KARTT: A Multimedia Tool to Help Students Learn Knowledge Acquisition

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One of the emerging technologies that is gaining in popularity and application is “interactive multimedia.” For education and training, multimedia is the wave of the future in supplementing the course instructor’s teachings. This paper describes a multimedia tool called KARTT, (Knowledge Acquisition Research and Teaching Tool), used to help the student in George Washington University’s “Knowledge Acquisition” graduate course learn about the various methods for acquiring knowledge in building expert systems.

Multimedia, the merger of text data, audio and visual information, can be said to be one of the largest emerging technologies. Although multimedia is just beginning its growth stage in terms of technology application, it is expected to be one of the highest growth markets for the rest of this century and beyond. According to industry analyst Frost & Sullivan in New York, the multimedia market is about $4.2 billion, and will increase to more than $25 billion by 1995 (Blanchard, 1991). The Information Workstation Group predicts that the multimedia market will grow to $10 billion in 1994 with the major multimedia applications being information retrieval, business presentations, and education/training. A survey by Straub and Wetherbe (1989) using 12 selected information management experts, found hypertext/hypermedia applications to be one of the most promising information technologies of the 1990’s (Shim, 1992). Moreover, Frost & Sullivan believes that there will be applications-driven growth in multimedia equipment, with entertainment winning the largest share of the market. They also feel that the next most popular applications for multimedia, in order, are: education and training, publishing, business presentations, and advertising applications.

Several events in the past year show the growing interest and support of multimedia. IBM and Apple formed a joint venture, Kaleida, to develop, license, and make available specifications and technologies to promote the exchange of information such as sound, graphics, video, text, and animation across a variety of computing and consumer electronic devices (Blanchard, 1992). IBM has also introduced its own line of PC-based
multimedia products, under the Ultimedia logo. Digital Equipment Corporation (DEC) has introduced its workstation-based Distributed Multimedia program. Intel has developed a board for developing multimedia applications on the PC. Other developments promoting the use of multimedia include TECH 2000, the world’s first permanent gallery of interactive multimedia (located in Washington, D.C.) (Adkins, 1992), the opening of the National Demonstration Laboratory for Interactive Information Technology in the Library of Congress (Withrow, 1992), and a proposed Virtual Reality theme park planned for a 1993 opening in Japan. Within the past year a new IEEE, (Institute of Electrical and Electronics Engineers) Computer Society Task Force on Multimedia Computing has been formed. With all these relatively new developments, the birth of multimedia applications is just emerging.

**Hypertext vs Hypermedia vs Multimedia**

As with any advancing technology, the terms used to describe the technology often get blurred. In discussing multimedia, there are two other terms that are sometimes referenced—hypertext and hypermedia.

Hypertext is an interactive approach for instructional material presentation. It essentially provides the user with text navigation control, allowing the user to jump from one subject topic to related topics. As such, it is considered a sophisticated approach for interactive use of text databases, that provides users with the ability to quickly follow documents without losing their original context (Shim, 1992). Tazelaar gives a wonderful example of the search or browsing process that is analogous of how hypertext can be used:

Imagine, if you will, walking into the New York Public Library and picking up a book on Mozart. You begin to read and learn that Mozart was an Austrian composer in the late 1700s. You wonder what else was happening in Austria then, so you go to the card catalog, find a book on Austrian history, go to the stacks, locate the volume, (if it’s not checked out), and read it before you can continue. In this book, you find a reference to old Salzburg, and you wonder what it looked like. Back to the card catalog, and the stacks, to find the book with images from that time. Finally, you get back to Mozart and read of a piano concerto you’ve never heard. This process continues until you have either satisfied your desire for knowledge on the subject or worn yourself out searching for it, whichever comes first. (Tazelaar, 1988)

With hypertext, links are created between the documents/nodes to allow the user to access certain information. Hypertext links, which serve the same purpose as card catalogs are linked to text files called nodes, which are in turn comparable to library stacks. Hypermedia is an extension of hypertext, that incorporates other media such as video, illustrations, diagrams, animation, and computer graphics (Shim, 1992). Increasingly, the term hypermedia is being used interchangeably with multimedia. However, in the most strictest sense, multimedia is a database management system that classifies, stores, and retrieves more than two forms of media (Orwig and Ragusa, 1991). As such, multimedia technology includes a combination of computer hardware, software, and other devices to produce a full audio/visual presentation.

**Hypertext, Hypermedia, Multimedia and its Implications in Education**

Five concrete benefits of hypertext/hypermedia/multimedia that have certain implications in instructional development have been identified (Shim, 1992):

- Hypertext/hypermedia/multimedia (HT/HM/MM) can increase learning and reduce learning transfer time by providing learner controlled instruction;
- HT/HM/MM can offer nonlinear access to information;
- HT/HM/MM can aid in the discovery of new and relevant information by indicating links to existing information
- HT/HM/MM can promote a collaborative work environment by allowing users working on individual pieces of information to be linked together; and
- HT/HM/MM can present the same information in multiple mediums.

Many studies have shown that learner control instruction is associated with increased learning (Milheim and Martin, 1991). Learner control research has shown that three major factors are associated with this observation. First, learner controlled instruction allows the student to study course material at a pace that suits his/her needs. Gagne suggested that learner control of the pace of instruction allows the learner the opportunity to encode information (Milheim and Martin, 1991). Ac-
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