

Chapter V

Perspectives on a Visual-Map-Based Electronic Portfolio System

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ABSTRACT

This chapter introduces portfolio system design perspectives that incorporate concept mapping and the map-based user interface. It also presents a prototype of a portfolio system that has been developed based on the discussed perspectives, along with its capacities and the lessons learned in the design and pilot-testing processes. The author argues that a concept map-based design can enhance a portfolio system, and a concept map as a visual aid can be an efficient user interface for students to better organize, present, archive, and retrieve multimedia contents. This chapter will help educators understand the benefits of incorporating the principles of concept mapping in the design of portfolio systems, and how the system capacities may support constructivist learning environments and qualitative assessment strategies linked to curriculum standards.

INTRODUCTION

Advantages of adopting portfolio-based learning and assessment have been reported by researchers (Cole, Ryan, & Kirk, 1995; Frey, 1995; Kim, 2004; Lehman & Richardson, 2003; Russell & Butcher, 1999) and acknowledged enough by accreditation agencies (e.g., NCATE) to consider the criterion-based portfolio assessment as one of standard assessment methods. While portfolios are being

adopted in various educational settings, the rapid advancement of digital and communication technologies are making it possible for the innovative designs, implementations, and applications of portfolios and portfolio systems. Two emerging areas of educational research studies and investigation attempts that are supporting, if not shaping, today's evolution of portfolio systems are: (1) collaborative learning and qualitative assessment through concept-mapping, and (2) interactive visual interface-based

multimedia storage and information retrieval. These two areas are particularly relevant and important to portfolio system designs, because concept mapping through collaboration may fit nicely into the role of promoting and supporting constructivist learning while enabling both formative and summative evaluations of students' progressive development processes, competencies, and the integrity of the purposefully organized portfolios.

The interactive visual interface aspect of concept map approaches are also relevant in the portfolio design discussions because the visual interface may assist the metacognition processes of creating, collecting, organizing, distributing, sharing, and archiving learning objects and student works of the digital age.

In regards to the terms used in the discussion, one can expect to find numerous terms such as "knowledge map," "mind map," "semantic map," "cognitive map," "Web map," "hyper map," along with "concept map" in various studies, and they are often interchangeably used and in some cases they mean different things. In this chapter when the term "visual map" appears, it means more of a freestyle graphical representation over the Web, which does not strictly require a proposition or semantic path, but does incorporate various multimedia components.

Assessment and Cognitive Development with Concept Mapping

The cognitive structure assessment through concept mapping has been considered as one of valuable qualitative assessment methods (Biggs, 1999; Kinchin, 2000) and an emerging pedagogy linked to the constructivist view of learning (Kinchin, 1998; Marshall, Zhang, Shen, Fox, & Cassel, 2003; Novak, 1998; Shen, Richardson, & Fox, 2003). The last several decades of

research studies support that there are notable advantages of adopting concept mapping activity in various educational settings. As an assessment technique, exploring students' cognitive structure using concept maps can be an important part of pedagogy when evaluating student learning (Tsai & Huang, 2002), because the assessment of the cognitive structure can make explicit the thoughts and understandings, or even misconceptions and biased beliefs, of the student (Kinchin, 1998) as if conducting in-depth individual interviews (Edwards & Fraser, 1983).

As a metacognitive strategy for learners, elaborating cognitive structures can facilitate conceptual development and conceptual change over time (Tsai & Huang, 2002). This is due to the fact that "identifying" new meanings or relationships that they may not have recognized or grasped consciously before explicitly constructing the maps can lead to progressive conceptual development (Novak & Gowin, 1984). The guided concept mapping process plays an important role in facilitating constant and progressive conceptual development over time by students' repetitive comparisons and analyses of their own cognitive structures at multiple stages (Freeman & Urbaczewski, 2002). In the Vygotskian view, this process may help identify the dimensions of a student's zone of proximal development (Brown & Ferrara, 1985).

Concept Map as Visual Interface

The graphical representation of concept maps serves not only as an effective visual aid to learning processes (Nuutinen & Sutinen, 2003), but also as an efficient user interface to manipulate multimedia materials. For example, a concept map-based visual interface leads to higher accuracy in search performance than a typical Web page-based browser (Carnot, Dunn,

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