Interactive Multimedia: A New Tutor

by
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"Interactive multimedia" is a relatively new term that can be confusing to many people—especially with the multitude of terms such as interactive video, interactive audio, CD-I and DV-I entering the language. The confusion experienced by both teachers and students is understandable.

Simply put, multimedia means the integration of at least two of the following media:

Audio
Video
Text
Animation
Graphics

Interactive multimedia, as defined in educational technology, means that students use a computer or similar input device to interact with at least two of the above mentioned media.

Education for Today's Student

Students are thoroughly adjusted to advanced technology. They are accustomed to watching television, playing video games and living in an environment that lends immediacy to their actions. With the advent of the Information Age and the decline of the Industrial Age, students expect to see, feel, touch and experience subject matter first hand. As informative as text may be, it is ill-equipped to compete with the exciting media that computers and digital technology have made available.

Text, by itself, has been shown to be less than effective in conveying information to students (Richter, 1991). In addition to being slow, it is ineffective in the sense that most individuals retain only10 percent of what they read. On the other hand, when they hear something, retention increases to approximately 20 percent, and when they see it, up to about 30 percent, and when they hear it and see it along with text, retention is about 50 percent. When students participate in the learning process (as opposed to passively absorbing information), by interacting with the audio, video and text, the retention figure increases to 90 percent! Thus, interactive multimedia has the potential to become an effective tool for learning.

Learning Media	Retention
Text only	10%
Text with audio	20%
Text with video	30%
Text with audio and video	50%
Text with audio and video and interaction	90%

We, as educators, cannot argue with percentages like these. Today's technologically literate students are capable of learning a quantity of material in a short amount of time, but are limited by the common low-tech classroom. Normal classroom instruction is geared to the average level of the thirty or so students. Brighter students tend to be bored, while slower students tend to struggle. This classic classroom setting is no longer the sole means of educating students, or even the most efficient and effective means.

How we view the educational process also has changed drastically. Compare the student/teacher relationships of the Industrial Age and the Information Age:

Industrial Age Consequences	Information Age Possibilities
•Teacher as teller	•Teacher as coach
•Student as sponge	•Student as participant
•Standardized curriculum	•Learner-driven curriculum
•Standardized testing	•Individual assessment
•Uniform mediocrity	•Educational excellence: Uniform achievement of potential

How then, can we make our classrooms more effective? In his monograph titled The Two Sigma Problem (1984), Benjamin Bloom states that individual tutoring results in a two-sigma improvement in learning performance when compared to standard classroom learning. Translated, this means that someone who scores fifty percent on a given test as a result of classic classroom instruction is capable of scoring ninety-eight percent if given good individual tutoring. If this premise is accepted, it seems logical to design programs for computer-based instruction using a tutorial as opposed to a classroom model. Such programs should be based on interaction. Anderson (with Boyle, Farrell, and Reiser, 1984), demonstrated that individualized instruction delivered in any manner is more efficient than classical classroom instruction. In one of the experiments with students using computer-based tutoring systems, the equivalent of ten hours of classroom instruction was achieved in slightly less than one hour and forty minutes.

The Multimedia Music Classroom of the Future

The music classroom of the future will be one in which the material will be structured to allow students to move at their own pace. The teacher will serve as a coach, helping students to conceptualize and providing direction and input based on the individual student's need and the teacher's experience. Although students may be grouped into classes, they will sit at multimedia workstations designed to provide tutorial instruction. Each station will consist of a computer with built-in CD-ROM, audio/video applications, and perhaps network connections to a nationwide fileserver. Although there will be classes, the environment will place a premium on individual accomplishment.

As an example, institutions that use large lecture classrooms have already made some innovative changes. Students entering a classroom are provided with a numbered remote control device. Throughout the class period, the instructor asks questions about the material being presented. Students respond by using the remote control device. At the end of the class period, the instructor receives a computer print-out of the responses. This not only provides the instructor with feedback on how well individual students are internalizing the material, but also helps the instructor evaluate his or her own presentations.

In another study by Rosenshine and Stevens (1986), it was determined that effective teaching/tutoring consists of three major steps:

1. Demonstration
2. Guided practice
3. Independent practice.

A review performed by Brophy (1988) supports these findings. Interactive multimedia allows students to follow these three steps independently and at their own pace.

Implementation

Music educators need to take the responsibility to implement the new technology. Although computers are somewhat common in the modern classroom, multimedia workstations are not. There have been several reasons for this:

- The relatively high cost of equipment (though prices are dropping rapidly)
- The cumbersome nature and quantity of add-ons such as CD-ROM drives, laserdisc and videotape players and monitors
- The lack of video compression

However, due to recent innovation in computer hardware and software design (and price reductions), it is now possible for every institution to take their first step into music technology, be it MIDI or interactive multimedia.

Multimedia at UNC

Many music students at the University of Northern Colorado are producing multimedia projects. It not only involves them in curriculum design (who better to design programs than those who have to learn?), but provides them with experience and/or exposure in technological areas such as lighting, videography, audio/video post production, sound recording, animation, bar coding and graphics. Students may work in teams of three to six individuals, each with specific responsibilities for the production.

Currently two multimedia stations are in use. One workstation uses laserdisc and video tape technology while the other uses only video tape technology. Additional stations will be added upon the completion of the new UNC Music Technology Center, scheduled for March, 1993. The interactive multimedia programs now being designed by UNC students are both creative and repurposing projects. In creative projects, students film and produce their own video and computer designs from the ground up. In repurposing projects, students take existing laserdiscs and video tapes and design a program to use them in a context other than their original purpose (which was usually passive viewing).

Technical Information

The easiest way to implement multimedia in the music program is by using a stand-alone laserdisc player such as the Pioneer CLD-V2400, which plays both compact discs and laserdiscs. This unit, along with a bar code reader, allows the user to immediately access specific sections of any CD or laserdisc. The bar code software allows the user to create bar codes on a computer but not have to use the computer as part of the delivery system. The instructor then tapes a bar code number on his or her lecture notes at the appropriate place and then runs the remote bar code reader across the number at the appropriate time. An excellent way to make lecture classes much more interesting with a minimal amount of set-up time and cost.

More advanced developmental techniques requires the integration of a computer. One of the video tape multimedia projects at UNC features a short video, *Basic Brush Technique*, by nationally-known drummer, Mel Brown. Using Hypercard as the authoring system, the

introduction to the project used programs such as Swivel 3D, MacRender Man and MacroMind Director. Graphics were imported for aesthetic reasons. The equipment used for this project is the NEC PC VCR with the NEC Multimedia Tool Kit software. This particular PC-VCR with the software allows the user to stripe time code on a pre-recorded video tape—a technique not possible until a year or so ago. The multimedia toolkit software provides the XCMDs which can be imported to HyperCard to control the video tape machine. With the RasterOps 24STV video board (an updated digital version of the 364 board), a 1/4 screen video picture is imported into the Macintosh and displayed on the monitor.

One of the laserdisc projects is based on the Pioneer Artists' laserdisc *Piano Legends*, narrated by Chick Corea. In addition to using HyperCard, the Voyager Audio Stack controls the CD while the Voyager Video Stack controls the laserdisc. Peripheral hardware used includes the Pioneer laserdisc player CLD-V2400 and an Apple CD-ROM drive. The RasterOps 24STV board, in this case, imports full-screen, full-motion video into the Macintosh.

With the technology currently available, it is no longer necessary to have a separate video monitor in addition to the Macintosh monitor. Using many of the video capture boards currently available, it is possible to use the Macintosh screen both as a video and computer monitor.

Summary

For the teachers in music classrooms to work more effectively and efficiently with students, it is necessary for them to have a working knowledge of current computer hardware and software programs. In a classroom environment it is a proven fact that students learn faster by being active participants and can retain more information if images such as video, graphics and animation are used. In addition, learning can be enhanced if students are able to work on a one-to-one basis with an instructor (or instruction), and, if they proceed at their own rate. And finally, it is to the students' benefit if they can enter an educational program at their own level of understanding or proficiency.

Interactive multimedia provides excellent opportunities for students to learn and their teachers to coach. The computer was never meant to replace teachers, but to support their teaching by relieving them of repetitive tasks and providing creative ways to help teachers become better teachers.