learning are explored in five topical areas often associated with this pedagogy. Among these areas are: case-based learning, incidental learning, learning by exploring/conversing, learning by reflection and simulation-based learning. In addition, the first topical area, case-based learning, is used to illustrate a number of Web 2.0 tools that enable wide-scale and inexpensive deployment of knowledge spaces in the emerging and increasingly digital learning environments found in institutions of higher education. Other tools and techniques are described in the remaining four topical areas. Finally, the concepts presented in this chapter are discussed and summarized.

CONSTRUCTIVISM CONCEPTS

The conceptual foundations of constructivism were influenced heavily by elements many theorists believed were missing from other learning theories. For instance, prior to constructivism, behaviorism, rooted in work by Pavlov, Skinner, and others suggested learning could be measured by behavioral change. Behaviorists viewed learning as a concept which could not be measured directly. Therefore, they believed a surrogate, instantiated as *behavioral change,* had to be measured instead. They posited that behavioral change was shaped by (1) the environment, (2) how close in time two events occur, and (3) reinforcement (either positive or negative). Behaviorists suggested that if a process influences behavior in a meaningful, long term way, then it was reasonable to assume learning had occurred.

The concept of behaviorism spawned a number of pedagogies. For instance, the idea of testing and giving grades is a form of behavioral reinforcement. Exam scores are viewed as measurable surrogates for learning. Instructivism (or direct instruction) is a common representation of behaviorism in education (Kim & Axelrod, 2005). Instructivist learning theory suggests knowledge exists outside the learner and is taught to the student by a teacher. Instructivism and other forms of behaviorism are generally teacher-centered. The student passively receives information from an authority.

Learning theory became the subject of numerous studies and several scholars suggested behaviorism did not adequately explain the process of learning. Among them, Bode (1929), believed behaviorism oversimplified learning. His ideas centered on cognitive changes internal to the individual and relied less on overt behavior (Bode, 1929). His research resulted in a learning theory called cognitivism. Bode's ideas drew on his era's understanding of the brain in the following ways: (1) the brain comprises an active memory system that organizes and processes information, and (2) learning is influenced by prior knowledge. Bode believed learning was far more than behavioral change and had a brain-level physical component. Cognitivists suggest that short term information stored in the brain was transferred into long term

21 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/knowledge-spaces-online-discovery-learning/61300

Related Content

SEAMAN: A Visual Language Based Tool for E-learning Processes
Gennaro Costagliola, Filomena Ferrucci, Giuseppe Poleseand Giuseppe Scanniello (2009). *Strategic Applications of Distance Learning Technologies (pp. 147-164).*
www.irma-international.org/chapter/seaman-visual-language-based-tool/29727

The Role of Multi-Agent Social Networking Systems in Ubiquitous Education: Enhancing Peer-Supported Reflective Learning
Jonathan Bishop (2010). *Multiplatform E-Learning Systems and Technologies: Mobile Devices for Ubiquitous ICT-Based Education (pp. 72-88).*
www.irma-international.org/chapter/role-multi-agent-social-networking/36073

LessonSketch: An Environment for Teachers to Examine Mathematical Practice and Learn about its Standards
Patricio Herbst, Wendy Aaronand Vu Minh Chieu (2013). *Common Core Mathematics Standards and Implementing Digital Technologies (pp. 281-294).*
www.irma-international.org/chapter/lessonsketch-environment-teachers-examine-mathematical/77489

Introducing Concepts
Jon Dron (2007). *Control and Constraint in E-Learning: Choosing When to Choose (pp. 1-17).*
www.irma-international.org/chapter/introducing-concepts/7144

Using Transformative Pedagogy to Facilitate Personal Growth and Development in Web-Based Service-Learning Courses
Holly J. McCrackenand Kathy L. Guthrie (2011). *Handbook of Research on Transformative Online Education and Liberation: Models for Social Equality (pp. 273-291).*
www.irma-international.org/chapter/using-transformative-pedagogy-facilitate-personal/48875