

AN ADVANCE ORGANIZER APPROACH TO DISTANCE LEARNING COURSE PRESENTATION

John W. Coffey¹ and Alberto J. Cañas²

INTRODUCTION

The idea of the advance organizer was suggested by Ausubel (1968) well before hypermedia, distance learning initiatives, etc., became pervasive. Ausubel suggests that advance organizers might foster meaningful learning by prompting the student regarding pre-existing superordinate concepts that are already in the student's cognitive structure, and by otherwise providing a context of general concepts into which the student can incorporate progressively differentiated details. Ausubel claims that by presenting a global representation of the knowledge to be learned, advance organizers might foster "integrative reconciliation" of the subdomains of knowledge - the ability to understand interconnections among the basic concepts in the domain. This paper describes a new approach to distance learning course delivery based upon advance organizers.

A computer program entitled LEO, a Learning Environment Organizer (Coffey, 2000), implements the approach described in this work. LEO is an editor/browser based upon concept maps (Novak & Gowin, 1984), which presents a graphical representation of the fundamental concepts in the topic of study, essential dependency or prerequisite relationships among the topics (if any exist), and links to instructional media that contain content pertinent to the topic. The student utilizes the organizer to view and access information pertaining to the topics to be studied. The system tracks student progress through the topics, displaying an indication of those that have been completed and those that have not. The remainder of this paper will present a brief summary of the types and benefits of advance organizers, and a more detailed description of LEO.

ADVANCE ORGANIZERS

The advent of the Internet and hypermedia/multimedia has given rise to a broad range of possible representations that may be utilized as advance organizers. Modern advance organizers take the form of text passages (Herron, 1994; Kang, 1996), graphical representations (Gay & Mazur, 1991), maps (Jones, Farquhar, & Surry, 1995), and description + pictures (Herron, Hanley, & Cole, 1995). When applied to hypermedia, advance organizers might present global concepts, indicate paths through the content, or foster access to individual components. Krawchuk (1996) presents a taxonomy of advance organizers that includes traditional textual summaries and basic themes that are presented before instruction, organizations rendered in lines and arrows (like flowcharts), and pictorial graphic organizers. The latter category includes concept maps that present nonlinear representations of information and knowledge to be learned.

This brief discussion of the literature documents the variety of advance organizers that might be utilized for a course of study. It is apparent that advance organizers have been used in a variety of ways to help students learn about a topic of study. The next section describes LEO, an advance organizer for online instructional materials.

THE LEARNING ENVIRONMENT ORGANIZER

This section describes a Learning Environment Organizer that is part of a distributed knowledge modeling system named CMapTools (Cañas et al., 1998, 2000). An Organizer takes the form of a graph (in the mathematical sense of the word), with two different types of nodes, instructional topic nodes, and explanation nodes that explain about the topics. The topic nodes have color codings to indicate student progress through the course of instruction. The Organizer presents both a global (context) view and a local (focus) view of the course structure, and a "Display Status Panel." Figure 1 presents a view of an Organizer pertaining to a computer science course entitled Data Structures.

¹ Institute for Human & Machine Cognition and Dept. of Computer Science, Univ. of West Florida

² Institute for Human & Machine Cognition, Univ. of West Florida

Topic nodes correspond to the topics in the course. Explanation nodes elaborate the relationships among the topic nodes and have no adornments. Figure 1 depicts topic nodes as those surrounded with shadowed boxes, populated with icons, and containing a rectangle on the left side that color-codes the status of the topic.

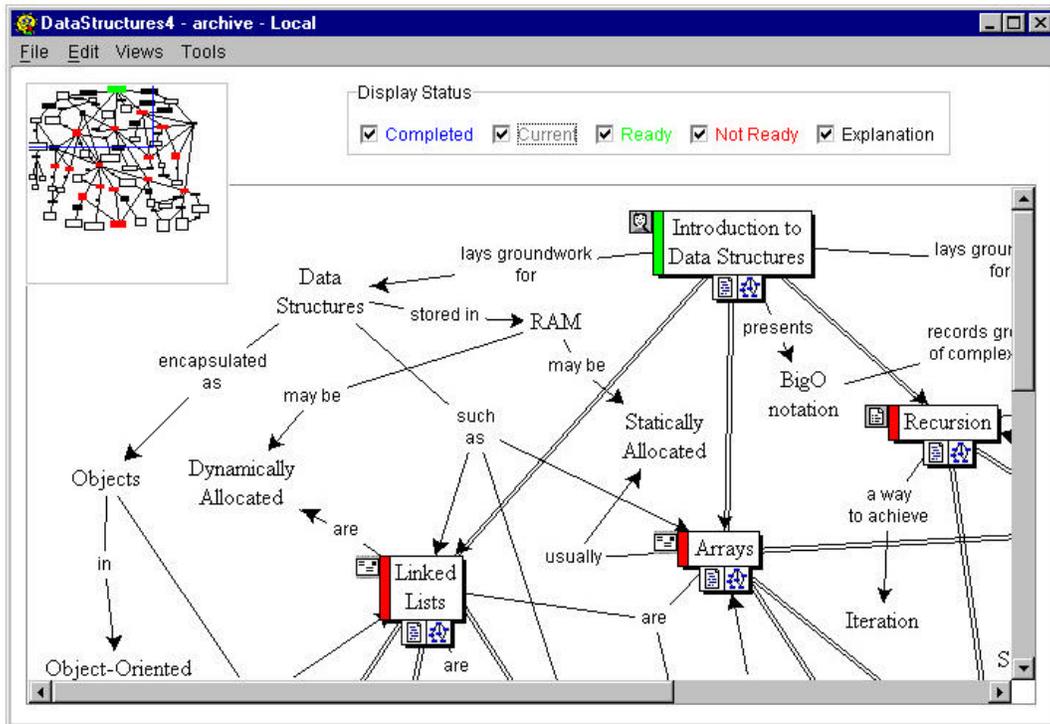


Figure 1. The Organizer in User mode, showing topic and explanation nodes.

For example, “Introduction to Data Structures,” “Linked Lists,” “Arrays,” “Recursion,” etc., are topic nodes. The topic nodes are linked together by double lines that convey prerequisite relationships. Topics have links to the instructional content that can be used to learn about the topic under consideration and to perform the tasks or activities associated with the topic. When the user clicks on the icon that looks like a graph, a pull-down menu appears that presents links to online instructional content that is pertinent to the topic. The other icons beneath the topic nodes may be clicked to access other instructional materials, as well as the tasks, assignments, activities, etc. that are associated with the topics. These assignments may be rendered in text, in a video, or in any other form the instructor wishes to utilize.

The instructor can specify the criteria for completion of a topic. Several possible alternatives have been identified and implemented. The instructor may require a submission of a deliverable that must be evaluated before indicating that the topic is completed. The student could download a test (true/false or multiple choice) that could be taken and graded on the spot by an automated process, with the organizer updated immediately. The topic could be essentially optional or suggested, in which case the student might be allowed to decide when to mark it and move on. The icon on the top left side of the topic node indicates completion criteria for the topic. The icon that looks like an envelope indicates that a submission must be made to the instructor. The icon that looks like a smiling student indicates that the user marks the topic completed when s/he is ready to do so. The icon that looks like a text indicates that the student takes a test to complete the topic.

The context view of the Organizer appears in Figure 1 as the floating palette in the upper left corner of the window. A highly articulated organizer with many topics and a large number of explanatory nodes can grow very large and tangled, and may not fit on a computer monitor. A concern that the design of this software addresses is the need of the user to see the entire organizer

while still being able to read a portion of it. A basic focus and context scheme has been chosen as an information visualization solution to this problem (Furnas, 1980).

The focus is the large rectangular component that fills most of the window. It is resizable by resizing the entire window. It contains the actual part that the user views. The user can grab the blue rectangle in the context view and move it around to move around the focus view. This mechanism is useful since it allows scrolling horizontally, vertically, or along arbitrary trajectories in a single mechanism, rather than only horizontally or vertically through two mechanisms, via scrollbars.

Students can freely browse through the materials in the Organizer at any time. If they wish to work on a course with the Organizer, they must first register with the system and log on. Once the student has logged in, the system either retrieves the progress record associated with the userid and the Organizer for which the logon occurred, or it creates a new progress record for the given Organizer and userid. The progress record contains information on the student's progress, submissions of deliverables, whether the deliverables have been graded, etc. When the student initiates the process of setting a topic to "completed" status, the system manages the process. If the student has permission to update the status of a given topic, the system automatically updates the screen display and the student progress record.

SUMMARY

This work describes a new approach to an online distance-learning environment that is based upon the idea of an advance organizer. The Learning Environment Organizer enables the student to access and browse online instructional materials. The Organizer provides the user with a graphical representation of topic sequences in the course, explanatory information regarding the topics, and tasks and completion criteria for the individual topics. The system tracks the user's progress through the topics in the course.

REFERENCES

- Ausubel, D. P. (1968). Educational psychology: A cognitive view. New York: Rinehart and Winston.
- Cañas, A. J., Coffey, J. W., Reichherzer, T., Hill, G., Suri, N., Carff, R., Mitrovich, T., & Eberle, D. (1998). El-Tech: A performance support system with embedded training for electronics technicians. Proceedings of the Eleventh Florida AI Research Symposium (FLAIRS '98). Sanibel Island, FL.
- Cañas, A. J., K. M. Ford, J. W. Coffey, T. Reichherzer, N. Suri, R. Carff, D. Shamma, G. Hill, M. Breedy (2000). Herramientas para construir y compartir modelos de conocimiento basados en mapas conceptuales, *Revista de Informática Educativa*, 13(2), pp. 145-158.
- Coffey, J. W. (2000). LEO: A Learning Environment Organizer to accompany constructivist knowledge models. Unpublished doctoral dissertation, The University of West Florida, Pensacola, FL.
- Furnas, G. W. (1980). The fisheye view: A new look at structured Files. Bell Laboratories Technical Memorandum #81-11221-9, October 12.
- Gay, G., & Mazur, J. (1991). Navigating in hypermedia. Hypertext Hypermedia Handbook. Berk & Devlin (Eds.), New York: Intertext Publications.
- Herron, C. A. (1994). An investigation of the effectiveness of using an advance organizer to introduce video in a foreign language classroom. The Modern Language Journal, 78(2).
- Herron, C. A., Hanley, J., & Cole, S. (1995). A comparison study of two advance organizers for introducing beginning foreign language students to video. The Modern Language Journal, 79(3), Autumn.
- Jones, M. G., Farquhar, J. D., & Surry, D. D. (1995). Using metacognitive theories to design user interfaces for computer-based learning. Educational Technology, July-August, 12-22.
- Kang, S. (1996). The effects of using an advance organizer on students' learning in a computer simulation environment. Journal of Educational Technology Systems, 25(1), 57-65.
- Krawchuk, C. A. (1996). Pictorial graphic organizers, navigation, and hypermedia: Converging constructivist and cognitive views. Unpublished doctoral dissertation. West Virginia Univ.
- Novak, J. D., & Gowin, D. B. (1984). Learning How To Learn. Ithaca, New York: Cornell Press.