"The students also appreciate the more general relevance of this experience for important aspects of their future in a technological world, including careers, medicine, and graduate school."

Robert Glassman, Ph.D.
Chair, Psychology

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Thanks to Steven Shaun Peterson for the cover artwork. Shaun obtained his BS in Biology, Spring 2006, as a non-traditional student at Marian College in Fon du Lac, Wisconsin. He was once a BFA Film/BSAS Architecture major. He took a break in his education to join the US Army where he became a field combat medic, EMT, and Licensed Practical Nurse. These experiences in the medical sciences helped Shaun to recognize a love of all aspects of Biology. He has used his drawing skills throughout his education to assist in the 3-dimensional understanding of subjects typically taught in two-dimensions. This drawing was done for Bio 206: Scientific Illustration. Shaun currently has applications out to many different biotechnology companies in the Madison, WI area as well as clinical research departments in surrounding medical centers.
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**HAPS-EDucator**

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**HAPS-EDucator** is the official publication of the Human Anatomy and Physiology Society (HAPS) and is published four times per year. Major goals of the Human Anatomy and Physiology Society are: to promote communication among teachers of human anatomy and physiology in colleges, universities, and related institutions; to present workshops and conferences, both regional and national, where members can obtain information about the latest developments in the health and science fields; and to encourage educational research and publication by HAPS members. HAPS was established in 1989.

Annual membership dues are $50. Annual membership renewals shall be due on January 1, or July 1. New members shall renew on whichever date most closely follows the date of their initial membership. **HAPS Hotline: (800) 448-HAPS (4277).** Information on membership, meetings, and more! Send correspondence to: HAPS, 8000 Bonhomme, Suite 412, St. Louis, MO 63105. Check out our new webpage at: [http://www.hapsweb.org/](http://www.hapsweb.org/)

**SUBMISSIONS TO HAPS-EDucator**

Papers for publication, requests for information, positions available and wanted, and letters to the editor are welcomed. Articles may be submitted to the editor as an e-mail attachment as a Microsoft Word or Word Perfect file, 3.5” double density disks—please include a hard copy as a backup. If references are included, please follow the methods suggested in *Scientific Style and Format: The CBE Manual for Authors, Editors, and Publishers*. 6th Edition, Style Manual Committee (Council of Biology Editors) Cambridge, Cambridge University Press. 1994.

It is the policy of the Human Anatomy and Physiology Society (HAPS) that any advertising appearing in its publication(s) must be related to the teaching of anatomy and physiology. The **HAPS-EDucator** Editor and **HAPS-EDucator** Editorial Advisory Panel jointly determine whether an advertisement meets the criteria of HAPS. Any advertisement that is deemed not to meet the needs of the organization will not be printed, and the advertisement plus any monies collected from the advertiser will be returned. The opinions reflected in advertising that appear in this publication do not necessarily represent the opinions of HAPS. Advertisement of a product in the **HAPS-EDucator** does not represent endorsement of that product by HAPS. Contact the Editor for information on advertising rates, advertisement size and the procedure for submitting an advertisement to **HAPS-EDucator** for publication.

**DEADLINES FOR SUBMITTING MATERIAL TO HAPS-EDucator:**
- April 15 (Summer issue)
- August 1 (Fall issue)
- November 1 (Winter issue)
- February 1 (Spring issue)

**CONTACT THE HAPS-EDucator Editor:** Susan Baxley, 8000 Bonhomme, Suite 412, St. Louis, MO 63105. hapsed@hapsweb.org
Greetings - continued on page 4

Spring and summer have arrived in most areas of the US (they never left Maui). It is hard to believe that by the time you read this, the HAPS Annual Conference in Austin, TX, will be a wonderful memory, and I will have made the transition from President to Past-President. It has been a busy year, and time has rocketed past.

On the issue of faculty credentials and accreditation, we have continued to press the Southern Association of Colleges and Schools (SACS) to clarify their position regarding qualifications and the utility of professional degrees. Although the Commission on Colleges had revised its printed guidelines for the review of faculty, the SACS Chief Consultant and head of the Consulting Network not only continued to recommend the old guidelines in discussions with administrators, but went further, advising them to disqualify holders of professional and clinical degrees. In March and early April, our Position Statement was endorsed by the American Association of Anatomists, the American Physiological Society, the American Chiropractic Association, the American Veterinary Medical Association, the American Physical Therapy Association, and the American Association of Anatomists, the American Physiological Society, the American Chiropractic Association, the American Veterinary Medical Association. Draft letters to SACS and to the Council for Higher Education Accreditation were prepared and circulated for review to these societies and to their related college societies, such as the Association of Chiropractic Colleges and the American Association of Veterinary Medical Colleges. While collecting feedback on those drafts, we learned that Dr. Margaret Sullivan, the SACS Chief Consultant, has resigned. We are hoping that this welcome event will break the impasse and make it easier for SACS to clarify their position.

With regard to the course and faculty survey on the website, we now have accumulated data from courses teaching over 50,000 students. The data were presented as a poster at the joint meetings of the American Association of Anatomists and the American Physiological Society in April. These survey data are available as a download from the HAPS website. We will continue to collect data, so please fill out the survey if no one else at your college has already done so. There is also a poll concerning the pass/fail rates of anatomy and physiology students, and you should consider filling that one out as soon as possible.

In other news:

• AAA has agreed to let HAPS members receive CME credits for courses held at their annual meetings. We are also exploring joint regional meetings and collaborating on continuing education programs.
• We are investigating options for offering continuing education programs, with accreditation through the University of Washington system; Sandy Lewis has been spearheading this initiative. AAA and APS both seem interested in working with us on course design and delivery.
• The Membership Committee has been very active, through the efforts of the new co-chairs, Jon Jackson and Valerie O’Loughlin.
• The Regional Conference Committee has set up more formal protocols and guides to assist members wishing to host a regional conference. Since January, Ewa Gorski has been “shadowing” Javni Mody, in preparation for assuming the chair of that committee.
• Javni Mody, while working with Ewa on the RCC, has been working with Donna White as part of her transition to the position of HAPS Marketing Manager. Together, Donna and Javni have done a great job working with the exhibitors for the Austin conference.
• The Curriculum Committee chaired by Carol Veil has continued to work on a set of outcomes to accompany, and complement, the Core Curriculum Guidelines.
• The 2006-2007 budget has been drafted, reviewed, and approved for presentation at the Annual Business Meeting at the 2006 annual conference.
• The website has continued to be updated and enhanced, with optional surveys (and posted results), committee publications and reports, and other items of potential interest to the membership.

Throughout all this, the other committees have been busy, and, of course, one of the busiest has been the Annual Conference Committee. Mary Lou Percy and the members of her Conference Committee have been working with Tonya at HAPS Headquarters, making sure that the Austin Conference would be an exciting and rewarding one.

HAPS is growing and reaching into new areas, and we will continue to provide new member services over the years to come. In fact, our biggest problem of late has been that we have more ideas and more tasks that need doing than we have people to do them. So if you enjoy being a member and you appreciate what HAPS does for the membership, please give some serious thought to becoming more involved – now, not later. There are many ways to be involved, but here is my personal wish-list:

• Join a committee, or volunteer to be part of a new com-
Greetings - continued from page 3

mittee dealing with continuing education, faculty credentialing, or public relations and media. If you do not know what you would like to be involved with, send me an email and we can probably sort out something in HAPS that needs to be done that falls in your areas of interest.

• Recruit a junior faculty member to join HAPS; a significant block of the membership is nearing retirement age, so we need to look to the future.
• Run for office. In case you have not noticed, fewer and fewer candidates are stepping forward each year, and that makes me very nervous. I can assure you that there is never a perfect time to run for office, so you might as well just go for it.
• Help spread the word about HAPS to your colleagues, administrators, media contacts, and other organizations.

This represents my “swan song” as your President, and, before closing, I want to say that it has been a great honor serving in that capacity. The Board has been wonderful to work with, and the Committees have been productive. By the time you read this, Joe Griswold will be your President, and I am looking forward to assisting him as needed.
Catch the Wave in San Diego

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Get ready to pack your swimsuit and surf on over to San Diego for the 21st Annual HAPS Conference that will be held May 26-30, 2007. The HAPS 2007 Conference Planning Committee has already selected the hotel and is scheduling a fantastic slate of speakers and activities.

The update seminars and vendor exhibits will be held at the Sheraton San Diego Hotel and Marina. The hotel is located on the edge of spectacular San Diego Bay and enjoys panoramic views of the bay and the city skyline. Being located adjacent to the airport, the hotel is offering free airport shuttle service.

The Sheraton San Diego has amenities that will guarantee a wonderful time. There are three swimming pools – two large adult pools and a separate children’s pool. Play water volleyball or soak in the hot tubs while you enjoy views of the marina and the San Diego sunshine. The hotel also has four lighted tennis courts, a fitness center with sauna and steam rooms, and a spa that offers a variety of massages and aromatherapies.

Convenient dining is not a problem. Six restaurants and lounges are in the immediate hotel area and several more are within a 10-minute walk of the hotel lobby.

The area around the Sheraton is simply beautiful. There are miles of waterfront pedestrian walkways for strolling or jogging. You can even rent a bicycle from the hotel to cruise along the bay and view the marina. Or you can just sit on one of the many benches along the waterfront and watch the sailboats navigate the bay on their way to the Pacific.

The San Diego Sheraton is just five minutes away from the bustling downtown Gaslamp District with over 90 restaurants and clubs. This historic area is the center of San Diego dining and nightlife. From sidewalk cafes to underground dance clubs, the Gaslamp District is a must see location during your stay.

Additional area attractions include historic Old Town San Diego, the birthplace of California, as well as 1,200-acre Balboa Park, home of the largest concentration of museums west of the Mississippi. Of course, no trip to San Diego would be complete without a visit to SeaWorld or the world
famous San Diego Zoo.

Other downtown attractions include Horton Plaza, a six-block, four-story shopping district that includes major retailers such as Macy’s and Nordstrom, as well as many local specialty boutiques. Every visit to San Diego should include time at Seaport Village, a local landmark for waterfront shopping and dining. At Seaport Village, over 57 shops and galleries, 13 sidewalk eateries, and four restaurants are accentuated by the beautiful views of the bay and Coronado. Petco Park, home of the San Diego Padres Baseball Club, is also located in downtown San Diego. The 2007 baseball schedule will not be available for months, but let us all keep our fingers crossed that the Padres will be in town for a home stand.

San Diego is also home to over 70 miles of beaches and over 90 beautiful golf courses. Be sure to visit the beaches of La Jolla or Coronado. True golf aficionados are sure to enjoy a round at the legendary Torrey Pines Golf Course. Its 36 holes are located atop cliffs along the ocean that offer breathtaking views. Torrey Pines provides a rare opportunity because it is the only public golf course that hosts a PGA event. Tee times are difficult to get, so be sure to make arrangements well in advance.

The HAPS 2007 Planning Committee is also arranging for terrific social events. Our Sunday evening event is scheduled to be held aboard the USS Midway, which is now the San Diego Aircraft Carrier Museum. Enjoy a buffet dinner aboard the longest serving carrier in U.S. Navy history. Tour the flight deck, hangar deck, galley, sickbay, and all of the over 20 aircraft and 35 exhibits that are on display. In a combination of stationary and motion simulators, you can land on and then catapult off of the Midway flight deck, dogfight enemy aircraft, or fly with the Blue Angels. This is a perfect event for a Memorial Day weekend.

There is so much to do in San Diego you may want to bring the family and stay through the following weekend. The Sheraton will extend the conference rate if you chose to do that. Join those who have extended their visit for a trip to the San Diego Wild Animal Park on Thursday after the conference. Presently, we are planning a day at the Wild Animal Park that will include private shows and behind-the-scenes tours.

The conference workshops will be held at San Diego Miramar College. The campus is 25 minutes from our hotel and boasts a brand new state-of-the-art Science and Technology building. With eight laboratories and 12 classrooms, this single building will conveniently serve as the heart for our workshops. Every instructional area is equipped with the latest in computing and audiovisual technology. So, consider presenting a workshop that will be easily delivered and visually stunning.

HAPS 2007 will also include the event elements to which we have all become accustomed. The Saturday evening hotel welcome reception is planned to be located between the marina and pool. Visit with your HAPS colleagues while you watch the sun set behind Point Loma and enjoy the evening breeze. The Monday evening banquet is scheduled to not only include fine dining, but dancing as well.

The Conference Planning Committee invites you to visit San Diego for HAPS 2007. Count on us to provide you with a quality experience in an unparalleled venue. We are your resource for information and planning, so contact us if you have any questions. Below are some web links you can surf on over to for more information. Or simply send an email to kpetti@sdccd.edu if you have a specific question, concern, or suggestion.

See you in 2007 when HAPS will Catch the Wave in San Diego!

Web resources for San Diego:
Sheraton San Diego Hotel and Marina: http://www.starwoodhotels.com/sheraton
San Diego Convention and Visitors Bureau: http://www.sandiego.org
Old Town San Diego: http://oldtownsandiego.org
San Diego Aircraft Carrier Museum: http://www.midway.org
Seaport Village http://www.spvillage.com
Torrey Pines Golf Course http://www.torreypinesgolfcourse.com
SeaWorld http://www.seaworld.com
San Diego Zoo and Wild Animal Park http://www.sandiegozoo.org
Most academic departments are encouraged to maintain and promote service initiatives, not only on campus but also in the local community. These service initiatives, often referred to as “community outreach,” can be a “win-win” situation for the academic department. The community receives services they may not otherwise obtain, and the academic department receives external exposure and develops ties with community leaders.

The Medical Sciences program at Indiana University Bloomington (IUB) is a relatively small (18 faculty) department that instructs many undergraduates, graduates, and medical students. Our largest course is Anatomy A215, which instructs a total of 800 students each year. The Anatomy lab utilizes models, histology slides, and two prosected cadavers. The cadavers are dissected the previous summer by the two Associate Instructors (AIs) who will help teach in our medical gross anatomy lab. In this way, our gross anatomy AIs receive valuable anatomical experience prior to their own teaching, and our undergraduate lab receives nicely prosected cadavers. In the Anatomy A215 lab, there are two AIs who demonstrate anatomical features on each of the cadavers to the students. The students are not allowed to touch the cadavers (so structures will not become damaged) and students are not allowed to photograph the cadavers.

Medical Sciences faculty and staff utilize the cadaver labs for community outreach as well. These community outreach projects help us justify the expense of utilizing cadavers in our undergraduate lab and have created stronger ties between the university and the community. Examples of our community outreach projects include the following:

1. We assist Emergency Medical Technicians (EMTs) with their training. The instructor of the local EMT class is an employee of Bloomington Hospital and has worked with IUB for many years. The EMT instructor brings his students to our undergraduate anatomy cadaver labs for one of their classes each semester. We demonstrate anatomical features on the cadavers, discuss potential health problems that can be observed on the cadaver, and allow the students to see what some of the body’s internal organs look like. Most of these students have already volunteered on ambulance “runs” and have seen some basic care, but they tell me that they never cease to be amazed by examining the cadavers. Many say they appreciate the anatomy even more now that they have had a chance to review the three-dimensional anatomy on a formerly living human being. Some of the EMT students have already taken our undergraduate anatomy class and enjoy coming back, while for others, this field trip inspires them to enroll in our Anatomy A215 class in the future. In addition, we strengthen our ties with Bloomington Hospital by volunteering in their educational endeavors.

2. We provide anatomy “refresher” courses for engineers and sales representatives in local medical instrument manufacturers and pharmaceutical corporations. Bloomington is home to several well-known medical instrument manufacturers and pharmaceutical corporations. These corporations employ engineers and sales representatives who must have a good understanding of anatomy before they can produce or sell their products. We at IUB have worked with these groups in multiple ways. Sometimes we volunteer our time and demonstrate a portion of the anatomy to a group of engineers who may want to see “up close” how their instrument will be used. For example, we have demonstrated the limb and trunk vasculature to medical instrument engineers who wanted to better understand the shape and texture of the abdominal aorta, as well as the femoral artery, so that they could design a better aortic stent.

Other times, some of these organizations have wanted to have intensive one- or two-day courses that review the anatomy and physiology of a particular system. For example, some groups have asked for an intensive overview of the cardiovascular system, and the target audience included the sales representatives for the organization. The company is charged a reasonable fee for more intensive courses likes these, and proceeds go to both the instructors of the course and to our department.

3. We provide an introduction to the human body to middle school students.
Body Bag - continued from page 7

School and high school students throughout the state of Indiana. We receive numerous requests for students to view the cadavers in our undergraduate anatomy labs. Medical Sciences set up some basic policies to prioritize such requests. First, we typically set up volunteer demonstrations for high school students, and occasionally for middle school students, who have had some previous exposure to anatomy in their current curriculum. We feel students should be of a certain age and maturity to appreciate the experience and recognize the fact that the cadaver they are viewing was once someone’s mother, father, or loved one. One or two Medical Sciences faculty/staff each demonstrate features on a cadaver. We illustrate how the lungs may become blackened due to smoking, how we can tell if someone had atherosclerosis in the coronary vessels, and if someone had a hysterectomy prior to death. Students are not allowed to touch the cadavers, but are encouraged to ask questions about the body. Some of our former Anatomy A215 students, who now teach anatomy in high schools across the state, have brought their anatomy classes back to the lab for this experience.

4. We strengthen ties with other campus departments by helping participate in other departments’ community outreach programs.

The Biology Department has a once-a-year outreach program for middle school and high school students in northwest Indiana. These students travel to campus during the summer and spend four days here, under adult supervision, and learn about the biological sciences. Medical Sciences faculty and staff assist with the program on one of these four days by having cadaver demonstrations. Some students initially claim to be “grossed out,” but within a few minutes of seeing various anatomical features, they become excited and ask lots of questions. Students evaluate the cadaver demonstrations as one of their best experiences during the four day event. In addition to helping a valuable outreach program, Medical Sciences and Biology programs have strengthened their connections as a result.

Our anatomy cadaver labs “pay for themselves” in terms of the community outreach and exposure we get on campus and the community. Such community outreach programs help justify the expenses of the lab and provide us with great opportunities to interact with a myriad of individuals interested in the health sciences. If you are considering developing a cadaver lab, or need reasons to justify the existence of your lab, look no further than your community for assistance!

Correction to Urine Recipes Article

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The article “Urine Recipes” in the Winter 2006 edition of HAPS-EDucator misidentified Chex-Stix™ Positive Control Strips as Chex-Sticks™, making it difficult for readers to find this product. I regret this error. Chex-Stix™ (product 1360) can be purchased from Fisher Scientific’s web site at https://www1.fishersci.com/Coupon?cid=1333&gid=113564. The cost is $57.07 for a bottle of 25 strips. This product can probably be purchased from other biological supply companies as well.
Imagine having an entire anatomy library on a single DVD.

With A.D.A.M. Interactive Anatomy 4 (AIA 4), you have the world's most comprehensive digital database of detailed anatomical images and animations at your fingertips. This complete anatomy reference and authoring tool features more than 20,000 anatomical structures as well as nearly 600 clinical illustrations showing disease states, injuries, first aid, surgical procedures, cellular components, and more. From fully dissectible male and female bodies to interactive 3D models, cadaver prosection images, and flexible annotation tools, AIA 4 enables you to create, organize and package anatomy lessons that will capture the imagination. To receive a free demonstration copy, visit www.adam.com/aia or call 1-800-755-2326.
Interactive Electronic Response Systems Boost Understanding and Enjoyment in Anatomy & Physiology

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Frequently Allied Health majors in two-year colleges can be intimidated by taking Anatomy & Physiology and other science courses. Many have had little previous coursework in the sciences and are reluctant to raise their hands and ask questions for fear of looking stupid in front of their classmates. Likewise, students are hesitant to respond to instructor-posed questions over lecture content during class. This can make it difficult for the instructor to gauge understanding and to encourage student participation. It can be even more challenging to involve students in large lectures.

Interactive Technology Program

A pilot program to enhance student learning and confidence was recently implemented in several Anatomy & Physiology I lecture sections. Each lecture section contained between 50–60 freshmen and sophomore students. The students used hand held remotes to respond to conceptual questions (Conceptests™) that I had provided on the lecture topic. The system allowed me to view student responses in real-time and included the practice of peer instruction. Peer instruction is a way of breaking the lecture time into short segments, each of which is followed by several multiple choice questions. Students are asked to respond individually to a question by using their remotes. The responses are anonymous in that only the answerer knows whether his/her response was correct or incorrect. The system is used to register the students’ answers and generate a histogram of responses. Questions and histograms are viewed on the screen in front of the class. Then, each pair of students is given a few minutes to discuss their answers before answering again. This process often results in an increase in the number of correct answers and in student confidence in their answer choices (Fig. 1).

Peer instruction coupled with the interactive remote system provided a rapid method of formative assessment of student understanding, requiring only modest changes to the classroom environment and introducing many of the recognized principles of effective teaching that enhance student learning. Chickering and Gamson provided the following seven principles of good practice in undergraduate education and indicated the use of interactive technology, Conceptests™, and peer instruction results in the application of the principles listed below.

1. Encourages student-faculty contact. The interactive technology and peer instruction provides faculty with an opportunity to interact with students by facilitating discussions as she/he moves around the classroom.
2. Encourages cooperation among students. Peer instruction provides occasions for students to talk and listen to their neighbors to improve their understanding of concepts. Those students who grasp concepts can help those who do not.
3. Encourages active learning. The use of the system transformed students from passive lecture attendees into active participants who are involved with their peers and answering questions. Improved student attitudes and a lively gameshow atmosphere can be seen in class.
4. Gives prompt feedback. The use of the electronic response system makes rapid feedback possible. Formative assessment during class measures student understanding immediately following the introduction of key concepts. Students are also able to self-assess their level of understanding relative to their peers.
5. Emphasizes time on task. Since small numbers of Conceptests™ are posed per class, it is fairly easy for stu-

---

The diagram depicts what type of joint?
A. Diarthrosis (2%; 0%)
B. Amphiarthrosis (62%; 85%)
C. Symphysis (26%; 11%)
D. Synarthrosis (11%; 4%)

Figure 1. Conceptest™ used in Anatomy & Physiology class, fall 2004. Proportion of student responses in parentheses (initial answer; answer after peer instruction).
Educational Issues - continued from page 11

6. Communicates high expectations. The integration of Conceptests™ into lecture sets higher expectations for student performance than simply taking notes and can challenge students to seek understanding of the Conceptests™, not just memorization of basic facts.

7. Respects diverse talents and ways of learning. The traditional passive lecture is geared to auditory learners who prefer to take notes, work alone, and ask questions when they are unclear on topics. Such students are fairly rare in undergraduate freshman and sophomore classes. The interactive technology system involves both visual learning and social learning. Peer instruction centered on Conceptests™ teaches some students how to think critically while others can assume the roles of peer instructors.

Student Data

Students completed satisfaction surveys at the end of the semester and were asked to identify positive and negative aspects of the use of the Conceptests™ and the interactive remote system. Survey scores showed that students thought the system improved their performance in class, increased their willingness to ask questions, and made the class more enjoyable. Students identified a range of positive attributes for the system while the negative comments focused almost exclusively on the use of technology. It is interesting that the negative comments were not focused on the pedagogy of this teaching method.

Summary

There are positive reasons for incorporating interactive technology and peer instruction into Anatomy & Physiology classes. Students enjoyed using the remotes, were actively involved in their learning, and attendance improved over previous semesters when the system was not being used. The use of this technology improved student understanding of concepts and encouraged the incorporation of good teaching practices.

References


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Finding Relevance in the News

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What is the meaning of the word relevant and what makes something relevant? According to the American Heritage College Dictionary, relevant refers to something “connected with the matter at hand; to the purpose; pertinent.” Many educators believe that if we use something (a concept, term, etc.) that we can connect to our work or daily lives, we will remember that concept or term for a longer period of time than when it is simply memorized for an examination. Anatomy and physiology is certainly alive as a discipline for us, the teachers, but for students the memorization of facts, terms, and processes may obscure the connections that would help them retain the material.

Educational Issues - continued on page 12
Teaching Cadaver Anatomy
A Variable, Multi-Station Approach

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Introduction
Most graduate-level allied-healthcare institutions require dissection of the human cadaver during the first year of a two-to four-year program. A number of undergraduate colleges and universities offer cadaver dissection to prepare students for postgraduate dissection, but these trends are changing with the increasing costs to store and maintain enough specimens to allow all students the chance to dissect. Schools that continue to offer cadaver courses have reduced the number of specimens to maintain a lower overhead. In fact, many undergraduate students learn by studying preserved specimens. Consequently, most undergraduate students are not afforded the opportunity to dissect the cadaver. So, while the students continue to learn the anatomical structures, little dissec-
Materials and Methods

Lecture occupies the first 1½ hours of class. Regional and basic clinical aspects of anatomy for that day’s laboratory are covered during this period. A set of lecture notes available to the students covers regional anatomy with an emphasis on the clinical aspects of each region. A Grant’s Atlas of Anatomy PowerPoint™ presentation provides the visual aspect of the lecture portion. This presentation is supplemented with X-rays, MRIs, CT scans, angiography, and the Visible Human Project™ published by the National Library of Medicine.

After lecture, the students break into four groups of six to prepare for the laboratory section of the course. Since one cadaver is utilized throughout the course, the original dilemma was finding a way to occupy 24 students’ attention during a four-hour time period that met twice weekly. To meet this challenge, the three-hour laboratory period was divided into two 1½-hour time periods. Next, four laboratory stations were set up, allowing each group of six students to rotate through each station in one week.

Station I begins with dissection of the human cadaver. Each laboratory group has the opportunity to dissect the specimen every week. Station II utilizes X-ray and MRI in conjunction with the disarticulated bones of the skeleton to allow students to visualize the human skeleton from a three-dimensional and two-dimensional plane. Development of this skill is vital for most healthcare professionals. Station III utilizes the Visible Human Project™. This popular product funded by the National Library of Medicine shows the male human body from several different planes and perspectives. Students at this station observe two-dimensional cross-sections of the human body, which allows them to visualize soft tissues and compare them to MRIs and CT scans of that respective region. Station IV incorporates clinical anatomy case studies allowing the students to develop critical thinking skills in a group setting to answer questions related to human anatomy and pathology. The four stations allow all twenty-four students the opportunity to dissect once per week and to learn detailed human anatomy from several different perspectives.

Students in the Advanced Human Cadaver Anatomy course take four lecture exams throughout the semester. Examinations contain predominantly essay questions that test lecture concepts, application of knowledge, and critical thinking skills. These essay tests challenge the upper-division students by assessing their ability to formulate and express a logical answer on paper.

Results

Most feedback from students is very positive. A course objective packet, given to each student at the beginning of the week, allows students to focus on specified laboratory material. Student evaluations which are processed at the end of the semester provide valuable insight into class effectiveness and unbiased student satisfaction. Attrition rates for this class as of mid-semester are comparable to other junior-level college courses at Metropolitan State College of Denver. The statistical data from six years of course evaluations are listed below. Faculty Mean is based on a 6 point rating scale with 1 rated - very poor, 2 - poor, 3 - fair, 4 - good, 5 - very good and 6 - excellent.

<table>
<thead>
<tr>
<th>Spring 2005</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student overall satisfaction with course:</td>
<td>5.70</td>
</tr>
<tr>
<td>Student satisfaction with course content:</td>
<td>5.70</td>
</tr>
<tr>
<td>Instructor contribution to the course:</td>
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Discussion

Since developing the cadaver course in 1999, a number of changes have been made to strengthen the lecture and lab content for the course. Lecture and laboratory study guidelines are prepared and handed out each week. These guidelines allow students to focus on the key concepts required to understand human anatomy. As mentioned earlier, a significant amount of time was invested in developing PowerPoint™ presentations for the cadaver course during the summer of 2004. This was time well spent as student response to the new lecture format was extremely positive. In lecture, PowerPoint™ presentations, writing on the chalkboard, and interjecting critical thinking questions all serve to engage classroom discussion and to accommodate the different learning styles of each student. The four lab stations also benefit
Educational Issues - continued from page 13

different learning styles. Whether a student is a visual, tactile, or auditory learner, each station utilizes the various senses to learn about the world of human anatomy.

This course can be adapted to fit into a one-semester, two-semester or three-quarter format. Physical examination equipment and various physical examination textbooks can also be incorporated into the case study station. This provides the student with another set of teaching aids that allow basic examination of the human body.

Conclusion

The technological horizon shows great promise in the field of healthcare. Medicine is in the beginning stages of using computer simulation programs that allow physicians to perform virtual surgery before ever touching a patient. Preliminary programs are currently being developed for that exact purpose. Until this becomes commonplace, cadaver dissection will be an integral part of the pre-professional and a professional healthcare student’s coursework. Due to the rising cost in education, institutions continue to look for ways to provides students with valuable and sometimes expensive courses without overextending their budget. This course fulfills that need by integrating currently utilized, yet inexpensive, medical technology to support the basic cadaver teaching model, while allowing all students the opportunity to dissect the cadaver.

* I would like to acknowledge the contributions of Dr. Patricia Stranahan during the initial development of this course.*

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EDU-Snippets is a column designed to let you – the members of HAPS – share your personal or institutional educational experiences. So, here are this edition’s contributions! Our theme for this issue is Cardio-Snippets – ways in which you, the HAPS members can make the teaching of the cardiovascular system more meaningful to your students.

For the sake of column continuity, we have done a bit of editing. We have also avoided quotation marks (except in-text). However, we think everyone will be able to tell where our introductions and commentaries leave off and where our contributors’ words begin. We have also used a modified outline format to help with the organization.

I. Introducing Organ-Snippets

We sent out the call for Cardio-Snippets, and we got two fantastic ideas, which are explained below. We also heard from some people that you, the members of HAPS, would like to have some specialty EDU-Snippet columns based on particular anatomical and/or physiological systems. We have not made up our collective editorial minds on this yet, but we do think it is a good idea, and we look forward to hearing what you think.

In any case, we begin this series with Cardio-Snippets.

II. Balloons, Blood Pressure, and Baroreceptors

Pat Bowne (Alverno College, Pat.Bowne@alverno.edu) sent us a fascinating way to use a balloon to teach some basic cardio-physiology.

Pat says we need long balloons and air pumps to make this work. She also says…. Take the long balloon and snip off the end. Then go outdoors and pump air through it for a while with the air pump to get all the latex dust out. It will make amusing noises, and passing students will think you are a goon. Do not let that bother you!

Back in class, give each group of three students an air pump and a snipped balloon. (One student represents the heart, one student the sphincter, and the third student the baroreceptors.) The group’s first job is to inflate the balloon halfway, but they may not tie knots in the ends of the balloon. The students will immediately figure out that it is impossible to inflate the balloon at all unless they hold the end closed. At this point explain to them that the balloon is the artery, the pump is the heart, and the person holding the end closed represents the arteriolar (or precapillary) sphincters. If those sphincters do not resist the flow of blood out of the end of the artery, arterial blood pressure (BP) will drop. Hence, “peripheral resistance.”

When the balloon is partly inflated, it is easy to explain to the students that while we measure blood pressure in the artery from the outside by seeing how hard we have to squeeze to collapse it, the body measures blood pressure from the inside via stretch receptors in the wall.

Have the students mark the end of the blown-up portion of the balloon (approximately 1/2 length of the balloon), then let the air out of it. This mark indicates normal blood pressure. Now have the person representing the heart pump air into the balloon and the person representing the sphincters hold the end closed. Since neither of these organs can measure BP, the students representing the heart and the sphincters must shut their eyes. The third person, the baroreceptor, looks at the mark on the balloon and tells the “heart” and the “sphincter” what to do in order to maintain a normal blood pressure in the balloon.

You can make this more difficult by telling the “heart” to slow down or speed up, to make larger or smaller strokes, or by telling the “sphincters” to dilate or constrict.

Have the students summarize what they had to do to maintain the blood pressure. Translate that into terms of cardiac output (CO) and peripheral resistance (PR).

This is a noisy exercise even when people do not burst their balloons. It has potential hazards for anyone with latex allergies, unless the balloons are well cleaned beforehand. Aside from those concerns, this exercise seems to please my students tremendously. It is fun and it does teach some of the basics of cardio-dynamics in a way that they can and do remember.

III. Lubb-a-Dupp, Dupp, Dupp

Janet Sherman, (Pennsylvania College of Technology jsheerman@pct.edu) had a great idea for teaching cardio-sounds.

Here is how I teach the lub/dupp sounds. I have the students stand with their arms at their side. I explain to the students that their arms represent the flaps of the valves. When the ventricles are contracting, the flaps of the valves will be pushed upward. The horizontal position is the closed position for both types of valves. I have the students raise their arms as I explain the ventricles are contracting and their arms represent the flaps of the AV valves. When their arms reach the horizontal position on the way up, I shout out “Lubb” and explain to the students that the AV valves have just shut. I continue to have the students...
Edu-Snippets - continued from page 16

raise their arms over their heads, explaining that their arms now represent the semilunar valves opening. When their arms are over their heads, I announce the beginning of relaxation. I then have the students lower their arms which still represent the semilunar valves. Once they reach the horizontal on the way down I shout “Dupp” and explain the semilunar valves have just shut.

I continue downwards to represent the AV valves which are now opening. Do this a few times with the students joining in the lubb/dupp.

I have varied this exercise by using two students, one for the AV valves and the other for the semilunar valves. I give the student representing the AV valves a resistance band to step on to represent the chordae tendinae. The student representing the semilunar valves works with an inverted umbrella or piece of plastic.

We hope you will be able to use this Cardio-Snippet as it has been written. If not, perhaps you can modify to meet the needs of your school.

III. And We Hope You Will….

Keep those cards and letters coming! We thank you all for your EDU-Snippet contributions. Our next deadline is August 1, 2006. Of course, we would like your contributions before that! Although we will announce our theme online, and we are thinking of body system themes, sometimes we mold Snippets to fit a theme. So, you can submit your ideas now and maybe next issue you too will see your EDU-Snippet in print!

HAPS Southern Regional Conference
Paducah, Kentucky
October 7, 2006

West Kentucky Community and Technical College (WKCTC) and the Human Anatomy and Physiology Society (HAPS) will host a Human Anatomy and Physiology Regional Conference on Saturday, October 7, 2006 at the WKCTC campus in Paducah, KY. The conference will highlight best practices in the teaching of Human Anatomy and Physiology, and will explore ways to promote academic success.

Keynote speaker, Dr. IAIN M. CAMPBELL, Associate Professor of Biochemistry, University of Pittsburgh Department of Biological Sciences, Pittsburgh, PA, will present “Keeping Non Science Undergraduates Awake and Interested”.

The other keynote speaker, LORI K. GARRETT, Professor of Anatomy, Physiology, Biology, and Science of the Sciences Division of Danville Area Community College, Danville, IL, will present “Getting Unprepared Students Ready for A&P.” During the course of the day, there will be workshops on varying topics of interest to teachers of Anatomy and Physiology, and Biology. There will also be exhibitors, prizes, lunch discussions, and lots of time to network with colleagues.

If you are interested in presenting a workshop, contact Joseph Gar, workshop coordinator.

For more details check one of the following sites:
Joseph.Gar@kctcs.edu
(270) 534-3233
http://www.hapsweb.org/displaycommon.cfran=1&subarticlenbr=159
or
hapsweb.org Click on the Meetings Tab on the left, then Regional Meetings tab
Neurotransmitter release is a key concept in understanding the function of the autonomic nervous system. Sympathetic neurons, especially those innervating blood vessels, release three co-transmitters: norepinephrine (NE), neuropeptide Y (NPY), and adenosine triphosphate (ATP). Dr. Thomas Westfall has been researching these molecules and their effects for a number of years in Virginia, Sweden, and Missouri. He has held his current position in St. Louis since 1990, performing an incredible amount of research and working just as hard at sharing that research with colleagues through peer-reviewed papers, editorial boards, and lecture courses. Being a physiologist as well as a pharmacologist, Westfall was very excited to share his passion with HAPS and to see what we could share with him.

NPY and ATP are co-localized and co-released with NE in the aforementioned sympathetic neurons. Through a variety of techniques, Westfall’s team has analyzed and measured these molecules. ATP appears to act in a rapid and phasic manner, NE appears to have an intermediate effect, and NPY has a slow and prolonged activity level. Through an orchestration of release, co-release, and co-inhibition, these three neurotransmitters regulate the stimulation of target neurons.

The possible connection between hypertension and the autonomic nervous system is a hotbed of research at the moment. Westfall’s team has been able to show an alteration in the pre-junctional modulatory role of these three neurotransmitters (NE, NPY, and ATP) in such disease states as hypertension. Taking the next step of proving a cause-and-effect connection is a major effort of his team at the present. Using the Spontaneously Hypertensive Rat, his team has shown that nitric oxide (NO), a direct vasodilator, modulates sympathetic neurotransmission by deactivation of NE. The unclear connection between blood pressure and levels of the three neurotransmitters is a puzzle to Westfall’s team. It is possible that some or all of the neurotransmitters mentioned may play a significant role only during intense stimulation, which might explain why neurotransmitter levels may not change as much as expected during lesser stimulation.

Secrets of neurotransmitters and the autonomic nervous system are being investigated more and more with advances in skills and technologies. Using these advances, as well as an open sense of collaboration and learning, Westfall’s team will continue to help us discover more about how the nervous system works and what happens when it does not work as it should.
Positive interdependence refers to the realization by group members that they get much more out of a group exercise than they might get by working individually. For the best chance at having positive interdependence, be sure that students have a clear goal, an incentive for completing the exercise, appropriate resources, and specific roles for various individuals within the group.

Individual accountability means that each group member contributes to the group in the achievement of group conclusions. Variables in individual accountability include success, stress, interest, meaning, understanding of results, and positive feeling. To build a feeling of success, try to build in chances for small successes early in the semester and have simple group activities to demonstrate to the students just how valuable group work can be (They will soon realize that their classmates have much to share!). To limit stress, try to structure group activities that are interesting, but not overly demanding. Humor and a personal connection will give meaning and interest to an activity. Knowledge of results means that the instructor has made his/her goal(s) clear to the students at the start of the project. Positive feelings about group work are fostered by a safe, non-intimidating environment. Once all of this groundwork has been laid, a successful group activity is well on its way!

It is important to have face-to-face interaction in group work. Try to arrange the tables/desks so that all group members are facing each other. This promotes active and positive interaction among all group members.

As the semester progresses, groups should begin to develop collaborative teamwork skills, that is, problem solving as a unit, as opposed to individually or not at all.

And finally, at the end of any group activity, it is important to have group processing and closure. This allows the students to summarize the results and reflect on the learning which has taken place. Some ways to summarize and reflect include having the students write a multiple-choice question and also take a short quiz about the topic in addition to participating in group discussions.

The teacher’s role in group activities should be to use all five of these principles in planning any group activity to create a lesson with clear objectives that are meaningful and interesting as well as clear directions. There should also be specific criteria for success, a time limit, and proper closure.

To demonstrate the principles, members of the workshop did a quick exercise. Groups of 4-6 participants were each given a piece of paper and a single envelope with 7 cards (upon which the words water, nucleic acid, lipid, carbohydrate, protein buffers, salts/electrolytes were written). One member of the group was designated the recorder, one the timer, and another the checker. Groups had seven minutes (timer’s job to track the time) to order the organic substances in order of importance in the human body. Each member was to give two reasons for the placement of each substance in the hierarchy (recorder’s job was to write it all down; checker’s job was to be sure everyone in the group understood each point made). Then, we shared the results with our “professor” (Arnestad) who asked various group members random questions about the exercise. We discussed our results and reasoning, thus giving the exercise closure. This exercise neatly demonstrated use of all the principles previously discussed and effectively demonstrated the value of group work.

Arnestad suggests frequently changing the students in each group, as well as frequently changing roles within each group, and keeping groups small (3-4 people). She uses group work in conjunction with lecture, switching two or three times during the class period between a more formal lecture/topic introduction format to group activities. She feels this is beneficial because most students are unable to really focus on lecture for more than 17-20 minutes at a stretch.

Arnestad gave many useful activity suggestions including several “games.” A few examples include: Round Robin (members around the table take turns contributing to an idea), Debate (two teams, one “pro” the other “con” discuss a topic), Jigsaw (each group member learns about a small piece of a topic, then teaches the other group members), Go Fish (matching a term with its definition), and Lingo (students learn vocabulary words that are placed on a Bingo card by students matching the read aloud definitions to the words on their card until they fill their cards).

This workshop was useful, enjoyable, and practical. I have already started using these ideas!
Two of the biggest challenges faced by students in the study of anatomy and physiology are understanding abstract concepts and complex terminology. What are the best ways to tackle those challenges? Mody and Veil suggested the following strategies: be aware of different learning styles; use visual aids and demonstrations; use analogies and concrete examples; make it memorable with humor or word tricks; and get students actively involved. On the first day of class, Mody and Veil use a learning style inventory to help students (and faculty) become aware of each student’s individual learning style(s). From the beginning of the semester, Mody and Veil also stress to their students the value of knowing Greek and Latin roots. They use a worksheet and group activity that asks students to search for words that use specific roots, to demonstrate the understanding of how roots are used in words, then to use roots to “decode” unfamiliar words. These roots are then continually reinforced in teaching and in assignments throughout the entire course.

The remainder of the workshop included numerous examples of analogies, demonstrations, and mnemonics, organized by course topics, that include basic chemistry, cellular functions, general histology, and the muscular, skeletal, and nervous systems. Due to time constraints, Mody and Veil did not have the opportunity to cover all of their examples in the muscular system, nor could they even begin to cover the skeletal and nervous systems. They plan to do a workshop at a future conference, focusing specifically on those organ systems.

The examples given in the workshop are too numerous to describe in entirety here, but a few of the “greatest hits” will be mentioned.

Basic Chemistry: Veil uses colored pony(craft) beads on a wire to demonstrate levels of protein structure. Twenty different colors of beads symbolize the twenty different amino acids in proteins. The order of colors on the wire illustrates primary structure. The whole wire, with its helix, can be bent into an irregular shape to show tertiary structure. Finally, a second beaded wire can be shaped and then held near the first wire to demonstrate quaternary structure. The shape of the wires can also be destroyed (without altering the primary structure) to show the process of denaturation.

Cellular Function: Veil offered a humorous mnemonic for the order of stages (prophase, metaphase, anaphase, and telophase) in mitosis. One day in class she observed her students writing the letters “PMAT” over and over, and she questioned how such an acronym could be effective without a meaning behind it. A light bulb suddenly went off as she found a meaning…and from that point on “P–MAT” was remembered as being the contour rug fitted to the shape of the toilet in the bathroom.

General Histology: Mody used the following analogy to illustrate the concept of organizational levels. To build the college campus, one must start with bricks and mortar. Bricks are like cells and mortar is like intercellular material. Bricks and mortar (cells and intercellular material) are put together to create a wall (a tissue). Walls are put together to create a room (an organ). Different walls are put together to create a building (an organ system). All the different buildings put together create a college campus (an organism).

Muscular System: Mody used three-inch long pieces of straws and stirrers to demonstrate the sliding filament theory of muscle contraction. She arranged three or four rows of straws on the overhead projector to represent thick myofilaments and the same number of rows of stirrers to represent thin myofilaments. She created two sarcomeres with this arrangement. She showed the A bands, I bands, and H zone while projecting the image on the screen. Then she slid the thin filaments towards each other to demonstrate the muscle contraction. She asked the workshop participants to pay close attention to what happened to the size of A bands, I bands, and H zone, while projecting the image on the screen. The shape of the sarcomere reduces, the size of each myofilament stays the same.
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