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Current Uses of Computer Multimedia in the University Environment

A study by

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for

The University of Tennessee, Knoxville

Honors Program

Abstract:

The university environment provides a unique opportunity for the development and trial of many new ideas and technologies. Such an opportunity arises as computers begin supporting multimedia (i.e., the use of graphics, sounds, pictures, and film clips in computer software). As an undergraduate in biochemistry, I have become involved in several multimedia projects which have enhanced many aspects of the University, its goals, and its longevity. The University must be interested as well as actively involved in producing and supporting developments using multimedia. The 21st century classroom has arrived and applications must be produced to support it and its environment. If this support is not provided, the University will surely fall behind in comparison to other educational institutions.

Several technologies are available to multimedia development. One of the most intriguing and fascinating is an entity called the World Wide Web, WWW for short. WWW is basically a "web" of computer servers that are linked together by hypertext "hot-spots." The following will be a discussion of how cyberspace, the virtual reality of the 21st century, is influencing the world of education. This discussion will be centered around the projects I have completed and how they were integrated into the university atmosphere.

Biochemistry Multimedia:

In the spring of 1994, I started working with the Biochemistry Department Head, John W. Koontz, Ph.D. to modify the introductory biochemistry course (Biochemistry 410). This multimedia supplement uses current computer technology to present otherwise dull topics in a new way. Instead of being confined to the two dimensional drawings on the chalkboard, the student will now be able to see things like protein structure and conformational changes in vivid color, capable of being rotated in three-dimensional space on a projection television system. To accomplish this goal, a program for the Macintosh called Aldus Persuasion® was used. This package was used on a Macintosh Quadra 840AV to develop a graphical interface shell. This shell is basically a

menu, allowing students to "point and click" on different menu items. The menu includes such items as "Enzymes," "Nucleic Acids," and "The Biochemistry Lab." Beneath this topical menu are more menus, becoming increasingly more specific. By using Aldus Persuasion®, external programs could be "jumped" to that were applicable to the menu item. For example, a menu item might be "Hexokinase". Upon clicking "Hexokinase," one would launch a external program, called Mage, and be able to see and rotate this enzyme in 3D. Mage is a program distributed by *Protein Science Magazine* that allows one to rotate three dimensional images of proteins. Another such program, MacMolecule, which is freeware, allows the same kind of rotation with various nucleic acids and other organic structures. This presentation, totaling over 20 Megabytes, was then used in the classroom to illustrate concepts of protein structure and function, nucleic acid structure, and other such relevant issues that can be graphically demonstrated. This program was also placed on the John C. Hodges Library computer lab file server so that students could access the program outside of class if necessary.

As part of upgrading the biochemistry classroom, a form of electronic communication was also implemented. VAX Notes Conferencing, a DEC piece of software running on a VAX cluster, was used for this task. This electronic communication forum was used to facilitate question and answer sessions between the student and the professor during the semester.

To accomplish this goal, students were assigned an account on the VAX system and were required to sign-on to prevent themselves from being dropped from the class roll. An entire class period was devoted to explaining this system, its features, and its capabilities. From that point, students could "post" a question to this conference, which could then be answered by a teaching assistant, the professor, or even another student. Something which was not expected was the level of participation of students answering each other's questions. This is truly a demonstration of what a university learning environment should be like. Since this class was the first large class (150 students) on the campus to use such a system, it has since spread to other biological science classrooms. This form of question and answer sessions is nothing other than a valuable benefit to the class it is used in. With this system, a shy student can ask questions he/she

would not think of asking in front of other students, a student can ask a question at 2 a.m. if he/she is up studying and the professor can address this question the following day, and if numerous students have a similar question, the concept can be explained again in the classroom.

Biochemistry, Cellular and Molecular Biology On-line Brochure:

Yet another development in the area of the biosciences is using the World Wide Web, or WWW for short. The WWW began in the late 1980's, and currently there are over 10,000 Web servers around the world. This technology allows "serving" of hypertext documents to anyone with a web browser (NCSA's Mosaic or Netscape) connected to the internet. Serving a web document involves the use of a programming language called HTML, hypertext markup language. This language allows one to take simple text and add hyperlinks, graphics, and other forms of multimedia and combine them into a "page". This page is what is presented to the browser, i.e. the person browsing pages would find a page of text with hyperlinks to other pages as well as graphical objects (pictures in .gif format, motion video in .mpeg or QuickTime format). I will stop with the technicalities and move on to what was done on the Web in relationship to U.T.'s Division of Biology and the Department of Biochemistry, Cellular and Molecular Biology (BCMB).

After the first mentioned multimedia project was completed, I was approached again by Dr. Koontz to set up an on-line brochure. An on-line brochure was proposed to be "served" to the virtual world via the World Wide Web and would include a list of the faculty members of the department, their biographies and research interests, as well as general information about the programs that were offered through the department. To accomplish this goal, I took pictures of all of the faculty members with a QuickTake 100 digital camera and then exported the pictures as digital images to be served as part of the on-line brochure "page". In addition, I gathered personal information from all of the faculty as well as obtained their research interests and converted this information into HTML code for the new "page". If you are interested in seeing this information on-line, you can browse the Division of Biology's Web page at http://www.bio.utk.edu. You will

find that the Biochemistry, Cellular and Molecular Biology page is an item on the Division's page.

I believe that this project was a very innovative and needed one. As universities all over the world begin to serve the world information about their programs, U.T. would fall behind if they did not do the same. This kind of presentation to the internet world targets a number of people. In the past, only those with advanced computing skills could find their way around the internet and the World Wide Web. However, at present, when many private companies are offering personal internet connectivity, the general population will be able to reap the benefits of "Web Browsing". In effect, the on-line faculty brochure will be used by the department to direct prospective students of the BCMB graduate program who have internet access to a "page" where they can have instant access to information about the program and all of its faculty members (including their pictures). This type of project also conveys to prospective students that this department is on the move, ready and willing to use the latest technology in its educational goals.

Honors Multimedia, Virtual Tour of the University and the Honors Program:

Around the same time I was working on the Biochemistry 410 multimedia supplement, I envisioned a similar project for the University Honors Program. The idea of an interactive "tour of the Honors Program" had been discussed for several years. As I became more familiar with multimedia, I also became interested in originating a project for the Honors Program. To assist, I recruited a fellow Tennessee Scholar, Andrew Core. Development of this project was slowed due to the numerous other projects each of us were undertaking. However, by the spring semester of 1995, the project was fully underway. Following is a brief explanation of this presentation, which was also developed using Aldus Persuasion®.

To best understand the way this project was set up, it would be easiest to obtain a copy of the disks that hold the Persuasion Player Application and the actual player file. Below (in item 4) is a description of how to obtain a copy and how to install it.

The information used in this presentation was taken from a number of sources. Many pictures as well as text blocks were original, but several pictures and other information were taken from existing University brochures. In addition, information was obtained from brochures from the Knoxville Visitor's Bureau, at the foot of the Sunsphere.

Enclosures and Directions:

1. *Biochemistry Multimedia*: This project, in its smallest form (the Aldus Persuasion Run-Time Player Version) is over 5 Megabytes. It is currently in use by the Biochemistry, Cellular and Molecular Biology Department for use in Biochemistry 410, and resides on the UTCC Hodges Library file server. It can be accessed from any library Macintosh or PC (must have the Windows 3.1 player application). In addition, the full version of the presentation (over 20 Megabytes) resides on a SyQuest cartridge owned by the BCMB department, and can be borrowed on request from the department head.

Technical Information: This presentation was created on a Macintosh Quadra 840AV, pictures were taken with a QuickTake 100 digital camera, and were used as .PICT files. Adobe Photoshop was used to enhance or modify images. Other pictures were scanned from various sources using a Relisys 2400 dpi flatbed color scanner. Other technical information can be found within the presentation itself in *About...*

2. *Biochemistry, Cellular, and Molecular Biology on-line brochure*: these WWW documents can be accessed from the internet using any standard web browser (preferably Netscape). The Uniform Resource Locator for the Division of Biology is http://www.bio.utk.edu/ , and one can find the BCMB page on this main menu, or directly with the URL http://www.bio.utk.edu/biochem/bcmb.htm

Technical Information: These pages were created on a Macintosh Quadra 840AV using the software HTML Editor for Mac. Pictures were taken with a QuickTake 100 digital camera and were enhanced and modified using Adobe Photoshop. These pages were tested on the Quadra running NCSA's MacHTTPd server software, and then placed on a Novell File Server running Netware 3.2 using the GLACI NLM as server software.

3. *Other Web Pages I have developed and/or worked on*: The Division of Continuing Education, http://web.ce.utk.edu; the Smoky Mountain Field School, http://web.ce.utk.edu/departments/noncredit/smoky/smoky.html. I was responsible for migrating these pages from an IBM running NCSA's HTTPd server for Windows to the Unix machine (discussed below) running NCSA's HTTPd server for X Windows (Solaris). I maintained this site while working for the Divison as well as modified, enhanced, developed, and upgraded old and new web pages for the site.

Technical Information: These pages reside on a Sun Microsystems Sparc 20 Workstation running Solaris.

4. *Honors Multimedia*: This presentation resides on computers in the University Honors Program Lounge, F101 Melrose Hall, and can be viewed by prospective students while visiting. In addition, run-time versions will be available for duplication to be sent to high school guidance counselors for use in recruiting future honors students. Both a Macintosh and a PC version are available from Mary Ann Bright, F101 Melrose Hall, 615-974-7875.

PC: Contained on this disk are the Windows 3.1 Player Application and the Player file, called UTHP which are PkZipped into an auto-extracting file. To extract the files, type install and press return. This will create a directory c:\honors and expand the files you need. Next, open Windows, and from the File Menu, select Run. In the dialog box, type c:\honors\playerw.exe and press return. This will open the Aldus Persuasion Player Application. You must now indicate where the player file is, UTHP. Browse to the c:\honors directory and double-click UTHP to start the presentation.

Macintosh: Contained on the Macintosh version of disks is a self-extracting archive of the Persuasion Player Application and the actual player file. Insert disk 1 and double-click on the UTHP.sea file and save the expanded file to a folder of your choice. Once the files have been extracted, double-click on the player file and the presentation will begin.

All users: To use the "Virtual Tour of UT and the Honors Program," you can click (only single-click) on any menu item where a hand appears. This presentation is modeled after

other hypertext documents that are point-and-click. If you happen to click on an area of a slide that is not hyperlinked, the next slide in the slide show sequence will appear.

Technical Information: This presentation was created on a Macintosh Quadra 840AV and Centris 650, pictures were taken with a QuickTake 100 digital camera, and were used as .PICT files. Adobe Photoshop was used to enhance or modify images. Other pictures were taken digitally from the University's Web Pages or scanned from brochures using a Relisys 2400 dpi flatbed color scanner or an Apple 1200 dpi flatbed color scanner.