SYMPOSIUM: MULTIMEDIA IN INSTRUCTION

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Getting started with multimedia

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This paper provides an overview of the symposium "Multimedia in Instruction" by addressing four basic issues: What does multimedia mean? Does it have advantages beyond traditional means of presentations in a classroom? What equipment does one need? What software are available for psychology instruction? Although multimedia represents a revolutionary technology, its application to instruction is an extension of computer-assisted instruction.

What Does Multimedia Mean?

Multimedia is a way of conveying information with a computer that mixes media—audio, video, text, numerical data, and graphics. It results from convergence within the computer, telecommunications, and video industries (Galbreath, 1992). These industries share a goal of bringing together multiple media in a common format so that computer and transmission media can handle voice, video, and data. The most efficient way to accomplish this goal is to have all media represented digitally. Galbreath surmised that education will benefit from the multimedia revolution primarily through a "trickle down" effect. Millions are being spent on research and development for products that bring the three industries together. As vendors develop cheaper and more efficient methods for business, they will eventually be mass-marketed for education.

As academicians, we sometimes get involved in debating whether a specific application really is or is not an example of multimedia. There have been a number of notes dealing with this issue posted on electronic discussion groups. Let's not spin our wheels too much. I would recommend a liberal criterion and would suggest that whenever we use a computer to present text with pictures and add some data and a few sounds we are satisfying the definition for multimedia.

Advantages for Instruction

Given the revolution in the technology, the first question that we need to ask is, Does multimedia have advantages

beyond traditional means of presentation in a classroom or teaching laboratory? Psychology instructors have a history of using technology. TV, VCR, films, slides, overhead transparencies, and computers have a long history of use in the psychology classroom. Within this context, multimedia may be more of an evolutionary rather than a revolutionary application. With the advent of multimedia, a broader selection of technologies can be used in the classroom—laserdiscs, CD-ROMs, speech, music, digitized pictures. For the first time, the computer can help to link together the media to create new ways for students to learn. Like blackboard work, multimedia presentations are interactive and can take unanticipated directions depending upon student input, but they differ in a tendency to be more sophisticated than work on the blackboard. Once developed, a presentation can be easily reused, modified, or updated. The graphing and calculation tools that are available in state-of-the-art statistical packages go far beyond simple blackboard demonstrations. They handle data more quickly with more in-depth statistical tests.

One advantage identified by Stoloff (1995) is that complex material can be presented one element at a time. For example, in a complex graph, one can present the axes and labels first and then add each bar or line. When the material is presented gradually rather than all at once, students can sometimes understand complex presentations more thoroughly.

Another advantage lies in the fact that multimedia materials are directed at students with diverse skills and proficiency levels. Students can learn at their own rates and skip material that is already mastered. Because of the potential for interactivity, there is more opportunity for the learning material to be customized. Again, this claim is

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not new. It was first made when computer-assisted instruction began over 15 years ago. However, the potential for achieving a more in-depth level of interaction is greater with multimedia than with any of the past instructional technologies.

Schwier (1992) identifies three levels of interactivity based on the type of cognitive engagement of the student. In the first level, labeled *reactive*, the student responds to a specific question. With the second level, the interaction is *proactive*, such that the student must learn to construct and generate answers. The highest level is *mutual* interaction, in which both the student and the system are adaptive, such that they are capable of changing on the basis of encounters with each other. Artificial intelligence or virtual reality designs are examples of this level of interaction.

With multimedia, students learn a tool for helping to assimilate massive quantities of information.

The multimedia metaphor enables the designer/developer to produce computer based learning systems that provide the user with the navigation tools needed to assimilate and convert massive quantities of information into knowledge by a means of inquiry that is based on higher order thinking. (Hirschbuhl, 1992, p. 321)

Another advantage with multimedia materials is that their use is not limited to the classroom. Once developed, the materials can be placed on a file server in a student lab, placed on the World-Wide Web, or developed into a CD-ROM for study and review. For the present generation of students who do not seem as interested in spending time with textbooks as did students of generations ago, these materials are an important study aid. Presenting materials on CD-ROM or on the World-Wide Web may have advantages over a textbook. The value of multimedia materials will vary, of course, with the subject matter. However, for courses such as Sensation and Perception and Physiological Psychology, where computer demonstrations and simulations have a long history of classroom use, these materials may be quite valuable. In fact, most of the multimedia software that are presently available for psychology instruction are in these areas. Stoloff (1995) has recently discussed teaching physiological psychology in a multimedia classroom. In this symposium, Sekuler (1996) presented a multimedia application in a perception course. Table 1 lists some of the multimedia software that are presently available in these and other categories.

Although multimedia is relatively new, there is some evidence that it constitutes an effective instructional technique. The early multimedia systems were based on the use of prerecorded videotape and linear structure. None of the navigation tools of the present systems were available. Today's hypermedia is designed with inquiry in mind (Hirschbuhl, 1992). However, even the early systems were somewhat effective. Wright (1993) reports that, in industrial settings, multimedia reduced training time 50% because the combination of visual and auditory experience delivered the information in an easy-to-

Table 1
Multimedia Materials That Are Available
for Instruction in Psychology

General Psychology	
MacLaboratory for Psychology (CD-ROM;	
Brooks/Cole-Wadsworth)	
Animations for Introductory Psychology (laserdisc;	
Brooks/Cole-Wadsworth)	
Dynamic Tutor (CD-ROM; Harcourt Brace)	
Dynamic Concepts in Psychology (laserdisc; Harcourt Brace)	
Perception	
Insight (Intellimation)	
Active Eye (Erlbaum)	
Contour (Non-Trad Media Erlbaum)	
Perception (Ismael E. Carreras)	
Exploring Perception (CD-ROM; Brooks/Cole-Wadsworth)	
Physiological Psychology	
The Brain (laserdisc; Brain & Benchmark)	
Human Brain Animations (laserdisc)	
The Graphic Brain: Neurophysiology (Brooks/Cole-Wadsworth)	
Neuroanatomy Foundations (Intellimation)	
Abnormal Psychology	
Exploring Psychological Disorders (CD-ROM;	
Brooks/Cole-Wadsworth)	

understand format. Also, there were reduced costs and an increase in student achievement. In this symposium, Lee, Gillan, and Harrison (1996) provided some additional evaluation data from a group of psychology students.

What Equipment Is Needed?

The equipment that you need for multimedia depends upon the extensiveness of use. Table 2 provides some recommendations. To get started with classroom presentations, you will need a portable computer (such as a Powerbook) and either a video projector or an LCD panel with an overhead projector. The portable computer should have at least 8–12 Mb of RAM (expandable with virtual memory). An easy-to-use presentation package such as PowerPoint is also necessary for creating slide shows with transitions. If you frequently integrate media into your lectures (that is, mix a video clip and sound files with text and graphics), then a presentation package that is set up for easy integration of media such as Mpower is also a must. Although it is possible to use a word-processing program to create slides, I would not recommend it. You would save some money, but much is lost in the quality of the product, and you will spend more time figuring out details, such as optimal type size, that are readily available in a presentation program.

The major advantage of using this set-up for classroom presentations over a traditional slide show is the interactive nature of the presentation. When I use technology such as this for my graduate course in research design, I can involve the students in the presentation. With a survey data set, for example, I can ask the students to generate hypotheses about the data and use their input to demonstrate statistical procedures.

A second advantage deals with the ease of combining media. Often, when I bring a film or videotape to class,

Table 2
Recommended Equipment for Multimedia Presentations

Classroom Presentation	
Portable computer (8–16 Mb of RAM)	
Video projector or LCD panel with overhead projector	
Presentation program (e.g., PowerPoint or Mpower)	
Developing Instructional Materials	
Hardware	
	AV Macintosh with Apple Audio Vision monitor (built-in speaker and microphone)
	CD-ROM or laserdisc
	Removable hard drive (Syquest or Zip drive)
	Scanner
	Digitizing camera (camcorder or flexcam)
Software	
	Authoring program (e.g., Hypercard or Macromind Director)
	Adobe Photoshop
	Adobe Premier
	Macromedia Sound Edit 16

I let the students view the whole 30- to 40-min show even though only 6 or 7 min of the film provide useful material. With a multimedia presentation, it is possible to insert a short film segment into a classroom presentation and show only the relevant material. Bringing a computer to class can replace several audiovisual (AV) devices—cassette recorder for audio material, slide projector, VCR, or film projector.

For developing multimedia materials, the list of necessary materials is longer. For those who work with Macintosh computers, the AV computers are particularly useful for capturing video images and for its sound capabilities. PowerMac AV models, as well as discontinued Centris/Quadra 660AV or 840AV, provide a ready way for developing multimedia materials. An AV Macintosh can record and play audio and can digitize Quick time movies from a camcorder or videocassette. A Radio Shack cable (Catalog No. 42-2475) is all that is needed to bring an audio signal from a tape deck or VCR to your AV Macintosh for digitizing.

The choice of CD-ROM or laserdisc depends upon the application, but I prefer CD-ROM because of its low price and popularity with students. CD-ROM can hold 250,000 pages of text, 12,000 images, or 250 microfiche. Equipping a computer with a drive or buying a CD-ROM drive already installed adds only 20% to the cost.

If you routinely work with sound and video, you may wish to save your material on a removable hard drive, such as a Syquest or Zip drive, because these files require a lot of storage. Scanners and digitizing cameras are useful for creating your own movies and images.

Software that would be necessary for multimedia development are also listed in Table 2. Authoring your own work can be accomplished with varying levels of expertise. At the low end, Hypercard can be a useful tool. At the high end, Director is a very effective development environment for those with the time and commitment for this work. Two of the talks in this symposium (Rosen & Petty, 1996, and Gotsick & Gotsick, 1996) provide more detailed information about authoring tools for multi-

media. The other software consist of easy-to-use tools for specialized material. Photoshop is quite effective for editing picture files. Premier provides a means for video editing, and Sound Edit 16 lets you edit Quick time movie sound tracks and add music and sound effects.

Instructional Software

Table 1 lists multimedia software that are available for instruction in psychology. This is by no means an exhaustive list. It is meant only to represent what is presently available. In their first generation, CD-ROM titles were geared to libraries and researchers and were primarily bibliographic databases. PsycLit is an example. Telephone directories, encyclopedias, and dictionaries are others. There are a few laserdiscs and CD-ROMs that are marketed as ancillary material for general psychology. For example, Harcourt Brace has a CD-ROM *Dynamic Tutor* and a laserdisc title *Dynamic Concepts in Psychology*. Brooks/Cole-Wadsworth Publishing Co. has several titles that are listed. There are a number of other software programs authored in either Hypercard or Director that have been available for some time as computer demos and simulations of psychological phenomena. Some of these titles are available across platform. There is also a mix of those on CD-ROM and those on laserdisc. The recent material, however, is almost universally CD-ROM.

When computers were first introduced into psychology instruction in the late 1970s, we identified student interactivity and flexibility in learning styles to be among the goals that would be accomplished through computer technology. With the advent of multimedia, we may finally see these goals fulfilled.

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