

FACILITATING LEARNING OF CMAPTOOLS SOFTWARE USING A LEARNING OBJECT

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Abstract. As the use of concept maps becomes more prevalent in educational programs, instructors begin to explore ways to utilize them more effectively to facilitate student learning. However, when initially introduced to concept map tools users have not always had a positive experience because concept map strategies may require users to organize information in a way that is outside their comfort zone or they may feel uneasy with the use of technology tools. Concept map tools are software programs used to facilitate manipulation of concept maps. Concept map strategies are used to develop a concept map. The purpose of this paper is to present the development process used for creating a CmapTools learning object, how this learning object can be used as an instructional aid to learn the CmapTools software, and implications for student use of the CmapTools Software.

1 Introduction

As the use of concept maps becomes more prevalent in educational programs, instructors begin to explore ways to utilize them more effectively to facilitate student learning. Concept maps have been used for a variety of purposes: to develop an understanding of a body of knowledge; to explore new information and relationships; to access prior knowledge; to gather new knowledge and information; to share knowledge and information generated; to design structures or processes such as written documents, web sites, web search, and multimedia presentations; to analyze concepts, theories, and research; and to problem solve options (Saskatoon Public School Division, 2004).

However, when initially introduced to concept map tools, concept map users have not always had a positive experience because concept map strategies may require users to organize information in a way that is outside their comfort zone or they may feel uneasy with the use of technology tools. Concept map tools are software programs used to facilitate manipulation of concept maps. Concept map strategies are used to develop a concept map. For example, concept maps have nodes or cells that contain a concept, item or question, and links. The links are labeled and denote direction with an arrow symbol. The labeled links describe the relationship between the nodes. The arrow denotes the direction of the relationship and reads like a sentence (Saskatoon Public School Division, 2004). The steps for creating a concept map can be cumbersome at first, but become easier as more concept maps are created by users.

Instructional aids that assist students in overcoming barriers related to learning how to create concept maps can help facilitate student learning of concept map tools and strategies. Therefore, this paper presents the development process used for creating a CmapTools learning object, how this learning object can be used as an instructional aid to learn the CmapTools (Cañas et al., 2004) software, and implications for student use of the CmapTools Software. A learning object in the context of this paper is defined as a digital unit of information that is reusable and retrievable for educational purposes. It is important to note that this paper describes the process used for the creation and implementation of learning objects without mentioning the inclusion of metadata, which makes the learning objects interoperable in different systems. Interoperability increases the usefulness of the learning object by making it more platform independent. Adding metadata to the CmapTools learning object is possible; however, due to the limited software and time to incorporate metadata in the learning object design, this feature is not used in the deployment of this version of the learning object.

2 Creating a CmapTools Learning Object: Development Process

The learning object development process involved a series of tasks, ranging from content outline to the deployment of the learning object. A variety of software programs were used to create the learning object: Microsoft PowerPoint®, Microsoft Word®, Macromedia Captivate®, and Camtasia®.

The design model used to develop the learning objects was based partially on elements of the learning object development process reported in the Funding for Post Secondary Education (FIPSE) Grant, “An Investigation of the Pedagogical and Economic Effectiveness of Sharable Content Objects, Using Standards, in Online Instruction” (Meachen, Olgren, & Ploetz, 2004). It involved the following phases:

1. Content Outline Phase
2. Storyboard Phase
3. Rapid Prototype Phase
4. Testing Phase
5. Deployment Phase

2.1 Content Outline Phase

During this phase, a content outline is created. This outline serves as a framework for the content development. Once the outline is created, the designer receives feedback from a reviewer with suggestions on how to reduce, expand, modify, or enhance the learning object content.

2.2 Storyboard Phase

During this phase, the designer develops a storyboard for the learning object. The storyboard includes a set of specifications detailing what happens on each screen of the learning object. Text, audio, video, graphics, animations, and interactions or exercises are described in detail. The storyboard simulates the components (i.e., learning activities and assessments) of the learning object carefully. The storyboard method is helpful in providing visualization, sequencing, gap identification (Driscoll, 2002), and context of the learning event. The storyboard contains text and graphics to describe the learning event. Each screen of the learning object is explained in depth. The following screens are set as standard:

Screen One: Learning Objectives, Prerequisite Knowledge, and Estimated Time to Complete

Screen Two: Introduction

Screen Three-Etc.: Presentation of content and practice of knowledge

Last Screen: Summary

The completed storyboard is evaluated by reviewers for their intent of design, clarity of information, and duration of the learning object being represented.

2.3 Rapid Prototype Phase

Once the storyboard is completed and feedback received, the designer develops the learning object rapid prototype. A rapid prototype is a learning object quickly created with enough functionality to evaluate its effectiveness. In this phase, the designer uses the actual media, graphics, animations, video, audio, and text to communicate the authentic learning object. Then the rapid prototype is evaluated by a reviewer using an online survey instrument. The elements in the survey instrument include: design, content, and learning outcomes in relation to knowledge gains and applications.

During the Rapid Prototype Phase reviewers quickly identify problems with the learning object in terms of precision of information, personal perceptions about the learning object, cognitive design, and media interactivity. This feedback allows the designer to identify where revisions are necessary; it shifts the focus from general design considerations to specific elements and highlights the need for the designer to plan interactive activities for the user more effectively.

2.4 Testing Phase

Once the prototype evaluation is completed, the designer revises the learning object to reflect the changes that are identified. It is during this phase that close attention is given to the effectiveness (design, sequence, interactivity), efficiency (timing), and appeal (visual attractiveness, professionalism) of the learning object (Reigeluth, 1999). The effectiveness of the learning object is based on the design of the learning object components, learning events

sequence, and use of interactive and assessment activities. Efficiency of the learning object depends on the run time of the learning object. Learning objects that require too much time are determined to be at risk of losing the interest of the user. Learning objects that are visually attractive and show professionalism are more likely to appeal to the user.

2.5 Deployment Phase

The final phase involves the deployment of the learning object and placement in a Learning Management System (LMS). At this point, the learning object is ready for use and sharing.

3 Content of CmapTools Learning Object

In this learning object users learn about constructing a basic concept map using the Institute for Human Machine Cognition (IHMC) software program. By reviewing and interacting with the learning object, users are expected to gain the ability to navigate the basic functions of IHMC CmapTools software in order to construct quality, efficient, readable, and structured concept maps. The learning object is comprised of three lessons: Create a New Cmap, Save a Cmap, and Open a Cmap. Users engage in a step-by-step interactive tutorial on constructing, saving, and opening concept maps using the CmapTools software. The CmapTools learning object allows users to identify the different components of the software as well as the strategies for creating a concept map such as adding a new proposition to existing concepts and creating new concepts from existing concepts and linking words.

4 CmapTools Learning Object as an Instructional Aid

The CmapTools learning object was created with the aim of helping students learn how to use the CmapTools software program. The purpose was to have students learn and interact with the features of the program. The CmapTools learning object has been used as an instructional aid in two formats for the Adult and Continuing Education Leadership Program at the University of Wisconsin-Milwaukee: online course and face-to-face course. In both cases the CmapTools learning object is used as an instructional aid.

4.1 Online Course

For the online course, the CmapTools learning object is placed in the LMS Desire2Learn (D2L) for student to access anywhere, anytime. A special administrative D2L site was created for students in the online program. The CmapTools software has been used as part of the orientation to the online program and as a reference for future use. Students also receive a copy of the CmapTools learning object on CD-ROM for easy access.

In the online program, students are introduced to concept map tools and strategies in the foundation course. Students read about concept maps, review the CmapTools learning object, create their first concept map on a course reading and save as jpeg file, share the concept map in the online discussion, post a reflection on the creation of the concept map, and then discuss maps created among students in the course.

4.2 Face-to-Face Course

For the face-to-face course, students read about concept maps, observe a demonstration of the CmapTools software, replicate a sample concept map by exploring the CmapTools software program, and then create a concept map of a topic addressed in class as a group. Students use the CmapTools learning object to review features of the software program on their own. During the period of the semester students are required to create concept maps of readings and reflect on it. Students bring their concept maps to class, share with classmates what they have created, and discuss their thinking processes related to the article read.

5 Implications for Student Learning

There is no doubt that a concept map as an instructional strategy can help learners be more effective with their learning, but it requires time for students to learn how to organize information in a concept map format. Also, it takes time for users to learn the software program. Once students are familiar with the concept map strategy and tools to create them, they can use concept maps to take notes during lecture, to aid group brainstorming, to plan studies and career, to create graphics for presentations and term papers, to outline papers and presentations, and to refine creative and critical thinking. Additionally, once students know how to use concept maps in their learning, the use of the CmapTools software can also assist with this process. It is our purpose with this paper to share the process of creating a learning object and how we have used it in our program as an instructional aid.

Students in introductory courses are typically anxious about the use of concept maps. Initially they are more concerned with understanding the software program than their thinking process. They often complain about the time it takes to create a concept map. Once students feel comfortable with the software program, they are more aware of their thinking processes. We believe that using the CmapTools learning object, students can cut time to learn the software program and better understand how maps link to their learning.

6 How to Obtain the CmapTools Learning Object

Anyone interested in obtaining the CmapTools learning object may contact the Online Master's Program in Adult and Continuing Education Leadership at the University of Wisconsin-Milwaukee:

Website: <http://www.adultedonline.soe.uwm.edu>
e-mail: adultedonline@uwm.edu

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