1 / VOL. 3, NO. 1
THE CHEMICAL EDUCATOR

ISSN 1430-4171
http://journals.springer-ny.com/chedr
10.1007/s00897980167a

Of Special Interest

Report On "Multimedia Instruction"

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…advantage of almost all instructional multimedia: it allows the user to do or see something that is otherwise impossible, dangerous, too expensive, or too time-consuming to do or see any other way.

The "Multimedia Instruction" workshop examined a variety of uses for multimedia in instruction. Marco Molinaro, Director of Multimedia Development for the Modular Chemistry Consortium based at the University of California at Berkeley, presided. The session consisted of developing a common language used in describing multimedia, exploring demonstration programs, and using hands-on experience to create, adapt, or critique available software.

"Multimedia Instruction" by Marco Molinaro was presented at the "Day 2 to 40" workshop symposium held May 10–11, 1997. The two-day event was held in the Willard H. Dow Chemical Sciences laboratory building on the central campus of The University of Michigan in Ann Arbor, Michigan. Each of the articles that comprise this issue was written by one of the group of reporters whom I asked to attend each session to take field notes and then follow up with the session leader and participants afterwards.

—Brian P. Coppola, Proceedings Editor

ISSN 1430-4171
http://journals.springer-ny.com/chedr
S 1430-4171 (98) 01167-5

Description

To distinguish between various forms of multimedia, Molinaro proposed that four questions be posed about various aspects of the media. (1) How is the information structured? (2) How does the user interact with the information? (3) What is the format of the media? (4) How is it distributed to the user? Answers were provided to these questions in the form of a handout and will be summarized below.

Media structure can be classified as singular, linear, or branched. *Singular* media has one general interface such as a computer screen. Users can typically alter variables or manipulate data and visualize the results on the screen. The RasMol[1] molecular viewer is an example of a singular structure. With a *linear* structure, media flows linearly through its content. Movies and Microsoft PowerPoint presentations are examples. Finally, in a *branched* structure media elements flow through branches that may or may not have interconnections. CD-ROM textbooks contain such a structure.

User interaction with the media can be separated into two categories: presentation mode and interactive mode. In *presentation mode* information is presented to the user in one of three ways. When the user has little or no control over the flow of information, this is called *passive presentation*. *Active presentation* allows the user to choose which paths to follow through the information. *Manipulative presentation* lets the user affect the view, size, color, etc. of the material or data. In *interactive mode* the information can be placed in one of four categories. In the *static mode* the user's choices or responses have little or no effect on the flow of information. If the user's choices or responses do alter the flow of information beyond a simple acknowledgment of a correct or incorrect answer, the mode is described as *dynamic*. When the user's actions, words, or images are communicated in a synchronized manner to various locations, the mode is described as *synchronous*. Videoconferencing is an example of synchronous mode. Email and newsgroups are examples of *asynchronous* interaction; that is, the user's actions, words, or images are communicated in an asynchronous manner.

There were many categories that described *media format*: animation, video movie, digital movie, simulation, visualization tools, databases, explorations, and immersive environments. The final two were discussed. In an *exploratory* format, content is

[1] RasMol© copyright 1992,1993,1994 by Roger Sayle rasmol@ggr.co.uk

ISSN 1430-4171
http://journals.springer-ny.com/chedr
S 1430-4171 (98) 01167-5

provided to the user without a great deal of structure. This allows the user to explore and gather information in order to answer a given question. If the user is immersed in a context and affects the outcome of what happens, then the format is termed an *immersive environment*. Typically, there is a story element that lends an air of reality to the situation.

Distribution occurs by one of six mechanisms: TV, the Internet, floppy disks, removable disks such as ZIP drives, CD-ROM, and DVDs (Digital Video Disks). Television is the standard delivery for multimedia presentations, but it is extremely passive. The Internet is fast becoming one of the most widely used distribution sources, but it has limitations, including the necessity of an Internet connection and slow transmission rates. Floppy disks are universally used but are limited by the ability to store only 1.4 MB of data. ZIP drives can hold much more information, but are not as widely used as floppy disks. CD-ROMs are relatively inexpensive, but reading from the disk slows down operations such as the viewing of complex media pieces. Digital video disks are cutting edge technology and as such the most expensive.

Discussion

To illustrate the structures described above (interaction, style, and distribution mechanisms), several examples of multimedia were explored. Molinaro pointed out a common advantage of almost all instructional multimedia: it allows the user to do or see something that is otherwise impossible, dangerous, too expensive, or too time-consuming to do or see any other way. “Learning About a Car Engine” was used as an example to help the participants understand the various levels and potential of multimedia. Video of a running engine showed the interplay of complex interactions. An animation of a cross section of the running engine showed a point of view not available in real life. The visualization tool allowed users to focus on specific parts of the engine. A database contained information about the engine and the types of fuel available for use. In the simulation portion, users could alter the amount of fuel and oxygen interactively and view the results. The CD-ROM entitled “Airbags‘R’Us” allowed participants to explore the design and chemistry involved with airbags in an immersive environment. Other multimedia examples included a Moon Around Earth,” “Emission/Absorption,” and the Enhanced RasMol Molecular Viewer. This hands on portion generated the most comments concerning the “Multimedia Instruction” workshop.

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Feedback

All participants enjoyed the chance to explore various software. Users found the "Molecules in Motion" portion of the "Airbags'R'Us" CD-ROM to be very informative and possibly useful in the teaching of kinetic molecular theory. The Java[2] applet involving emission and absorption was thought to have immediate classroom utility, as was the viewing of three-dimensional molecular representations. In addition, Molinaro's ability to respond to a wide range of backgrounds and interests was widely recognized and appreciated. Also noted was the effort that had gone into getting the computer laboratory set up to run smoothly. Criticisms of the workshop had little to do with the software but instead dealt with hardware concerns.

Several participants pointed out that the University of Michigan computer laboratory stocked with 25 PowerMacs all hooked to the Internet did not represent the typical computing resources found at most schools. There was a desire for discussion of multimedia material that worked on older computers and how to implement this material at smaller nonconsortia schools. Another consideration involved funding; in the age of decreasing departmental budgets, who funds the creation of multimedia laboratories? Are there outside sources available? Others were disappointed that the workshop did not teach techniques for developing multimedia software; instead, it pointed to existing web sites containing instructional material that cannot be modified to suit the instructor's educational goals. Questions concerning the amount of time needed to preview and then integrate multimedia into a classroom presentation were raised. One possible answer was to create a clearing house that would list available multimedia programs, give a brief description of their content, and describe any hardware-compatibility problems. There was general agreement that future symposia should address funding and applicability issues.

[2] Java™ is a trademark of Sun Microsystems, Inc., 2550 Garcia Ave., Mountain View, CA 94043-1100.