The Construction of a Web-Based Learning Platform from the Perspective of Computer Support for Collaborative Design

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ABSTRACT

The purpose of this study is to construct a web-based Computer Support for Collaborative Design (CSCD) learning platform based on theories related to a constructivist learning environment model, mind mapping and computer-supported collaborative learning. The platform conforms to the needs of design students and provides effective tools for interaction and collaborative learning by integrating mind-mapping tools into a learning environment that utilizes CSCD, a computer-assisted support system that can support and enhance group collaboration. The establishment of the CSCD learning platform represents a significant advance beyond the fixed functions and existing models of current online learning platforms and is the only learning platform in the world that focuses on learners in design departments. The platform offers outstanding user-friendly functions and innovative technology. In terms of funding, technical ability, human resources, organizational strategies, and risk analysis and evaluations, the learning platform is also worthy of expansion and implementation.

Keywords: Computer Support for Collaborative Design (CSCD), Computer Support for Collaborative Learning, Design Education, Mind Mapping, Web-Based Learning Platform

INTRODUCTION

The advancement of information media and the convenience of the Internet have fostered the growth of web-based instruction, interactive functions, and resources that allow learners to interact, learn, and discuss without time or geographic constraints. In design practice, the integration of computer technology has allowed designers to consistently and innovatively use design approaches that were previously possible only through the use of traditional tools or simulated hand-made physical objects; furthermore, computer technology has improved the ways in which humans communicate (Hsu, 2010a, 2010b; Phelan, 2006). Hence, web-based instruction is essential for design education.

However, because network-based teaching has been implemented so quickly, design departments have fallen short in comparison with other departments. The reasons for this deficit include the many unique features of design...
education, such as difficulties with transferring design materials and works into digital formats (Chen & You, 2008; Chou, Yang, & Huang, 2010; Hsu & Yen, 2006; Sun & Yen, 2009). Furthermore, the current functions of general web-based learning platforms are insufficient for teaching design, thus slowing the progress of web-based design instruction (Kalay, 2006). Given the special knowledge and techniques required for design work, design students possess unique learning styles and specialties, and web-based design courses need to integrate related knowledge and coordinate professionals from different fields during the design process. For these reasons, the establishment of an individualized and adaptive web-based instructional platform that can enhance the effectiveness of design education remains a significant issue (Chen & You, 2008).

Creative thinking is one of the most valued abilities in business and academic circles (Liang, Hsu, Liu, & Lee, 2011; Wu, 2010; Wu, Chang, & Chen, 2012). Design students are highly sensitive to graphics and colors, and they are skilled at using visual-thinking models and images related to creative thinking methods to cultivate their creativity (Goldschmidt, 2010; Jefferies, 2012; University Campus Suffolk, 2010). Mind mapping is a learning method that uses graphic techniques to develop the potential of the left and right hemispheres of the human brain. The design concept of mind mapping is associated with radiant thinking, a graphic type of organizational skill that incorporates graphics, colors, spaces, and imagination and effectively utilizes a whole-brain approach. The use of both graphics and text, in turn, enhances creativity, thereby completing the associative process of brainstorming (Hsu, Chang, & Hsieh, 2008; Pan, 2006; Wang, Lee, & Chu, 2010). With advances in computer technology, computer-based mind mapping allows designers to create new concepts by freely linking concepts and integrating graphics, text, voice, video, and other media through methods related to spatial and visual organization.

A designer must possess visual thinking capabilities, and mind mapping is a learning tool that employs graphic, visual, and spatial thinking. When applied to the creative thinking process in the early stages of a design, this tool may enhance a designer’s creative thinking ability. To establish a web-based instructional platform that meets the user’s needs and enhances learning effectiveness, the researcher has proposed the CSCD platform, a design model based on design teachers’ and students’ needs for web-based instructional platform functions and learning tools. This model was developed by considering previous research (Yen & Hsu, 2007) using the analytic hierarchy process (AHP) and by using learning theory as the basis for integrating and analyzing the design of the constructivist learning environment model, the Blackboard platform, the National Sun Yat-Sen Cyber University platform, and technology companies’ e-learning tools for design. After this analysis, the researcher proposed the Computer Support for Collaborative Design (CSCD) platform design model based on the design department teachers’ and students’ needs for web-based instruction platform functions and learning tools. Subsequently, the technical capabilities of many technology experts were integrated to establish a CSCD platform prototype, and modifications were conducted based on expert validity and user tests. After the CSCD platform was completed, the experts and users assessed its usability and the overall design results through formative evaluations. The evaluation results show that the experts and users’ feedback was very positive; furthermore, they reported that the platform possessed strengths that general online learning platforms lacked and that its completion marked the beginning of customized web-based learning platforms. The platform combines several web-based technologies and teaching resources, and it displays works using multimedia graphics and animation with user-friendly and image-style characteristics that are useful for learners with imaging expertise.
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