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Cover art: Jamie Smith is a professional cartoonist (Nuggets, Freeze Frame), artist, and art instructor in Fairbanks, Alaska. He drew this cartoon while taking Marsha Sousa's anatomy and physiology class several years ago. He spends as much time as possible exploring the Alaskan wilderness. You can find out more about Jamie at http://inksnow.blogspot.com/.
Greetings
HAPS members!

I hope that everyone is off to a good start for the spring term. It is freezing here in Pennsylvania, but at the same time, seeing all of you in Denver this summer seems like it is just around the corner, so that makes winter much easier to bear! There has been a lot of activity in HAPS since I wrote my last column.

The big news is that we hired our first Executive Director. I mentioned this in an earlier email, but please welcome Dr. Laurence Spraggs to the organization! Larry started his career as an A&P teacher before he became a college administrator. In his most recent academic position, he served as President of Broome Community College in Binghamton, New York. Larry brings many skills to HAPS, including experience planning curricula on a large scale, working with accrediting agencies, fund raising, strategic planning, publishing, and integrating technology into classrooms.

We are very pleased to have him join us. Larry will be at our annual conference in Denver. If you are there, too, please take some time to say hello. He is working hard to learn the organization and meet members, and I know he is excited to finally get to talk with HAPSsters face-to-face.

Speaking of the Denver conference, if you have not already done so, please take a minute to register and reserve a room. As you recall from the past, rooms at the discounted conference rate usually run out sometime during the spring. More details are available on the HAPS website, but we have receptions, dinner, dancing, special events, . . . oh, and some great academic opportunities planned, too! The HAPS Institute will be offering continuing education courses for faculty in conjunction with the amazing update speakers and workshops we enjoy every year. If they are not in the midst of collectively pulling out the last of their hair, please be sure to thank our 2010 conference coordinator, Terry Harrison, and his hard working committee for planning such a wonderful event!

In addition to the HAPS-I courses offered in Denver at the annual conference, two other courses are being offered this spring by members of the Board of Directors. Past President Kevin Petti will offer a cadaver workshop in San Diego this February, and Secretary Wanda Hargroder will offer another cadaver-based course in Baton Rouge, Louisiana, later this year. Kevin’s course is already full, but keep an eye out for the announcement about Wanda’s course. All of the HAPS-I courses are amazing opportunities to brush up on skills, get the latest updates on the topics we teach, and earn graduate credit.

Finally, please also watch for an email from President-Elect Caryl Tickner about the ballot to elect officers this spring. Caryl and the Nominating Committee have been working hard to build a strong slate of candidates. Thank you to everyone who has helped Caryl with this important task. Please send me a note or give me a call if you have any questions or concerns about HAPS. There will be more news when we meet in Denver, but until then, have a wonderful semester!

Best wishes to you all,
John Waters
President, Human Anatomy and Physiology Society
johnwaters@psu.edu 814-863-1154
One of the most rewarding tasks that a HAPS president performs is selecting the President’s Medal recipient. This individual demonstrates exceptional service to HAPS and its mission of promoting excellence in the teaching of anatomy and physiology. The award is traditionally given during the annual conference, which coincides with the end of a president’s term. I announced my selection at the 2009 conference in Baltimore. The intent of this column is to share this selection with the rest of the Society.

Selecting this individual is a responsibility that is taken seriously by a president and could be considered a difficult endeavor. In my case, however, I found the choice to be clear. My selection is perhaps the greatest ambassador that HAPS has ever had. He has served HAPS in innumerable capacities, volunteering both his time and talents. Perhaps most importantly, he is both a gentleman and a scholar. My choice for the 2009 President’s Medal is Richard Faircloth.

Outlining Richard’s contributions to HAPS tells only half the story, yet could still fill an entire issue of the EDucator. These contributions include serving on the Grants and Scholarships Committee, the HAPS EDucator Editorial Board, and the Board of Directors as Eastern Regional Director (two terms). His leadership while in these roles resulted in significant gains in a variety of areas. Applications for grants and scholarships climbed dramatically, donations to the Robert Anthony Scholarship Fund increased, and his co-authorship of the EDU-Snippets was welcomed by the membership.

Richard has been generous with HAPS not only in leadership roles, but as a general member of the Society as well. He made numerous presentations at annual and regional conferences, coordinated a conference photograph collage that was displayed at many of our meetings, and could always be counted on to be a central figure on the dance floor during the annual banquet! It should also be noted that Richard and his mother donated a substantial amount of their own money to cosponsor the USS Midway Aircraft Carrier Museum event that was held in 2007 during the San Diego Conference.

But Richard is so much more than his substantial leadership contributions. It is his commanding social presence and welcoming personality that truly defines him. I believe that it is this trait that most represents what it is that distinguishes HAPS from other professional societies. I firmly believe that it is his unique combination of volunteerism and personality that makes Richard an obvious choice for the President’s Medal.

Although Richard has just retired from full-time teaching at Anne Arundel Community College in Maryland, he continues to serve in various leadership roles. It is my hope that his warm and welcoming presence will be felt for many HAPS conferences to come. And it is my great pleasure to share with the general membership this announcement that 15-year member Richard Faircloth is the recipient of the 2009 President’s Medal. Congratulations Richard!
INTRODUCTION

Understanding the gastrointestinal system and its organs, their anatomical relationships, and their functions is typically extremely challenging for undergraduate students, particularly in the context of a rigorous course in Human Anatomy and Physiology. Several didactic methods and tools have been used to facilitate students’ understanding of this challenging material. Conventional teaching methods include the use of PowerPoint lectures that incorporate images and diagrams of the body systems which demonstrate their location in the body cavities.

Though this and like-minded conventional techniques can be effective, research suggests that a hands-on approach can better facilitate the acquisition of difficult concepts (Bredderman 1983). For example, in one recent study science and engineering students learned more from a hands-on learning module than through traditional instructional techniques. Students who devoted the majority of their time to the design of a working water purification device scored significantly higher on tests of engineering competency than students who learned primarily through lecture-based instruction (Riskowski et al. 2009). These gains were observed for the “hands-on” groups despite having only 10 percent of classroom time dedicated to lecture-based learning. In a related study, student comprehension of statistics was significantly improved by the implementation of hands-on research projects (Smith 1998). Teams of students who worked on bi-weekly projects that emphasized real-world applications (e.g., the association between classroom seat location and academic performance) significantly outperformed students in more conventional lecture-based courses.

The present study was designed to extend this principle to the acquisition of biological concepts among state college students in an academically demanding anatomy and physiology course. Specifically, the study examined the efficacy of cadaver dissection in promoting student understanding of the gastrointestinal tract over and above what can be achieved solely by more traditional undergraduate teaching methods. Students in two control classes were taught using a conventional lecture that relied on a PowerPoint presentation, illustrations, and anatomical models. Students in the experimental class received this conventional instruction, but also participated in a cadaver workshop in which they witnessed a cadaver dissection and physically examined the organs involved in the gastrointestinal system. All students then took a brief test of competency in the subsequent class. It was predicted that students would exhibit a significantly better understanding of the material in the experimental condition relative to the control condition, thereby demonstrating the unique gains afforded by the cadaver workshop. Learning those structures in their appropriate sequence and understanding their functions based on the differences in their tissue architecture and appearance are significant parts of anatomical studies.

METHODS

Students in all three classes received instruction about the gastrointestinal system using conventional PowerPoint lectures, illustrations, and anatomical models. Two of these classes served as the control condition (N = 49). Students in the third class (N = 37) were randomly assigned to receive instruction involving the dissection of a human cadaver. Students in this experimental condition (cadaver group) were instructed by exposing the abdominal cavity and the organs of the gastrointestinal tract, including the accessory organs (Figure 1.) The students also were encouraged to manipulate and closely examine the structures in the cadaver and compare them to the images in their textbook. Students were encouraged to successively visualize the interconnection of the structures of the gastrointestinal system, beginning essentially at the oral cavity. Particular features of the dissection were designed to illustrate key principles and spontaneously

(Continued on next page)
engender an inquisitive nature in students. For example, the green stain on tissues from stored bile invariably – and naturally – attracted students’ attention to the gallbladder and the hepatic and the cystic ducts. Throughout the dissection, students were reminded of key processes (e.g., that most of the absorption of ingested food takes place in the small intestine) while they simultaneously handled the actual organs where these events take place. Moreover, the dissection presented students with the opportunity to make discoveries about medical procedures the cadaver may have undergone. For example, after close inspection, the students may not find an appendix, which in turn can lead them to conclude that the cadaver belongs to a person who had undergone an appendectomy. During the entire process, students were given the opportunity to arrange the gastrointestinal tract on a tray outside of the cadaver and, through a series of dissections, succeed in observing the internal tissue transition and points of connection. Students also were encouraged to dissect and explore the unique structural elements in each part with which they worked. The muscular strength of the pylorus, the folds in the stomach or the rugae, the hepatopancreatic ampulla, and the ileocecal valve are examples of the anatomical features that captivated the students’ attention.

Students in all three classes were required to take a 5-item written exam in the class period following their designated instructional session (conventional instruction for the two control classes and cadaver instruction for the experimental condition). The exam required the students to list organs, explain their function, and analyze the relationship among the parts of the gastrointestinal tract during the processes of digestion and absorption (e.g., example question).

RESULTS

Student performance on the comprehension questions was assessed by two independent raters who possessed expertise in the subject matter. A reliability analysis revealed an acceptable degree of agreement between the evaluations of the two raters (Cronbach’s α = .72); therefore, the separate ratings were combined into a single mean rating.

It was predicted that students who experienced the cadaver training (cadaver group) would exhibit a significantly better comprehension of the material than control students who experienced only a standard Anatomy & Physiology lecture. To examine this hypothesis, a t-test for independent means with instruction type (cadaver vs. control) as the independent variable and overall mean performance rating on the 5-item test as the dependent variable was conducted. As seen in Figure 2, students in the cadaver condition (M = 7.42, SD = 1.14) performed significantly better than students in the control condition (M = 5.37, SD = 1.41), t(84) = 7.467, p < .001. Maximum score on the assessment was 10.

The cadaver group also performed significantly better than the control group on each of the five individual comprehension questions, but the magnitude of the difference between the groups did not vary significantly across questions (all p > .05 in a multiple regression analysis). Overall, the results suggest that hands-on instruction involving a cadaver is associated with markedly improved performance relative to instruction based solely on a conventional lecture.

![Figure 2: Overall mean performance rating for students in the cadaver group and control conditions (maximum score = 10). The observed difference is significant at p < .001.](Continued on next page)
CONCLUSIONS

The present findings strongly suggest that undergraduate students benefit from instruction involving exposure to a human cadaver. Specifically, students in the “cadaver” condition outperformed control students in terms of overall comprehension on a 5-item anatomy and physiology quiz. Though it is suspected that this improvement is attributable to the mundane realism afforded by the cadaver, the success of students in this condition may have been due simply to the increased instruction they received. Students in all three conditions received a conventional lecture, but only students in the cadaver condition benefited from additional instruction.

To determine whether the knowledge gains enjoyed by the “cadaver” students were simply a function of the amount of instruction – and not the realism provided by the cadaver – a future study should include a control condition in which students receive an additional lecture that mirrors every aspect of the cadaver condition but does not actually involve a cadaver. Nevertheless, the cadaver condition outperformed the control conditions in this study by such a wide margin that the gains may be attributable, at least in part, to the type of instruction (rather than merely the amount of instruction).

Based on these results, undergraduate programs in the biological and medical sciences are encouraged to supplement standard lectures with instruction involving cadaver dissection.

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Cool Learning Supplements Are Not Useful to All Students

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INTRODUCTION

Students use many techniques, tools, and supplements to study anatomy. One such supplement is paper flashcards. These typically have an unlabeled figure on one side and a labeled figure on the other side. Our hypothesis was that improvements could be made on current supplements used to study the skeletal system, and that these improvements would make studying more interesting, and thus, more productive. Specifically, we predicted that improved flashcards would increase performance on the written exam on the skeletal system in all students and that poorer performing students would be motivated to study more. To this end, we provided on-line, innovative, digital flashcards, used "real-clinical cases" to make the skeletal system clinically relevant, and incorporated pedagogy to teach techniques for learning.

RESEARCH QUESTIONS

As we entered this project, we had four basic questions:
1. Do students prefer using the digital flashcards over paper ones?
2. Do students prefer to study the skeletal system on a standard figure or a radiograph?
3. Do students prefer studying skeletal structures on a standard radiograph or on a radiograph from a real clinical case with trauma and pathology?
4. Do students prefer a standard flashcard or a flashcard with learning clues?

METHODS

Data was acquired by anonymous evaluations from students in a one-semester undergraduate Human Anatomy course. The course is taught with a systems-based approach. The evaluations inquired about the students’ use of flashcards for studying, and also included questions about performance on the written examination of the skeletal system. This was done in order to correlate the use of flashcards to performance. Our department received a donation of two sets of radiographs previously used for teaching in a hospital. These include plain films, and images from CT and MRI scans. The teaching sets were accompanied by a complete medical history and brief teaching notes. Funds were allocated to purchase a radiograph scanner to make high-resolution scans. This study was supported by a Student Grant from HAPS Grants and Scholarships (2008) to Angela Jorgensen.

Three different sets of digital flashcards were created in Microsoft PowerPoint. The most basic was of drawings showing bones and bony features. Second, similar flashcards were created using radiographs of bones and bony features. Third, clinical cases were used with radiographs to learn about bones and bony features. In PowerPoint, each slide was a flashcard and was a portion of a two- or three-part question. The first slide showed a bone or bony feature. The subsequent slide provided a clue, and the final slide revealed the answers. Completed sets of flashcards were saved as one secured .pdf (Adobe) file. At the beginning of each set, students were instructed to fit the flashcards to their screen and then use the down-button to pass through successive cards. The slides are aligned so that using the down-button gives the appearance of interactive cards. All students in the course had unlimited access to these digital flashcards through our password protected course website (WebVista/Blackboard). An evaluation of the flashcards was offered on this site following the completion of the exam on the skeletal system.

(Continued on next page)
EXAMPLES of FLASHCARDS:

Standard

Radiographs

Clinical cases

> 59 year old male
> Fall from ladder at home
> Reports with severe pain in left lower thigh, with palpable swelling over this region
> X-rays of knee and thigh were ordered

Which bone is affected?

> 59 year old male
> Fall from ladder at home
> Reports with severe pain in left lower thigh, with palpable swelling over this region
> X-rays of knee and thigh were ordered

Which bone is affected?

> 59 year old male
> Fall from ladder at home
> Reports with severe pain in left lower thigh, with palpable swelling over this region
> X-rays of knee and thigh were ordered

Which bone is affected? Femur. Did you also notice the screw in the tibia and patella from previous procedures?

(Continued on next page)
RESULTS:

Of 423 students registered for the course, 123 responded to an anonymous evaluation about their use of flashcards for studying. Of the respondents, 25.0% were seniors, 31.8% were juniors, 19.3% were sophomores, 2.3% were freshmen, and 21.6% were returning or non-degree seeking students. (Note: Many of the sophomores were advanced placement freshmen.) When respondents were questioned about their performance on the written exam, 34.1% reported performing above 90%, 46.6% between 90-80%, 14.8% between 80-70%, and 4.5% below 70%.

The first research question was to determine if students prefer using the digital flashcards over paper ones. It was our assumption that innovation would make studying more interesting and, thus, more productive. In the evaluation, 30% reported that they prefer to use only conventional flashcards, 10% prefer only digital flashcards, and 59% prefer to use both. When correlated to performance on the written exam, the data suggest that students at the lowest performance level use conventional over the more sophisticated digital flashcards. The reverse seems true at the highest performance level: students use the digital flashcards more than the conventional ones (Figure 1).

Figure 1 : Do students prefer using the digital flashcards over paper ones?

Question on Evaluation: “Do you prefer to use the digital flashcards or conventional methods, (e.g., textbooks, atlas, paper flashcards, etc.) to study the skeletal system?”

To measure the degree to which the students used the digital flashcards, the evaluation contained the question: “How often did you use the digital anatomy flashcards to study the skeletal system?” In the evaluation, 25% of the students reported using the digital flashcards extensively, 51% rarely, and 24% responded that they never used them. When correlated to performance, 53% of students with exam scores >90% use the digital flashcards extensively to study (only 4% never used them), 20% of students with scores 90-80% used them (15% of students never used them), 23% of students with scores 80-70% used them (31% of students never used them). Most notably, only 2% of students with scores < 70% used the digital flashcards extensively (71% never used them) (Figure 2).

These data confirm the data from Figure 1 that students in the lowest performance level use the digital flashcards much less than conventional ones. The reverse is true for the students in the highest performance level. It seems that the hypothesis that the innovative flashcards would make studying more interesting and, thus, more productive is true only for the students in the highest performance level. This data suggests that the digital flashcards introduce a level of complexity that makes them non-productive or un-attractive for use in studying.

Figure 2: Do students use the digital flashcards?

Question on Evaluation: “How often did you use the digital anatomy flashcards to study the skeletal system?”

The next hypothesis was that radiographs are more interesting than a standard figure. That is, innovative digital flashcards that use radiographs to teach the skeletal system would motivate poorer performing students to study more and increase performance on the written exam.

The students responded to the evaluation question designed to determine if students prefer to study the skeletal system on a standard figure or a radiograph. In their responses, 36% of the students reported that standard figures only were most helpful for studying the skeletal system, 2% reported that radiographs only were most helpful, 57% reported that it was most helpful to use both, and 4% reported that they found neither to be helpful. When correlated with performance, 23% of students with exam scores >90% found the standard figures to be most helpful, 10% found radiographs most helpful, 67% found that both were most helpful, and 2% found neither to be helpful. This trend reversed as the performance level decreased! In the group of students with exam scores <70%, 60% found the standard figures to be most

(Continued on next page)
helpful, 2% found radiographs most helpful, 5% found that both were most helpful, and 20% found neither to be helpful (Figure 3).

This data seems to support our conclusions from Figure 2 that increasing the complexity of the digital flashcards reduces their usefulness for most students. A radiograph is more complex than a standard figure from the textbook and thus is used less frequently.

The previous data suggest that adding complexity to the digital flashcards tends to reduce their usefulness. It was our assumption that introducing clinical information from actual clinical cases would make them more interesting because of the clinical relevance. An increased interest level would lead to increased usefulness, and improved exam scores.

The students responded to the evaluation question designed to determine if students prefer studying skeletal structures on a standard radiograph or on a radiograph from a real clinical case with trauma and pathology. The evaluation data show that real clinical cases are preferred over standard radiographs by 33% of students with exam scores >90%, 32% of students with scores 90-80%, a decrease to 15% of students with scores 80-70%, and only 17% of students with scores < 70%. A Chi-square Test shows that the two-sided P value is 0.0143; it is significant that fewer students prefer using the clinical cases to study in the group that performs <70% versus the group that performs >90% (Figure 4).

These data suggest that solving a clinical problem requires a high level of application and analysis. This increases the complexity of the digital flashcards and reduces their usefulness for most students despite being clinically relevant.

The previous data suggest that solving a clinical problem requires a high level of application and analysis. This increases the complexity of the digital flashcards and reduces their usefulness for most students despite being clinically relevant. To test this hypothesis, the students responded to an evaluation question designed to examine different learning styles. The question stated: “Please identify whether the amount of information presented on the flashcards was appropriate for facilitating your learning. (Not enough information, Enough information, Too much information).”

The evaluation data show that when asked about learning styles, 12% of students with exam scores >90% reported that the information provided on the digital flashcards was not enough and 4% reported that it was too much. Furthermore, 15% of students with scores 90-80% reported that the information was not enough and 12% reported that it was too much. In the lowest performing group, 50% of students with scores <80% reported that the information was not enough and 50% reported that it was too much. These data support the hypothesis that an increase in the complexity of the digital flashcards may lead to a reduction in their usefulness for most students.

Subsequent evaluation questions were designed to further examine learning styles. The question stated “Describe your preferred learning style. (I prefer to be given all the information I need to know; I prefer to be given open-ended cases/scenarios to problem-solve; or I prefer to be given a mixture of information I need to know and some opportunity to problem-solve).” The evaluation data show that when asked about learning styles, 57% of students with exam scores >90% (Continued on next page)
reported that they prefer to be given all the information that they need to know and 42% reported that they prefer a mixture of information they need to know and some opportunity to problem-solve. In addition, 67% of students with exam scores 90-80% reported that they prefer to be given all the information that they need to know and 32% reported that they prefer a mixture of information they need to know and some opportunity to problem-solve. In the lowest performing group, 83% of students with scores <70% reported that they prefer to be given all the information that they need to know and 17% reported that they prefer a mixture of information they need to know and some opportunity to problem-solve. These data support the hypothesis that an increase in the complexity of the digital flashcards leads to a reduction in their usefulness for most students.

The previous data suggest that adding complexity to the digital flashcards tends to reduce their usefulness for many students. It was our assumption that adding learning clues would make them more helpful for the students. This would then lead to increased usefulness and improved exam scores. The students responded to the evaluation question designed to determine if students prefer the addition of learning clues to the flashcards. It was our assumption that the addition of learning clues would make the flashcards more helpful to the students. To test this hypothesis, the students responded to an evaluation question designed to examine different flashcard styles. The question stated: “The digital flashcards contained 3 slides: the question, some clues, then the answer. Others used two slides: the question, then the answer. Which presentation method was most helpful to you for studying? (Radiographs with 3 slides (and clues) or Radiographs with 2 slides (no clues)).”

The evaluation data show that when asked about learning styles, 77% of students with exam scores >90% reported that they prefer the three-part digital flashcards (with a question, identification clues, then answers) and 27% preferred a standard two-part digital flashcard (with question and answer). Furthermore, 81% of students with exam scores 90-80% and 92% of students with exam scores 80-70% preferred the three-part digital flashcard. In the lowest performing group, only 60% of students with scores <70% reported they preferred the three-part digital flashcard. This data suggests that most students appreciate some type of learning clues; however, it also suggests that the lowest performing group does not find the learning clues useful.

DISCUSSION and CONCLUSIONS

The hypothesis for this study was that improvements can be made on supplements to make studying more interesting and more productive. These improvements included providing digital flashcards, using radiographs and real-clinical cases to make the skeletal system clinically relevant, and incorporating learning clues to teach the student techniques for learning. We hypothesized that the improvements to the flashcards would result in better performance on written exams.

Our findings suggest that the use of innovative digital flashcards was not perceived to aid learning by all students. We assume that this is because the digital flashcards are more complex than conventional cards, and that the additional level of complexity is a deterrent to many students, particularly those who perform poorly on exams. Furthermore, using a radiograph to study the skeletal system is more complex than studying from a standard figure from the text. This difficulty was not overcome by making the digital-flashcards more clinically relevant. Studying the skeletal system using a clinical problem required an unexpected very high level of learning (applying, analyzing, and problem-solving).

The findings are consistent if considered within the realm of Bloom’s taxonomy of learning (Krathwohl 2002, Bloom and Krathwohl1956). Students begin learning by acquiring knowledge and repeating it. This is followed by the ability to comprehend and interpret. More demanding feats follow in application and analysis. The most difficult feats are evaluation and creation (i.e. problem-solving).
Students find conventional flashcards helpful because they help the student acquire knowledge and remember. The digital-flashcards using radiographs require the students to be able to comprehend, understand, and apply knowledge. The digital-flashcards with clinical-cases are the most demanding. These require the student to analyze, evaluate, and problem-solve.

In contrast to our hypothesis, our findings suggest that there is a learning process to using an innovative type of learning supplement. At the lowest level, students did not find the digital flashcards more helpful than the conventional flashcards for studying. Only the more advanced students were able to study the skeletal system by looking at radiographs. Upon mastering this level of sophistication, the students were then able to attempt using the radiographs from real-clinical cases to study the skeletal system. At all but the lowest level of performance, the students reported that the digital flashcards that included learning clues were helpful for studying.

In conclusion, it should not be assumed that students are more likely to study the skeletal system with digital flashcards, radiology, and/or real clinical cases. The data suggest that these present increasing levels of difficulty to the student as a supplement to their learning.

This study is not complete. Further analysis is required to correlate data from each student. A correlation of digital flashcard use by each student with his or her preference of conventional figures or radiographs, as well as with case-studies and use of learning clues, would be helpful. That data could be further analyzed by performance level. Trends must be analyzed. At this stage, it can only be predicted that there is a correlation between the individual student who did not find digital flashcards useful, and the inability to study from the clinical-cases.

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One way that the dictionary defines “inspiration” is “the drawing of air into the lungs”. At high altitude, that might be a little more difficult than at sea level. Another definition is the action or power of “moving the intellect or emotions”. This will not be difficult this year in Denver. Though both definitions are apt to what you will be doing this summer in the Mile High City at the 24th annual HAPS conference, the later is what we in the conference committee are hoping will happen to you this year and are working hard to foster and support. Indeed, the update seminars, poster sessions and workshops are designed to move your intellect to an even greater understanding and appreciation of Anatomy & Physiology and the get togethers with co-Hapsters, the banquet, and the stunning tour through the Rocky Mountains are designed to move your emotions.

The conference committee would like to inform you of some of the most recent updates and plans that have been made to make sure you become inspired this summer.

Great news for Hapsters, an all new BodyWorlds exhibit will be in Denver during the HAPS conference this year! The committee had already planned to have the traditional Sunday night get together at the Denver Museum of Nature and Science prior to the
One of the rewards of approaching retirement age is the ability to think back on a happy childhood and perhaps to have an opportunity to share cherished memories with children, grandchildren, and friends. Of course, we know that some childhood memories are not happy ones — particularly those that chronicle the litany of childhood diseases that were prevalent during those growing-up years. Chicken pox, with its itchy rash, unsightly red spots, and blisters, is one disease that many would just as soon forget. Unfortunately, about a million adults each year in the United States receive a painful reminder of chicken pox when the virus re-emerges seemingly from nowhere and delivers a whopper of a sucker punch with burning, aching pain just as the golden years are getting underway. The second time around the virus causes shingles and it can be even more problematic than the first round was as chicken pox.

Shingles, or herpes zoster (HZ), is caused by the varicella-zoster virus (VZ), the virus that also causes chicken pox as a primary infection. Herpes zoster typically presents as a blistering, painful skin condition that follows the distribution of one of the dermatomes — skin areas that are innervated by a single spinal nerve. The varicella-zoster virus can persist for many years without causing symptoms as a result of existing in an apparently dormant state in the posterior root ganglia of spinal nerves or the ganglia of the sensory component of cranial nerves. It is seemingly held in check in these ganglia by cellular immunity until such time as cellular immunity naturally starts to decrease as a function of the aging process or is compromised by immunosuppressant conditions. When immunity weakens to a certain level, the virus quietly reactivates and travels down the axons of sensory nerves to the skin. Once its migration has been accomplished, it causes a painful, burning rash that affects the elderly population in greater numbers than any other group of people. Fully 68% of shingles patients in a recent study in Olmsted County Minnesota were over the age of 50. The pain of shingles can be so severe that it is not uncommon for it to be initially misdiagnosed as a heart attack, a gallbladder attack, a kidney stone, pleurisy, appendicitis, or a duodenal ulcer. Typically the pain is unilateral and associated with vesicles on a red base. Crusts form over the vesicles in 7 to 10 days, and complete healing of the vesicles can take up to 4 weeks (Sampathkumar et al. 2009).

If that were the whole story of shingles, it would be a fairly painful, fairly short, self-limiting disease that would be here and gone and good riddance. Shingles, however, has a whole bag of dirty tricks that can be rolled out apparently on a random basis. When the lesions involve the eye, patients can lose vision, so doctors must keep a close watch for vesicles along the top or side of the nose that can herald eye involvement. Herpes zoster can also invade the second and third divisions of the 5th cranial nerve, the trigeminal nerve, and by doing so produce painful lesions in the ears, mouth, larynx, or pharynx. It can also be disseminated in a systemic manner to involve the lung, liver, or brain, though this form of the disease is generally seen only in patients who are immunocompromised. This type of systemic involvement carries a mortality rate of 5% to 15% with death usually coming as a result of pneumonia. Severe and rare neurological complications can include encephalitis, meningitis, and autonomic nervous system dysfunction. Secondary bacterial infections of staph and strep organisms are frequently complications of the disease (Sampathkumar et al. 2009).

Perhaps the most debilitating complication of herpes zoster virus is a lingering and extremely painful condition known as post-herpetic neuralgia (PHN), defined as a minimum of 100 days of documented pain following a herpes zoster infection. Post-herpetic neuralgia is seen in about half of all shingles patients who are over 60, and it can make life miserable for those who experience it (Farage et al. 2009). The pain is thought to be the result of damage done to the sensory nerves by the herpes virus and it can be such that even the touch of clothing over the affected area can trigger extreme discomfort. At its worst, the pain can interfere with sleeping and daily activities to the point of causing clinical depression (Sampathkumar et al. 2009). Prompt treatment with antiviral drugs such as acyclovir, while the virus is still confined to the

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initially damaged nerve, is thought by many doctors to be key to lessening the severity of pain and perhaps the length of post-herpetic neuralgia (Farage et al. 2009).

Unfortunately, there is no one specific treatment for post-herpetic pain and many of the medications that offer some pain reduction have side effects of their own. In general, there are four classes of medications that may be useful: agents applied topically to the skin, tricyclic antidepressants, anticonvulsants, and opioids. The two most useful topical agents are lidocaine patches and capsaicin. Lidocaine patches work by decreasing the nociceptive activity of small nerve fibers. The patch itself may offer some protection from the irritation of nerve fibers associated with wearing clothing. Capsaicin, which is sold as an arthritis remedy, produces a burning sensation of its own which some patients can tolerate and others cannot. Topical medications in general produce few side effects because there is little systemic absorption associated with their use, so they are often the first treatments to be tried in the hope of achieving some pain relief. The tricyclic antidepressants, such as nortriptyline and amitriptyline, produce a sedating side effect that can be helpful to patients who are experiencing sleep difficulties due to post-herpetic pain. The new anticonvulsant drugs pregabalin and gabapentin show promise in treating the neuralgia by calming the nervous system. The role of opioids, like oxycodone and morphine, remains controversial due to side effects such as constipation, mental confusion, and possible addiction. It is generally recommended that patients be referred to pain treatment specialists if more invasive and aggressive methods of pain control are contemplated such as posterior root ablation or cryotherapy (Sampathkumar et al. 2009).

The Merck vaccine Zostavax was approved by the Food and Drug Administration in 2006 for prevention of herpes zoster in adults over the age of 60 (Quan et al. 2007). It is a live attenuated vaccine that contains the same strain of virus (Oka/Merck) as the chicken pox vaccine Varivax. The two vaccines are not interchangeable; however, since Zostavax is roughly 14 times stronger than Varivax. Zostavax does not contain the mercury based preservative thimerosal or any other preservative which could inactivate the virus, so it has to be kept frozen at 5°F (-15°C) and cannot be used if its temperature rises above 23°F (-5°C) or if it has been reconstituted for longer than 30 minutes (Woolery 2008). The vaccine must be reconstituted just before it is given using the diluents supplied by Merck. Immediately after it has been reconstituted it is given as a subcutaneous injection in the deltoid region. It is recommended that the vaccine also be given to those who do not remember having chicken pox as a child as well as to those who have already had a case of shingles. Adverse effects from the vaccine are usually mild and may include redness, swelling, pain, and itching at the injection site, and headache. The vaccine is believed to reduce the incidence of infection with herpes zoster by about 51%, reduce the burden of illness from the virus, measured by the severity and duration of pain, by 61%, and reduce the incidence of post-herpetic neuralgia by 66% (Singh and Englund 2009).

Though considered to be safe and effective, Zostavax should not be given to certain subsets of people. It is contraindicated in individuals who are allergic to neomycin or other components of the vaccine, those who have AIDS or are undergoing chemotherapy or radiation treatments, those with leukemia, lymphoma or organ transplants, those who have active untreated TB, and those who may be pregnant or nursing. People who are taking antiviral drugs and some corticosteroids should postpone getting the vaccine, as should individuals who have a fever greater than 101.3°F (Singh and Englund 2009, Woolery 2008).

Zostavax is a relatively expensive vaccination with an average cost to patients for the vaccine and its administration by a health care professional between $150 and $200. It is covered by Medicare Part D as a prescription drug but is not generally covered by private health insurance. In spite of the expense, Zostavax is viewed as being cost effective since the average cost of treatment for herpes zoster as an outpatient in 2006 was $112 to $287, a cost that can skyrocket to $3,221 to $7,206 if the patient has to be hospitalized (Singh and Englund 2009).

What the future holds with respect to shingles in the wake of the vaccine is still unclear. By 2047 most middle-aged Americans will have received the chicken pox vaccine as children. It is not yet known what the risk of getting shingles may be to those who receive the chicken pox vaccine as children compared with the current population of adults who had the wild type of chicken pox. Researchers believe the Oka/Merck virus will remain dormant in nerve ganglia like the wild type. If there are fewer viral particles in the ganglia of those who received the chicken pox vaccine, the incidence of shingles may decrease over time. However, many believe that one of the things that strengthens adult immunity to shingles is occasional exposure to children with chicken pox, which acts as a type of booster to herpes zoster immunity. Some believe that the mass vaccination of children with Varivax may, as an unintended consequence, make it more difficult for

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adults to maintain cellular immunity to herpes zoster. If this turns out to be the case, the number of shingles cases could increase in the future and the need for the shingles vaccine would increase dramatically over time (Quan et al. 2007).

According to the Census Bureau, by 2050 there will be approximately 21 million Americans over the age of 85 (Quan et al. 2007). They will hopefully be protected from shingles so that their golden years can be as vital and active as possible. They will certainly be a huge population that will be extensively studied to determine the effectiveness of the herpes zoster vaccine, its benefits, and its possible risk to recipients over time. If an ounce of prevention really is worth a pound of cure, the rewards of vaccination will be clear over time. If an ounce of prevention really is worth a vaccine, its benefits, and its possible risk to recipients will be a huge population that will be extensively studied in this population and shingles will be a disease that is forgotten by most people in their retirement years because they had the foresight to be vaccinated against herpes zoster and were able to effectively escape it.

References


Annual Conference (Continued from page 14)

announcement that this new exhibit would in fact be held in the museum at the same time. Once the announcement was made, the committee has made every attempt to make this wondrous exhibit available to conference attendees during the Sunday night festivities. Because the registration forms were already posted on the HAPS website, inclusion of the BODY WORLDS exhibit was not possible. Discussions with the museum are continuing with the hope that an option to attend the exhibit will be available before the conference begins so that attendees can plan accordingly. Stay tuned for an update.

Dancing Hapsters

Hapsters like to boogie and will be treated to one of the best local bands in Colorado to shake, rattle and roll this year at the Monday night banquet. Chris Daniels and the Kings have entertained local music fans for nearly 20 years with a souped-up mix of jump blues, blue-eyed soul and horn-infused rock. The kings have also earned something of a worldwide fan base, especially in the Netherlands, where they’ve even coaxed the nation’s queen to shake her royal booty. Chris Daniels and the Kings have produced nine albums, toured worldwide and remained a top local concert draw. The reason for that is best summed up by Chris Daniels himself: “We make the celebration special by bringing joy to the music we play!”

Seeing Blue in Denver

Not to be confused with the infamous “Blue Stallion” that welcomes passengers to Denver International airport (DIA), the “Blue Bear” stands peering in to the Colorado Convention Center, just outside the west exit of the Denver Hyatt Regency Hotel. The giant 3-story blue bear is a sight conference attendees will see and will serve as the landmark that guides attendees to Denver’s light-rail transport system, which will be used to transport everyone to and from the workshops being hosted by Arapahoe Community College in Littleton. Conference attendees in Denver will be asked to “Look for the Blue Bear” to locate the light-rail station near the Hyatt.

Top Notch Speakers with a Colorado Flavor

The world famous forensic anthropologist Diane France who has been referred to as the “bone detective” will give an update seminar and the world renowned forensic botanist Vickey Trammell will be the banquet’s keynote speaker who will share interesting stories in her own enthralling way from her many years of teaching A&P. The architect of the Visible Human will also speak as will research specialists from many of Colorado’s best institutions on topics related to high altitude physiology as well as neurophysiology.

Climbing to Denver

This year’s conference logo shows Skully climbing up a mountain and the artwork in the lobby of the Denver Hyatt Regency hotel symbolizes the climb of man to higher levels. Katherine Lee Bates was inspired to start penning the famous poem that became “America the Beautiful” during a trip up to Pikes Peak in Colorado in 1893. She wrote “…when I saw the view, I felt great joy. All the wonder of America seemed displayed there, with the sea-like expanse.” A visit to Colorado has inspired many people in many ways. How will a visit to Denver and the HAPS conference this year inspire you?
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Taking a Small Step Toward Conceptual Learning

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Are you an expert at something? Can you play the guitar like Jimmy Page, ride a bike like Lance Armstrong, or hit a tennis ball like Serena Williams? Or maybe your expertise is something more germane to HAPS like neurophysiology or muscle anatomy. To become an expert requires both time and talent. Malcolm Gladwell in his book, *Outliers*, claims that at least 10,000 hours must be devoted to practice before one can maybe (yes, maybe!) be considered an expert. Ten thousand hours of studying neurophysiology or muscle anatomy. For most of us, the bulk of these hours can be summed up by saying “graduate school.”

Along with being experts in anatomy and physiology, we are also expected to be experts at teaching and learning – another investment of 10,000 hours thinking, reading, and experiencing the enormously complex world of cognitive science. And then to prove that we are indeed teaching experts, we try to develop teaching methods to transform our students from novices to experts in one or two semesters. Gladwell would laugh at that goal. But if an expert is a “10” and a typical student is a “1,” in terms of knowledge and understanding of anatomy and physiology, what should our goal be? 1.1? 2? 5?

First, some bad news. In many cases our students go through our science courses and don’t learn anything of significance. Sorry. It’s true. The key word there of course is significance. Sure, they learn the origin, insertion, and action of the biceps brachii, the branches of the aorta, the thoracic cavity, and maybe even the parts of the myocardium that are fed by the left circumflex artery. But instead of developing a robust understanding of the principles of anatomy and physiology, students frequently walk away with an unorganized spew of facts that are easily forgotten unless quickly reinforced in their next courses.

But there is more to our discipline than the collection of facts and details that students, and many HAPS members, associate with human anatomy and physiology. Enter the world of conceptual learning, where understanding is the goal and the ability to memorize long lists of structures becomes not all that important.

A concept is more than a collection of facts; it’s a set of ideas that can be used over and over again to solve problems. Concepts are cognitive tools used to describe, control, predict, and explain events in nature: events like the flow of information within the body, like the energy dynamics required to maintain life, like .... Nuts. I have trouble thinking of many more. And this is important for anatomy and physiology education.

I’ve been teaching anatomy and physiology for twenty years and I’m still struggling with identifying the central concepts. In general biology courses the central concepts, or “big ideas,” are easy to identify (but of course, not so easy to teach and learn), e.g., evolution by natural selection, the flow of genetic information from one generation to the next, energy flow through the ecosystems, etc. But what about human anatomy and physiology? What are the big ideas that help all the details fall into place? And holy smokes, do we have details! How many muscles, bones, blood vessels, tissue types, etc. do we require our students to memorize? Oops, sorry, I mean “learn.” And why do we do it? First and foremost, it’s what we were made to do when we were students. And because we learned that way, we teach that way. (General principle of teacher education: we teach the way we were taught.) And most all of us can live very comfortably in the world of anatomical facts.

Instructor: "OK class, here is your mandible, here are your maxillae, here is your nasal bone.”

Student question: “Where did you say your mandible was located?”

Now there is a question we can all answer. A factual question. Nice and easy. We all know thousands of facts about the human body, and when a student asks us about one of those facts, we can quickly and easily give him an answer. Now where’s my paycheck?

But there is another end to the cognitive swimming pool--the deep end. At this end we have questions that are not so clean and simple.

If we know so much about the human digestive system and nutrition, how come so many people are getting type 2 diabetes and atherosclerosis?

Two kidneys but only one heart. Why?

What are the implications behind only a few people having Thebesian valves? Don’t we need them? And if we don’t need them, why do some people have them? 

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It is important to state clearly that facts are needed in order to build concepts; conceptual understanding requires detail. (You have to know what a Thebesian valve is before you can ask a good question about it.) However, if we focus only on details, conceptual understanding is rarely developed. And without a conceptual understanding, the details that students learn are quickly forgotten.

If you’re interested in teaching for conceptual learning, a good place to start is at the beginning of a teaching unit. Try to identify one or two big picture questions that you would like students to “sort of” or “begin to” answer by the end of the unit. “Sort of” answer is necessary because the big questions do not have easy answers. They evolve with increasing understanding, and your “A” students will answer the questions differently from your “C” students. And their answers cannot be evaluated as right and wrong, but rather more or less in line with the way current scientists are thinking.

For example:

Explain the importance of ion gradients in muscle and nerve cells.

How are ion gradients generated and maintained?

Or even:

What’s the big deal about the sodium / potassium pump?

Or

When you stub your toe, how does the information get to your brain?

Students can help you generate the questions. During the first day of teaching a new body system, it’s good practice to let students work in small groups for a few minutes to generate their own questions. Specifically, after a brief instructor introduction to identify major organs and functions, have students brainstorm their own questions about the system, and have them write those questions on the board for all to see. Assimilating those student questions into your presentation is a first step to conceptual teaching. (“Oh! That’s why gradients are important!”)

So on the above 1 to 10 scale, what should be our goal? That’s entirely up to each instructor and the goals of the program. Are you trying to produce nurses? Research scientists? Or maybe you’re like me and teach in a liberal arts curriculum and are trying to produce literate citizens. In each case, the goals will be different. But we’re still faced with grading. And what level of understanding warrants high grades? Low grades? Etc. And how do we assess the many different levels of understanding? (That’s a whole different kettle of Thebesian valves.)

The simplest procedure is to give tests (remember, we teach the way we were taught – and we all took tests.) The highest marks on the test get “A’s” … easy. Yawn! Here is something new (and I’m trying it out with my students this semester): give credit for good questions. If a student asks an insightful question during class, give her some credit on the next exam. Reason here is that it takes a very robust and dynamic conceptual understanding of a topic to generate a question that makes you, an expert in the field, pause and think back on your 10,000 plus hours of study, (i.e., your own conceptual understanding), and generate an answer that may not be identical to the current paradigm used in scientific literature, but is still “pretty good.”

Cool. Now this is why teaching is fun. ■
A column that survives because you - the members - send in your Snippets

by Roberta Meehan
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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 your ideas into our EDU-Snippets column, I have been continuously amazed at how many teaching and demonstration ideas are easily transferred from one instructor to another through Snippets. Please keep your wonderful ideas coming!

I. Chemical Snippets

In the past, this column has dealt with the problems and challenges of presenting chemical concepts to our anatomy and physiology students. We have all probably struggled, along with our students, as they work to grasp the world of chemistry.

A. Redox Snippet

Robert Logan (North Shore Community College, rlogan@bu.edu) sent a very interesting Snippet to help us in teaching the redox cycle.

Quite often, my students experience confusion with the concept of redox reactions. I also found the concept to be challenging when I was a student. Commonly, it is misunderstood that the thing being reduced (oxidizing agent) must be getting smaller in mass, and the thing being oxidized (reducing agent) must be getting bigger, and maybe even gaining an oxygen atom in the process (which it sometimes does – but that is not the redox point here). The tendency to relate the terminology to changes in mass is compounded by the fact that redox reactions are decomposition reactions that are often presented related to foodstuff being broken down. The idea of negative feedback presents similar problems. The concept of “reducing” or “negative” can also be seen as gaining an electron or increasing mass. We have all probably struggled, along with our students, as they work to grasp the world of chemistry.

B. Snippet and Tonic

We all know how confused students can become when dealing with hypertonic and hypotonic solutions. They usually understand the hyper- and hypo-prefixes, but they often have difficulty relating that to the "tonic solution" concept.

Ellen Arnestad (Director – HAPS Institute, magpie40@telus.net) sent in a tonicity experiment designed specifically for those going into the health care professions.

One thing I do when I am first getting into the cell section is talk about hypertonic and hypotonic solutions. To do this I take two eggs and put them in vinegar for about 16 - 20 hours to dissolve the outer shell. Leaving them in much longer will cause the vinegar to start to denature (cook) the cell membrane. At the beginning of the class, I first ask if anyone has any idea what the biggest and smallest...
cells in the human body are. Usually someone guesses egg and sperm. Although there are different ways to classify cell size, the mention of the egg provides me with a good starting point for the demonstration.

I show the class the two chicken eggs with the dissolved outer shells. I tell them that we are going to learn about hypertonic and hypotonic solutions. I put each egg in a beaker and I fill one beaker with distilled water and the other with D50W (dextrose 50% in water). I use this because I am usually teaching allied health students and they will use D50W in their practice. Corn syrup or a similar product will work equally well. I tell the class that we are going to leave them in the D50W for the class period and see what happens to each egg (my class periods are two hours), but that I want them to start thinking about it now.

At the end of the class period, the egg in the distilled water is obviously bigger than the other one. If the students touch them, they can see and feel the effects of the differences in tonicity. The egg in the D50W never actually crenates, but it shows enough of a difference to see and feel. Corn syrup, because of its higher viscosity, produces much more dramatic crenation results.

From this simple demonstration a good discussion will ensue and a solid understanding of the changes caused by hypertonic and hypotonic solutions will result.

II. Respiring Snippets
We have all been through the problems and frustrations of teaching cellular respiration and know the problems that our students have with the intricacies of this process.

Tama Fox (South Seattle Community College, auntama@gmail.com) sent in some ideas for helping our students understand cellular respiration – from glycolysis, through TCA, and on to ATP production.

To get started, you will need to have the following props ready:

- 3 clear containers to hold “ATP”, “pyruvate”, and “batteries” respectively. (Lettuce ‘bins’ from the grocery are perfect.)
- Plastic Easter eggs to serve as glucose.
- Balled up paper, 3 balls scotch taped together to represent each pyruvate. Call these 3C for short.
- Old batteries - C size for NADH, AA size for FADH2.
- Corn syrup or a similar product will produce much more dramatic syrup, because of its higher viscosity, through the K crembs cycle, ripping off a ball each time CO2 is released. (I throw the piece of paper into the air up behind my back – dramatically of course.)

II. ATP Production (using proton motive force)

I. Grab C (NADH) and AA (FADH2) batteries. Explain that the C batteries plug into the beginning but FADH2 plugs in later on (so there is a 3:2 ratio of amount of protons moved across depending on battery type).

J. Put beads into lightly plugged waterwheel “dam” for each battery as you remove the batteries from the battery bowl. If you want to be really correct about it, you could put a bead in per hydrogen moved. (For a better demo, I have a few handfuls of beads in the wheel before starting.)

H. Go through this procedure twice to represent each pyruvate so that the students understand that glucose causes two turns of the TCA cycle. Count out the number of batteries and their types available for the next step.

**Physically do A-E again to remind the students of the net gain: 2 sets of paper-ball-strip pyruvates, 2 ATP candies, and 2 NADH batteries per glucose egg.
M. Let the students eat the ATP (er, candy -- if it is a lecture space.)

N. Immediately reinforce this with a video of respiration while the candy is being passed around. Show the tape twice if necessary.

_Tama Fox added another point._

You know what would be really fun? Insert the 3C paper balls into the Easter egg halves so that you can pull them out of the half eggs! I am going to do that! Also, obviously, by the TCA cycle, I am going to include converting pyruvate to Ac-S-CoA by throwing a paper ball behind the back and yielding a battery!

**III. Synthesizing Protein Snippets**

It seems that everyone is always looking for another meaningful way to present protein synthesis. This time, EDU-Snippets received two complementary ideas that anyone teaching this material can use either separately or in unison.

**A. Structural Snippet**

_An EDU-Snippet came in from Sharon Holthaus (Madison Area Technical College, sholthaus@matcmadison.edu) who has a great class idea for learning about the structure of proteins._

Here is what I did for replication and transcription. At the beginning of class, I handed out several 8 x 11 “signs” with large letters – either “A”, “C”, “T”, “G”, or “U” to represent different nucleotides. Each nucleotide was a different color, and I connected 2 signs with string so the student “wearing” the sign had a large letter on both his/her back and front (for maximum visibility in a mid-size lecture).

After I gave an introduction to DNA replication, the students formed DNA strands by linking elbows to show strong covalent bonds between phosphorus and deoxyribose molecules and by touching fingers with their complementary nucleotide to show weak hydrogen bonds.

I then had the hydrogen bonds break and had a new group of students/nucleotides step in to demonstrate replication. I then continued the lecture on DNA replication.

Later in the class, I did a similar activity for transcription. I used different colored hula hoops (a wand might work, too) to represent DNA helicase, DNA polymerase, and RNA polymerase.

You could make this activity as simple or complicated as you wish. I liked how students helped each other find their places and were willing to be involved.

**B. Productive Snippet**

_Nina Zanetti (Siena College, Zanetti@siena.edu) had a great idea for demonstrating the actual amino acid chains that make up these proteins._

Here is something that I have done, and I have been pleasantly surprised at how well it worked.

In my freshman biology class we were going over protein structure. I wanted the students to understand how, although the protein was a long chain of amino acids, the chain did not typically exist as a “straight line” but rather would become folded into the protein’s tertiary structures.

As I was trying to explain how different amino acids would “want” to be located nearer to the inside or nearer to the outside of a protein (in contact with aqueous cytoplasm), I would have the students stand up and link hands to form a chain (the polypeptide). I would then have them pretend that everyone who was wearing green (several students were) was an amino acid with a hydrophobic side chain. There was a LOT of jostling around while the “green” students tried to move to the center of the mass while continuing to hold hands with their neighboring “amino acids”. It only took a few minutes to do this exercise, it was fun, and the students left saying “I’ll never forget that idea.”

This is a simple idea but sometimes simple ideas are the best. With HAPS ingenuity, you will probably be able to augment the protein chain to meet your own needs!

**IV. And We Hope You Will….**

Keep those cards and letters coming! Thank you all for your EDU-Snippet contributions. Your ideas are tremendous! For the next issue of the HAPS-Educator, send your EDU-Snippet experiences and ideas to biology@ctos.com. You will also find a reminder on the HAPS-L list. Plan ahead. You can even submit your ideas now and maybe next issue you too will see your EDU-Snippet in print!
Successfully Navigating the Ambiguous Role of the Graduate Student Instructor

Daniel O’Neill
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Indiana University School of Medicine

When I began teaching laboratory sections of undergraduate anatomy as a graduate student, I wasn’t particularly anxious. I had been prepared with orientations and trained in the rules; I even had a decent amount of experience leading a classroom from teaching appointments as an undergraduate. The course curriculum was all worked out, and the lab set up was taken care of; all I needed to do was carry out my clearly delineated tasks and teach the assigned material in lab. Simple, right? Not so, of course. It’s a cliché but still true that orientations had not prepared me for the other challenging aspects of functioning as a student instructor, among them: learning to work as both a teacher and student, especially in regard to how that duality should be handled in terms of approaching the students we teach. Having taught anatomy for a little over three years, I’d like to lead off this series of articles by grad students serving “in the trenches” of undergraduate education by discussing what I’ve learned about when to be a student and when to be teacher.

First, undergraduates don’t always feel as inhibited around graduate student instructors as they do around professors or lecturers. This is a good thing at times but it can also be problematic to say the least. A few semesters back a student asked me a question about the “surface anatomy of the inguinal region.” When I stepped closer to her table and before I could react, she pulled her panties down and showed me. I was completely unprepared for this type of behavior. This is the only time in my memory that I’ve literally been shocked speechless. I just froze; I think I was hoping to avoid any extra attention. I definitely remember feeling a kind of panic that I might somehow be blamed for this. She was seated in the very back of the room, and everyone else was busy working on their own. I think that the only other person to see this was her friend seated next to her, and she had the sense to cover her up quickly after which they both left. I just went back to teaching like nothing had happened; funny how shock allows you to do that. After class, I described the entire incident in a detailed email to the course director so that she was aware of the incident. I did nothing to provoke this particular incident, but upon further reflection, the environment in the classroom had been too collegial up to that point - I was perceived more as a fellow student and not primarily as a teacher. Proactively setting the right tone of authority requires a balanced and a self-conscious effort and is not particularly easy.

My biggest pedagogical mistake was my failure to appreciate the potential “conflict of interest” between the teaching and student cultures. For although we always remain “students” in the scholarly sense of that word, our role as teachers requires us to establish a culture in our classroom that is collegial on the one hand and that, on the other, also sets an appropriate tone of authority. We must also realize how our conditioned perception of hierarchy functions between the identities of student and teacher. The establishment of a constructive classroom culture presumes a shift in the identity projected by the graduate instructor from student to teacher, a projection which cannot be taken for granted. The challenge is to understand when it is both appropriate and constructive to assume the identity of teacher or student with respect to the students we teach.

At Indiana University, graduate student instructors are given the title “Associate Instructor,” which usually (Continued on next page)
becomes “AI”; it is our version of the term “Teaching Assistant” which is used at many other schools. The duties and descriptions of the job seem straightforward enough. Freshmen in their first weeks on campus often ask, “What are Associate Instructors?” and the simple answer that usually follows is: “They are graduate students who are paid to teach undergraduates.” And while truthful and sufficient for the purposes of the questioner, I have learned that this answer is woefully inadequate for the student instructors themselves.

Classrooms have teachers and students, and there is always a sharp distinction between members of those two groups. This is a construct that is socialized into us at a young age and continually reinforced throughout development. As a result, the perception of these roles provides instantaneous social identity cues that we utilize to define the world inside the classroom. To put it plainly, in the sociology of a classroom, you are either a teacher or a student, not both. This isn’t an issue of any great complexity for professors; they remain professors when they go to their labs, offices, even their homes. In the eyes of their students, they are always in the role of the teacher. The same goes for college students; they remain students when they are studying on campus, meeting up with their peers, even when video taped acting foolishly on spring break (incidentally, professors also remain teachers in spite of an occasional indulgence in some immaturities on vacation, but that’s another story). However, the identity of a graduate student instructor is fluid and entirely dependent on situational context. It changes completely based on whom you are talking to, what location you are in, and even at what time it is.

For example, I have dealt with students passing out a few times. Anatomy laboratory at Indiana University is taught with prosected donor bodies, and often students have some understandable anxiety about seeing a dead body for the first time. Most of the instructors I have worked with attempt to deal with this by calming the class before their first cadaver demonstration; they are not all equally proficient at it. In my experience, students become most vulnerable when instructors try to calm them by explaining in gory detail all of the “warning signs” that they may be about to faint – the supposition being that the student will sit down when they start feeling this way and avoid injury. Based on what I’ve seen, this may not be the most effective measure to deal with this issue. I have learned that most students are more afraid of humiliating themselves by fainting in front of their peers and instructors than by the proximity of the body itself. So walking them through the process only makes them more anxious and causes them to mistake any further minute increase in their anxiety level as certain evidence that their worst fear is about to come true.

Once students have fainted, and the appropriate steps are taken to secure them physically, they need to be reassured and their self-confidence restored. With all of my fainters, I have helped them walk out to some comfortable couches in a lobby in our building, and I have taken five minutes to be a fellow student rather than a teacher. The last thing they need or want is an authority figure, a teacher, to whom they are conditioned to always present their best face. This is a time to use the closeness you have in age and status to assume the mode of a fellow student. I try to minimize the stigma of the event by stressing that many of us, including me, have had similar vulnerabilities. I relate an example from my own experience of when I fell out of a chair unconscious at the first sign of blood ON A TELEVISION SCREEN at a universal precautions training session, very embarrassing for a medical student! I still shudder at that one even as I write this. We joke around for a while and then I remind them that we have both fainted and that I can handle being in lab with the bodies and so will they. All three times they have thanked me as a fellow “student,” and the next class session I go right back to being the “teacher.”

This idea of shifting identities may be abstract but there is a concrete reality: failure to properly navigate this difficult issue of varied and shifting identity impedes good teaching. On the one extreme, there are student instructors who try to be authority figures and teachers at all times. They may come off as pretentious and haughty to both their students and their colleagues; they aren’t respected and their authority and teaching isn’t taken as seriously by their students. Then there are those who try to be “cool student instructors” and treat their students like friends and equals; I made this second mistake early on with my own teaching. I viewed myself as a student and hence saw the undergrads as a sort of group of younger siblings. Sure, I knew more than they did, that’s why I was teaching them after all, but really I tried to relate to them as younger, less experienced colleagues. This approach had worked for me when I was an undergrad because it was an honest reflection of status and identity back then, but not now. On my first set of evaluations as a grad student, several students reported on my evaluations that they liked me but that they didn’t necessarily like learning from me. I took this criticism seriously and fixed this in subsequent semesters.

At the end of a lab practical exam I once had a student start shouting and demand that his paper be returned to him. He became enraged and advanced at me and the other instructor. I calmly but very firmly told him that he had to leave now with the other students in accordance with the rules, that I would talk with him in the hallway, and that if he didn’t, I would call the police. He calmed down almost immediately and in the hallway he had tears forming in his eyes when he apologized. I was able to diffuse the situation quickly and effectively because I had been conscious of maintaining a teacher role with the students when in the classroom. If I had continued to regard and treat my students as buddies as in previous semesters, this incident might not have been so easily handled. In retrospect, I don’t think there was ever any physical danger, but it wasn’t a good

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situation and I’m glad it was diffused.

Clearly, moderation is what is called for, and the vast majority of student-instructors that I have worked with arrive at this conclusion very quickly. The real trick is in understanding that there is no static middle ground, so to speak; you have to be flexible and adjust your approach between contexts and between students. Here’s what I have learned: When you are standing in front of the classroom and lecturing, you should be a teacher, period. You should expect your students to behave respectfully and you should call them out on it if they do not. This is a difficult thing to do with so little age difference. You are in charge in front of the classroom, so you need to exert an appropriate authority. On the other hand, when you are not commanding the attention of a group, you should be approachable and natural. When dealing with students individually, don’t feel constrained to constantly prove that you have a greater command of the subject – although you may have a few more years of study, it is perfectly appropriate and often beneficial to share your own status as student as well as a teacher.

Outside of the classroom you should always maintain a professional standard of behavior in your roles as teacher and student. If you meet your students casually on campus, they may have questions for you in your role as their teacher, or they may just want to have a quick conversation as a fellow student dealing with the challenges and anxieties of collegiate studies. Both of these modes of interaction are natural, and you should be capable of either based on the situational context. You are in fact both a teacher and student. Being aware of the situational context will help you determine which role is both the most appropriate and most constructive with respect to your students.

I have written about some of my negative experiences because it’s easy to learn from them, but positive experiences should never be brushed off, and it is important to reflect on them as well. I should also point out that the vast majority of the interactions I have had with students have been very positive. In my first semester I had a few students get a low F on the first of four exams in the course. I very cynically believed that anyone who performed so abysmally lacked either the discipline or brain power to do better and there was no sense worrying about it. Most of them did not improve their performance, but one surprised me. Shortly after the exams were returned, she respectfully asked for a conference. Over a series of meetings, I went over some really basic learning strategies for organizing and understanding the material, things that I had taken for granted. She ended up earning grades of A on all three remaining exams and a B+ overall in the class. I learned that, while you can’t succeed with every student, you can’t dismiss ANY of them either. She wrote a very kind note at the end of the semester thanking me for my teaching, which I’ve kept in my portfolio as a reminder of the real reason I choose to teach.
HAPS Institute’s first cadaver regional anatomy course is now officially off the ground. We previously offered a “How to Use Cadavers” course with Paul Krieger, and our scholars told us that they would really appreciate some cadaver anatomy classes. They said that they wanted to have an opportunity to brush up on their own anatomy knowledge and get some new ideas about how to teach a cadaver course. Although it took some time for us to get this course organized, the idea was more popular than we ever could have imagined: the course filled within 48 hours of the opening of registration! Since then we have been madly planning for other cadaver anatomy courses to try to keep up with the demand.

Our first cadaver-based anatomy course will focus on the anatomy of the thorax and abdomen. This course has been generously supported by a grant from AAA. It is also a nice touch that the workshop will be in San Diego during February, so people will have an opportunity to escape any cold weather that they may be experiencing at home. The course has been designed and will be taught by our very own Kevin Petti, with assistance from Wanda Hargroder. These two highly respected professors will easily make the course a big success with their experience and ability to make learning fun.

The cadaver course is structured similarly to our previous conference-based courses: three postgraduate credits, with six weeks of online work before the workshop and another six to eight weeks after the workshop to build a final project and have it peer reviewed. The six weeks prior to the workshop will be filled with assignments and discussions. The assignments will give the scholars some ideas of the best ways to teach using each of some different modalities. The discussions will focus on teaching and various other aspects of using cadavers.

The workshop itself will be a weekend in February consisting of a Friday night get-together, all day Saturday in the cadaver lab, and a wrap-up on Sunday morning. The sixteen scholars will not only see previously prosected cadavers, they will also have the opportunity to participate in dissecting as well. After the weekend workshop, the scholars will return home to create a final project that will become a teaching resource. This resource can be of many different types: PowerPoint slides/presentations, case studies, problem sets, laboratory exercises, demonstrations, multimedia resources (images, video, sound), games, web pages, teacher reference materials, how-to summaries, models, equipment design and use, lab design proposals, lab maintenance guidelines, syllabi, curriculum proposals, course proposals, and learning-type research projects are some of the examples. Each of these will, in some way, be related to the anatomy of the thorax and abdomen. The final project will have two parts. The first part will include a short introduction to the topic content, the level of students for which the activity is designed, a time-line for implementing the project, the objectives of the activity and how the instructor might assess those objectives, and a list of resources required. The second part will be the actual content that was developed. When finished, the project will be a complete resource that any instructor could take into his or her classroom and use easily.

These projects are peer reviewed by classmates and then passed to the instructor for publication on the HAPSweb.org website. With these projects, HAPS is developing a repository of useful teaching resources for all of our members. To see some of the learning resources from previous years, go to www.hapsweb.org and click on HAPS Institute on the left hand side of the page. From there, look for the ‘Collection of Teaching Resources’. With the level of peer and instructor review that these projects have, you can be assured to find a wealth of resources for innovative ways to teach some aspect of anatomy and physiology that is either difficult to learn, or difficult to teach.

We plan to offer another cadaver anatomy course this June in New Orleans; additional courses are proposed for fall of 2010. If you missed the opportunity to get in on the ‘Anatomy of the Abdomen and Thorax’ in February, please watch for our upcoming offerings of cadaver anatomy courses. And remember, register early!
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