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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 $65 for full-time faculty, $50 for retired, part-time faculty, and students. 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. Information on additional membership categories, meetings, and more can be found at: http://wwwhapsweb.org. Correspondence should be directed to: HAPS, PO Box 2945 LaGrange, GA 30241 or (800) 448-HAPS (4277) or 706-883-8215 (fax).

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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. If references are included, please follow the methods suggested in Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers 7th Edition, Style Manual Committee (Council of Biology Editors) Cambridge, Cambridge University Press 2006 or see the reference guide on the HAPS-EDucator page of the HAPS website (hapsweb.org).

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:** August 1 (Fall issue); November 1 (Winter issue); February 1 (Spring issue); April 15 (Summer issue).

**CONTACT THE HAPS-EDucator** Editor: Susan Baxley, HAPS, PO Box 2945 LaGrange, GA 30241 orhapsedhapsweb.org.
I am also very excited to be able to announce the second year of the HAPS-Institute (HAPS-I). The first year of course offerings was more successful than any of us dreamed it would be. While this raises the expectations of participants, HAPS-I Director President Emeritus Kevin Patton and his organizing committee have been hard at work since last June planning this year’s offerings. Get involved in HAPS-I yourself by contacting Kevin. There is much work to do and the more successful HAPS-I becomes, the more work there will be to do in the future. HAPS-I is the sort of program that makes being part of HAPS always new and always exciting.

In the fall of 2007, we saw the launch of a new journal, Anatomical Sciences Education, by one of our partner associations, the American Association of Anatomists, and HAPS is part of this journal. In fact, HAPS member, Mark Terrell, sits on the editorial board of Anatomical Sciences Education as an Associate Editor. Here is yet another place for HAPS members to get their teaching expertise into the literature.

In addition to these large visible events, the quiet behind-the-scenes committee work is also still going on. Public Affairs Officer David Evans and President Emeritus Ric Martini continue to monitor the credentialing issues associated with SACS’ interpretation of national accrediting standards. The Curriculum and Instruction Committee continues its work on the development of outcomes to accompany our core curriculum document, the HAPS EDucator Committee continues to turn out the EDucator come rain or come shine, the Testing Committee is working to streamline its function and store and analyze results data for use in ongoing periodic revision of the HAPS Exam, and the list goes on and on. You get the picture.

If you want to become more involved in HAPS, we have plenty of ways to do it. Please check out what our committees are up to by visiting the website (http://wwwhapsweborg) and attending a committee meeting at the conference in New Orleans. Do not be shy. Express an interest in a committee and before you know it, you will be on the committee. And would it not be exciting to step up from committee member to committee chair too?

Let us keep the excitement going!
Come to New Orleans and “Get Jazzed!” Plans are well under way for the 22nd Annual HAPS Conference which will be held in New Orleans, May 24-29, 2008. Update seminars and exhibits will be held at the Conference Hotel, The Westin New Orleans at Canal Place, located in the French Quarter (http://www.wyndham.com/hotels). Workshops will be held at the Louisiana State University Health Sciences Center in downtown New Orleans.

Please check out the HAPS website for travel and lodging information. Early registration information is available online. We encourage you to apply for posters and workshops now. Be prepared for the Natchez Jazz Dinner Cruise as the Sunday night event (http://www.steamboatinetchez.com/) and stay for the Oak Alley Plantation Tour (http://www.oakalleyplantatio.com/) we have scheduled for Thursday morning.

We would like to know how many HAPS members would be interested in attending a Zephyr’s baseball game Saturday or Thursday night, and Wanda Hargroder would also like to organize a HAPS run. The run, The Skully Walk/Run will be either 3 or 5K beginning at the hotel, progressing through the French Quarter, and ending with coffee and beignets (a New Orleans tradition) at the famous Café du Monde. Please contact Wanda (whargro@lsu.edu) if you have an interest in either of these two events.

Susan van Loon has contacted Habitat for Humanity for those of you who expressed an interest in doing something for the victims of Katrina by helping to rebuild New Orleans. This is purely voluntary and not a HAPS sponsored event; please contact Susan (svanloon@olhcc.edu) if you would like to participate.

In addition to these organized events, there is much to do and see in this remarkable city. New Orleans is, very literally, a feast for the senses. Begin with taste. We have some of the best restaurants in the world (this is not hyperbole) within walking distance of our hotel or a short taxi ride away. Dining in New Orleans approaches an art form. The ingredients of a soup, the selection of wine, a question of what fish is freshest, the choice chicken or seafood gumbo… any and all of these topics serve as conversational fodder among diners as they peruse the menu and engage the waiter in making the decision of what to order. Here are a few of the many good restaurants in the French Quarter:

**Acme Oyster Bar** for amazing charcoal broiled oysters, oysters on the half shell, and fried seafood

**Antoine’s and Arnaud’s** for the classic New Orleans dining experience

**Brennen’s** for breakfast

**Café Du Monde** for café au lait and donuts served with powdered sugar
New Orleans – continued from page 4

Gumbo Shop for a great selection of gumbos
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Use this website for a complete list of New Orleans restaurants sorted by location and cuisine: http://www.nomenu.com/.

New Orleans is also a city of smells, the good and the not so good. One of the best smells in the city greets your olfactory receptors as soon as you enter the door of Central Grocery on Decatur Street. The store is the home of what many claim to be the best muffuletta around. Muffuletta are sandwiches made with cold cuts and cheeses and topped with olive salad mix. Walk in if only to breathe the air filled with the aromas of olives, dried fish, and all manner of Italian food. The stroll down Decatur Street takes you past restaurants busy boiling crabs and shrimp. The smell of crab boil and lemons wafts over the sidewalk and creates unforgettable memories.

Sound is everywhere. Music is the heartbeat of the city, and it can be heard throughout the French Quarter. From the calliope of the riverboat Natchez to jazz at Preservation Hall, the sounds of instruments and voices fill the air. If you are lucky, you will hear the pie lady sing of her wares as she walks down Royal Street calling out “Pie Lady, Pie Lady.” The House of Blues and Kerry Irish Pub, both on Decatur Street, are live music venues and are just a couple of blocks from the hotel. If light jazz is your thing, visit Snug Harbor on Frenchman Street.

Continuing this sensory journey through the French Quarter, you may end with the sense of sight, and there are so many sights to see. From the gaudy and bawdy Bourbon Street to the more sedate Royal Street filled with antique shops and restaurants, to the mighty Mississippi River, there are enough sights to fill even the largest card in your digital camera. New Orleans’ French Quarter architecture is unique, a combination of the French and Spanish influences present since the founding of the city in 1718. The Quarter is still a residential neighborhood to many New Orleanians. The residents live in apartments above the shops and restaurants. Look up to see the landscaped and furnished second and third story balconies that are the outdoor extensions of apartment living space. Beyond the big wooden doors are interior patios, many decorated with fountains and tropical plants. One of our most famous French Quarter residents is former U.S. Congresswoman Lindy Boggs, who lives on Bourbon Street. In the past few years Hollywood has discovered the city and several movie stars now maintain homes here.

For history lovers there are, in addition to the French Quarter, the romance and elegance of the Garden District’s Victorian mansions and the history and solemnity of the National WWII, D-Day Museum. For nature lovers there are the Audubon Zoo and The Aquarium of the Americas within easy reach of the hotel. If you are adventurous, you can also take a once in a lifetime opportunity to see the local environs close-up with one of the numerous Swamp Tours that are available.

To learn more about things to do and see in New Orleans, please go to: http://www.neworleansonline.com/neworleans

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From the Eye of the Storm to the Eye of the Tiger

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Everyone has seen the pictures, heard the stories, and felt the impact of Hurricane Katrina. Whether you were personally displaced or lived thousands of miles away, America was shocked at what Mother Nature could do in such a short period of time. In its aftermath, Katrina left Louisiana State University’s medical, dental, and allied health schools with flooded halls, damaged equipment, and hundreds of educators and students wondering what would happen to their programs of study. With determination, administrators set out to find a place for the resumption of classes with the least amount of disruption. Starting over in New Orleans was not an option; therefore, Louisiana State University and Pennington Biomedical Research Center, both in Baton Rouge, seemed the most reasonable places to salvage the existing health-care programs that were located in New Orleans.

In collaboration with the LSU School of Veterinary Medicine and Pennington Biomedical Research Center, all of the LSU New Orleans’s based health-care programs moved to Baton Rouge. The gross anatomy lab became a prosection class because of space limitations within the veterinary school. To transport enough cadavers to Baton Rouge, store them, and have them available to the students was not feasible. Therefore, the LSU Medical and Dental School’s faculty and students were relocated to Baton Rouge and classes resumed within three months.

Prior to Katrina, Louisiana State University’s Department of Kinesiology anatomy faculty Melissa Thompson, Dennis Landin, and I studied and worked with faculty from the Medical and Dental Schools in New Orleans. Melissa Thompson is a certified athletic trainer and an instructor in the discipline at LSU. Dennis Landin and I teach anatomy lecture and advanced anatomy courses. In preparation for a possible cadaver lab at the undergraduate level, we traveled from Baton Rouge to New Orleans for two years to learn proper cadaver dissection methods. Never during that time was there ever any concern about a hurricane completely destroying schools, hospitals, clinics, and lives. At that time, we were intent on becoming proficient dissectors and eventually passing our knowledge on to future health-care professionals.

Following the relocation, the medical and dental schools’ gross anatomy labs became a prosection lab housed on the campus of LSU, thus providing an opportunity to make the most of what had been a bad situation. I recognized an opportunity to open an educational door for the undergraduate students at LSU with the assistance and cooperation of the necessary academic entities. Once schedules were compared and support given from all applicable administrations, an undergraduate level cadaver dissection program at LSU Baton Rouge evolved. Within a couple of months all the necessary equipment needed for a cadaver lab was bought, assembled, and made ready for classes beginning in January 2007.
Currently, the LSU Department of Kinesiology offers one dissection and four prosection classes per academic year. Cadavers are acquired from the New Orleans Medical School and transported to Baton Rouge where they are kept in tanks in the School of Veterinary Medicine’s Gross Anatomy Lab. Every semester some form of gross anatomy is offered providing cutting-edge training for students. The classes are filled to capacity with double-digit number waiting lists. Melissa Thompson remarked, “We have the interest. Students are begging us to get in this class. We would love to allow more students access to this unique learning environment, but we are limited by funding and space issues.”

I believe strongly in the academic impact the cadaver lab has on students because, when our students graduate and enter their professional schools, one of their first classes taken is gross anatomy. I know there are options for teaching an anatomy laboratory, such as using CDs and computer-animated graphics, but these cannot replace the detailed hands-on instruction cadaver dissection provides. Thompson agrees, “Access to cadavers is critical to the development of three-dimensional views of human anatomy. That is the cornerstone of understanding injuries for our athletic-training students.” Landin finds the students fascinated by the opportunity of seeing how anatomical structures interact in the human body. He says, “Students saw one of the main arteries that flows to the brain almost completely plugged with plaque, one main cause of stroke. It was a real eye-opener.” Mattie Pontiff, an undergraduate Kinesiology Human Movement major, was enrolled in the first cadaver dissection class offered. She states, “The cadaver lab is a way for students to gain a comprehensive understanding of human anatomy. It gives us a chance to take the information we have learned in the classroom from lecture and textbooks and put it to use to piece together the puzzle that is our human body. It challenges us to think and motivates us to learn.”

While these courses attract students from a variety of disciplines, such as basic sciences, they also provide an opportunity for the Kinesiology faculty to initiate research opportunities with other health sciences faculty on campus and nationally. Future plans include making the cadaver lab available to the medical community for demonstrations and practicing new medical procedures, such as disk repair or other high-demand surgeries.

The faculty firmly believe the lab is critical for student preparation and allows for future collaborative efforts within the university and community. In addition, these classes are improving the education of LSU students as they prepare to enter medical and allied health professional schools. Louisiana State University College of Education Dean M. Jayne Fleener points out the impact of this academic addition, “The lab will have a positive effect on healthcare and economic development in the state. This is a tangible example of engaged students and faculty impacting our community.”
MRSA (Methicillin-resistant *Staphylococcus aureus*) infection, which can be fatal, is caused by a strain of *Staphylococcus aureus* bacteria that normally lives on the skin and in the nasal passages of approximately 30% of the U.S. population. Most strains of *Staphylococcus* bacteria are usually harmless in healthy people unless they enter the body through a break in the skin surface. In older people or in people whose immune system is suppressed, staph infections can cause serious illnesses such as boils, cellulitis, abscesses, and toxic shock. MRSA is a strain of *Staphylococcus aureus* that emerged decades ago in hospital environments. It is resistant to the broad-spectrum antibiotics most often used to treat it. People who have this resistant staph on their skin or in their nose, but are not sick, are said to be “colonized” but not infected with MRSA. Healthy people who are colonized with MRSA can pass the bacteria on to others. MRSA has been in the news and featured on television programs recently because it has moved away from its place of origin in health care facilities and has begun to infect people in the community at large. The American Medical Association (AMA) estimates that 94,360 people developed a serious, invasive MRSA infection in 2005 and approximately 18,650 people died from nosocomial MRSA infections i.e., infections they contracted in hospitals.

MRSA is specifically resistant to antibiotics known as cell wall inhibitors or beta-lactam antibiotics, those that contain a beta-lactam ring. In non-resistant bacteria, beta-lactam antibiotics such as methicillin, oxacillin, amoxicillin, and penicillin disrupt cell wall synthesis as bacteria grow. The beta-lactam ring mimics part of the peptidoglycan layer of the bacterial cell wall. As a result, the peptidoglycan layer becomes weaker and more permeable. Enzymes produced by the host cell can attack the weakened peptidoglycan layer and osmotic pressure from extracellular fluid causes the bacteria cell to lyse, killing the bacteria. *Staphylococcus aureus* bacteria, whether resistant or non-resistant, produce protein enterotoxins that punch holes in the cell membranes of target cells, severely weakening or killing them. When left unchecked by antibiotics, the bacteria are formidable pathogens.

Bacteria are the undisputed masters of survival strategies on this planet, but it is believed that, in the case of MRSA, humans bear most of the responsibility for the current level of antibiotic resistance. Antibiotics have been prescribed excessively and unnecessarily for years, even for ailments such as the flu and other viral infections that do not respond to antibiotic treatment. Antibiotics have been extensively given to beef cattle, chickens, and other animals to keep them healthy before taking them to market, and runoff from feedlots has contaminated water systems with antibiotics. Frequently, patients do not take antibiotics as they are prescribed. They may discontinue use as soon as symptoms are gone instead of taking all the prescribed pills. This allows bacteria to mutate. In hospital settings, large numbers of infectious people are brought together in a limited space where the chance to transfer resistant bacteria to others is always present. Constant disinfection of hospital treatment surfaces has consistently selected for the most virulent bacterial strains. Even when antibiotics are appropriately used and selection pressures are normal, many bacteria mutate much more quickly than new drugs can be produced.

There are three main mechanisms by which bacteria become resistant to antibiotics. Bacteria can keep antibiotics out by producing chemicals in their cell walls that block antibiotic penetration or by constantly changing cell wall proteins known as penicillin-binding proteins or PBPs. The second method by which bacteria become resistant is by developing membrane efflux pumps that use proton gradients to actively pump antibiotics out of the cell. The third strategy for resistance alters the attacking antibiotic and modifies it to a harmless form by changing specific chemical groups in the antibiotic or by using hydrolyzing enzymes to destroy all or part of the antibiotic. Bacteria have these strategies encoded in their chromosomal DNA, in plasmids, in transposons, or in gene cassettes, and the survival strategies can be transferred quickly to other bacteria through conjugation, transduction, or transformation. Resistant *Staphylococcus aureus* employs two of the three strategies. It stops antibiotic penetration with its cell wall and it modifies attacking antibiotics to an inactive form.

MRSA has acquired at least two genes, mecA and blaZ, that code for its resistant mechanisms. Researchers believe that these genes did not originate in *Staphylococcus aureus* but were from a distantly related species called *Staphylococcus sciuri*. There are four well-known penicillin-binding proteins on the...
outer surface of *Staphylococcus aureus* bacteria. The *mecA* gene codes for a unique fifth penicillin-binding protein which is not affected by beta-lactam antibiotics. In the presence of beta-lactam antibiotics, the fifth penicillin-binding protein assumes the function of the other four penicillin-binding proteins, which allows cell wall synthesis to continue despite antibiotic attack. The *blaZ* gene codes for beta-lactamase enzymes, which target and hydrolyze beta-lactam antibiotics.\(^5\)

In order to wage war against the rapidly evolving problem of antibiotic resistance in *Staphylococcus aureus* and other bacteria, scientists are hoping to find new methods of fighting bacterial infections. Some of the most promising research being done today focuses on the creation of a vaccine against *Staphylococcus aureus*. As scientists race to stay one step ahead of bacteria that are constantly fashioning new survival techniques, the hope is that a vaccine will completely eliminate the need for antibiotics against MRSA in the future.\(^10\) So far, vaccines have been tested only on animals. Other research centers on a class of antibiotics against MRSA in the future.\(^10\) So far, vaccines have been tested only on animals. Other research centers on a class of antibiotics against MRSA in the future.\(^10\) So far, vaccines have been tested only on animals.

According to the Mayo Clinic, researchers recognize two types of MRSA. MRSA infections in hospitalized patients and long-term care facilities are known as health-care associated MRSA (HA-MRSA). MRSA infections, which since the 1990's have been showing up in other locations, are known as community associated MRSA (CA-MRSA). Vancomycin is one of very few antibiotics that is still effective against HA-MRSA, but it no longer works in all cases. There are currently more drugs that are effective against CA-MRSA, but, since CA-MRSA is known to be a rapidly evolving strain, it will no doubt become resistant to more and more antibiotics. CA-MRSA is associated with several serious skin and soft tissue infections and a very serious form of pneumonia.\(^15\)

Since HA-MRSA and CA-MRSA usually occur in different settings, the risk factors are different for the two strains of MRSA. The Mayo Clinic lists risk factors for HA-MRSA and CA-MRSA as follows:

**The primary risk factors for HA-MRSA are:**
- Current or recent hospitalization especially of older adults or people with weakened immune systems
- Living in a long-term care facility
- Being on dialysis or having catheters or feeding tubes
- Recent antibiotic treatment, particularly treatment with ciprofloxacin or cephalosporin

**The primary risk factors for CA-MRSA are:**
- Young age, as young adults and children are more likely to have cuts or scrapes and immature immune systems
- Participation in contact sports where cuts and abrasions are likely and skin to skin contact is increased
- Sharing athletic equipment and uniforms or sharing towels or razors
- Having a weak immune system secondary to HIV/AIDS
- Living in over-crowded or unsanitary conditions
- Being in close contact with health care workers\(^15\)

The CDC and the Mayo Clinic advise people, especially children, to seek medical attention if minor skin problems such as pimples, cuts, abrasions, or insect bites become infected. People are asked to request testing for MRSA before antibiotic therapy is started, since drugs that treat ordinary *staph* infections are not effective against MRSA. Doctors are able to diagnose MRSA using tissue samples or nasal secretions. The newest tests can detect the DNA of staph in a matter of hours. Some hospitals are already finding vancomycin-resistant MRSA. To help with recovery, doctors may find it necessary to open and drain abscesses caused by MRSA rather than trying to treat the infection with drugs. Many hospitals are screening patients for MRSA, particularly those coming from long-term care facilities. People infected with MRSA may be put into isolation.\(^14,15\)

Since MRSA is passed through direct contact with bacteria on skin surfaces, hand washing is deemed to be so essential for the prevention of infection that the Mayo Clinic has devoted a whole section on its web page to describing proper hand-washing technique, recommending cleaning the hands with soap and water or an alcohol based hand sanitizer. Alcohol based hand sanitizers are actually more effective in killing bacteria and viruses than soap and water, and antimicrobial wipes or towelettes are just as effective as soap and water. If washing the hands with soap and water, people are advised to lather the hands well and keep the lather on for 15 to 20 seconds, being sure to clean under the fingernails, between the fingers, and over the backs of the hands and the wrists. When using alcohol based hand sanitizers, check that these products contain at least 60% alcohol. Apply about a ½ teaspoon of the product to the hands and rub the hands together until the product dries. The Mayo Clinic recommends hand washing or sanitizing “after using the toilet, changing a diaper, touching animals, before and after food preparation, before eating, after blowing the nose, after coughing or sneezing into your hands, before or after treating wounds, before and after touching a sick or injured person, after handling garbage, before inserting or removing contact lenses and when using public bathrooms.”\(^15\)

Since its discovery in 1880 *Staphylococcus aureus* has demonstrated an incredible ability to become resistant to antibiotics. Penicillin was discovered in 1928. By the early 1940’s, when the first antibiotics were being used by the military and later by civilian populations, *Staphylococcus aureus* was already becoming resistant to penicillin. Because of this resistance, methicillin and oxacillin (both semi-synthetic penicillins), were created in 1959.\(^2\) Methicillin-resistant *Staphylococcus aureus* was first recognized in the UK in 1961 and has become widespread since then. In 2002, a strain of MRSA appeared which is completely resistant to vancomycin.\(^10\) The speed of this evolution of resistance could leave us with no way to fight staph infections in the near future. Is it the beginning of the end of the age of antibiotics? We will have to wait and see. Penicillin and other antibiotics have saved millions of lives over the years but resistant forms of many bacteria are clearly on the rise. Tangential DNA transfers among bacterial cells of the...
The Cutting Edge – continued from page 10

same or different species are accomplished with ease. Bacterial pathogens swap genes as easily as children swap baseball cards. It will take a renewed commitment to research and to discover and develop new antibiotics, perhaps from novel sources, to contain the expected explosion of resistant bacterial forms that looms in our future.

References


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Introductory Anatomy and Physiology (A&P) is a content intensive course that many students struggle through. In addition, instructors sometimes find it difficult to move from a lecture format, which is efficient for covering large amounts of content, to a format which allows for active student participation in the classroom. A&P at Purdue University Calumet is generally taught in a lecture format. To enhance student learning and potentially improve student success, students enrolled in the first semester of (A&P) were taught using a combination of lecture and group activity over a 2 year period (Fall 2003 and Fall 2004). Data from this group of students, the experimental group, was compared to data from a second group of students, the control group, who were taught using the standard lecture only format.

For the experimental group, lecture time was decreased on average by 1/4 to 1/3 in an eighty minute class period. This time was used for group work on critical thinking questions selected from the textbook (Anatomy and Physiology by Seeley, Stephens and Tate (2003), 6th edition; McGraw Hill). The questions were built on material discussed in class, in particular material which was not covered as extensively as in the lecture only course. Answers to questions were either gone over in class or posted on-line.

All lecture topics were covered for both groups. For the experimental group topics were either covered more quickly or students were expected to go over some of the material on their own. Complex ideas were covered in lecture for both groups. In addition, the instructors’ notes, which covered all of the lecture material, were posted on-line for both groups. Overall there was no loss of content for the experimental group of students. Student grades for the lecture portion of the course were determined by four exams. Exams were identical for both groups. All students also attended a laboratory; this was identical for both groups.

At the start of the course students were asked to fill out a questionnaire giving basic demographic information about themselves. Control and experimental groups were demographically similar. Students were also asked to fill out a course survey at the end of the semester.

Results/Discussion

Table 1 shows the numbers of students who started the course, completed the course, and received a C or better. The numbers were comparable for both groups. The percent of students who received a C or better appears to be lower for the experimental group; however there was no statistical difference between the grades. Decreasing in-class lecture did not have a negative impact on student content acquisition.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Control Group (Fall 03&amp;04)</th>
<th>Experimental Group (Fall 03&amp;04)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial # of Students</td>
<td>96</td>
<td>74</td>
</tr>
<tr>
<td># of Students Who Finished the Course</td>
<td>62 (64.6%)</td>
<td>47 (63.5%)</td>
</tr>
<tr>
<td>Number of Students Who Received C or Better</td>
<td>46 (47.9%)</td>
<td>31 (41.9%)</td>
</tr>
</tbody>
</table>

Although students were not negatively impacted by the decrease in lecture, they were not positively affected, when looking at retention levels and grades. However, the students were much more involved in the course. Whereas in the control group, it was common for the majority of students to sit quietly through lecture, students in the experimental group actively participated in the class. These students asked more questions and volunteered more comments about subject material; this was true for both the 2003 and 2004 groups. The students did not seem to be intimidated by the course. This is an important point since A&P has a reputation for being difficult. For the students entering A&P in this study
approximately 65% had heard something negative about the course. Overall, it seemed that the students became more involved in the lecture material and their attitudes toward the course were more positive.

On examining the final survey it was noted that students indicated a preference for lecture combined with activities and they perceived that they would be more successful with in-class activities. Both control and experimental groups were questioned in a multiple choice format, as to whether they would prefer the course be taught as lecture only, a combination of lecture and activities or activities only. In the control group 58 students took the final survey. Thirty-seven (63.8%) felt that they would learn more if an activity was added to the lecture. In the experimental group, 46 students took the final survey. Of those responding, 42 (91.3%) felt that the course should have an activity included with the lecture (Table 2).

| Table 2: Percentage of Students Who Feel A&P Should Include In-Class Activities |
|---------------------------------|------------------|
| Control Group                  | 63.8%            |
| Experimental Group             | 91.3%            |

The students were asked a second question about in-class activities. Students in the control group were asked if they felt they would learn more in a course that included in-class activities, 57 students responded. Of the respondents, 41 (71.9%) indicated they would have learned more with in-class activities. Students in the experimental group were asked if they felt they had learned more in the course because it included an activity component, as compared to if it had been taught with just lecture, 43 students responded. Thirty-six (84%) indicated that they learned more because activities were included (Table 3).

| Table 3: Percentage of Students Who Feel They Learn More In A Course That Includes In-Class Activities |
|---------------------------------|------------------|
| Control Group                  | 71.9%            |
| Experimental Group             | 83.7%            |

Overall the majority of students felt they learn more when they are actively involved in the course. Interestingly the numbers were slightly higher for those students who had actually participated in an activity, even though student grades did not verify this perception. This raises the question as to why the students in the experimental group perceived they had learned more even though there were no significant differences in assessment scores. One possibility is that the assessment tool measures only some aspects of learning. An assessment that measures a broader range of skills might reveal differences. Another possibility is that the combination of lecture and in-class activity may have an affect on long term retention of the material. It is also possible there is no significant difference in learning. Further studies should be done to investigate these questions.

In summary: Decreasing in-class lecture, in conjunction with inclusion of in-class activities, did not change student content acquisition. Including in-class activities did increase student participation and altered student perception of how much they learned.

---

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EDU-Snippets is a column designed to let you, the members of HAPS, share your “ways to make sure your students get it”. During these past few years of putting together your ideas into our EDU-Snippets column, we have been continuously amazed at how many teaching and demonstration ideas pop up and are easily transferred from one instructor to another through Snippets. This issue’s column is no exception! We did, however, decide to do something a bit different. We focused on two themes – one stolen unashamedly from the HAPS-L discussion list and the other submitted to us for inclusion here in our array of fantastic EDU-Snippets. As always, we have done a bit of editing so that these ideas blend together.

I. Connective concerns

It all started in mid-October 2007, when Dee Silverthorn (University of Texas Austin, silverthorn@mail.utexas.edu) posed a question from some post-doctoral students who were looking for useful teaching methods for demonstrating the differences in connective tissues, particularly in relation to structure and function. We, ourselves, certainly concurred that students have a great deal of difficulty with connective tissues. Dee’s question led the way to a lively discussion on how to help the students conceptualize the structure and function of connective tissue. We decided to use that as a starting point for our EDU-Snippets column.

A. Colorful connectives

Betsy Ott (Tyler Junior College, bott@tjc.edu) came up with several ideas.

I once saw a demonstration using a red-and-white checked tablecloth – pull it along the grain of the fabric, and it resists; pull along the bias, and it stretches. This is a very visual structure/function demo with the contrasting colors!

We provide some props to help students relate microscopic images to a 3-dimensional construct. A trip to the fabric department of a hobby store will do. Each table in our lab has a box that includes a piece of rope (collagen analog) and a piece of elastic cord (elastin). In addition, the box contains a small section of foam rubber (cartilage), interfacing (areolar tissue), and quilt batting (irregular dense CT). Pulling on the tissues gives some sense of how strong they are. The boxes also hold some epithelia – a square of felt with an iron-on image of a surface view of squamous epithelium (felt = basement membrane), along with 2 thickness of foam padding, with cuboidal and columnar cells drawn on with markers (both side and top views).

We also use modeling clay – we created a block of simple columnar cells (pink clay, with purple-clay nuclei on the inside), then slice through them to demonstrate longitudinal, transverse, and oblique sections. Something similar could be done to show the appearance of an irregularly-arranged dense connective tissue.

We also have student groups practice identifying tissues from a collection of digital images. We use about 60 different images, so they have to recognize key features from an image they have never seen before. Students discuss each image within their groups, an activity that seems to reinforce individual learning.

B. Tasty connectives

As usual, the members of HAPS were big on the food analogies and food props!

1. Chicken connectives

Carol Gavareski (Bellingham Tech College, cgavares@btc.ctc.edu) reminded us of that wonderful bird, Gallus domesticus. One very useful visual for connective tissues is to have the students dissect a chicken leg. Areolar, adipose, and dense fibrous tissues, among others, show very well. It is also useful to see the transition between areolar and dense fibrous, regular and irregular, and gradations between them. I have found it to be a great introduction to looking at the slides of various connective tissues.

Janet Sherman (Pennsylvania College of Technology, jsherman@pct.edu) continued the chicken connection by telling us that chicken legs are good for studying joints and that chicken knees even have cruciate ligaments. (We have never seen a chicken with a torn ACL but we can picture how the chicken knee might help the students get a clear understanding of this problem.)

2. Pasta connectives

As usual, our HAPS members had plenty to say about how to use pasta to demonstrate connective tissue. Most of the discussion centered on gelatin/pasta combinations. Alan Magid (Duke University, amagid@nc.rr.com) recalled a Science magazine cover with curved slices through a mixture of black gelatin and
lasagna. Ken Saladin (Georgia College & State University, ksaladin@alltel.net) recalled that the cover photo showed several curving but parallel lines, and the question was whether this was more consistent with 3-D sheets or tubules. Ken thought it bore a vague resemblance to an electron micrograph of rough endoplasmic reticulum (RER). Meanwhile, David Evans (Pennsylvania College of Technology, devans@pct.edu) said that Ken’s illustration of a longitudinal section of a spirilla is inspired and that ducts just do not look like themselves in tissue sections but figures make the tissues clear to students.

We were reminded of all the various ways gelatin and pasta have been used in anatomy and physiology. We definitely agreed that a good gelatin/pasta salad could demonstrate very nicely the complexities of connective tissue.

John Moore (Parkland College, jmoore@parkland.edu) added his recipe for connective gelatin. My graduate histology class had two, 3-hour labs each week. However, for the first meeting of the semester, we only met long enough to do two things – cook some pasta and mix up some Jell-O! We mixed the two together, poured the mess into some dishes, and placed them in the fridge. At the start of the next lab session, we removed the Jell-O from the dishes and used warmed cheese knives and slicers to “thin section” the “tissue.” Each lab table was given examples of the types of pasta used, and tasked with matching each “organelle” in each slice with a specific type of pasta. It was a most excellent way to expose students to the three-dimensionality associated with histology, i.e., tubular macaroni could yield rectangular, circular, or elliptical organelles depending on the orientation of the structure to the blade that sectioned it.

### 3. Gelatin connectives

We also received another idea from Alan Magid (Duke University, amagid@nc.rr.com). This looks like a tasty and very unforgettable way of using gelatin for a digestive system demonstration.

At the beginning of lecture or lab I have three Petri™ dishes out on the lecture table. Each Petri™ dish is filled with a layer of 1 percent plain gelatin. (Gelatin = denatured collagen – derived from the dermis of pigs and cows. Knox Gelatin® or equivalent is available at any grocery or supermarket.) I sprinkle two of the gelatin plates with equal amounts of unseasoned meat tenderizer (Adolph’s® or the like). These tenderizers contain a broad-spectrum protease such as papain (from unripe papaya) or bromelain (from pineapple). I have a panel of students confirm that both plates are equally seasoned. Then, with a spatula or scalpel, I mince the gelatin in one and leave the other undisturbed. The third plate I leave untreated as this serves as the control. I promise the students that at the end of the hour they will see how digestion works (both mechanical and chemical).

Toward the end of the period when the lecture is about over, I invite them up to see what has happened. The gelatin (protein) that was “chewed” (minced) will be largely liquefied (chyme), but the other plate will have only started to digest. Thus, mechanical digestion assists chemical digestion.

Finally, I make the point that this chemical digestion with a store-bought protease occurs outside the body, just like in the digestive system! Only after epithelial transport do the amino acids released from dietary proteins become available inside the body to support metabolism.

By the way, many people carry the mistaken belief that gelatin is made from hooves and horns – keratin. Not at all! Gelatin is usually derived from pig skin. Kosher or halal gelatin is derived from Kosher or halal cattle.

### II. And we hope you will…

Keep those cards and letters coming! We thank you all for your EDU-Snippet contributions. For the next issue of the HAPS-EDucator, send your EDU-Snippet experiences and ideas to Rfaircloth@aacc.edu as soon as possible. Plan ahead. You can submit your ideas now, and maybe next issue you too will see your EDU-Snippet in print!
Accreditation

The issues around accreditation seem to be quiet but tense right now as some of the regional accreditation agencies are in litigation. Here is an example: In what may be a groundbreaking ruling that upsets what some believe is a monopoly by the regional accreditors, De Vry University, a for-profit institution based in Illinois which runs campuses in California, tentatively won a federal lawsuit against the Western Association of Schools and Colleges (WASC). WASC had maintained that De Vry violated California law by not revealing that some of its courses would not transfer to other colleges. Federal judge Margaret M. Morrow of the Central District Court of California found that WASC had violated the commerce clause of the US constitution because De Vry was accredited by the North Central Association and local regulations (i.e., whatever WASC said) cannot impede interstate commerce. Under California law it is possible for an institution to operate while not under direct supervision of a local accreditor.

It is not at all clear how this tentative ruling will affect non-profit schools, neither those in California, nor those with distance learning components. Note again that local law had a role in upsetting WASC’s apple cart.

In less happy news for a college, St. Andrews (in North Carolina) lost an appeal for its loss of recognition and is suing SACS. The reason SACS cited is lack of stability in St. Andrews’ finances.

I share all HAPS members’ concerns about this issue and continue to research it, but more help is needed! Richard Faircloth has been very helpful, but if you read or hear anything about accreditation, please get me the information as quickly as possible.

False claims and academia

The US Government can levy heavy fines for those who falsely take money from the government, including educational institutions. For example, a western US university had to conduct a significant legal defense in a case where some instructors were claiming the institution was encouraging evening students to leave their classes early. Many of the students were on some sort of federal aid program so, if the allegations were proven correct, the government could have claimed the institution was defrauding it by not delivering on its promises to educate. The university would have had serious problems, the most serious of which would have been a threat to its accreditation.

The specific above-mentioned case was quite involved, and I am not sure it would be easy to explain clearly here. I am also conscious of the possibility of presenting inaccurate information about this specific matter. Therefore, I am being vague in these details and will not provide a link to a news site about it. At least one other Western institution is being investigated for something similar as I write these lines.

The federal code is pretty simple to understand and I pass along its link: http://www.law.cornell.edu/uscode/31/usc_sec_31_0003729----000-.html.

So what does this matter to you as an anatomy and physiology instructor? Making sure that students get their money’s worth is the ethical thing and, in any case, the Feds mean business here! Consider that since the students and the governments pay us for a job, and if we do not, we could lose….

The evolution wars

There has been an unusual increase in the stories related to politics, colleges, and Creationism. Here are some of those stories reported:

1. The Council of Europe’s Parliamentary Assembly, the continent’s primary human rights body, voted on October 4 to ban the teaching of Creationism and Intelligent Design (ID) in science classrooms. The vote was 48 in favor of the ban with 25 against. No prohibition would be imposed on teaching those ideas in religion classes. Some members seem to feel that the move to teach Creationism and ID as if they were science originates from religious extremism. The basis for the vote was that the presentation of those ideas in science classes is an affront to human rights.
2. Creationist funding: A $100,000 earmark funding request to support a Creationist educational agenda has been attached to appropriations legislation for the departments of Labor, Health, and Human Services, and Education (S.B. 1710). The purpose would be to improve science education (this is a near quote from the bill). The sponsor of this earmark is Republican Senator David Vitter, perhaps better known for alleged sexual scandals involving a purported call service in Washington, D.C.

3. There is a furor over the forthcoming movie, “Expelled: No Intelligence Allowed.” Richard Dawkins and other prominent evolutionary biologists were asked to participate in a film recently but told that it would have the title “Crossroads” which would examine the nexus of science and religion. But when the movie came out, it favored Creationism and Intelligent Design and had a new title: “Expelled: No Intelligence Allowed.” Some of the scientists feel deceived but the producers claim no such intent.

4. The Nation, a liberal magazine, had a short article in the October 8, 2007 issue on the struggle between Darwinians and Creationists in US schools.

5. In a narrow, technical decision, a Sacramento-area Creationist has lost a legal judgment in the case of Caldwell v. Roseville Joint Union High School District. The creationist claimed in this instance, that he was denied his legal right to be heard. The gentleman in question, a Mr. Larry Caldwell, has lost similar decisions in 2005 and 2006 in his disputes with his school district.

6. Several evolutionary biologists at Colorado University in Boulder, CO, claimed that they received terroristic threats from alleged Creationist groups last summer.

What does it all mean for teaching? It is easy to say that the Evolution Wars happen a long way from wherever you are, but one should reflect, that if someone can tell a population biologist and a geologist what to teach, can other special interest groups be far beyond the walls of your campus?

The animal rights war

Some animal rights groups do a lot of good, but others are not necessarily so constructive to everyone. So-called animal rights activists are alleged to have bombed a university researcher’s car in California during the summer, and animal researchers at the University of Utah successfully shielded their addresses under state law from animal rights activists. Dalhousie University (in Halifax, NS, Canada) is being slammed with accusations of cruelty to “…dogs and puppies…kittens…” on Facebook, and apparently a lot of folks in Canada are paying attention. The University claims it has used only insects and rodents in its research for a long time.

Peace and opportunities

The Howard Hughes Institute has a new initiative: Science Education Alliance (SEA) intends to encourage cooperative educational activities. The emphasis of the educational work will be on developing ways for younger students to get involved in laboratory research. The aim is to show students earlier in their academic career, that science can be fulfilling. There will be a nationwide pilot project with genomics.

Modeled on a European idea, Science Cafes are organized so that people can discuss science informally. You can set up a get-together locally or participate in several other ways including going to their blog. The cafes are taking original pictures for their website right now too.

Here is a place to go to for more information: http://www.sciencecafe.net/html/getting-involved.htm

Please contact me whenever you hear of education in the news: devans@pct.edu.

Future HAPS ANNUAL CONFERENCES

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2009 in Catonsville (Baltimore County), Maryland
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2011 in your city???

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please contact:
Izak Paul, Chair of the Annual Conference Committee
Mount Royal College
4825 Mount Royal Gate SW
Calgary, Alberta T3E 6K6 Canada
(403) 440-6173
(403) 440-6095 fax
ipaul@mtroyal.ca
TONYA FERGUSON  
Colleague and Friend

Gail Jenkins, compiler of memories and presenter at the HAPS Business Meeting in San Diego  
Rich Faircloth, submitter and photographer

The engraving on the clock presented to Tonya:

Tonya Ferguson  
Business Manager, 1997 to 2007  
The Human Anatomy and Physiology Society  
“In appreciation for a decade of professionalism, devotion, and friendship”

And finally as presented at the business meeting:

Some of the Many Reasons we Appreciate Tonya Ferguson

10. Tonya is our continuous organizational thread, our institutional memory.  
9. Tonya fully understands how things actually get done in HAPS.  
8. Tonya puts up with us even though she has no idea what "bifurcated uvula" or “crenulated epithelial cells” are.  
7. Tonya is truly professional, kind, patient, honest, and understanding.  
6. Tonya “gets” HAPSters.  
5. Tonya knows where the public restrooms are at every conference.  
4. Tonya continually nudges us toward a better path.  
3. Tonya usually doesn’t laugh out loud at our more ludicrous ideas.  
2. Tonya’s great strength of character flows through all of HAPS.  
1. Tonya is such a NICE person!

Tonya, We will miss you, stay in touch.
Anatomy Digital Storytelling Projects 101: How to Create and Implement Digital Storytelling into Your Curriculum

Mandi Dupain & Loréal Maguire
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Digital storytelling, learning, and retention

While there are many ways to describe what digital storytelling is, the majority of definitions incorporate the use of multimedia tools, including graphics, audio, video, and animation to tell a story. C.A. Mellon defines digital storytelling as the “application of multimedia software techniques to the telling of stories”.¹ In the example proposed in this article, students work in groups to create anatomy digital storytelling projects for understanding a physiology concept. Research suggests that students learn best when they are actively involved in the process.² Regardless of the subject matter, students working in small groups tend to learn more of what is taught and retain it longer than when the same content is presented in other instructional formats.³

Digital storytelling projects in the curriculum increase a student’s retention rate and comprehension of course material through active learning. Active learning involves activity-based learning experiences: input, process, and output. According to Edgar Dale’s research, the effectiveness of learning is due to the media involved in the learning experiences. Developed in 1969, Dale’s Cone of Experience is a model that reflects retention rates in students based on different methods of presenting course material. Porta’ uses Dale’s model to posit the importance of visualizing and storytelling, as well as the importance of media. The digital storytelling assignment uses the “teach others/immediate use” method of teaching which achieves an average retention rate of 90% according to Dale’s Cone of Experience Model Research illustrated in Figure 1.⁸

Figure 1
Dale’s Learning Pyramid (Abilene Christian University, Adams Center for Teaching Excellence)

Objectives and assessment technique

Objectives for the digital storytelling project are two-fold. Students will be able to: a) gather and process information relating to a physiology concept and b) develop a digital storytelling project using Windows Movie Maker 2.0™ explaining and demonstrating a physiology concept.
Grading for the digital storybook projects employs a grading rubric. The main areas of assessment include the content used, the organization of the content, media resources used, effectiveness, and presentation. All members of the group receive the same assessment as determined from the grading rubric sheet according to the criteria presented in Figure 2.

**Materials and resources**

Each group is responsible for creating a digital storytelling project that involves building a narrative presentation to demonstrate their understanding of a physiology concept. This also encourages students to take part in cooperative learning. In designing the digital storytelling project, students use Windows Movie Maker 2.0™ and iMovie™ technology to create a narrative presentation that contains text, images, video, and sound illustrating a physiology concept.

Windows Movie Maker 2.0™ is a free home video editing system that ships with Windows XP™. It can be found in the Windows™ Start menu under Accessories > Entertainment; if not found there, it can be obtained online from www.microsoft.com/downloads. iMovie™ is another video editing system that comes free with the Apple operating system and can be used to complete the digital storytelling project. Project activities enable students to apply technology, communication skills, and assessment techniques as they build their digital storytelling project.

**Procedures**

Begin with students forming groups of four and selecting a topic related to a physiology concept. Project topics may include, but are not limited to, renal physiology, heart physiology, action potentials, and the sliding filament theory. Each group then prepares a storyboard for their digital storytelling project. A storyboard is a hand-drawn rough draft of how to organize the digital storytelling project and a list of its contents.

Storyboards are graphical and text representations of all the information that goes into the digital storytelling project. A storyboard helps the student figure out what media (i.e., video, still photos, graphics, etc.) and text to use for each part of the project. In other words, a storyboard contains the exact contents of the digital storytelling project. The storyboard should be reviewed by the instructor to be certain that the content has been planned and is accurate. The group then writes a script for the narration of the digital storytelling project. Students practice reading it in order to prepare for the taping of the narration. Finally, the group produces their digital storytelling project using Windows Movie Maker 2.0™. A typical digital storytelling project will run for 10-15 minutes.

**Conclusion**

The results of digital storytelling projects are exciting and rewarding. Students have found this exercise very informative – both as constructors of the digital storytelling project and observers of their peers. There has been an apparent improvement in the students’ skills and abilities understanding health concepts. The digital storytelling project adds a practical experience that supplements the lecture material. Digital storytelling projects are a powerful way to motivate students to understand an academic concept while building their narrative presentation. The method allows for peer-to-peer learning and also fosters an increased ownership in learning the course material. The potential for increased retention rates and comprehension of course material is found in digital storytelling projects as they promote cooperative and active learning.

### Anatomy Digital Storybooks Grading Rubric

<table>
<thead>
<tr>
<th>Score</th>
<th>Content: Material</th>
<th>Content: Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>Extremely thorough; displays evidence of extensive research; presents accurate information with appropriate resources</td>
<td>Material is extremely well organized; format is logical and easy to follow; ideas flowed from one idea to another</td>
</tr>
<tr>
<td>Good</td>
<td>Adequate summary of information; demonstrates reasonable research</td>
<td>Shares research through an organized and clear presentation; most parts flow to one another</td>
</tr>
<tr>
<td>Fair</td>
<td>Presents limited amount of information with accurate sources</td>
<td>Organization lacks in consistency; little continuity</td>
</tr>
<tr>
<td>Poor</td>
<td>Limited information; demonstrates little evidence of research</td>
<td>Required information extremely unclear</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>Required information was missing</td>
<td>No evidence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>Media Resources</th>
<th>Effective</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>Supporting resources are very appropriate to topic; method of utilizing media is very effective</td>
<td>Captures the interest of the audience</td>
<td>Clever, creative and exceptionally appealing delivery of required components</td>
</tr>
<tr>
<td>Good</td>
<td>Appropriate selection and use of media resources</td>
<td>Presents a clear message for audience</td>
<td>Clear and adequate display of required information</td>
</tr>
<tr>
<td>Fair</td>
<td>Selection and use of media resources is very limited</td>
<td>Message difficult to decipher</td>
<td>Required information was partially fulfilled</td>
</tr>
<tr>
<td>Poor</td>
<td>Little use of appropriate media resources</td>
<td>Little evidence of creative energy</td>
<td>Required information was incomplete, ineffective, and reflected little effort</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>Required information was missing</td>
<td>No evidence</td>
<td>Required information was missing</td>
</tr>
</tbody>
</table>

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**Figure 2**

Teaching Tips - continued from page 21

References


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- 10 anatomical lessons with subsections for more organized, relevant scholarship
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Educational Research and HAPS

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At the San Diego HAPS Conference, a group of twenty-six participants met to brainstorm ideas about educational research, scholarly teaching, promotion and tenure, and HAPS. Historically the focus of the Annual HAPS Conferences has been on teaching and facilitating communications among instructors who teach full time. HAPS’ role in the educational research process is less well developed, and our informal group of educational researchers hoped to derive a few suggestions that could aid HAPS in this area.

During our meeting, small groups were formed to answer the following questions: “I need help with…”, and “I wish HAPS would…” The following suggestions are based on responses to these two questions.

Suggestion #1

HAPS has a strong history of connecting new and experienced teachers, and, likewise, it could promote connecting new and experienced educational researchers. A logical first step would be to offer a yearly workshop for new educational researchers that involves HAPS members who have experience in writing grants, conducting research, and publishing papers in the arenas of educational research and the scholarship of teaching and learning. The format could simply be a roundtable conversation where questions could be posed and answered.

Suggestion #2

There is no shortage of journals that feature research in anatomy and physiology education, e.g., Advances in Physiology Education, the new Anatomical Sciences Education, etc., and thus there is no reason to shape the HAPS-EDucator into a publication that would compete with these existing journals. However, it would be beneficial to have current educational research articles that are germane to HAPS members summarized in HAPS-EDucator. More specifically, we could ask a journal editor or paper author to write a short summary of recently-published articles that would be useful to HAPS members.

Suggestion #3

HAPS members who conduct educational research often publish their work outside of HAPS, but still, their work could be of great use to HAPS members. With this in mind, HAPS could promote research by offering a “Research Paper of the Year” award. In order to be eligible for the award, the author or authors of the paper would have to be active HAPS members. There would be some type of recognition at the annual conference. In addition, the authors could be invited to write a short summary of their work for HAPS-EDucator.

Suggestion #4

Posters have evolved into a useful tool to communicate research findings and every year HAPS sponsors a poster session. Similar to the “Research Paper of the Year” award, HAPS could sponsor an “Outstanding Poster” award and publish a copy of the poster in HAPS-EDucator.

Suggestion #5

During the annual HAPS conference, HAPS could schedule a plenary session that features educational research that advances scholarly teaching. Members of the program committee could recruit experts in science education research, assessment and evaluation, learning and cognition, action research, etc. One logical possibility is to feature the author of the previous year’s “Research Paper of the Year.”

Suggestions 4 and 5 would both require a review process that would mean additional work for HAPS members. However, work on review committees is a highly informative process and would in itself promote research and scholarship.

Conclusion

The above suggestions are simply ideas without any plans for implementation. The HAPS Board of Directors and other members in leadership positions already have enough work to stay busy; therefore, proposing the formation of an “Educational Research Committee” seems unwieldy. In order to promote the role of research, scholarly teaching, and promotion and tenure issues within HAPS, we need members who wish to put into operation one of the above suggestions. One very easy first step would be to write a workshop proposal for the New Orleans conference that would network new and experienced researchers.

As HAPS grows and matures, its mission should evolve so as to better accommodate the needs of its members. Along with heavy teaching loads, many new A & P instructors have “educational research” as a component of their jobs; therefore, it is logical for HAPS to begin developing resources to assist in this area. But along with helping new instructors, the promotion of educational research should help all HAPS members become better teachers.
My Experiences in the HAPS Institute Pilot Courses

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I participated in the two pilot HAPS-I (HAPS Institute) courses: Advanced Renal Biology and Topics in Anatomy & Physiology during the summer of 2007. These courses were centered around topics presented at the HAPS conference in San Diego followed by an online format which used Blackboard Learning System™ (online learning management system) for the remainder of the summer. One graduate credit was offered for each course. Both courses had reading assignments of a text and journal articles submitted by the speakers to be completed before attending the HAPS conference in San Diego. Since the basis of the course content was presented at the HAPS Conference, all participants developed personal relationships with each other, which allowed an effective online learning community to exist.

The Advanced Renal Biology course consisted of attending the renal physiology update seminar and two three-hour workshop sessions at the conference. These workshop sessions focused on reflective and advanced problem-solving activities that could be utilized in A and P courses, renal content knowledge, and utilisable case studies, problem sets, and inquiry driven labs.

The Topics in Anatomy & Physiology course met during lunch on the first day of the conference in order to get to know the other participants with whom we would be conversing online. Attendance was required at all of the update seminar presentations. Following the conference, there were seven weeks of online discussions, each week discussing a new question that was relevant to our teaching experiences. An excellent online learning community was created and much active dialogue among the participants. Various participants elaborated on a teaching technique, tool, or activity that had worked well for them in the past and posted these on the Blackboard Learning System™ course website.

Both courses required submission of a culminating learning object or activity to be used in A and P courses utilizing the information learned from the course. These varied widely and included case studies, problem sets, visual models, or an in-class activity or tool. The learning objectives were posted on Blackboard Learning System™ and peer reviewed by three members of the course, which was a nice opportunity to receive feedback on a teaching activity. After revisions were completed, these assignments were posted on the American Physiological Society (APS) Archive of Teaching Resources—a cooperative effort of HAPS and APS.

It has been shown in educational literature that effective learning environments for teachers should focus on pedagogical content knowledge. Often workshops and/or courses will focus on pedagogy alone, but there is a need to combine it with subject-specific content knowledge for effective implementation into the classroom. These HAPS-I courses are a unique opportunity to develop skills and content knowledge directly applicable to teaching A and P. I have incorporated several of the activities from both of the courses into my Fall Semester 2007 curriculum with nominal preparation necessary.

Although I originally enrolled in the HAPS-I courses to receive graduate credit toward promotion, I came away with a network of good contacts, a myriad of teaching activities, a reflection on the HAPS conference update seminars, and peer reviewed teaching activities to add to my CV.

Reference

Note: Because the HAPS Institute (HAPS-I) continuing professional education program is new to the HAPS community at large, we asked Emily Allen to share her experiences as a HAPS-I Scholar (participant) in the HAPS-I pilot courses offered last year.
—Kevin Patton, HAPS-I Director
Summary of a Poster Presentation
A Preliminary Survey on the Conceptual and Motivational Value of Using Specially Designed Clinical and Pharmacological Cases as Problem-Solving Tools in Physiology Dry Labs for Pre-Nursing Students

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Background
Students who take an anatomy and physiology course as a prerequisite for a nursing program are mainly interested in how the concepts they learn relate to medical conditions they will encounter in their future profession. Furthermore, many community college students in such classes already work as lower division healthcare workers encountering a myriad of brain-tickling medical problems on a daily basis. At the same time, most of these students lack either previous and/or serious science coursework, or they are striving to continue their education after many years spent far from the classroom. In addition, their study time is often very limited by their work or family-related situations. Such students, understandably, have difficulty grasping the principles of college-level physiology. They need help and we had designed cases to address those limitations.

I started from three premises
1. Physiology need not be an oppressive and frightening task. A college-level course deals with difficult material; my job is to make difficult material more understandable.
2. “Problem-based learning is a curriculum development and instructional system that simultaneously develops both problem-solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem-solvers confronted with an ill-structured problem that mirrors real-world problems.”
3. A unique learning tool may facilitate the comprehension of difficult subject matter: programmed instruction. Difficult concepts are broken into single sentences or simple modules that are carefully linked, and stem from each other. “In this way, small doses of didactic medicine bring the concept into focus.” This approach develops active and interactive learning.

Designing the cases
Building on these premises, I added an additional guideline: one case should never take more than 30 minutes for students to master. Using these parameters, I designed clinical and pharmacological cases for my students. I followed Guided Design principles fully described in CE Wales and RA Stager, Guided Design. Samples of the types of scenarios that students explored are available on request.

Other lab formats – activities used in my classes
- Classical “wet” labs were mostly from Elaine N. Marieb, Human Anatomy And Physiology Lab Manual, fetal pig version, 8th edition
- Biopac™ (BSL) student lab for human physiology
- PhysioEx 5.0™

Survey
Six months after completion of the course, I contacted a random selection of 20 former students. I asked the following six questions in order to assess the long-term educational and motivational value of the clinical and pharmacological cases as problem-solving tools compared to other types of lab activities:

1. What type of lab format contributed most to your understanding of physiological concepts?
2. If you were forced to miss one lab session during the semester, which would least detract from your learning about and understanding of physiological concepts?
3. Which lab format did you find most enjoyable?
4. What lab format most engaged your sense of inquiry and caused you to continue thinking about the problems after class?
5. After the course finished, what lab worksheet did you retain as being a valuable for future reference?
6. What kind of lab most piqued your curiosity about the overall process you were studying?

Students selected among the following four answers:
- A. Clinical case studies
- B. PhysioEx™ computer simulations
- C. Biopac™
- D. Classical ‘wet’ labs
Results

<table>
<thead>
<tr>
<th>Question</th>
<th>Classical</th>
<th>Cases</th>
<th>PhysioEx™</th>
<th>Biopac™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format</td>
<td>0</td>
<td>13</td>
<td>7</td>
<td>0</td>
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<tr>
<td>Curiosity</td>
<td>0</td>
<td>19</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

These data appear to be very straightforward. With such a small study, I do not think any explanatory value would be added by calculating standard deviation or other such parameters.

Conclusion

It would be impossible to draw definitive conclusions about the efficacy of using case-studies on the basis of such a small sample. However, I plan an expanded study to more effectively evaluate this kind of lab activity in comparison with other lab activities. I also plan to develop a digitized version of this approach for distance learning.

References

1 Finkle SL, Torp LL. Introductory Documents. Available from the Center for Problem-Based Learning, Illinois Math and Science Academy, 1500 West Sullivan Road, Aurora, IL 60506-1000. 1995.

2 Dubin D. <www.emergencyekg.com>

Summary of a Poster Presentation
Know your Audience: Linking Effective Physiology Instruction With Student Learning Preferences

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Introduction
What is learning? Learning involves changes in long-term memory as new knowledge is moved from the limited confines of working memory to be restructured and stored within the boundless reservoir of long-term memory.1 Large undergraduate classes are often composed of diverse populations of young adult learners, each with his or her own arsenal of approaches to the process of learning. While we, as postsecondary instructors, often draw on our own prior learning experiences when presenting new course content, these approaches may not be sufficiently diverse to reach all of the students in the classroom. Familiarity with the types of learning styles used by students and knowledge of those particular learning preferences displayed by a given cohort of students can provide guidance as to the most effective means with which to acquaint students with new concepts and factual information.

VARK (© 2006, Fleming & Bonwell)2 is a questionnaire that students can complete online or in paper format to classify themselves as primarily visual (V), aural (A), reading/writing (R), kinesthetic (K), or multimodal learners. The VARK© survey was initially developed as a questionnaire composed of 13 multiple-choice questions that expanded on Stirling’s initial three categories of learners (visual, aural, and kinesthetic)3 to include a fourth type of learner, a modified visual learner called the read/write learner who interacts well with visual information, but more when it is presented as text, rather than diagrams or animations.4 In 2006, the VARK© survey was revised and expanded to a 16-question document (Version 7.0) in which grammatical inconsistencies were corrected and questions that performed poorly in the past were replaced.2 The survey questions portray everyday situations with which students should be familiar and, when taking the survey, students are instructed to choose their preferred approach(es) to a given scenario and to select more than one answer if that would more accurately convey their entire response to the given situation. A sample question from the Version 7.0 VARK© survey is shown below [with the VARK© coding that would be used during scoring in brackets beside each response;]:

You are helping someone who wants to go to your airport, town centre or railway station. You would:

a) go with her [K]
b) tell her the directions [A]
c) write down the directions (without a map) [R]
d) draw or give her a map [V]

Materials and methods
During September 2006, entry-level medical (M) and health science (HS) students studying anatomy and physiology at the University of Ottawa were asked to visit the VARK© website, complete the survey, and submit their VARK© scores anonymously using the form shown below:

<table>
<thead>
<tr>
<th>VARK© SCORE (Sept. 5, 2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual:   … . .</td>
</tr>
<tr>
<td>Aural:   … . .</td>
</tr>
<tr>
<td>Read/Write:  … . .</td>
</tr>
<tr>
<td>Kinesthetic:   … . .</td>
</tr>
</tbody>
</table>

The student VARK© data were collected and sorted using Microsoft Excel™ in order to compare the M and HS student populations and to:

1. identify the mean frequencies with which students selected V, A, R and/or K approaches to problem solving.
2. recognize any tendencies for students to preferentially use V, A, R or K as their primary learning style.
3. compare the distribution of multimodal learners within the two student groups.

Results
Student response rates of 25% (28/112) and 26% (76/289) were obtained for M and HS students, respectively. For both student groups, the learning preferences were spread uniformly among the four different options with no significant differences noted (Fig. 1). However, an interesting trend for both groups was to choose kinesthetic learning more often than the other learning styles and for M students to select aural while HS students chose visual learning the least often (Fig. 1).

Figure 1. Mean VARK© scores for M and HS students. (V = visual, A = aural, R = read/write, K = kinesthetic).
With regard to identifying a single learning preference, 89% and 86% of M and HS students, respectively, did report one learning style that scored higher than the others by at least a single unit. While all learning styles were represented as primary choices, kinesthetic was selected more often by both student populations and, of concern to lecturers, aural was selected the least frequently (Fig. 2). The proportion of definitive unimodal students was then determined by identifying those individuals whose preferred learning style was chosen with a frequency that exceeded that of selecting any of the remaining choices by a minimum of 3 units. 43% of M [n = 2 (V), 1 (A), 3 (R) and 6 (K)] and 38% of HS [n = 6 (V), 9 (A), 8 (R) and 9 (K)] students fell into this category.

**Figure 2.** Favorite learning style of those students who expressed a dominant learning preference. (V = visual, A = aural, R = read/write, K = kinesthetic)

A multimodal learner uses at least two learning styles equally when approaching new information or a problem to solve. Using the most strict definition of a multimodal learner (the two top learning styles have identical scores), it was found that 11% of M and 14% of HS students were truly multimodal. For those population subgroups, kinesthetic learning was the most popular component of the learning style pairs while read/write was the least popular (Fig. 3). Related to this concept, a large proportion of both student populations was composed of learners with multiple preferences. For these students, while their preferred learning styles did not always score identically, their top three learning preferences did cover a spread of no more than four units, indicating that they should also be considered as multimodal learners. This feature was displayed by almost half of the students surveyed (46% of M and 47% of HS students). In further support of this trend toward multimodality, only one M (aural) and two HS students (aural and visual) had a learning preference that scored a value of zero.

**Figure 3.** Learning preferences of multimodal learners. (V = visual, A = aural, R = read/write, K = kinesthetic)

**Discussion**

A concern in this study was the low student response rate, due in part to the voluntary nature of the survey and also to the fact that students were asked to complete the questionnaire on their own time and to remember to fill in and return the VARK data forms. This study will be repeated with two improvements: the survey will be conducted during class time, and the data collection form will be amended to ask students to also indicate their sex, in an effort to increase response rates and to ensure that the data collected is representative of the student population being surveyed, respectively.

The finding that approximately 40% of the survey respondents presented as strongly unimodal learners agrees well with that reported by Fleming and Bonwell. Hence, it is important to recognize that within the lecture room, there exists a large proportion of students for whom audio and/or reading textual information does not constitute their primary mode of learning and that other means (e.g., animations, case studies, problem solving, opportunities to physically interact with physiological structures) must be used to reach these students when teaching. An equally important finding from this study was that close to 50% of students studying physiology within the faculties of medicine and health sciences at the University of Ottawa identified themselves as multimodal learners who used at least three learning styles (and sometimes four) almost equally as they tackled course content. These data agree well with the value of 60% reported by Fleming and Bonwell for those members of the population who use at least two learning styles with similar frequencies. These learners are not content to just use one mode when learning and, indeed, may become anxious and unable to learn effectively if not presented with opportunities to employ all of their learning styles when studying. Indeed, Abby Hassler provided the following student comment in a report of her efforts to apply VARK principles to the education of rehabilitation science students:

“We like the way you teach. You say everything in three different ways: you say it, you point to it and you do it. If we miss one way, we have a second and even a third chance to learn.”
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Hence, it is important for instructors to know their class composition and for students to know their learning preferences. The former will allow instructors to modify their approaches so as to engage as many students and learning styles as possible while the latter will allow students to recognize and make optimal use of their learning strengths, both inside and outside the classroom, so that they can maximize their achievements. Students are helped in this regard by the supplementary web pages associated with the VARK© web site. These pages describe each learning style and suggest ways in which each preference can be used to improve learning.

Acknowledgement


References


Summary of Update Seminar #1

Applied Surgical Anatomy of the Shoulder with Anatomical Correlation

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Robert Alan Pedowitz opened the seminar with a brief review of the history of surgery and the progress and developments that have lead to arthroscopic surgery. He described the procedures involved in arthroscopic surgery and the current advances. This is a challenging field which requires excellent dexterity, “it’s like tying knots with chopsticks under water” - that sounds easy!

There followed a concise and clear review of the anatomy of the shoulder. In his description, he reviewed the biomechanics of the shoulder joint and addressed its fantastic range of motion which can, unfortunately, lead to instability, degenerative processes, and surgery.

The presentation continued with several videos of arthroscopic repairs of relevant ligaments, cartilage, and bones. Pedowitz described the duration of rehabilitation process of arthroscopic surgery as similar to that of open shoulder surgery, but that the less invasive techniques of arthroscopy resulted in a reduction of additional tissue damage. The clinical issue of repeated shoulder dislocation and the most current clinical approach to initiate early repair was discussed. He also gave a brief overview of statistics concerning the likelihood of reoccurrence of a shoulder dislocation after the initial dislocation in young males and conveyed the importance of providing this information to patients in their decision-making process on surgical intervention.

Pedowitz finished his presentation with a review of his research. By examining ligaments of different muscles, he was able to observe that the cells in each of these locations behave differently and repair occurs at varying rates during the healing process. He is currently studying the possibility of manipulating the environment of joints pharmacologically to enhance ligament healing. Pedowitz was engaging, presenting anatomical, clinical, and research information all nicely tied together “without chopsticks.”

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