Going Virtual: Creating Educational Resources for Tomorrow

By Robin Suits

With support from two National Library of Medicine (NLM) grants, faculty in the Department of Anatomy are creating vast databases of virtual anatomical objects and neurological teaching videos that are likely to be used by educators and clinicians worldwide for decades to come. Resources from both projects will be available for free download via the department's Web site.

It is an honor to have won such prestigious grants from NLM," says Jane N. Scott, Ph.D., chair and associate professor of anatomy. "One grant will support a scholarly activity that has already received national recognition. The other will involve close collaboration between a basic scientist and a clinician in creating a new resource that will be of great value to the field of neurology."

Anatomical Library

Gary L. Nieder, Ph.D., associate professor of anatomy, and Frank Nagy, Ph.D., associate professor of anatomy and surgery, are principal investigators on Anatomical Resources in the QuickTime® VR (QTVR) Format.

For hundreds of years, the time-honored tools used in teaching anatomy were dissection of anatomical specimens and viewing images of them in atlases, Dr. Nieder explains. Many undergraduates and others studying human anatomy in remote areas don't have access to human organs. "They have to rely on looking at atlases and charts alone, trying to mentally create a reality out of that," he points out.

Using virtual reality (VR) technology, the team will photograph hundreds of anatomical specimens to add to a collection of VR images they've been building since 1996. "We're going to build a large database—or library is probably a better term—of virtual anatomical objects that people at other educational institutions can download from the Internet to use in their lectures, tutorial programs, and other teaching activities," Dr. Nieder explains.

In 1995, Drs. Nieder and Nagy developed "Beyond Vesalius," a set of interactive programs for teaching sectional and radiological anatomy using images from the NLM's Visible Human Dataset. With the introduction of VR technology for the personal computer, Dr. Nieder, Dr. Scott, and Mark Anderson, multimedia director in the school's Interdisciplinary Teaching Laboratories, created "Yorick: The VR Skull," a program for teaching human skull osteology. Both "Beyond Vesalius" and "Yorick" are still used at Wright State and have been widely distributed to other medical schools and educational institutions through CDs and the World Wide Web.

"Using VR, we were able to create the illusion of holding and turning a three-dimensional object via a computer screen," Dr. Nieder says. As many as 640 photos of one object taken from all angles can be assembled to make an interactive "object movie" controlled by the computer user.

In spite of the fact that VR technology has been available for several years, few people are creating similar anatomical resources. "This work is incredibly time consuming and requires a level of technological sophistication few educators have," Dr. Nieder explains.

Neurological Teaching Resources

John C. Pearson, Ph.D., associate professor of anatomy, is principal investigator, and Thomas Mathews, M.D., chair and professor of neurology and professor of pathology, Dr. Nieder, and

Mark Anderson are co-investigators for the other NLM-funded project, Neurological Teaching Resources in the QuickTime Streaming Format.

"The long-term objective of this project is to establish a searchable database of digital videos depicting neurologic disorders and distribute them as a neuroscience resource to health care educational institutions. A lot of people in neuroscience have been asking for such a resource," explains Dr. Pearson.

"The neurological physical exam can reveal so much about nervous system function that it is an absolutely critical tool in making a neurological diagnosis. Neurologists have traditionally taught the exam through demonstrations using real patients or by video recordings of them. But these teaching methods have their limits based on patient availability and videotape distribution. Our objectives are to produce digital source videos and prepare them for computer network distribution to avoid the limitations of traditional teaching methods," he explains.

"We are developing a storehouse of digital videos of Dr. Mathews, who has taught neurology for more than 25 years, conducting physical exams on patients with neurologic disease," continues Dr. Pearson. The videos will be compressed in a QuickTime streaming video and stored in the database with patient records. "Users will be able to search the database for specific diseases or symptoms, review video clips, and, when they find the information they are looking for, they'll be able to download files they can distribute on a local area network accessed by their students. They can customize the materials to suit their curricular objectives."

Patients participating in the exams will represent all significant neurological disorders across a wide range of ages and both genders. Real names will not be used and the database will be password protected so that detailed medical records can be included.

The videos also could be incorporated into Web sites physicians reference in making diagnoses. Many neurological disorders are diagnosed and managed by primary care physicians, according to Dr. Pearson. A physician could search the database for a specific symptom or disorder and then view a video showing a patient with the symptom and his or her medical records.

"Material recorded today will have next generation potential—that is, it will be available to be repurposed and used with technology that has yet to be developed. This is a resource that will be useful well beyond our time," Dr. Pearson maintains.