### FY12 Innovations in Teaching with Technology Awards

**Proposal Title:** TILE-Configured Audiovisual Workstations for Gross Anatomy Laboratory Instruction  

**Investigators:** Justin Sipla  

**Org Unit:** Carver College of Medicine  

**Department(s):** Anatomy & Cell Biology  

**Funding Awarded:** $25,170

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The Carver College of Medicine Gross Anatomy Laboratory (BSB Room 1-8208;230) is the primary educational space for teaching human anatomy in the Department of Anatomy and Cell Biology (ACB). This laboratory and adjacent Ingram Learning Center occupy 5,098 sq. ft. of teaching space used for cadaveric dissections in specialized courses for medical, dental, and physical therapy students, plus courses in the physician assistant program, nurse anesthetist program, and various undergraduate and graduate programs. The space is also used for teaching Medical Neuroscience in the Spring Semester, the largest graduate course at the University of Iowa (~220 students), and the lab continues to be used for surgical demonstrations, plastination procedures, and as experimental space for multiple research programs. In total, nearly 1,000 students use this lab each year. Many of their courses are taught concurrently in the same room, creating conditions of overcrowding in the lab and strains on classroom resources. Reconfiguring the space for each occupant is time consuming and must often be undertaken on a weekly and sometimes daily basis, according to the needs of instructors and investigators. Maximizing the delivery of course content in these conditions is the principal challenge we address in this proposal.

To reduce overburden, the gross anatomy lab is now the focus of a major renovation and modernization project sponsored by ACB, soon to be under bid for contract, with building expected to be completed by Summer 2012. The budget for this project includes upgrades to basic power, lighting, and audiovisual systems, and remodeling of communications infrastructure using principles of the TILE classroom. We use the TILE designation informally and stress that the Anatomy Lab is not becoming a true TILE classroom, but that the designers and engineers involved in this project are using TILE principles to create physical and technology enhancements for the teaching spaces.
When complete, our lab will boast improvements to the teaching space, enabling active and collaborative learning, increased faculty interaction, and student engagement, consistent with the goals of TILE design.

Toward this, BSB Room 1B208;230 is being configured to accommodate six pod stations. Each pod station represents a modular teaching space supporting a cluster of five dissection tables with dedicated ceiling-mounted communications outlets, multimedia connections, and two flat-panel video monitors. Instructors will use a wireless touchpanel unit to quickly configure pods into any combination necessary for teaching, called an array. Each pod array will enjoy interlinked video, microphone sound, and lighting control, effectively creating a personalized teaching space separate from the unused pods. In this manner, the lab can be configured into any combination of six pod arrays at a time, and reconfigured just as easily.

One of the benefits of the pod arrays is the ability to broadcast multimedia content across interlinked monitors. Laptop computers can instantly push high definition video media to the screens for easy visualization of dissection instructions, medical images, and instructional material. Students can access the internet from a dedicated Wi-Fi LAN and use Iowa’s site license for CyberAnatomy directly in lab, with interactive content displayed on large LCD monitors.

We are requesting funds to supplement this renovation by adding stainless steel movable workstations to each pod, as well as funds for digital video equipment. Workstations will serve as mobile workbenches for placing laptops and video cameras, with storage for teaching materials, anatomical models, and specialized dissection equipment. Video cameras will be used to broadcast difficult aspects of live dissections to the rest of a pod, array, or the entire lab room via the monitors, enabling our instructors to deliver content in ways previously impossible. Installation will be completed with the lab renovation, during Summer 2012.

Curricular integration of classroom technology

As frequent users of classroom technology, we are well aware that it is not effective to simply place high-tech equipment in the presence of students and expect them to use it appropriately to maximize learning outcomes. Here we describe how mobile workstations and videography equipment will be integrated into our courses curricula with two purposeful learning activities to facilitate student learning: live video broadcast and prepared video projects.

Live Video Broadcast in Dissection Labs
An important learning objective in all gross anatomy courses is gaining an appreciation for variations in structure within a population of individuals. Students are encouraged throughout their dissections to share well-dissected representations of anatomy, unusual variations in structure, or clear evidence of pathology or surgical intervention with their classmates. However, in a large room filled with active dissectors, distributing these in the moment observations without hampering students progress is challenging. With live video capabilities, students will be able to simply grab the mobile workstation and broadcast their interesting findings to their pod, or with the instructor’s assistance, across the entire laboratory. Further, instructors in our anatomy courses frequently use prospected specimens to demonstrate challenging dissections. These video capabilities could be used to address the entire class rather than bringing one group to a specimen at a time.

Video Projects to Document Anatomical Regions/Concepts

Peer teaching and presentation of dissection is an essential feature of all of our gross anatomy courses. Mastering content to the level required to present it to another learner encourages thorough dissection work and professionalism in the classroom and we propose to enhance these features more fully through use of this technical innovation. This technology will enable students to represent their knowledge in novel ways, and encourage a higher standard of professionalism than what is seen in typical face-to-face presentations.

Each group of students at a dissection table will be responsible for preparing one 5 minute video demonstration of a particular anatomical region or medical concept over the course of their semester in the lab. They will be encouraged to choose the dissection recorded based on the quality of their work and the unique features of the cadaveric specimen revealed during dissection. Their presentations should emphasize those unique features, highlighting the importance of anatomical variation.

Once videos are stored on the ICON course site, they will be made available for streaming viewing by other students in the class from any local or remote computer. This will provide another way for students to engage with dissection (still the most effective way to learn anatomy) away from the physical constraints of the anatomy laboratory.

Evaluation of Instructional Improvement

In order to determine if incorporation of this technology is effective in the anatomy classroom, we propose to assess the project from several angles. First, usage statistics will be gathered by course staff to determine how frequently students or faculty utilize the video capture system to broadcast anatomical variants or evidence of
pathology out to the class. We plan to record these statistics for at least one year because in previous technological upgrades we have experienced a slow, but gradual increase in usage over several semesters before a typical rate of usage is reached. Second, student and faculty satisfaction surveys will be collected for one year to address the educational value of the video projects. In this survey we plan to investigate the comfort and confidence level of students in the areas that they prepared videos for and compare them with areas that they did not prepare videos for. The results of these surveys and usage statistics will be used to establish a list of best practices that will be used to refine the use of this technology in future courses.

The renovation project for the Gross Anatomy Lab includes provisions to purchase and install new lighting systems, basic telecommunications materials including dedicated ceiling-mounted communications outlets, 55 flat panel monitors, speakers, and rack components necessary to configure the multizone pod system, as detailed in the first section.

We are requesting funds, specifically, to enhance this building project with materials outside the scope of the renovation proposal, specifically:

* Six (6) stainless steel mobile workstations
* High-quality digital camera heads, recorders, and mounting armature for six (6) workstations

Workstations

What is needed for each pod is a movable workstation that can be positioned beneath the communications pedestal, at the center of the dissection tables. This workstation will have a flat-top stainless steel surface suitable as a workbench for computers, while also providing storage space for teaching materials, bones and anatomical models, and specialized dissection equipment common to the teaching of most anatomy courses (bone saws, hammers and chisels, basic dissection tools, etc.). Through preliminary testing, we have determined that a standard industrial quality tool bench, available through retail stores like Sears, will achieve the goal of housing equipment in a durable, easy-access location.

Digital Cameras

An additional feature to implement into the mobile workstations is high-quality digital video equipment to enable students and faculty to broadcast aspects of their dissection work to the rest of a pod, array, or the entire lab room. After touring the facilities of the UI Ophthalmic Videography Service with Director Randall E. Verdict, we identified the Panasonic AG-HCK10G camera heads and AG-HMR10 portable recorders as ideally
suited and cost appropriate for this purpose. These camera heads are small, durable, and allow users to shoot from angles that would be difficult with bulkier systems, such as high places and narrow spaces. Image quality is superior, recording full-raster HD images with high resolution, ideal for demonstrating intricate anatomical systems on HD monitors. The camera heads also have built-in stereo microphones, allowing our instructors to record audio commentary and broadcast this content to their pod array without complicating the procedure with additional microphone equipment.

Each head will be mounted on 2-section articulated arms and positioned via clamps to the central workstation for each pod. The lightness of the camera head and the repositionability of the clamp allows the equipment to be easily mounted to cadaver gurneys or other substrates, as necessary. The camera head teams with the AG-HMR10 recorders. This unit will be mounted permanently to the side of each workstation. It allows for centralized and intuitive control of camera parameters such as zoom, focus, iris, shutter speed, as well as camera setup.

<table>
<thead>
<tr>
<th>Rough estimate of costs</th>
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<tbody>
<tr>
<td>Craftsman 52&quot; Wide 14-Drawer Griplatch Tool Cart x6 @ $845 e. = $5,070</td>
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<tr>
<td>Panasonic AG-HMR10 Handheld AVCCAM HD Recorder/Player x6 @ $2,600 e. = $15,600</td>
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<tr>
<td>Panasonic AG-HCK10G POVCAM Full HD Camera Head x6 @ $1,800 e. = $10,800</td>
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<tr>
<td>Camera head cables, memory cards, and threaded adaptors x6 @ $1,350 e. = $8,100</td>
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<tr>
<td>Manfrotta Super Clamp w/2-Section Single Articulated Arm x6 @ $100 e. = $600</td>
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<tr>
<td>TOTAL ESTIMATED COSTS: $40,170</td>
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For more information on the Innovations in Teaching using Technology Awards, please send an email to: Innovation Strategies for Teaching & Learning.

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