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The HAPS-EDucator is the official publication of the Human Anatomy and Physiology Society. As such, the HAPS-EDucator aims to foster the advancement of anatomy and physiology education by facilitating the collaboration of HAPS members through the publication of a biannual journal. Journal articles may include, but are not limited to, those that discuss innovative teaching techniques (e.g., use of technology in classrooms or active learning practices), original lesson plans or lab exercises, reviews of trending topics in anatomy and physiology, and summaries of newsworthy events (e.g., seminars or conferences that all society members can attend). Additionally, an extra issue of HAPS-EDucator will be published after the Annual Conference, highlighting the update speakers, workshops and poster presentations. All submitted articles will undergo a peer-review for educational scholarship. Articles not immediately accepted will be returned to authors with feedback and the opportunity to resubmit.

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Formatting

Manuscripts are to be submitted in rich text format (.rtf) or .docx, in Arial (10) font with 1” margins on all sides. Accompanying the text, authors should submit an Author Submission Form consisting of a title page that lists the full name, associated institution and address, and email address of each author. A short Abstract of 150 to 200 words that explains the primary thesis of the submission should be included. Photos and illustrations should not be included in the body of the manuscript but should be submitted, clearly labeled, with the manuscript. They should be submitted in JPEG format or in some other appropriate and usable form.

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It is the responsibility of the author to make sure that the information on each reference is complete, accurate and properly formatted. References should be included in the body of the manuscript where appropriate, using the following format: Author’s last name and date of publication, (Martini 2011). A list of “Literature Cited” should appear at the end of the paper alphabetically by author’s last name. Example references are available in the complete "Author Submission Packet".

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- July 15 for the Conference Issue
- November 15 for the Winter Issue

You do not need to be a member of HAPS to publish in the Educator. For more information see the complete submission guidelines using the link above.

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If the editors recommend rejection of the manuscript due to inappropriateness of its subject, lack of quality in its presentation or incorrectness of grammar or style, it will be rejected. If two reviewers recommend rejection of the manuscript made on the basis of inappropriateness of its subject, lack of quality in its presentation or incorrectness of grammar or style, it will be rejected.

The review process is single blinded which means that the reviewers know the identity of the authors of the manuscript but the authors do not have access to information regarding the identity of the reviewers.

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The 2014 President’s Medal was presented by President Valerie O’Loughlin to…

Curtis DeFriez and Eric Sun

I had the distinct pleasure of awarding the HAPS President’s Medal to two very deserving individuals, Curtis DeFriez and Eric Sun, at the HAPS Annual Business meeting in Jacksonville, FL. The President’s Medal is an annual award that recognizes a HAPS member or members who provided exemplary service to the organization. Curtis and Eric are very deserving of this honor.

Eric Sun, Ph.D. has been a HAPS member since 2002, while Curtis DeFriez, MD, MSc joined HAPS in 2007. Both men served on the HAPS Testing Committee in 2007 and began co-chairing the committee in 2009. At this time, the HAPS exam was in paper format only and had several limitations due to exam question quality, lack of any significant psychometric analysis of the exam, and potential security of exam content. Eric and Curtis worked together with the goal of developing a new, rigorous, reliable and secure online exam. Using the A&P learning modules and learning outcomes created by the HAPS Curriculum and Instruction Committee, the Testing committee developed questions that mapped to these outcomes and modules. While the exam question development was ongoing, Curtis and Eric held a pilot study (using the old paper exam questions) with Chi Tester (an online assessment tool developed at Weber State University). The successful pilot study led to HAPS signing a contract with Chi Tester (for the distribution, administration and grading of our online exam) in 2010.

The question development process and building of the test bank for the HAPS online exam took several years. This process required Eric, Curtis and Executive Director Peter English to travel on two separate occasions and meet face-to-face for several days to refine questions and ultimately build two equivalent versions of the online exam. These ‘marathon sessions’ of exam building were in addition to the regular travel and commitments required of all HAPS Steering Committee members. Thanks to their hard work, two equivalent versions of the online exam were developed and a second pilot study was performed using these exams. Curtis and Eric are working with psychometricians from Indiana University to evaluate the data from the pilot study and assess the exam’s reliability and validity. The HAPS Online exam is secure, maps to our learning outcomes, consists of well-designed questions, and has been offered to our membership since Fall 2013. This fall, Eric and Curtis will lead yet another marathon meeting to develop additional rigorous, reliable questions for the test bank.

Curtis DeFriez and Eric Sun have gone ‘above and beyond’ for our organization. Due to their tireless efforts, HAPS has an online test and testing system that is exemplary. Many thanks go to Curtis and Eric for all that they have done for HAPS!

Valerie O’Loughlin
HAPS Foundation Grants and Awards

Award descriptions are on hapsweb at: http://www.hapsweb.org/?page=GrantsandScholarship

HAPS – I to: Amanda Nelson (not pictured) and Mays Imad

Graduate Student Travel Awards to: Keely Cassidy, Melissa Taylor, Stacey Dunham, Barbie Klein, and Tirzah Birk

Sam Drogo Awards to: Wendy Riggs and Aaron Fried

Student Scholarship Awards to: Rebecca Ludwig, Richard Gatt and Caris Cassady

continued on next page
Faculty Award to: April Hatcher

Robert B Anthony Awards to: Karen Groh and Courtney Dunn-Lewis

Primal Picture Awards to: Dani Hall and Rebecca Ludwig
Why are images important? We all use images in lectures and lab manuals to teach material with more clarity and meaning. Dr. Tim Wilson presented a great deal of food for thought in terms of how much information should be given at one time, and in what manner information should be presented, in order to achieve the most effective learning and remembering. He reminded us of the premises that we have regarding memory. The first premise most of us have is that we think of short-term (working) memory as being fairly limited in capacity and duration. A 7-10 digit phone number can be held in memory for a few minutes and is a good example of short-term capacity. The arrangement of the phone number in 3 and 4 digit chunks aids with the temporary storage and recall of this information. The second premise we have regarding memory is that our brains have a fairly large capacity for long-term memories, and these memories can be retained for decades.

When we are teaching our students, of course, we hope that we can fill their memory banks in a way that allows for long-term storage and accurate recall. In lecture, forming memories is a three-step process:

1. The words, as well as the pictures, used to relay information are immediately received by the ears and eyes of students, forming sensory memories.
2. These sensory memories are then screened and selected to become short-term working memories.
3. In order to become long-term memories, the working memories must be coded and retained through the strengthening of neural connections.

Dr. Wilson stated that the use of both words and pictures in a lecture is 50% more effective at teaching the material than either words alone or pictures alone. There is definitely an interplay between the processing of perceptions (e.g., vision and hearing) that bolsters long-term memory formation.

There has been quite a bit of interesting research in this field. Mayer and Moreno’s research has focused on analyzing the processing abilities of verbal and pictorial content, which is known as dual-channel processing. In their research, they have put forth the theory that each channel has a limited capacity in processing material in a given amount of time. Mayer and Moreno make three assumptions about how cognition is achieved: the dual-channel assumption, the limited capacity assumption and the active processing assumption. Several research groups have contributed to the dual channel assumption, which is the belief that humans have two separate channels for processing verbal and visual material. Intuitively, the limited capacity assumption is defined as meaning humans have a limited processing capacity in both the verbal and visual channels. As one might expect, the active processing assumption is that the act of learning requires extensive cognitive processing in both the verbal and visual channels. Indeed, the active processing of lecture material requires five cognitive processes: “selecting words, selecting images, organizing words, organizing images and integrating that information” (Chandler 1991, Sweller 1999, Paivio 1986, Baddeley 1998, Mayer 2001, Mayer and Moreno 2003, Wittrock 1989).

In their research, Mayer and Moreno have tested various factors that contribute to cognitive load by testing students in both retention tests and transfer tests. Transfer tests measure deeper learning by assessing the ability to use or transfer knowledge when answering problem solving questions. In their study, Mayer and Moreno evaluated three types of cognitive demands:

1. Essential processing, which is necessary for interpreting and understanding the material.
2. Incidental processing, which is cognition devoted to understanding extra content, such as background music, that has been added but is not required for understanding the topic at hand.
3. Representational holding, which is the cognitive energy required to hold previous newly delivered content in mind and connect it to upcoming material.

It was found that a student could become cognitively overloaded if any of those three processes is pushed to exceed a student’s total cognitive capacity.

Mayer and Moreno provide nine recommendations to help reduce cognitive overload. The first is to reduce the amount of visual information perhaps by converting some of it to audio which is delivered at the same time. It has also been found that increased cognitive load (e.g., more words, more pictures) can actually decrease a student’s ability to form short-term memories, which of course would then yield fewer long-term memories as well. It is therefore desirable to decrease cognitive load to find a sweet spot that allows the class to form the most short-term memories and increase the probability of converting those memories to longer-term ones (Mayer and Moreno 1998, Mayer and Moreno 1999, Moreno et al. 2001).
The second recommendation is to allow some time between content rich portions of visual and audio information. Information that is presented in sections at a learner-friendly pace was found to be more effective than a continuous presentation. However, sometimes segmenting information like this is not possible. In such instances, pre-training, or teaching the learners each particular component first, prior to how the components fit together, is more manageable for the learner. Pre-training is therefore the third recommendation (Mayer and Chandler 2001, Mayer et al. 2002, Pollock et al. 2002).

The fourth strategy tested to diminish cognitive overload is to reduce “interesting but extraneous material” which requires incidental processing. If reducing additional information is difficult, a fifth recommendation includes signaling, which involves emphasizing, circling or highlighting in some way the most important content (Mayer et al. 2001, Moreno and Mayer 2000, Mautone and Mayer 2001, Lorch 1989).

The sixth tip is to present essential material as clearly as possible. This can be achieved by providing strong, solid explanations, and strategically aligning text with appropriate images. In eye movement studies, Dr. Wilson noted that spacing images far apart increased saccade time, leading to fewer memories being developed (Moreno and Mayer 1999).

The seventh suggestion is to eliminate redundancy. The eighth piece of advice is to eliminate representational holding, which is the cognitive load required to remember a previous piece of content and hold it in one’s mind while learning something new about that content. The solution is to create more synchrony in the relaying of such content so that it is viewed or heard simultaneously, which will reduce the cognitive effort required to learn the material. The ninth and last recommendation is to individualize when synchronizing content is not possible. This strategy involves tailoring the lesson to the skill set of the students (Mayer 2001, Moreno and Mayer 2002, Mayer and Sim 1994).

Dr. Timothy Wilson’s team has added to this study on cognitive load by studying the effects of cognitive load on cerebral blood flow. This is a very unique approach to measuring the effectiveness of teaching and learning. Often, the success of introducing a novel teaching strategy is assessed by comparing exam results between a control group, a class that did not participate in the new activity, and a group of students that did participate. Also, many studies involve anecdotal or survey based evidence that suggest one activity may be more effective than another. Dr. Wilson presented data reflecting his interest in whether cognitive load (or the difficulty of the task) for an individual student correlated with internal physiological differences taking place during the task. In order to study this, Wilson asked students to complete a spatial rotation test which involved matching drawings of 3D shapes that had been rotated. At the same time, transcranial Doppler ultrasonography was used to measure blood flow velocity. It was predicted that those students who found the 3D spatial rotation task the most difficult would have increased cerebral blood flow during the task. What was found was actually the opposite. Low spatial learners had decreased cerebral blood velocity during the task in comparison to high spatial learners. It is believed that this occurs because low spatial learners were breathing out more CO₂, leading to reduced cardio-acceleration stimulus and increased cardio-inhibitory responses. This, in turn, might lead to reduced heart rate, reduced stroke volume, reduced vasoconstriction, reduced mean arterial pressure, and therefore reduced velocity of cerebral blood flow (Loftus and Wilson 2013).

Further questions to be addressed in regards to the effects of cognitive load on cerebral blood flow include possible gender differences (females tend to score lower on spatial ability tests) as well as teasing out test-taking anxiety effects on blood flow from those due to cognitive load differences.

The take-home message from this elegant series of studies certainly speaks volumes: too much is too much! Paul Eldridge may have said it best: “In the spider-web of facts, many a truth is strangled.” As an enthusiastic instructor, with newfound knowledge regarding the very real limitations of student cognitive load, the quote that springs to mind comes from Antoine de Saint- Exupéry: “The only things you learn are the things you tame.”

Here is a link to Tim Wilson’s article for AAA:
http://amasan.informz.net/admin31/content/template.asp?sid=35700&ptid=918&brandid=3960&uid=825288744&mi=3508177&ps=35700

References


As Chair of the **HAPS Eastern Regional Meeting**

which met on 3/15/2014 at Springfield College, I would like to thank the individuals who helped to make the meeting a success. In particular, I would like to thank HAPS Executive Director, Peter English, as well as Ellen Lathrop-Davis, Valerie O’Loughlin, Robin Hurst, and Sarah Cooper from the HAPS organization for their assistance with registration, website advertisement, and their guidance in the planning of the conference. I would also like to thank Javni Mody, HAPS Eastern Regional Director, for passing up an opportunity for personal travel during her Spring break, in order to assist with the greeting and registration of the attendees. I appreciate the support that I was given in planning this event.

Jeannette Hafey, Instructor
HAPS Eastern Regional Conference chair
Department of Biology/Chemistry
Springfield College
Higher education is in a period of unprecedented change. Rising tuition costs and increasing student debt, questions about the real-world relevancy of a college-degree and work-force readiness, and concern that students are not learning in college, challenge us to reevaluate our concepts about teaching and learning in a world of expanding information and rapid globalization that requires an increasingly educated workforce (Fischer 2011, Arum and Roksa 2010).

In her presentation, Dr. Teresa Balser discussed how education is in a period of transition. She discussed how our current education system was born of the Industrial Age and designed for a world that no longer exists. We now live in a world of rapidly, expanding information and rapidly changing technology. A week’s worth of the New York Times contains more information than a person in the 18th century would come across in a lifetime (Fisch, 2012). Meanwhile, four exabytes (4 x 10^18) of unique information was generated in 2012 alone; that’s more information than was generated in the previous 5000 years! It is estimated that half of what is learned in the first year of college is out of date by the third year. Furthermore, today’s graduate may hold ten to fourteen jobs by the age of 38, yet the top ten jobs in 2010 did not exist in 2004. In light of this, Dr. Balser raised the questions, “What does this mean for learning and education? What happens if learning needs are changing, but our teaching style is not? How do we prepare students to enter a workforce with jobs we have not even thought of?”

Dr. Balser noted that there is evidence that lecture does not work and results in little retention. Yet lecture continues to be the primary mode of instruction. Why? Dr. Balser proposed one likely answer is that people continue to do what has been done for a long time. Additionally, people typically perceive faculty as subject matter experts who act as ‘gatekeepers of knowledge’. What then, does our changing world mean for the role of faculty? Today, access to the Internet is readily and quickly available, and a Google search can generate over 2 million search results in under half a second. Faculty cannot compete with the Internet as the gatekeepers of knowledge. So, if faculty are not needed for their content knowledge in today’s society, what is their role?

The change in our world means that faculty need to rethink their roles as educators, and reframe their ideas about the nature of their job. They need to change from viewing their role as being the ‘sage on the stage’, the teacher as the sole content provider and expert, to the ‘guide on the side’, a coach who creates learning environments and guides and facilitates learning. How can educators change their role? Dr. Balser suggests that faculty first need to let go of all hope of being the primary content provider. Second, they need to give up ideas about what a classroom ‘should’ look like, and deliberately design learning environments that engage students by paying attention the teaching space, method, and people, in addition to content. Third, she suggests that educators need to revise their ideas about what learning is supposed to look like. They should focus on making learning fun by being enthusiastic and excited as teachers, embracing the ‘Wiki-world’ and engaging students in that world, and promoting creativity and authentic audience by transforming traditional lessons into relevant, meaningful learning experiences that allow students to create products and performances (e.g., songs, poems, short stories, games, etc.) that demonstrate their learning and understanding. Finally, Dr. Balser proposed that educators need to trust their students. If faculty engage students, students will want to learn (Finkel 2000). This then begs the question: How might faculty teach differently, if they really believed their students wanted to learn, and if they believed teaching and learning could be fun?

As an example, Dr. Balser discussed an alternative approach to teaching the nitrogen cycle. Because the nitrogen cycle is important, it is taught in many biology, ecology, agriculture and environmental studies classes. However, students typically hate it because it is complex and has ugly chemistry. Dr. Balser wondered whether it was possible to make learning the nitrogen cycle more fun. She developed a board game centered around the nitrogen cycle and began using it with her students. Student reactions to the game were positive. They reported actually learning the processes, and found the game setting made learning the nitrogen cycle interesting and easier. Additionally, students learned the vocabulary, steps in the cycle, and ability to
think more critically and holistically about the concepts. Thus, a creative, non-traditional approach designed to engage students in the learning process produced better outcomes – both in learning and in student attitudes towards the learning.

Dr. Balser concluded that we live in an accelerating world – and learning needs have changed. As a consequence, teaching must change. Teaching must shift from a passive transmission of facts to instead focus on engaged learning (i.e., a move from ‘push’ to ‘pull’ learning). The ways she proposed educators can do this are to:

- reframe their role in the classroom;
- deliberately design learning environments that are interesting, engaging and authentic;
- trust students to be learners; and
- make the content LEARN-able: Living – Engaging - Authentically assessed – Real world relevant – Novice friendly.

References:


HAPS Comprehensive Exam

Now a fully online test

The new online exam provides enhanced reporting capabilities. Scores can be presented as a total score, or it can be broken down by topic area (such as cardiovascular anatomy, muscle physiology, etc.). Chi Tester is used to implement the secure administration of the exam, and will work with schools to find appropriate facilities and reports.
Judith S. Bond, Emeritus Professor of Biochemistry and Molecular Biology, Penn State College of Medicine, discussed the importance of being active in shaping policies that are important to biomedical research. Congress and funding agencies make decisions that affect the future research in medicine and biology, and societies such as HAPS are important spokespersons for researchers and educators.

Several policies involving animal use have been shaped by societal attitudes on research animals. For example, both FedEx and UPS no longer transport research animals due to pressure from PETA. Criminal acts involving the release of animals from laboratories and the fact that the National Institute of Health (NIH) no longer allows research using chimpanzees or great apes to occur are evidence of a growing threat of extremism in biomedical research.

The NIH released a biomedical research report that concluded that there are too many individuals with PhD degrees and actually raised the question of gender inequities being present in animal research. A report published in 2012 listed the employment areas of US-trained biomedical PhD’s as follows:

- 43% Academic teaching or research
- 18% Science-related non-research
- 18% Industrial research
- 13% Non-science-related fields
- 6% Government research
- 2% Unemployed

For the past twenty years, a smaller number of biomedical PhDs have been going into tenure track positions in a research university. With budgetary constraints in higher education, this trend is likely to continue. Those with doctoral degrees have acquired many skills that allow a variety of career options such as: working in public health, research and educational sales, involvement in making science policy, working in intellectual property areas, and scientific and medical testing. The US has a strong need for PhDs committed to biomedical research. The fact is that less than 0.5% of the 1.2% of the US population that have a doctoral degree actually have a PhD in the biomedical sciences. Therefore, those who say there are too many PhDs are not correct!

Although the US has a strong commitment to scientific research, the federal budget has squeezed support monies for both education and scientific and medical research. It is troubling that there is a projected sharp decrease in such funding through 2024.

Due to the fact that very few scientists and medical doctors are currently members of the US Senate, professional societies have become important advocates for scientists. Scientists can do many things to help increase support for funding such as: meeting with Congress members, talking to colleagues, and getting the public involved. The Federation of American Societies for Experimental Biology (FASEB), an advocacy organization, “is the organization that legislators, federal agencies, and the media turn to for information on policies related to biomedical science and engineering.”

*The material presented in this recap reflects the research and opinions of Judith S. Bond, PhD, President of FASEB. For more information about Judith S. Bond, PhD and FASEB, please see: [http://www.research-europe.com/index.php/2013/01/judith-s-bond-president-federation-of-american-societies-for-experimental-biology/](http://www.research-europe.com/index.php/2013/01/judith-s-bond-president-federation-of-american-societies-for-experimental-biology/)
Update Seminar IV

Is Anatomy a Dead Science?

Speaker: R. Shane Tubbs, MS, SA, PA-C, Ph.D., Pediatric Neurosurgery, Children’s of Alabama, Birmingham
Recapped by: by David L. Evans, B.S., M.Sc., Ph.D. devans@pct.edu Penn College, an affiliate of the Pennsylvania State University

Dr. Tubbs' presentation set out to demonstrate that anatomy is a living science. I believe that his goal is an excellent one even though I am not primarily an anatomist. Some time ago, one of my A&P colleagues said that anatomy was not even a science at all, let alone a dead science. Clearly, our experiences with students show that anatomical hypotheses can be disproven but arguably that fact alone does not make anatomy a science.

According to the Oxford English Dictionary¹ science is “The intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through observation and experiment...” Clearly, by this definition, my colleague was wrong in her assertion.

The speaker took this idea in a different direction than some by demonstrating that there were novel ways to apply anatomical information. His background is in pediatric neurosurgery so his examples came largely from neurology. Amongst the items were nerve resectioning to restore function, creating appropriate third ventricle drainage via a shunt in its floor, epilepsy treatment through crainial nerve stimulation, and nerve decompression.

Even so, is anatomy still a “living” concept? That is, does anatomical data grow larger or smaller with new observations? I like to say that in science we only rent the truth because while some new ideas attain some verification and add “weight” to the body of science, others are proven wrong—all scientific information must be falsifiable. While the speaker did mention at least one recently discovered human structure, there are exciting findings.

The following are two examples of anatomy operating as a science. The anteriolateral ligament of the patellar area has been rediscovered. Apparently, this 2013 observation can substantially aid surgeons in dealing with a sometimes failing knee, which sometimes occurs after anterior cruciate ligament repair, a post-operative problem called pivot shift. The second example is perhaps more illustrative of how science really works since some, according to this posting by Dr. Magid on the HAPS list server, dispute the revelation. Also of note is the 1996 discovery of the sphenomandibularis one of 3 muscle pairs used in mandibular elevation, which made headlines at the time. A peculiar “behind the eyeball” headache is supposedly due to referred pain from this muscle. Whether you agree about the existence of the sphenomandibularis or not, discussions such as these reveal that anatomy is a science which in fact consists of falsifiable assertions.

References cited:

_____

¹ http://www.oxforddictionaries.com/us/definition/american_english/science
Forgotten Student Profile #443

NAME: John Mills
AGE: 19

HOMETOWN: Port Townsend, WA.

LONG-TERM GOAL: Registered Nurse

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As the title of the talk suggests, Dr. Schreihofer’s presentation focused on the integrated action of the cardiovascular and respiratory systems. The delivery of oxygen to specific tissues is controlled according to the need of the organs and this, in turn, is controlled by the central nervous system via the autonomic nervous system. Dr. Schreihofer’s lab focuses on the elucidation of the mechanisms that the respiratory centers of the brain use to influence the autonomic function of the cardiovascular system.

In this content-heavy presentation, Prof. Schreihofer efficiently elucidated the inter-relationship between the physiology of the organ systems and the nervous system. Until recently – and perhaps continuing even today – the teaching of organ level physiology has focused on learning about the processes within the specific organs involved, with very little emphasis on learning about the interdependence between these systems. Although our students are expected to appreciate the overarching concept of homeostasis, the fundamental aspects of this often remain elusive to lower level undergraduate learners. Although we emphasize the importance of the nervous and endocrine systems in the regulation of all the other systems in the body, it typically gets discussed only during the discussion of those specific “chapters” and the teaching of the importance of neurotransmitters are relegated to pharmacology courses. The physiology courses at the University of North Texas Health Science Center have been designed to teach the end organ processes with neuronal controls at each level.

The talk focused on the control of the heart by the ANS, specifically the sympathetic activity on the arterial vessels and the splanchnic nerve that innervates the mesenteric circulation. The significant pool of blood that this vascular bed contains at any given time makes it a convenient target for sympathetic regulation through vasoconstriction. Additionally, since it contributes significantly to the total peripheral resistance, this vascular bed is emerging as a significant contributor in some forms of hypertension, (Christensen & Mulvany 1993). Studies on rat brains have been easily transferable to understanding the controls in the human brain stem; and so it is the mammal of choice at Dr. Schreihofer’s lab. Such transfer of knowledge is facilitated by the fact that the brain stem shows little anatomical and functional variability between mammals as it serves to maintain the very basic and vital physiological functions that keep an animal alive.

The rostral ventrolateral medullary (RVLM) nucleus provides excitatory drive by the secondary neurons to the cardiovascular centers. The neurons of the RVLM receive input from various sources, including baroreceptors, and then regulate activity of sympathetic preganglionic neurons.

Pharmacological studies reveal how this nucleus functions. It is known that the major excitatory amino acid (EAA) is glutamic acid (Glu) in cardiovascular regulation (Dampney 1994). Microinjection of Glu into the RVLM results in a corresponding increase in the mean arterial pressure (MAP). When the GABA<sub>A</sub> agonist muscimol (the psychoactive constituent of Amanita mushroom) is injected into the RVLM, the sympathetic nerve activity (SNA) drops dramatically almost to zero and concomitantly a significant decrease in MAP and heart rate (HR), similar to that seen in upper cervical spinal cord transection, is observed. Thus, under resting conditions, this nucleus provides the basal drive that maintains the SNA. GABA<sub>A</sub>, of course, serves as the most important neuromodulator of the nervous system through its inhibitory effect on the brain regions, and hence is also important in the autonomic regulation of the cardiovascular system. Major GABAergic inputs to the RVLM restrain nerve activity and maintain normal BP. Similarly, blocking the GABA<sub>A</sub>R with bicuculine also elevates the SNA and BP.
Afferent baroreceptor input, via the nucleus tractus solitarius (NTS), activates the GABAergic neurons of the caudal ventrolateral medula (CVLM) which, in turn, inhibits the RVLM and, thereby, the sympathetic activity (Mandel & Schreihofer, 2008) (see Figure 1). The effect of inhibiting the CVLM neurons by muscimol also leads to a massive rise in the SNA with a concomitant rise in the MAP and HR. This tells us that not only does the CVLM provide the tonic inhibition, it is the main resource of tonic inhibition of the RVLM for controlling the SNA in the cardiovascular system.

These nuclei are not just important for basal activity, they are very important for producing a variety of reflexive controls. The best known of these would be the arterial baroreceptor reflex. The mechanoreceptors of the carotid sinus and the aorta, where the ANS tries to maintain a homeostatic level of BP and HR for the optimal perfusion/infusion at the tissue level, are under the sympathetic inhibitory control. Dr. Schreihofer reminded the audience about the strong interdependence between the cardiovascular and the respiratory systems through the influence of the central respiratory drive (CRD) on the RVLM neurons. We know that the respiratory pattern generator has a marked influence upon the sympathetic nerves that regulate cardiovascular function. One of the sites at which the sympathetic neurons interact with those of the respiratory rhythmicity is the ventrolateral nuclei of the medulla. Also, brain stem nuclei that regulate arterial pressure and breathing are in close proximity to each other.

Most of the talk focused on the CVLM neurons and their importance on the cardiorespiratory integration. By monitoring the activities in rat brainstem neurons with microelectrodes, while applying snares to the carotid arteries, it was found that these CVLM neurons are acutely sensitive to arterial pressure changes. At the same time, this causes inhibition of the RVLM to depress the SNA in order to restore the arterial pressure. These neurons were impregnated with biotinamide their GAD67 mRNA expression was monitored. The stained representative cell presented at the conference showed characteristics typical of interneurons as expected.

Further studies revealed that there was more to this cardiorespiratory coordination and modulation than just the baroreceptors and the NTS. Therefore, it was only natural that Dr. Schreihofer’s lab focused on the respiratory regulation of the cardiovascular system. It is easy to speculate that the closely situated nuclei governing the cardiovascular and respiratory centers of the brain stem would have regular communication. It was indeed refreshing to listen to Dr. Schreihofer bring up the conundrum in our teaching physiology, where we often talk in terms of all or none effects – in terms of activation – and rarely do we mention or discuss the importance of inhibition in a neuronal pathway.

The rest of the seminar focused on the respiratory influence on the cardiovascular function. The arterial chemoreflex also has a major role in deciding the output from the RVLM. There is differential activation for sympathetic neurons from the RVLM. In response to hypoxia, the afferent nerves to the NTS are activated and the central respiratory drive is stimulated. The result is a two-pronged modulation: while it excites the thoracic splanchnic nerve, it actually inhibits the sympathetic activation of the heart. Apparently, there is no effect of inhibiting the CVLM under reduced pO2 and excitatory SNA response persists under such conditions.

Acute hypoxia was seen to increase respiratory drive as well as activity of the splanchnic nerve. Rats held in 10% oxygen through a ventilator, the phrenic nerve activity was stimulated, as was the SNA. The MAP held steady. That was expected since the vasodilatory effect due to hypoxia is countered by the rise in SNA. The effect is duplicated by cyanide, except that the usual effect of vasodilation due to external hypoxia is not noted. The respiratory cycle showed a different picture regarding the SNA. If the respiratory cycle is divided into four phases (Early and late inspiration; Early and late expiration), there was a detectable increase in SNA during both early and late expiratory phases, whereas such an increase is not seen under normoxic environment. Indeed, under normal oxygen tension, there is significant suppression of the SNA during the expiratory phases. This points towards a

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cardiorespiratory component to this nerve activity. It was observed that the responses in CVLM neurons under hypoxic conditions were associated with the pattern observed in the respiratory-related SNA. This observation then prompted the schema as presented in figure 2. In this scheme, under hypoxic condition, the nucleus tractus solitarius would set a chemoreflexive tonic activation of the RVLM, leading to sympathetic activation. On the other hand, the respiratory neurons can also be activated by the output from the NTS leading to the activation of some of the cardiovascular neurons of the CVLM while inhibiting others. This would facilitate and/or suppress specific phases of the respiratory cycle. Activation of the CVLM should lead to a suppression of the RVLM. This meant that as a result of specific chemoreflex condition, the RVLM would be able to cause sympathetic nerve activity. Based on the above scenario, if the CVLM GABAergic neurons were to be specifically blocked from receiving GABA input, the sympathetic response to hypoxia would also be reduced. This prediction was based on the assumption that the nuclei were being activated and suppressed at the same time during hypoxia. It is to be noted that the inhibition of the whole CVLM nucleus blocked the sympathetic activation. Indeed, as the data showed, blocking the CVLM GABA<sub>A</sub>R with bicuculline under hypoxia greatly reduced the SNA. A picture emerges where the chemoreflex and baroreflex act separately, yet in a coordinated fashion, work to integrate the homeostatic regulation of the respiratory and cardiovascular functions.

The last part of the seminar was devoted to talking about a condition which is known to afflict about 6% to 7% of Americans (www.nhlbi.nih.gov, n.d.). Patients with Obstructive Sleep Apnea (OSA) experience chronic intermittent hypoxia during sleep. As the condition persists for an extended time, as is most often the case with those who are prone to OSA, neural plasticity results. Thus, hypoxia-induced sympathetic nerve activation, and in turn, hypertension becomes established as a chronic condition even when the person is awake. Additionally, it leads to exaggerated sympathetic chemoreflexes.

Rats were put in chambers where the oxygen concentration was controlled by introduction of nitrogen. For 14 days, the animals were subjected to hypoxic (or normoxic) condition during the sleep period (8h/day). The animals subjected to CIH showed significant and chronic rise in sympathetic nerve activity, arterial pressure (AP), and phrenic nerve activity (PND) are observed (Figure 3). However, over a period of several weeks to months following this, the experimental animals did attain normal levels of the parameters. This is the same result obtained in case of humans where the patient with sleep apnea have undergone corrective therapy, and the antihypertensive medications can be removed.

It is important that we understand the connections between regulatory systems to fully understanding how each of them works in healthy and disease states. This seminar addressed the cardiorespiratory connection and discussed the neurons in the brain that regulate autonomic control of the cardiovascular function as impacted by the neurons of the respiratory centers. Part of Dr. Schreihofer’s research concentrates on hypoxia driven controls of the sympathetic nerve activity.

**Illustration credit:**

Figures 1, 2 and 3 are used with permission of the author, Dr. Ann Schreihofer.

**References**


“What is Sleep Apnea” retrieved from http://www.nhlbi.nih.gov/health/health-topics/topics/sleepapnea/
First Timer Experiences

A newbie experience

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I first want to extend a major thank you to the HAPS foundation and the Primal Pictures Company for granting me scholarship money to attend this year’s HAPS Conference in Jacksonville, Florida. I would also like to thank Dr. Santa Makstenieks, my professor and mentor, who encouraged me to join her at this conference and nominated me for the scholarship. Most importantly I would like to thank the HAPS community for being so warm and welcoming to me.

When I was given the opportunity to participate in this year’s HAPS conference, I was at first intimidated. “I am only 21- I’m just a student!” - I thought to myself throughout the whole preparation process. Did I have anything to offer to these seasoned educators? As I was boarding a plane to Florida, I found myself second-guessing my sanity. I was about to fly to a conference where I would meet numerous Anatomy and Physiology professors who know more A&P than I do, and I was going to lead a workshop in front of these veteran professors. Needless to say I was nervous and overwhelmed.

But those feelings of inadequacy quickly disappeared once I got integrated into the HAPS community at the welcome reception and the first-timer breakfast. I realized that a title means nothing to this society, but more importantly the ideas offered from each person and how those ideas can inspire others. With this in mind, I soon relaxed in the confidence that my ideas were just as important as those of other members who have been part of the society for years.

When the workshop portion of the conference arrived, I felt as though everyone present was cheering me on. In the days leading up to my workshop, I had met so many people who were interested in my topic and how “flying tennis balls” worked in the A&P classroom. I encountered another wave of nervousness right before my workshop started. More than 30 people had come to hear me speak. I was petrified. My confidence again wavered. What on earth would cause so many people to want to come?

Yet, throughout the presentation the participant’s enthusiasm grew with each interactive activity. I realized that the participants were hungry for new ideas and wanted to better equip their students: that is why they came. In some respects this is why I attended the conference as well: To one day better help my potential students understand A&P content.

I never would have thought that I would get this opportunity. Everything fell into place. I am most grateful that I received the scholarship money to be able to attend, and that I met such a welcoming supportive group upon my arrival in Jacksonville. I left the conference even more inspired to further my education of the human body. I can confidently say that I somehow will find myself back in the classroom- not as a student, but hopefully as a professor who is always searching for integrated methods of teaching.

Thanks HAPSter’s!

My First HAPS Conference Experience

Brian G. Salisbury
Union County College

I have been a member of HAPS for 2-3 years now but the Jacksonville meeting was the first national Conference that I have been able to attend. I was not disappointed. I had attended the East Regional Conference earlier in the Spring so I was instantly familiar with the meeting’s format, albeit now on a larger scale. The venues - Hyatt Regency and Florida State College - were excellent as were all the staff and individuals with whom I came into contact. The Jacksonville Jazz Festival was a nice touch as well.

I thoroughly enjoyed the First-timers’ Breakfast, with the opportunity to meet many new people. In particular, I was warmly greeted at my table by Kevin Patton, one of the President Emeriti. He related a good amount of HAPS history that I was not aware of. Also at my table was Tim Wilson. Tim gave the first Update Seminar on Sunday morning entitled Visualization Potential Meets Cognitive Load in Anatomical Education. I thoroughly enjoyed his presentation. One statement that Tim made has stuck with me: “Learning is inversely proportional to cognitive load.” It led me to

continued on next page
realize that I need to adjust my presentations so not to overburden my students in a fairly short period of time. I will be using the remaining summer months to revamp my A&P-I presentations for the fall semester, hoping to improve my lectures and increase student learning.

The workshops were terrific although it was tough to choose between concurrently running ones. Attending the Conference with a colleague would have a distinct advantage in allowing some coordination of workshop attendance with subsequent sharing of notes and thoughts. My only other real disappointment was the fact that I had to miss the last day of workshops due to the start of my summer session class back home.

**First Timer Experience**

Karen Groh
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After I spent many years engaged in other pursuits, my adventures in teaching Anatomy and Physiology began seven years ago when I was asked to teach a section of A&P I Lab as an adjunct. Since A & P Lab at that institution was virtually exclusively anatomy, my initial thought was that teaching the lab would be rather dull, but I was willing to do it. How wrong I was! I ended up fascinated with the amazing structure of the human body and how structure correlates with function from the molecular level up.

After several years of teaching a section or two of A & P Lab a year, I moved to another city where I taught A&P as an adjunct at a community college. Later on, I was offered a full-time position at a hospital-based nursing school, Good Samaritan College of Nursing and Health Science (GSC). Shortly after I began at the nursing school, a colleague strongly recommended that I join HAPS, an organization I had never heard of before. Eager to improve my teaching ability as well as my knowledge of anatomy and physiology, I joined HAPS. Since there are only two other biologists at GSC, I have limited ability to network with others in the same profession, so I knew attendance at a conference would be important for me. With limited funding for conferences, I applied for and was thrilled to receive a Robert Anthony Scholarship which covered the cost of my conference registration.

During the first two days of the conference, I made good use of the resources available in the exhibition hall. I talked with representatives from companies that sell some of the products we have at GSC, getting questions answered and obtaining some useful resources. I looked over a variety of textbooks for both A&P and Pathophysiology. I also enjoyed the update speakers. Timothy Wilson’s presentation, “Visualization Potential Meets Cognitive Load in Anatomical Education” was helpful, giving me some ideas for preventing cognitive overload in my students when I’m teaching anatomy. I gleaned some teaching tips from the poster sessions, including how to incorporate more writing into my A&P class, team-based learning activities and application of muscle structure and function to yoga, plus many others.

The workshops held on the last two days of the conference were wonderful! I tried to select a variety, some for personal enrichment, some for increasing my own knowledge and understanding and some for teaching strategies. I’ll describe my favorite from each category.

For personal enrichment, I attended Kevin Petti’s session, “Anatomia Italiana: Art and Anatomy in the Italian Renaissance”. In this fascinating session, I learned about the history of the study of anatomy and how cadaver dissections would have been done in Italy during the Renaissance. Looking at the art Kevin showed, I saw the connection between art and anatomy in paintings, sculptures and other art forms of the time. After this session, I will see art from this period with new eyes, noticing how the artist’s understanding of anatomy informed the artwork. I also plan to incorporate a few art images in my A&P classes.

Janet Casagrand’s workshop, “Teaching and understanding electrochemical forces, equilibrium potential, and ion flow” was an excellent review of these concepts. Janet had us solving problems during the workshop, but to be sure I really understood them, I redid all of the problems later on my own. By giving me a deeper understanding of what I’m teaching, this session gave me the tools to do a better job when I teach action potentials in A&P. One immediate result of this workshop is that I realized some of the language I used in a worksheet I wrote for my class was misleading. As soon as I got home from Jacksonville, I corrected that worksheet. The students might not know the difference, but it’s important that what we teach, even if simplified, is still correct and now my worksheet is correct.

Though I have never used concept maps, they are used extensively in nursing classes at GSC, so one of my teaching goals is to introduce my first semester A&P students to concept maps, both as a way of helping them organize and retain knowledge as well as to prepare them for their subsequent nursing classes. I have also wanted to use...
concept maps in Pathophysiology with upper-level students who are already familiar with them. Eileen Bush’s workshop, “Diagnosing how students organize their knowledge” provided me with an introduction to concept maps as well as an opportunity to create one of my own. After Eileen explained both the theory behind concept maps, as well as how to use them in the classroom, we split up into groups of four to create a concept map. My group’s task was to create a concept map of membrane transport using the list of terms Eileen gave us. After we received the list of terms for our concept map, we headed into the hallway where there was plenty of space to arrange sticky notes on the wall. Much discussion ensued among the four of us regarding the organization of our map. We argued and explained concepts to one another as we arranged our sticky notes on the wall. After we finished, we all agreed how surprising it was that constructing a concept map on a topic we were all quite familiar with sparked so much rich interaction between us. Last week, I had my Pathophysiology students work in small groups to create a concept map of sepsis, which sparked lots of interaction and discussion among them. When I asked the students afterward if they found the activity useful, they said it helped them organize their ideas and would help them retain the information.

In between the organized portions of the conference, I had many wonderful opportunities to interact with other Anatomy and Physiology instructors, broadening my ideas and providing me with a network of people to contact in the future. In fact, the day after I arrived home, I sent eight emails to people I had met at the conference or to presenters of workshops I had attended, asking them to send me materials. Their responses have provided me with some excellent teaching resources. My roommate at the Hyatt was a former colleague from another city and we had a wonderful time catching up with one another. This colleague had previously attended large national conferences with thousands of attendees and was uncertain whether a smaller conference like HAPS would be as enriching as the larger conferences. At the end of the conference, she told me she actually liked HAPS much better since the information presented was more pertinent and immediately useful. Also, at the smaller HAPS Conference, people were much friendlier, providing her with many more opportunities for those informal and spontaneous interactions which can be even more important and useful than the sessions of a conference.

How could I have ever thought of anatomy and physiology as dull topics? To me, the human body is the most remarkable entity I’ve ever studied and the more I learn, the more curious about it I become. The HAPS Conference provided me with an opportunity to expand my knowledge so that I can better share the excitement with my students.

First Timer First Take
By: Barbie Klein
Indiana University Bloomington, barbklei@indiana.edu

The HAPS conference was a marathon of speakers, workshops, poster presentations, and meeting friendly people. I was finally able to put faces to the names I’ve read on the listserv and we exchanged contact information for follow-ups and future collaborations. I also met a new friend during the 5K fun run. We encouraged each other, jogged through some amazing sites of Jacksonville, and crossed the finish line together, tired but motivated!

I was nervous at first to present my poster, but in the end I received a lot of helpful feedback about my e-book, Atlas of Thoracic and Abdominal Cadaver Dissection with Accompanying Histological Samples. The first-timers breakfast was a great opportunity to meet other newbies, past presidents, and the Steering Committee. Afterwards, I took on the scavenger hunt challenge, which was a fun way to meet all of the committee chairs. The evening receptions were also a nice time to relax and mingle with other HAPS members at the end of the day.

It was difficult to choose between all of the interesting and informative workshops at Florida State College. Wendy Riggs and Karen Clark had great workshops about their experience flipping classes and I learned valuable techniques and methods that I will use this fall. Dr. Elbatarny demonstrated how he projected real-time microscopic images in his histology class to improve student learning and Tom Lehman’s workshop walked us through the first day of his A&P class filled with activities that set up a positive vibe for the rest of the semester. I have a lot of work to do processing all of the tips, advice, applications, and novel ideas for creating an engaging classroom and laboratory after attending this conference.

Looking forward to next year in San Antonio!
Poster Presentation Summary

Investigation of chronotropism using Osteopilus septentreonalis: An inquiry based model

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² Polk State College, Dept. of Biology, Winter Haven FL

Abstract
Cuban tree frogs (O. septentrionalis) and African Clawed frogs (X. laevis) tadpole hearts are transparent, allowing students to visualize heart rate and contraction in vivo. This project describes the use of Osteopilus septentrionalis and Xenopus laevis in an inquiry based lab activity to examine chemical regulation of the cardiovascular system in an Advanced Anatomy & Physiology course. Students anesthetized and dissected tadpoles, applied unknown chemicals, collected heart rate data, and developed explanations for their data. Chemicals used included caffeine, ephedrine, epinephrine, and dimethyl phthalate. Students enjoyed the activity and believed it enhanced their understanding of these concepts. This engaged learning activity introduced students to chronotropism in a collaborative learning environment.

Introduction
Students in advanced anatomy and physiology courses are tasked with learning complex topics that may be difficult for them to understand. Typically, a laboratory session is utilized to help students gain a more concrete understanding of these topics. Due to financial and temporal constraints, it is tempting to design advanced anatomy and physiology lab activities where the instructor knows the methods and outcome from the onset. However, traditional laboratory experiences such as these are not the most effective way to teach science, according to the National Research Council (National Research Council 2005). In an advanced A&P course, as in other science courses, laboratory activities should provide students the chance to experience the process of science first hand through an inquiry process of developing a question, designing an experiment, collecting and analyzing data, and drawing conclusions. This is in line with recommendations from the National Science Education Standards, which emphasize the inclusion of student inquiry in science courses (National Research Council 1996). This type of instruction has many benefits, including increasing the amount of content students understand (Lord and Orkwiszewski 2006), improving student attitudes toward science (Sessen and Tarhan 2011), and improving students’ research skills (Brickman and Gormally 2009). Educators may be reluctant to undertake the monumental task of changing their entire curriculum to one that utilizes inquiry. However, even changing a single lab activity has been shown to improve student performance (Cacciatore and Sevian 2009). In this study we report the development, implementation, and analysis of one such advanced A&P laboratory experiment that addresses cardiovascular concepts.

Methods
Materials:
Cuban Tree Frog (Osteopilus septentrionalis) or African Clawed Frog (Xenopus laevis) tadpoles
Dissecting Microscopes
Forceps
Tricaine solution
“Unknown” solutions (e.g. 1x PBS, DMSO, 9.5mM acetylcholine, 30% ethanol, 0.01M caffeine, 6.0x10^-2M ephedrine, or 0.1M or 0.01M dimethyl pthalate)

Animals:
Cuban Tree Frogs (Osteopilus septentrionalis) are an invasive species in Florida and are available for collection in many areas. African Clawed Frog (Xenopus laevis) tadpoles were purchased from Xenopus Express (www.xenopusexpress.com). All animals were housed in accordance with approved IACUC protocols at Florida Southern College.

Lab Activity:
This lab utilizes organisms with transparent hearts to allow students to investigate the impacts of various chemicals on heart rate. The lab includes sample questions to guide student discussion as well as examples of chemicals that one can use. However, feel free to modify the list.

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Have students watch this short video clip of the beating heart of a Cuban Tree Frog (http://www.youtube.com/watch?v=6wMAZudgEBc).

Possible Pre lab Questions:
1. What factors can affect heart rate?
2. Are there other ways, other than increasing heart rate that will increase cardiac output?
3. Can you think of some ingestible substances that will increase or decrease heart rate?
4. Design an experiment to examine the effects of different substances listed in #3 that will impact heart rate.

Teacher Hints:
1. Students may list general sensations (e.g. stress, excitement). Have them explain what is happening physiologically during these sensations that impact heart rate.
2. Students can discuss altering TPR, contractility, etc. The focus of the lab is on changes in heart rate.
3. Students may consider alcohol (depressant), caffeine (stimulant), etc. Students will investigate how the food/drinks they ingest affect the body.
4. Provide students time to work on their ideas, which will probably be similar to the following protocol. Encourage solid experimental design. Phosphate buffered saline can serve as a control.

Procedure:
1. Anesthetize your tadpole in 0.1% Tricaine solution for 1 minute
2. After the tadpole stops moving, place it ventral side up on a dissecting microscope tray.
3. Locate the tadpole’s heart. It is pulsing underneath the chin.
4. With your lab partner acting as a timekeeper, count a pre heart rate for 1 minute.
5. Repeat 3 times and take an average heart rate.
6. Following the pre heart rate calculation, hold the tadpole to the tray with one pair of forceps and expose the heart by gently tearing integument and pericardium with a second set of forceps.
7. Bath the exposed heart in 10 µl of experimental solution.
8. Wait for 10 seconds then record heart rate for 1 minute.
9. Graph your data (pre and post heart rate) in Excel
10. Share your findings with your classmates.

Post Lab Questions:
1. Based on your data, what effect did your unknown substance have on heart rate?
2. What could your unknown substance be? Explain why you think this is. Could it be something else?
3. Research your unknown substance and describe its affects on heart rate.

Teacher Hints:
1. With the exception of caffeine, we found that all of the unknowns listed above decrease heart rate.
2. Students should explain their data logically, based on what they know about factors that can control heart rate.
3. If desired, discuss the different unknown solutions, emphasizing how different molecules can produce similar results.

References

** Animal use disclaimer: We obtained approval from the Florida Southern College IACUC - protocol number 1006 to use these organisms. Our lab activity was developed under this protocol. It was approved on February 27, 2013.
Poster Presentation Summary

Mapping the incidence pattern of some ailments and autoimmune diseases among young adults using GIS

Weam Altaher, Amber Morrison, Alexandra Mastro, and Mary Vagula
Biology Department, Gannon University, Erie, PA
Presenter: Mary Vagula

According to a recent National Institutes of Health report 23.5 million Americans suffer from autoimmune diseases, making them a common occurrence today. Autoimmune diseases are associated with abnormal immune responses to innocuous agents or chemicals that attack normal healthy tissue resulting in the destruction of structure and function of the affected organs. In addition to autoimmune diseases, conditions such as acid reflux disease, depression, and myopia have also become more prevalent. Although the exact cause for the increase in the incidence of these conditions remains unknown, modern lifestyle appears to be the primary culprit. This study was done to examine the prevalence of these health conditions among young adults between the ages of 18-25 in Erie County, PA and to compare the results with state and national statistics. A two-page questionnaire, which had been approved by the Gannon University Institutional Review Board (IRB), was administered to 542 young adults whose responses formed the raw data. The questionnaire, which took 10 to 15 minutes to complete, was given out to students in over thirty randomly chosen classrooms. Once all the data was collected (n=542), the responses were entered into an excel document to keep track of the responses electronically and to facilitate parametric tabulation of the data. The key to this research project was a geographical linkage component that was established as each individual participant provided his or her hometown zip code. Mapping the incidence of these conditions was done using Geographic Information System (GIS) software. Analysis of the data revealed that 47.42% of the population had myopia, 11.81% hyperopia, 15.13% asthma, 6.83% acid reflux, 4.98% eczema and 9.59% depression. The top six conditions in this survey are shown in Table 1 along with the percent of prevalence in males and females. Table 2 compares the current data with that of 2013 data collected from the same place in Erie County. When interpreting the collected data it was observed that the number of female participants (63.5%) was significantly higher than the number of males participants (36.5%).

Table 1. Incidence of some health conditions/ailments among young adults

<table>
<thead>
<tr>
<th>Health Conditions</th>
<th>% Population with the condition</th>
<th>% Females with the condition</th>
<th>% Males with the condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myopia</td>
<td>47.42</td>
<td>33.02</td>
<td>14.39</td>
</tr>
<tr>
<td>Asthma</td>
<td>15.13</td>
<td>8.49</td>
<td>6.64</td>
</tr>
<tr>
<td>Hyperopia</td>
<td>11.81</td>
<td>8.30</td>
<td>3.51</td>
</tr>
<tr>
<td>Depression</td>
<td>9.59</td>
<td>7.01</td>
<td>2.58</td>
</tr>
<tr>
<td>Acid reflux</td>
<td>6.83</td>
<td>4.80</td>
<td>2.03</td>
</tr>
<tr>
<td>Eczema</td>
<td>4.98</td>
<td>4.24</td>
<td>0.74</td>
</tr>
</tbody>
</table>

Table 2. Incidence pattern of six most common conditions studied in 2014 and its comparison with data collected in 2013 and the national data

<table>
<thead>
<tr>
<th>Health Conditions/Ailments</th>
<th>2013 (N=582)</th>
<th>2014 (N=542)</th>
<th>Erie County (N=147)</th>
<th>National data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myopia</td>
<td>48</td>
<td>47.42</td>
<td>46.9</td>
<td>25.74</td>
</tr>
<tr>
<td>Asthma</td>
<td>14.60</td>
<td>15.13</td>
<td>12.2</td>
<td>8.20</td>
</tr>
<tr>
<td>Hyperopia</td>
<td>11.30</td>
<td>11.81</td>
<td>8.8</td>
<td>22.40</td>
</tr>
<tr>
<td>Depression</td>
<td>8.60</td>
<td>9.59</td>
<td>11.6</td>
<td>11.10</td>
</tr>
<tr>
<td>Acid reflux</td>
<td>6.7</td>
<td>6.83</td>
<td>6.8</td>
<td>20.00</td>
</tr>
<tr>
<td>Eczema</td>
<td>5.10</td>
<td>4.98</td>
<td>6.8</td>
<td>5.51</td>
</tr>
</tbody>
</table>

continued on next page
Although there is an uneven distribution of genders in this study, the percentage of females having any one of these conditions was greater than the percentage for males, with the exception of asthma. For example, out of the 47.42% of the population that have myopia 69.4% were females and 30.6% were males. Similarly, hyperopia, depression, acid reflux disease, and eczema are significantly higher in females than in males. Asthma is the only condition which was noted to be higher in males than in females. When looking at overall national trends of autoimmune diseases such as asthma and eczema, it is reported that women tend to have a higher prevalence of these diseases. According to the American Autoimmune Related Diseases Association, autoimmunity refers to a varied group of illnesses that involve almost every human organ system and targets women 75% of the time (AARDA 2013). They reported that autoimmune diseases strike women three times more often than men (Walsh 2000). Estimates report that almost 30 million out of the 50 million Americans currently living with an autoimmune disorder are women. Autoimmune disorders are the fourth largest cause of disability among all women in the United States (DHHS 2000).

The observations made in this study reveal a consistent trend among males and females, which correlates with the national average. The percentage of subjects that have myopia and asthma in the study are significantly higher than the national average, while hyperopia and acid reflux are significantly lower than the national average. A possible source for this discrepancy could be related to the geographical conditions and the size of the sample of individuals that were surveyed. We used the zip codes of the participants from Erie County (N=147) when doing the comparison. The averages of the data collected from this sample tended to agree...
with the national average. Other conditions noted in this study are shown in Table 3.

Table 3. Other conditions noted in subjects currently living in Erie

<table>
<thead>
<tr>
<th>Conditions / Ailments</th>
<th>% of young adults with the condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glaucoma</td>
<td>1.66</td>
</tr>
<tr>
<td>Hypertension</td>
<td>2.77</td>
</tr>
<tr>
<td>Hypotension</td>
<td>2.77</td>
</tr>
<tr>
<td>Arthritis</td>
<td>2.21</td>
</tr>
<tr>
<td>Insomnia</td>
<td>2.58</td>
</tr>
<tr>
<td>Hyper/hypo Thyroidism</td>
<td>2.40</td>
</tr>
<tr>
<td>Celiac Disease</td>
<td>1.84</td>
</tr>
</tbody>
</table>

Based upon the data that was collected, depression was lower in 2014 than the national data, but has increased in comparison to the previous year, 2013. The investigators believe that seasonal depression may have contributed to this increase. Overall, the observations made in this study indicate that certain conditions are distributed unequally between males and females and the overall incidence of some conditions in Erie County, PA is much higher than the national average.

References
Introduction:
Working in any laboratory can provide valuable educational experience, but is not without risk. Laboratories can be potentially dangerous environments, because of various toxic, flammable, corrosive, or reactive substances. Potentially infectious or pathogenic organisms may be handled, and research and educational endeavors often involve the use of equipment that could cause harm. With proper training, precautions, safety protocols, good work practices, and common sense the risks of injury can be managed in any laboratory setting.

The use of biological specimens in a laboratory setting provides a unique opportunity that is illuminating and worthwhile, but it does pose some health and safety risks not seen in other types of laboratories. A human cadaver has its own considerable weight, and some biological specimens are preserved in potentially harmful solutions. Skillful separation of tissues with dissection requires the use of scissors, forceps, and scalpels and if used improperly may cause trauma.

The process of dissection is an important method of studying gross anatomy. It provides a hands-on opportunity to examine the texture of tissue, evaluate the interrelationship of tissues and organs, and of even greater importance, dissections show that bodies differ from one another. This variation is very difficult to illustrate on a computer program where the anatomy is the same or dependent on the platform being utilized. Although dissections are highly useful activities, some inherent risks are associated with the use of preserved specimens and dissecting equipment in the laboratory. Prompted by these concerns, the HAPS Safety Committee conducted a survey of HAPS members and non-members in 2014 to evaluate the use of preserved specimens, safety protocols, and accidents in the laboratory.

The majority of the survey respondents (39%) performed dissections in the human anatomy and physiology lab, followed by 20% in the human, gross, or comparative laboratories. Nearly 16% of the respondents carry out dissections in general biology courses. Five percent accomplished dissection activities in the animal physiology, human biology, and embryology classes.

Specimens Used in Dissection
Most respondents (33%) conducted dissections on various types of preserved animal organs (brains, hearts, kidneys etc.) from various species. The cat was the species observed to be used in the dissection laboratory with the highest frequency (20%), followed by fetal pig dissection (16%). While human cadavers were used, only 9% of respondents used them as a specimen to learn human anatomy. Eight percent of the respondents handled rats and mice to carry out dissection activities. Remarkably, 4% of the respondents teach laboratory courses that do not include dissections.

Class Size and Review of Safety Protocols
For approximately 64% of the survey respondents, maximum class size in a laboratory section was 13 to 24 students; 43% of the respondents had a maximum class size of 25 to 48 students. Eighty-three percent of the students enrolled in the laboratory sections taught by the respondents were 1st or 2nd year students. Previous studies have noted that accidents and injuries in the laboratory have been shown to increase with class size and inexperience of the students.

Nearly 95% of the survey respondents spent time in the lab to review safety protocols with the students. Safety protocols were most commonly presented (60%) by identifying the location of safety supplies and equipment (showers, eye washes, first aid kits, etc.) in the laboratory. Demonstrating the use of safety procedures (31%) and showing videos on safety (9%) were also employed to teach students safety in the lab.

Common Injuries
Of the 77 respondents, the majority (58%) experienced no lab accidents in the past year while nearly 38% indicated an accident frequency of 1-5. The cause...
of injury varied between scalpel cuts (49%), broken glassware (19%), splashed preservatives (12%), and allergic reactions (9%). Overwhelmingly, the main injury cause was scalpel cuts with broken glass injuries coming in second.

Four questions of the survey, dealt with scalpel injuries and safety protocols when using scalpels. Sixty-one percent of the injuries that resulted from scalpels were cuts to the individual performing the dissection; only 9% resulted in injuries to other students or the instructor. These injuries were more common while dissecting and 17% occurred when changing blades. About 85% of the respondents reported that they use disposable blades which would reduce this type of injury. From this group of respondents, 32% reported using a blade remover. HAPS Safety Guidelines recommend the use of scalpel blade removers to minimize the risk of injuries. Fifty-eight percent of the respondents require their students to wear aprons and 78% require the use of closed toe shoes and/or long pants when dissecting.

Four questions were about preservatives used and safety measures. Out of 68 respondents using some type of preservative, about 63% use formaldehyde free solutions such as Carosafe as their only preservative, 18% use formaldehyde free solutions such as Carosafe in conjunction with other types of preservatives such as phenol, formaldehyde, methanol/ethanol and 19% use other preservatives such as phenol, formaldehyde, methanol/ethanol as their only preservatives. About 94% of the respondents that use preservatives have eye wash stations in their labs. Only 4% have used the eye wash stations between 1-5 times in the past year. Interestingly, only 57% of the respondents that work with preservatives in their labs use some type of eye protection such as goggles or face shields.

Nearly 9% of the respondents reported not requiring their students to use any type of gear to protect themselves from preservative splashes.

Four questions of the survey were aimed at the occurrence of severe allergic reaction to preservative fumes in students or instructors and air ventilation in the laboratory. Just 12% of respondents documented a severe allergic reaction as an adverse event and 28% of those had recommended ventilation (18-20 air changes/hour). Twenty-seven of the respondents used other methods to improve air quality in the dissection laboratory. Of those, the majority (9%) used exhaust fans, hoods or various types of negative pressure fans to remove impure air and bring in fresh air, thereby improving air quality. Of the other methods used to improve air quality, 8% stated that doors or windows were opened to bring in fresh air. Five percent improved air quality by using electrostatic cleaners, air purifiers, bench ventilation, an air snorkel, or updraft or down draft ventilation systems, while 1% performed dissections in a lab maintained at 34°F.

Practices and Use of Body Fluids in Lab Exercises

Three questions were about the use of body fluids and the types of body fluids used in the lab. The HAPs... continued on next page
Safety Guidelines notes that some instructors feel that students should be introduced to the safe usage of their own body fluids in a controlled supervised environment to develop these skills, while other instructors feel that the risk of infection is too great and prefer substitutes. Of the 77 respondents, about 60% used some type of body fluid in their labs. The most commonly used body fluids were blood (75%) followed by urine (67%) and saliva (37%).

Three questions of the survey dealt with how bodily fluids are used (or not) and how they are disposed of. Of the 77 respondents, 23% reported using animal blood, with 6% reported using both animal and human blood. Thus, 64% of all respondents reported using human and/or animal blood.

Sixty-six percent of respondents reported that universal precautions were taught. Disturbingly, 5 of the 18 respondents which reported using animal blood did not report teaching universal precautions. Although universal precautions are not strictly needed for handling animal blood, this teaching opportunity was missed in those 5 situations.

Sixty-eight percent reported that materials contaminated with human body fluids are disposed of in biohazard containers. Eight percent said no and 25% of the respondents did not reply to this question. Of the respondents that reported using human bodily fluids, all but 1 reported using biohazard containers. This respondent also reported not teaching universal precautions.

Three questions in the survey were directed towards the safety practices employed in the common urinalysis exercise in which students drink various unknown solutions and then collect and analyze the subsequent urine to identify the composition of the unknown solution. Only 15.5% of the 71 respondents were found to use this urinalysis exercise in their labs. Of those who did, 20% prepared the solutions themselves whereas 80% used commercially prepared solutions (sugary sodas, bottled water, pickle juice, etc.). The HAPS Safety Guidelines recommends using commercially prepared solutions, which have strict procedures during processing to ensure that a product is safe for human consumption. None of the respondents reported any injuries to students because of incorrect labeling or improperly prepared solutions.

**Disposal of Specimens**

The last question of the survey dealt with the disposal of dissected specimens. For animal specimens, the most common method of disposal was to use the dead animal pick-up service (28%), provided by many municipalities. Incineration of specimens (16%), marking the specimens for biohazard disposal (8%), and returning the specimens to the supplier for disposal (5%) were other methods used. Surprisingly, 18% of the respondents throw away animal specimens in the regular trash.

As recommended by the HAPS Safety Guidelines, instructors should always check with local authorities for regulations in their municipalities regarding the disposal of dissection specimens.

**Conclusion**

Based on the results of this survey, we should focus our attention on discovering new ways to disseminate the information contained in the HAPS Safety Guidelines. Perhaps, one of our future goals should include the development of a safety video with the intent to further decrease risks of laboratory injuries.

To view the Safety Poster click on the following link:

Instructional technology is a rapidly evolving field that is intended to improve the effectiveness of teaching and learning for both teachers and students. The essential components for instructional technology systems are the following: appropriate design instruction, application of learning theory to instructional design, selection of an appropriate delivery system, process evaluation, management and adoption of innovations, and the implementation of a delivery system to learners. At Gannon University an upper level physiology course, BIOL368, is offered to undergraduate junior/senior students who have a basic background in biology. This is one of the required courses for students applying to professional health science programs such as medical school, physician assistant programs and doctorate of physical therapy programs and it is critical in preparation for the MCAT exam. We believe that a thorough understanding of physiology forms the basis for success in professional programs. However, a majority of students find the study of physiology challenging and subtle key points may evade the attention of casual students unless the instructor explains them upfront using an interactive method. For these reasons the following course objectives have been adopted for this course:

Upon completion of BIOL368, students should be able to:

a) Understand the complex nature of the functions of the human body,

b) Understand the themes of homeostasis, the integration and communication of physiological systems, and the primary structure-function relationships of physiological processes,

c) Describe the physiology of the primary organ systems and develop an understanding of the changes that occur in abnormal physiological conditions

d) Learn the skill of synthesizing numerous general physiological principles and be able to apply this skill to new situations.

In order to achieve these objectives four instructional tools, SoftChalk, student response systems, iPad case files, and Prezi, were used in teaching renal physiology, muscle physiology, and digestive physiology to approximately 45 students enrolled in BIOL368. SoftChalk is a software package that allows the instructor to create interactive lessons for students. The lessons can be uploaded in Learning Management Systems such as ANGEL and Blackboard, or published as web pages or CD-ROMs. Engaging interactive activities and quizzes can also be created using this software. Student Response Systems, known as clickers, help to keep every student engaged in class. Using them the instructor can ask questions in various formats such as multiple-choice, multiple-correct, numeric-response, true-false, or yes-no, and keep track of immediate student responses. This allows the instructor to effectively assess student comprehension and progress. Prezi is a presentation tool that makes use of one large canvas to pan and zoom various body parts and emphasize the information associated with each area. Prezi supports the use of text, images, and videos and also provides a collection of templates to help new users become accustomed to the interface. The iPad Case files application, which can be used to engage the students in discussions of physiology and pathophysiology, was developed by McGraw Hill for iPads. This application presents 51 case studies of pathological conditions. Each case study includes the symptoms, diagnosis, and treatment for the condition along with the mechanism of action of appropriate medications associated with the condition. Each case is followed by questions and clinical correlations. The pathophysiology of an affected system is then contrasted with the normal one.

Students were asked to provide feedback on these teaching tools shortly after their exposure to them. Student input was very positive, with about 90-95% of students expressing enhanced ease in learning complex concepts in physiology. The majority of students indicated that these tools helped them: a) learn the subject matter quickly, b) review the material more meaningfully, and c) appreciate the application in real life settings. Students’ suggestions will be taken into consideration in the future implementation of these tools in teaching and learning physiology.

It was observed by the this instructor that the use of instructional technology in teaching physiology concepts helped motivate students, contributed to better student comprehension, reinforced learning, encouraged class participation, increased the quality of student-instructor interaction, and allowed the instructor to keep track of student preparation.

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Creating and implementing student activities that require minimal instructor effort! Increasing student engagement through low-risk, low-reward activities! This workshop captured my attention from the get-go. Nilanjana did not disappoint. She had so many great ideas for ensuring student attendance, engagement and participation. Within her course, she has six low-risk, low-reward (minimal mark) activities as well as nine low-risk, no-reward activities.

In the first category (low-risk, low-reward), Nilanjana uses daily lecture quizzes worth 0.1% of the final mark to encourage students to keep on top of their studies as well as provide immediate feedback on problem areas. A useful tip in making the quizzes is to draw from publisher-generated test banks such as Learn Smart flash cards from McGraw Hill. In a similar manner, make use of online weekly lab quizzes that display correct answers after the first attempt and ensure that students become familiar with lab content prior to coming to lab.

In addition, students are asked to create a study guide that contains definitions to vocabulary words and answers to a series of long answer questions, which are generated from the learning outcomes for the course. In completing this assignment, I would imagine the students feel a sense of accomplishment as they witness firsthand their mastery of the topics of the course. Additionally they end up creating a very usable study resource that actually earns them marks as they hand it in at the beginning of an exam. The study guides are marked during their exam and count toward their final grade. The students get to pick up their study guide as they leave the exam so they have immediate feedback on their learning progress in the course. In order to keep this assignment truly minimal effort for the instructor, marks are based on scanning for completion and accuracy. The study guide is worth 10% of the students' final mark. In order to make things fair, there are two caveats to the study guide assignment: 1) the study guide must be hand-written to eliminate "sharing" (copy/paste) between students and 2) students may not copy/plagiarize study guide answers from the lecture notes (Powerpoints). The study guide turned out to be very popular and students didn’t want to part with them at the end of term. For the few top students that did not want to complete a study guide, a simple solution was to add in a “rule” that the study guide was not required if a student scored an A or higher as their final grade. The rationale being, if a student could achieve an A on their own without creating a study guide, clearly the study guide wasn’t required for their success. This rule might act as an incentive as well: if a student studies hard, they won’t have to put in the work of creating a study guide.

The fourth low-risk, low-reward activity is the worksheet assignment which is fairly open-ended. The students are asked to create a two page worksheet on a chapter and the class votes anonymously on the best one. The worksheets are typically a mix of questions including fill-in-the-blank, multiple choice, labelling diagrams, crosswords, matching questions, etc. If a student wins, that student gets to opt out of a

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**Low-Risk, Low-Reward Activities:**

1. Daily lecture quizzes
2. Weekly lab quizzes
3. Study guide assignment
4. Worksheet assignment
5. Blue book
6. Organ presentation
7. 2-day diet (nutrition) journal
8. Jeopardy
9. Whiteboard drawing

**Low-Risk, No-Reward Activities:**

1. Lab completion check at beginning of lab
2. Oral lab quiz at end of each lab
3. Two-time switch
4. Metabolism cards
5. Practice lab practical
6. Pictionary

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Nilanjana also presented several advantages to this kind of an assignment:

1. It is instructive to the students since they need to review the material and learn it fairly deeply in order to generate the questions.
2. Once they share their worksheets, they benefit several times over with lots of practice questions to try prior to the exam.
3. The students and instructor can immediately identify any trouble-spots by analyzing the wording and answers for accuracy.

The fifth assignment is the Blue Book, which is literally a thin blue paper-back notebook bought at the bookstore for $1.00. Students bring this book to class every day and use it for recording learning-style generated study skill tips given on the first day, a table for recording and keeping track of their grades and quizzes. The quizzes are for extra credit and are done at the end of each class. This provides a nice incentive for students to attend, focus and pay attention during class.

The sixth and last assignment is the organ presentation. Nilanjana didn't have too much time to elaborate on this assignment, but the premise is that the students select organs to present a persuasive argument to the class that their organ is the most important. This is a time for students to get creative as they are free to present in the form of a debate, a paper, a poem, a skit, a video, or a cartoon. Again this assignment provides great opportunities for student engagement, immediate feedback and student-centered learning.

Nilanjana also presented several low-risk, no-reward (no mark) activities that she uses to increase student engagement and performance. First, she makes a point of talking to each student at the beginning of lab and checking for lab completion. Even though there are no marks for this, she records completion and discusses any problems they may have had with completion. She finds that this simple act works well to boost attendance as well as completion. The second unmarked activity she does in lab is to give each student an oral lab quiz at the end of each lab. Again, immediate feedback and further discussion of material likely bolsters students' understanding of the material. In the third type of low-risk, no-reward activity, Nilanjana, uses the two-time switch, which means that if she asks a question in class, the students write down the answer on a piece of paper and then exchange papers twice, so the recipient of their paper is quite random. She then asks students to read from the paper in front of them. This is a great way to go over the answers and address any confusion, without putting any one student on the spot. Similarly, sometimes she gives all the students coloured cards and if she holds up green, she might be asking if any of the students with a green card are confused. Another card game she plays with her students is Metabolism cards. Each student gets a few cards that might say a particular action, e.g., “increase H2O excretion” or “increase H+ in blood”. Each card has a number of dots on it. When asked to get out all the cards with one dot, for example, the students get together as a group and select those one dot cards and try to figure out what physiological change is happening in the body that would account for each action shown on those particular cards. Other activities allow the students to practice their knowledge on the topic of the day in the form of a game (Pictionary, Jeopardy); or just having fun drawing or labeling diagrams on the whiteboard; or creating a 2-day nutrition journal and calculating calories, percentage fats, percentage protein and percentage carbohydrates consumed.

This workshop gave me so many ideas to try out with my class. In my mind, the more fun I’m having the more fun my students are having and I suspect that goes for learning too!

COVER ART - Kelly Paralis is a scientific illustrator and graphic designer. She graduated cum laude with a BFA from Tyler School of Art in 2000. Her career began as an illustrator and subsequent art director at J.B. Woolsey Associates from 1999-2006. In 2006 she began her company, Penumbra Design, Inc. Kelly’s illustrations have appeared in numerous books and journals. She has been providing quality design and illustrations for several clients, including:

- Adhesive Films, Inc.
- Cengage Learning
- Houghton Mifflin
- Johns Hopkins University Press
- Oncology Nursing Society
- Pearson Education
- Philadelphia Singers
- W. W. Norton
- Topaz Pharmaceuticals, Inc.
- The American Physiology Society
- The American Society of Microbiology

If you are interested in seeing samples or discussion about your project, please email her at: Kelly@PenumbraDesignInc.com.
Workshop Summary

Best Practices in Multiple Choice Question Writing and Item Analysis for Undergraduate Instructors.

Presented by: Jennifer Marie Burgoon and Melissa Marie Quinn
Recapped by: Melissa Marie Quinn and Jennifer Marie Burgoon

Many instructors across the country utilize multiple choice questions (MCQs) to assess students for a number of reasons including, but not limited to, increasing class sizes, as well as a need for rapid and clear cut grading. However, composing effective multiple choice questions is not a simple task and requires considerable time and effort.

The Best practices in multiple choice question writing and item analysis for undergraduate instructors workshop presented at the 2014 HAPS Conference examined the utility of MCQs, the components of MCQs, the best practices for composing MCQs, and how to determine the effectiveness of these questions through item analysis. The goals of the workshop were that attendees could, by the end of the session, describe the components of a MCQ, write an effective MCQ using the guidelines presented during the workshop, and utilize item analysis in order to determine if a question should be retained, edited, or removed from an exam.

With a packed room of attendees, the workshop began with a background on the usage of MCQ exams at universities and four-year colleges based on faculty gender, as well as usage of MCQ exams based on full-time faculty by rank (i.e. full professor, associate professor, assistant professor, lecturer, and instructor). The percentages for this information were taken from the Undergraduate Teaching Faculty: The 2010-2011 HERI Faculty Survey (Hurtado, Eagan, Pryor, Whang, & Tran 2012). As the workshop progressed through the advantages and disadvantages of using MCQs, as well as the reliability of using MCQs, attendees shared their thoughts and viewpoints. This was only one aspect that brought about a very interactive and collaborative experience to the workshop.

Going through the “anatomy” of a MCQ provided a refresher for everyone on the components of a MCQ from the stem to the alternatives/options. This was followed by an in-depth presentation and discussion of the major “rules” for writing effective MCQs that included guidelines for stem and options development, as well as ways to avoid providing clues to students and how to effectively address course objectives. The discussion that revolved around these guidelines was thought-provoking and the discussions that developed primarily focused on whether some of the rules applied more to writing MCQs for undergraduate courses versus other programs (i.e. medical students, graduate students, physical therapy students, etc.). Once all the rules were described and examples of some poorly written MCQs were presented for review and criticism by attendees, the attendees then worked together in groups to write some MCQs and contribute to a room discussion on the pitfalls, issues, or tips for writing MCQs.

The final component of the workshop was on item analysis where some statistical terminology ([i.e., item difficulty index (p-value), correlation coefficient for index of reliability (point biserial), and discriminatory index] was reviewed in order to appropriately read the statistical output typically generated by computer scoring systems. Attendees were then presented with example output for a few select MCQs and asked to analyze the statistical output obtained after exam administration to determine such information as whether each was a good question, a mastery question, a question that should be thrown out of or retained for the current exam, or if a poorly performing question could be retained with edits for future exams. Attendees also determined whether each question was a high or low discriminating item and if each had high or low reliability.

Overall, it was a very successful workshop that brought about a good exchange of ideas and collegial debate that, in the end, hopefully leads to better MCQ writing by attendees. Anyone interested in receiving the PowerPoint file from this presentation and/or has questions may contact either presenter/author via email [Jennifer Marie Burgoon (jennifer.burgoon@osumc.edu) or Melissa Marie Quinn (quinn.269@osu.edu)].

Literature Cited from Article/Presentation


First impressions matter. Meeting the future in-laws. Meeting new neighbors. Meeting your new teacher. That first experience can set the tone for the entire course. Make sure you start off on the right foot.

The danger is that we – as the instructor – know that there are a lot of details that our students need to know in order to succeed. We want them to get all of these details, tricks, and hints as early as possible. Unfortunately, that can easily turn the first day of class into a long-winded lecture about a bunch of minutiae that doesn’t exactly excite most people.

You can change that.

At Coconino Community College (Flagstaff, Arizona), we start every course on the first day with a hands-on, group activity. We have the luxury of having lecture and lab combined in the same block schedule and we happily take full advantage of that. We have 2.5 hours during each class session and we use the full time. We start with a quick introduction of the course, objectives, materials, and syllabus. We are able to keep it quick – less than 20 minutes – as much of our material is online and there is a syllabus quiz that students must pass – a perfect 10 out of 10 – before continuing with the remainder of the course. That gives us a triple advantage; (1) it frees up some time in person for more interactive things, (2) we make sure students know how to navigate our course website early on, and (3) it helps us to either weed out or encourage the slower or less motivated students early on.

We follow the introduction with a short lab safety session in which groups perform a scavenger hunt to find all of the safety equipment in the room. Next, we give a 30-minute lecture of the first chapter, so students witness our lecture style (and can prepare for next period’s lecture).

Finally, that leaves us with over 90 minutes for the first lab. The specific lab varies for the course, but in Human A&P, we begin an orientation into the human body and the tools that we’ll be using this semester. Each table – group of 4 students – gets a paragraph instruction of tasks and a hands-on tool (i.e. torso model, sliced bananas, mini-skeleton with colored dots). For six (6) minutes, they work together to perform the task, using all of their resources. An example would be to identify the anatomical location of each colored dot on the skeleton. Then, the station moves to the next table and your table receives a new station. This is repeated for the six stations (our classes are capped at 24 students). There is also a worksheet – no points, just review – that asks more in-depth questions for them to discuss.

At the end, we pull out small dry erase boards for each student and the instructor asks general questions from today’s lecture and lab to reinforce what was covered during this period.

It’s gratifying when the students realize that 2.5 hours have spun by and it’s time to go (several are so into the material that they don’t want to leave yet). That’s the magic that we like to foster; they can’t wait until next time when they get to build a cell out of clay, look at slides under a microscope, and draw anatomical and cellular structures on the dry erase boards.

Your classroom setup may be different, but you can take some of these ideas and make your first impression with your students as riveting as possible. They’ll want to come back for more! Huzzah!
Rational Human Anatomy & Physiology Course Design: Incorporating the HAPS outcomes into new and existing courses. (2 credits) Sept 15 - Nov 7, 2014 Dr. Margaret Weck St. Louis College of Pharmacy

This 8-week course briefly reviews the major concepts associated with the “backwards design” model of rational course development, which stresses the value of thinking through the ultimate outcome goals (both in content mastery and cognitive skill development) for a course as a first step the course design process. Participants will examine the HAPS Course Guidelines for Undergraduate Instruction and A & P Learning Outcome statements and think about the design elements, teaching methodologies, and assessments (both formative and summative) that would best foster student achievement of these outcomes. The course will be conducted entirely on-line. Participants will produce syllabi for new or existing courses that demonstrate the principles of rational course design. As part of this process sample assignments and assessments will also be developed that could be used in any course to demonstrate student achievement of the A&P Learning Outcomes.

Advanced Cardiovascular Physiology Dr. George Ordway (2 credits) Sept. 22, 2014 - Jan. 31, 2015

This unique course is designed to provide college-level instructors with an opportunity to develop their understanding of the anatomy and physiology of the cardiovascular system, including key cellular and molecular mechanisms responsible for function of the heart and blood vessels. The course also will include examples of pathophysiology that result in common acute and chronic cardiovascular diseases. Participation in the course will be online only with weekly directed readings and assignments that will be posted to a discussion board for instructor and peer review, along with regularly scheduled interactive conference sessions. Cardiovascular Physiology (7th ed.) by Mohrman and Heller will be used as the course text along with available internet resources and databases. In addition, selected articles from the primary literature will be used to help participants foster an appreciation of the research that has advanced our knowledge of cardiovascular physiology and pathophysiology. Participants also will complete a final project supporting the teaching of cardiovascular biology in a college-level anatomy and physiology course. The project may take a variety of forms; however, developing a case study or review article will be emphasized. A total of approximately 60 hours will be required to complete all course work. Grading will be on a pass/fail basis and evaluation will include successful completion of weekly assignments, pre- and post-course knowledge assessments, a final project, and participation in scheduled conference sessions. A pass grade will require 75% of a total of 100 points. This course will serve as the basis for future on-line-only offerings of advanced topics dealing with cardiovascular physiology and pathophysiology.

The Physiology of Reproduction (2 credits) August 24 - December 15, 2014 Dr. Chad M. Wayne, University of Houston

This course is designed to provide college-level instructors with the opportunity to expand and refine their understanding of key molecular and cellular concepts and processes as they relate to human sexual reproduction. Participants will be introduced to material through directed readings from the current literature that examine the mechanisms that govern the union of the human gametes, the organs that promote pregnancy, and the mechanisms of parturition from the molecular level through the organ level. The participants will explore the material through the directed readings, but will also be encouraged to participate in online discussions to test and expand their understanding of the material. Ultimately, participants will need to demonstrate mastery of the material which will be assessed through specific application in online exercises and in a terminal, peer-reviewed project. Participants will be expected to independently develop at the end of the course, a college-level lecture appropriate for the course that the participant normally instructs. This project should demonstrate a deeper understanding of the key themes in human sexual reproduction, integrate molecular and cellular mechanisms into the participant’s normal lecture routine, and expand the college course beyond the typical A&P or physiology lecture. The participants’ projects will be discussed at the conclusion of the course, either in person at the HAPS annual conference in Jacksonville, FL or via electronic methods. The participant will be evaluated on a variety of criteria, including performance on online exercises, participation and the quality of final project.

Male Reproductive Physiology (2 credits) August 24 - December 15, 2014 Dr. Chad M. Wayne, University of Houston

Description of course: This course is designed to provide college-level instructors with the opportunity to expand and refine their understanding of key molecular and cellular concepts and processes as they relate to male reproductive physiology. Participants will be introduced to material through directed readings from the current literature that examine the male reproductive system from the molecular level through the organ level and provide the participant a deeper understanding of how these structures are integrated into a whole system responsible for sperm production and delivery. The participants will explore the material through the directed readings, but will also be encouraged to participate in online discussions to test and expand their understanding of the material. Ultimately, participants will need to demonstrate mastery of the material which will be assessed through specific application in online exercises and in a terminal, peer-reviewed project. Participants will be expected to independently develop at the end of the course, a college-level lecture appropriate for the course that the participant normally instructs. This project should demonstrate a deeper understanding of the key themes in male reproduction, integrate molecular and cellular mechanisms into the participant’s normal lecture routine, and expand the college course beyond the typical A&P or physiology lecture. The participants’ projects will be discussed at the conclusion of the course, either in person at the HAPS annual conference in Jacksonville, FL or via electronic methods. The participant will be evaluated on a variety of criteria, including performance on online exercises, participation and the quality of final project.
Abstracts

Tuesday Session 1

101 (G101) – The HAPS POGIL Project – Final Report and Implications for Classroom Practice – 60 minutes
Murray Jensen, University of Minnesota, mjsjensen@umn.edu
*Sponsored by POGIL*
The HAPS POGIL project has generated curriculum activities for entry-level anatomy and physiology students. The materials promote conceptual learning through active learning endeavors and provide a practical alternative to lecture. This session will review the two-year project and outline both its research findings and curriculum products.

101 (M2103) – Drawing-to-Learn: The Effect of an Instructional Drawing Component as a Part of Anatomy Instruction – 60 minutes
Prof. Lucia J. Tranel, Saint Louis College of Pharmacy, ltranel@stlcop.edu
Does tactile, drawing-based instruction improve student comprehension of anatomy concepts over traditional lecture instruction? A pretest was administered to anatomy students with no knowledge base of selected anatomical material. Students were then instructed on the material. The control group was instructed using traditional lecture teaching methods. The experimental group was instructed using hands-on, drawing methods. A post-test was administered. The tests were scored, and the average improvement was calculated for the control and experimental groups. These results were compared, and the data show that the use of a drawing component as part of anatomy instruction drastically improves student retention of anatomical structures.

103 (M2105) – Who is the teacher and who is the student? The dual service- and engaged-learning pedagogical model in Anatomy Academy – 60 minutes
Heather Wilson-Ashworth, Utah Valley University, heather.ashworth@uvu.edu, Jonathan Wisco, Brigham Young University, jwisco@byu.edu, Jeff McCleve, Utah Valley University, jeffmccleve@gmail.com, Erik White, Utah Valley University, erikwhite7@gmail.com
Anatomy Academy is a program that teaches anatomy, physiology, and nutrition concepts to 5th and 6th grade elementary school children (Students) with the objective of improving science interest, science knowledge, and health and exercise self-awareness. Undergraduate and graduate health sciences students (Mentors) paired together to teach seven systems-based lessons to 6-8 Students in a group over the course of seven weeks. Students completed (88 percent response) pre- and post-program Likert-scale surveys assessing science interest, science knowledge, and exercise self-efficacy. Students completed (89 percent response) pre- and post-program surveys assessing confidence with teaching and completed weekly journal-style reflections discussing the nature of teaching and learning. Students improved in science knowledge (p=0.014) and exercise self-efficacy (p=0.038), but not science interest (p=0.371). More than half of the Mentors improved on content delivery, student engagement, classroom management, and level of professionalism. Mentor reflections indicated a/an: 1) realization of an ability to make a difference in the world now; 2) acknowledgement of the importance of listening in teaching; 3) recognition that lives can and will change with a little love; 4) insight to the effectiveness of guiding students through material rather than lecturing; 5) awareness of the value of respect in the learning environment; 6) cognizance of the power of individualized attention to motivate Students; 7) reflection of one’s own personal growth through the open influence of Students. Our results suggest that Anatomy Academy, and other similar service-learning programs, has an essential, and valuable role in elementary and higher education. The Institutional Review Boards of BYU, UVU, and UUSOM approved this study.

Michael Windelspecht, Appalachian State University, michael@ricochetprod.com
*Sponsored by McGraw-Hill*
The traditional textbooks is not easily personalized to fit the specific needs of a student. The integration of a digital textbook with the LearnSmart adaptive learning platform is changing this environment, allowing students to assess their own knowledge base. It is also now possible for authors to instantly visualize where students are struggling with the content. Authors are now able to assess precisely what it is that the student’s do not know, and target areas of the text for revision or the development of additional learning resources. We will explore some of the data coming from these new platforms, its impact on instruction, and the ways that adaptive learning is driving the evolution of the textbook.

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105 (M2107) – “Weight weight, don’t tell me!” - weight control as an integrative topic in A&P – 60 minutes
Krista L Rompolski, Drexel University, klr94@drexel.edu
Many students gain a significant amount of weight in college. Unfortunately, unless enrolled in nutrition courses, students receive little to no instruction on healthy and safe weight control. This workshop will address the effect of excess adiposity on the body and what is known about healthy weight control, with interactive quizzes and challenges for participants. Participants will understand how weight control is an excellent topic to tie together a number of the body systems covered in A&P. Special attention will be paid to overcoming issues surrounding weight stigma, eating disorders and sensitivity for instructors.

106 (M2108) – Virtual technology utilizing BodyViz: 2D/3D education impacts Anatomy and Physiology and Nursing instructional methods through innovative gaming techniques – 60 minutes
Dr. Juan Guzman, Florida Gateway College, juan.guzman@fgc.edu, Dr. Doris Lombo, Florida Gateway College doris.lombo@fgc.edu, Scott Rodenburg, Bodyviz, Derriel Cribbs-Florida Gateway College, erriel.cribbs@fgc.edu, Dr. Gabriel Pardo, Florida Gateway College, gabriel.pardo@fgc.edu
*Sponsored by BodyViz*
In January 2013, Florida Gateway College began implementing an innovative teaching method utilizing BodyViz. This system allows the transformation of real patient CT’s and MRIs into 2D-3D full color rotatable images. With this software, Anatomy & Physiology and Nursing faculty have the ability to offer high quality dimensional images to the students. This has enhanced the knowledge and understanding of the human body providing educational opportunities for students in these programs. With the assistance from the IT department, lectures and images can be recorded, permitting the students to observe and review the anatomical images at home. The videos have been an invaluable resource to the Nursing and Health Sciences Department. The nursing students can refresh their knowledge of the human anatomy, receive instructional dialogue from internal college resources expanding their depth of pathophysiology of the human body, as well as, present cases on clinical discussions at the professional level.

107 (N244) – Increase Student Success Using MasteringA&P Adaptive Follow-Up Assignments™ – 60 minutes
Rebecca Orr, Collin College, rorr@collin.edu
*Sponsored by Pearson*
Combining diagnostics from pre-lecture assignments, additional post-lecture practice opportunities, and pre-exam quizzing feedback, MasteringA&P can be used to increase student proficiency with difficult concepts and to increase their success on exams. But what else can be done for students that accumulate gaps in their understanding of key A&P content as the semester progresses? Take your use of MasteringA&P to the next level by incorporating Adaptive Follow-Up Assignments. Learn about how these personalized learning opportunities were developed, gather best practices for preparing for and using them, and review preliminary results indicating that Adaptive Follow-Up Assignments may increase student success.

108 (N245) – Easy-to-use sensors for your physiology lab – 60 minutes
Mike Blasberg, PASCO scientific, blasberg@pasco.com
*Sponsored by PASCO*
In this hands on workshop you will experience how easy it is to incorporate PASCO technology into your physiology lab. Come try our powerful and intuitive SPARKvue software which runs on the iPad, Android Tablets, PC/Mac, and Chromebooks. Several labs will be conducted using PASCO’s affordable plug-n-play sensors including EKG, blood pressure, spirometer, and skin temp.

109 (G301 G) – How to Increase Student Engagement – 60 minutes
Nilanjana Caballero, Santa Fe College, nilanjana.caballero@sflcollege.edu
Jodi Long, Santa Fe College, Jodi.long@sflcollege.edu
Keeping students engaged is always a priority for instructors. This workshop highlights some ways to keep students focused and increase knowledge and retention. Giving low-value assessments with frequent feedback gives the students a chance to explore the depths of their knowledge without fear of failure.
110 (G301 H) – Estrogen And Estrogen Receptors In The Aging Female Heart: Is There Any Hope For Hormone Replacement Therapy? – 60 minutes
Nanette J. Tomicek, The Pennsylvania State University, njt128@psu.edu
Heart disease remains then number one killer of women, and disease prevalence increases 2- to 3-fold following menopause. Clinical trials, such as the famous Women’s Health Initiative (WHI) of the 1990s, have failed to demonstrate cardioprotective benefit from chronic estrogen replacement therapy. There are two estrogen receptors, ERα and ERβ, found in the human heart. Targeted estrogen receptor activation/blockade has been proposed as a potential therapy for aging women with heart disease. Previous studies in animal models indicate estrogen receptors may work antagonistically in the body’s tissues. ERα activation is associated with cardioprotection in rodent models. The role of ERβ in the heart, specifically, is unclear. The purpose of the present study was to determine if ERβ activation antagonistically increased damage to hearts subject to a simulated heart attack using a female rat model. Hearts were isolated from adult (6mo; n=9), aged (24mo; n=13), and aged ovariectomized (n=14) female rats and assessed for functional recovery of the left ventricle. The data suggests ERβ activation does not affect functional recovery in female rats. ERβ manipulation currently does not show potential as a viable therapy. To date targeted ERα activation stills show promise, but a cardiac specific drug is still not available. Basic research and ongoing hormone replacement therapy trials, such as the Kronos Early Estrogen Prevention Study (KEEPS) are still in progress today in the hopes of finding an effect therapy for preventing and treating women with heart disease.

111 (A210) – What do flying tennis balls have to do with anatomy and physiology? - Innovative teaching methods for small group environments. – 60 minutes
Becca Ludwig, Concordia University Wisconsin, rebecca.ludwig@cuw.edu
We are taking the classroom to the next level! Come and learn about original pedagogical methods created by a supplemental instruction (SI) student leader which cultivate knowledge suitable for different learning styles. These approaches have been assessed by using pre-session and post-session surveys to compare learning of students who attend interactive SI, traditional SI, or no SI. We will discuss how to incorporate interactive educational techniques such as using food to model anatomical structures and role playing different physiological processes. Participants will have the opportunity to engage in hands-on activities.

112 (T123) – Anatomy in real 3D with Visible Body – 60 minutes
Robb Kneebone, Visible Body, robb.kneebone@visiblebody.com
*Sponsored by Visible Body*
Visible Body’s 3D anatomical models of the human body make learning and teaching anatomy and physiology visual and engaging. Come see our best-selling apps and learn how they can enhance your lectures and lab time. Outside of the classroom, your students can practice dissections on their PC, Mac, iPad, or Android. They’ll understand the big picture by watching short, dynamic animations of physiological processes.

Tuesday, Session 2

201 (G101) – Use Learning Catalytics™ to Experience Peer Instruction and the Flipped Classroom from the Students’ Point of View – 90 minutes
Dr. Marien Cendon, Miami Dade College, mcendon@mdc.edu
*Sponsored by Pearson*
What is it like for a student to be in an interactive classroom? Please join Marien Cendon of Miami Dade College as she flips the traditional HAPS workshop. Come experience a flipped classroom where you will participate in a session that uses cloud-based constant formative assessment with critical thinking questions and sketching on A&P illustrations. We’ll explore a different A&P interactive class with peer instruction based on your responses. Bring your smartphone, tablet, or computer to this hands-on workshop that uses cutting edge flipped classroom techniques and technology.

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202 (M2103) – Teach to Reach Each Learning Style – 90 minutes
Carol Veil, Anne Arundel Community College, cbveil@aacc.edu, Javni Mody, Anne Arundel Community College, jmody@aacc.edu
This interactive workshop will provide a learning style inventory that can help to identify visual, auditory, and tactile learners. Examples will be given of activities that incorporate different learning styles, to improve students’ understanding of difficult concepts in anatomy and physiology. Suggestions will be given for getting students more actively involved in the learning process. Participants are encouraged to bring ideas to share.

203 (M2105) – How to establish a service-learning program in the local community to augment your classroom curriculum objectives: The Anatomy Academy model. – 90 minutes
Heather Wilson-Ashworth, Utah Valley University, heather.ashworth@uvu.edu, Jonathan Wisco Brigham Young University jjwisco@byu.edu
We have developed a program called Anatomy Academy that provides pre-professional undergraduate and allied health sciences graduate students the opportunity to teach health and nutrition concepts together to elementary school children (Students) as an educational intervention to fight childhood obesity. Volunteers (called Mentors) in the program learn how to communicate complex health information at a level appropriate for Students; prepare and deliver lessons on anatomy, physiology and nutrition that help Students understand the importance of establishing and maintaining a healthy lifestyle; teach groups of Students in didactic and active learning environments; serve as role models for pursuing higher education; demonstrate the utmost professional demeanor; and become exposed to an experiential learning environment that results in immediate, quantifiable behavioral change in Students. Mentor reflections completed during the course of the program Fall 2012 and Winter 2013 semesters indicated the: 1) realization of an ability to make a difference in the world now; 2) acknowledgement of the importance of listening in teaching; 3) recognition that lives can and will change with a little love; 4) insight to the effectiveness of guiding students through material rather than lecturing; 5) awareness of the value of respect in the learning environment; 6) cognizance of the power of individualized attention to motivate Students; 7) reflection of one’s own personal growth through the open influence of Students. In this workshop, we will describe the Anatomy Academy service-learning program and provide guidance for developing a similar program at attendees’ own institutions.

204 (M2106) – How Do I Use the New Next Generation Science Standards in My High School Classroom? – 90 minutes
Miranda Byse, American Physiological Society, mbyse@the-aps.org
Margaret Shain, American Physiological Society, mshain@the-aps.org
*Sponsored by HAPS & APS*
Experience active learning as you work to familiarize yourself with the newly released Next Generation Science Standards and sample some of the many free resources available in the Archive of Teaching Resources that can help. Engage in two hands-on activities from teacher developed lessons designed to inspire participants to have their students move beyond normal textbook learning into actively engaging students in higher level thinking. Hand-outs of the activities will be provided.

205 (M2107) – “In Sickness and in Health”: Histopathology is for everyone! – 90 minutes
Nina Zanetti, Siena College, zanetti@siena.edu
Have you ever been invited to present an A & P-related talk to a gathering of non-scientists? And, given the technical demands, does histopathology seem a likely candidate for such a talk? This workshop will present an example of a workshop on histopathology that was developed for a “general public” audience with little or no science background. I’ll share my experience with the challenges and rewards of doing such a presentation, and will invite participants to generate ideas for sharing similar A & P-related topics with a lay audience.

206 (M2108) – Enhancing Classroom Learning through Digital Dissection – 90 minutes
Samantha Suiter, M.A., 1. Trident Technical College, Charleston, South Carolina
2. People for the Ethical Treatment of Animals, Norfolk, Virginia, SamanthaS@peta.org
*Sponsored by PETA*
Alternatives to dissection are increasingly being sought by science educators to avoid animal use, reduce teaching expenses, integrate technology in the classroom and comply with various laws and policies allowing students to opt out of animal dissection. HAPS and other organizations endorse teachers’ decisions to use alternatives to animal dissection and encourage teachers to offer them to students. This interactive workshop will familiarize educators with the range of non-animal teaching methods available, their efficacy and provide hands-on tutorials of several popular anatomy software programs.

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207 (N244) – Biopac Student Lab: Budget Beating Physiology Lab Solutions – 60 minutes
Ken Graap, BIPAC Systems, info@biopac.com
*Sponsored by BIPAC Systems*
Students use the Biopac Student Lab system to record life science data from their own bodies. Each lesson includes on-screen guiding text, sample data, and videos to help students focus on principles, not procedure. This workshop is aimed at current Biopac Student Lab users, or those instructors who want to see the full extent of the Biopac Student Lab’s capabilities to engage student minds & increase learning! BSL systems are intuitive and extremely robust. Use the 4-channel MP36 system or the new handheld 2-channel MP45 system with BIPAC’s extensive curriculum library (60+ lessons) and broad range of transducers. Easily add experiment segments for active learning. Add BSL PRO software to create your own lessons and for independent projects. No programming required, just simple pull-down menu selections. Attend the workshop and be amazed by the power, flexibility and budget beating price options.

208 (N245) – An Active Learning Approach to Acid-Base Physiology – 90 minutes
Dr. Cherie McKeever, Great Falls College - Montana State University, cmckeever@gfcmsu.edu
pH got you down? This session is designed to leave those acid-base blues behind with a fun, practical approach to teaching acid-base disturbances and renal and respiratory compensation. Participants will practice step-by-step, hands-on methods to identify acid-base disorders in real-life case studies. In the latter part of the session, we’ll explore the relationship of H+ and K+, and simple transcellular shifts. Participants will leave with teaching strategies and acid-base case studies ready for immediate classroom use.

209 (G301 G) – Record ECG, EMG and Spirometry with the iWorx Teaching Kit – 90 minutes
Judi D’Aleo, iWorx Systems, Plymouth State University, judid@iworx.com
Josh Brown, iWorx Systems joshb@iworx.com
*Sponsored by iWorx System, Inc.*
Learn about the new, easy to use and flexible iWorx Teaching Kit. Be involved in live recordings and analysis of ECG, EMG and Spirometry; learn how built-in calibration makes setup so quick and easy! iWorx always delivers the highest quality teaching experience and endeavors to make all aspects of teaching labs as easy and fun as possible. Based on over 25 years of experience, iWorx developed the iWorx TA Physiology Teaching Kit, the latest generation of recording devices focusing on the ease of setup, data collection and advanced analysis.

210 (G301 H) – Digital anatomy and histology notebooks as an active learning tool in A&P Teaching – 90 minutes
Dr. Brian R. Shmaefsky, Lone star College - Kingwood, brian.r.shmaefsky@lonestar.edu
Gross anatomy and histology are two of the more stressful topics for students learn in A&P and related courses. A large amount of memorizing is required within a short period of time. Studying for these topics is further confounded by the variations between specimens in the lab and specimen images from the textbooks and ancillary study materials. A body of educational research is showing that student-centered instruction improves comprehension and retention of rote memory learning. This workshop shows how students can use simple digital cameras to produce digital image spreadsheets that reinforce learning of anatomy and histology. The images can be made by faculty or students using traditional or WiFi digital cameras. The images are imported by students into software such as Paint, Word, or Excel to make a digital notebook that can be shared with other students for group study. Please bring a Wifi enabled tablet or smart phone to the session and a laptop computer if possible.

211 (A210) – Retrieval Practice Enhances Learning in an A & P I Online Course – 90 minutes
Michael A. Kolitsky, Ph.D., University of Texas at El Paso, makolitsky@utep.edu
*Sponsored by Primal Pictures*
Graded practice Quizzes called Quizlets can be classified as a form of retrieval practice (Karpicke, J. & Blunt, J., 2011 Science 331: 772-775). The last five Quizlets done by students was shown to be correlated to the total exam score and the amount of time spent doing Quizlets (minimum verifiable study time) was linked to their course grade. Comparison of time spent doing Quizlets also supported the idea that retrieval practice method of learning in lecture was better than traditional flash card method. These results proved useful for advising students how to improve their exam performance.
Tuesday, Session 3

301 (G101) – Teaching made Simple by a Novel Educational Tool to grasp Leukemia and Blood Cell Disorders within Minutes. US Patent # 8,277,225 – 60 minutes
Lakshmi Atchison, Ph.D., Chestnut Hill College, latchiso@chc.edu
*Sponsored workshop*
A patented visual blood cell model is presented to teach a) normal blood cells, b) how cells change in number, shape and appearance during leukemia and other disorders, c) how aberrant cells block arteries and circulation, and d) blood cell differentials. Many human anatomic models are available as valuable tools for teachers and doctors. However, no visual blood cell model is currently available. Using this 3-D model, students grasp blood cell anomalies within minutes. This educational tool can be used from high school to medical school, and in physician’s offices for instant grasp of leukemia and other blood cell disorders.

302 (M2103) – “It Hurts When I Do This” – 60 minutes
Steve Kish, Zane State College, skish@zanestate.edu
Regional anatomy allows a person to study the relationship between various structures located within that region. Participants will build the anatomy of the elbow joint using Maniken™ models. The focus will be on the relationships between the skeletal, muscular, nervous, and vascular components, how they are supposed to function under normal conditions, and explore disorders that can affect the elbow joint.

303 (M2105) – Enhance or Flip Your Classroom with Learning Catalytics™ – 60 minutes
Terry Austin, Temple College, taustin@templejc.edu
*Sponsored by Pearson *
Bring your web-enabled device (laptop, smartphone, or tablet) to “test drive” the Learning Catalytics student engagement, assessment, and classroom intelligence system. A&P Professor Terry Austin of Temple College will share examples and results from his class. With Learning Catalytics educators can assess students in real time, using open-ended tasks to probe student understanding; understand immediately where students are and adjust lessons accordingly; improve students’ critical-thinking skills; access rich analytics to understand student performance; add questions to make Learning Catalytics to fit the course exactly; and manage student peer interactions with intelligent grouping and timing.

304 (M2106) – Using focus groups to supplement pathophysiology subject evaluation – 60 minutes
Robert Paine, LaTrobe University, Bundoora, Australia, r.paine@latrobe.edu.au
This workshop is designed to discuss the use of focus groups as a part of subject evaluation. At La Trobe University we typically evaluate our subjects at the end of the teaching semester, using a standard questionnaire with a numeric scale for responses. Although we also use open-ended questions in the evaluations, it can be difficult to determine a clear understanding of the students’ responses. The use of student focus groups to supplement our pathophysiology subject evaluation enables us to: 1) explore questions and responses to a greater depth; 2) use group dynamics to clarify issues, and 3) improve planning of new teaching/learning initiatives.

305 (M2107) – Those who CAN do: TEACH! Recruiting the next generation of A&P educators. – 60 minutes
Amy Way, Lock Haven University, away1@lhup.edu
John R. Waters, The Pennsylvania State University, johnwaters@psu.edu
As advocates for anatomy and physiology education, our obligation extends beyond the undergraduates whom we teach. We can share our love of teaching anatomy and physiology with graduate students who are contemplating a career with a teaching emphasis. We have developed a talk that describes the opportunities that exist in anatomy and physiology education at the college and university level, suitable for delivery to graduate and postdoctoral students, but easily adapted for other audiences. Join us for a discussion on developing and delivering presentations that are designed to inspire consideration of a career in anatomy and physiology education.

306 (M2108) – Osmosis is Not the Diffusion of Water – 60 minutes
Phil Tate, McGraw-Hill, ptate4@gmail.com
Osmosis is the movement of water across a semipermeable membrane. What causes the water to move? An explanation found in introductory biology, chemistry, and anatomy and physiology texts proposes that osmosis is a diffusion process in which water diffuses from a higher to a lower water concentration. While the diffusion of water explanation is easy to understand, it is not theoretical sound and does not match the experimental data. This workshop will explore common misconceptions about osmosis and the osmosis explanations given by physicists.
307 (N244) – The Adventure of Teaching Online Anatomy and Physiology – 60 minutes
Nahel Awadallah, Johnston Community College, mawadallah@johnstoncc.edu
Focus will be the start to finish design of an online A&P course with fully integrated online laboratory experiments. Presentation will include how to successfully design your online science course with academically acceptable lab experiments that bring academic quality, convenience, consistency to FTF, success to students, and meet budget requirements. Participants will learn to about available resources to create, develop and customize an online A&P course that is integrated into your LMS. Yes it can be done.

308 (N245) – Using the New HAPS Online Exam – 60 minutes
Curtis DeFriez, MD, MSc., Weber State University, cdefriez@weber.edu
*Sponsored by HAPS*
The new 100-question online examination has been unveiled and is now being administered around the country by HAPS. The HAPS Competency Exam (HAPS CE) has been developed to serve as a tool for measuring outcomes of Anatomy and Physiology instruction by those interested in quantifying student performance and documenting the integrity of their instructional pedagogy. The advantages of administering this exam in an online environment, and the mechanics of the new test will be explained in this workshop. The workshop will also be an ideal setting to answer questions and explain procedures for those instructors not accustomed to giving online exams to their students.

309 (G301 G) – Psychophysiology - the Stroop Effect – 60 minutes
Judi D’Aleo, iWorx Systems, Plymouth State University, judid@iworx.com
Josh Brown, iWorx Systems, joshb@iworx.com
*Sponsored by iWorx Systems*
Come record the physiology of the Stroop Effect using Open Sesame for a fun advanced workshop. Learn how easy it is to integrate data recording and Experimental Design using the iWorx TA. Features make the recording and selection of pertinent data effortless; allow simultaneous measurement from multiple channels; and easily measure a variety of parameters. Use the included instructions, illustrations, and websites to assist students in performing an experiment – all with the click of a button. While recording, easily change display times, pause the data to take measurements, or work in an on-screen notebook as data is displayed.

310 (G301 H) – Innovations in helping students succeed in the anatomy & physiology lab – 60 minutes
Stephen N. Sarikas, Ph.D., Lasell College, Newton, MA, ssarikas@lasell.edu
*Sponsored by Pearson Higher Ed*
Do your students struggle with lab concepts and procedures? Do they get lost in their lab manual? Do you struggle to keep your students engaged with hands-on lab activities? Please join Stephen Sarikas, author of Visual Anatomy & Physiology Lab Manual, as he shares a unique approach to lab instruction that encourages reading, stimulates learning, and promotes confidence and success in the anatomy & physiology lab.

311 (A210) – More options, better tools to teach the way you want – 60 minutes
Wes Colgan III, ADInstruments Inc., w.colgan@adinstruments.com
Shannon Donovan, ADInstruments Inc, s.donovan@adinstruments.com
*Sponsored by ADInstruments Inc.*
ADInstruments is the industry leader in data acquisition for the life sciences. Whether you choose the fully self-contained LabTutor teaching suite or LabChart 8, the most versatile and powerful data acquisition software available today, we have a solution that will fit your courses learning objectives. ADInstruments’ innovative software enhances teaching and learning and is now easier to use for teachers and students. An overview of the latest technology for online, blended (hybrid), and traditional hands-on laboratory course delivery will be demonstrated.

312 (T123) – Bodies for Dissection: Where do/did they come from? – 60 minutes
Bill Perrotti, Mohawk Valley Community College, wperrotti@mvcc.edu
Nowadays the bodies used for medical- and health-related education are donated to and obtained through anatomic gift programs generally run out of medical schools. That was not always the case. The history of human body use goes back over 2000 years and involves many countries and cultures. It’s an amazing and often startling and alarming saga. This presentation is an update of a talk first given at HAPS 2013 in Las Vegas. It tells about much of that past as well as the current status of body procurement. Hear about this surprising history and about what’s involved in body donation.
Tuesday, Session 4

401B (A207) – Crossing membranes: A review of transporters, channels, and teaching membrane transport – 90 minutes
Dee Silverthorn, University of Texas at Austin, silverthorn@utexas.edu

The human body is divided into compartments by cell membranes or epithelial cell layers. Movement of solutes and water between compartments takes place by simple diffusion, protein transporters and channels, or membrane vesicles. Transport across an epithelium occurs when substances pass through junctions between the cells or through the epithelial cell membranes. In this workshop we will review the various methods by which substances move across membranes and the forces that promote or oppose movement, including movement of ions. We will then work on assessments that test student conceptual understanding of transport processes.

402 (M2103) – Assessment of chemical and cellular student learning outcomes in community college anatomy and physiology – 60 minutes
Maureen Gannon, Bronx Community College of the City University of New York, maureen.gannon@bcc.cuny.edu, Dr. Abass Abdullahi, Bronx Community College of the City University of New York, abass.abdullahi@bcc.cuny.edu

Community college student retention and application of concepts learned in the introductory sequence of Anatomy & Physiology (A&P I) is problematic. A pilot study, to determine which concepts covered in A&P I, if any, were retained in A&P II, was conducted. Questions were designed at both lower and higher levels of Bloom’s taxonomy and evaluated by departmental faculty. Results were compared to student performance in departmental common final assessment questions. This study will be presented in the context of how community college assessment efforts could be used to improve student outcomes. Please bring your own observations for an open discussion.

403B (M2105) – Best practices in multiple choice question writing and item analysis for undergraduate instructors – 90 minutes
Jennifer Marie Burgoon, Ph.D., Division of Anatomy, College of Medicine, The Ohio State University, jennifer.burgoon@osumc.edu
Melissa Marie Quinn, Division of Anatomy, College of Medicine, The Ohio State University, quinn.269@osu.edu

With increasing class sizes and the need to quickly return exam scores, more undergraduate instructors are utilizing some form of multiple choice exams in their courses. Composing effective multiple choice questions is not an easy task and requires considerable time and effort. Poorly written multiple choice questions can be confusing and frustrating for students. Therefore, it is important for instructors to learn the appropriate steps and guidelines to compose quality multiple choice questions. This workshop is designed to do just that along with evaluating and modifying existing multiple choice questions through item analysis.

404B (M2106) – Making the First Day Interactive and Riveting! – 90 minutes
Tom Lehman, Coconino Community College, Tom.Lehman@Coconino.edu

First impressions set the tone for the entire course. Make the most of that first day. Come learn some simple techniques for the integration of group collaboration, terminology usage, and microscopy and model experience. Stations include “That’s a banana?”, “Where’s McBurney?”, “What color’s the nucleus?”, “Which way’s up?”, and “Build a Golgi.” Your students will leave that day with applicable knowledge, an idea of what to expect in the course, and the desire to come back for more.

405B (M2107) – Bring Vision and Change to Your Undergraduate Classroom – 90 minutes
Miranda Byse, American Physiological Society, mbyse@the-aps.org
Margaret Shain, American Physiological Society, mshain@the-aps.org

*Sponsored by HAPS and APS*

Join us in this hands-on discussion of how you can implement Vision and Change in your classroom. This workshop will center around one of the main focuses of Vision and Change in Undergraduate Biology Education: student-centered learning. You will engage in teacher-created activities from the Life Science Teaching Resource Community (formerly the Archive of Teaching Resources) that you can use directly in your classroom to promote active learning. You will also learn about the free student-centered learning resources available to you in the Life Science Teaching Resource Community, of which HAPS is a partner. Hand-outs of the activities will be provided.

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406B (M2108) – **Introducing Calibrated Peer-Reviewed Writing into the Science Classroom.** – 90 minutes
Chad Wayne, Ph.D., University of Houston, cwayne@uh.edu
One of the cornerstones of the sciences is reporting to one’s peers the observations and discoveries made in the laboratory (or field) and then having the analysis of those observations critiqued by those peers to be accepted or rejected into the greater body of knowledge. To this end, it is imperative that students in the scientific disciplines should be exposed to the process of empirical evaluation and critical analysis, as well as learning how to report their findings in an appropriate manner. While writing in the disciplines is not particularly foreign, it is usually avoided in large classrooms due to the vast number of reports that must be graded. Using a calibrated peer-review system, not only alleviates the burden on the instructor, but also teaches to student to appropriately analyze and critique the works of their peers and prepares them to enter into the scientific and health associated professions where they will need to use these skills. The discussion focuses on how to design, create, and implement a calibrated peer-review writing assignment for use in the undergraduate science classroom.

407A (N244) – **Evolution of Skin Color and Core Principles in Anatomy and Physiology** – 60 minutes
Robin McFarland, Cabrillo College, romcfarl@cabrillo.edu
Core principles such as structure/function relationships are central to understanding anatomy and physiology. However, it is challenging for students to apply such concepts to specific body structures or systems. Modern human skin tones range from dark ebony to light peach. This variation provides a fascinating platform for exploration of connections between skin structure, physiological roles in vitamin D synthesis and protection of folate, and human evolutionary adaptation. This workshop presents lecture and laboratory activities that use variation in skin color to promote understanding of key ideas in anatomy and physiology.

408A (N245) – **Flipping the Classroom: A Case Study at Miami Dade College** – 60 minutes
Dr. Marien Cendon, Miami Dade College, mcendon@mdc.edu
*Sponsored by Pearson Higher Ed*
Students at Miami Dade College report that a flipped classroom with peer-to-peer learning provides more support than traditional lectures and stimulates problem solving and cooperation. But how do we create a successful flipped classroom? How do we prepare effective problem-based learning activities students will find stimulating and engaging? Please join Marien Cendon as she discusses best practices from her use of Learning Catalytics™ in a flipped classroom.

409A (G301 G) – **Teaching and understanding electrochemical forces, equilibrium potentials, and ion flow** – 60 minutes
Janet Casagrand, University of Colorado, Boulder, Janet.Casagrand@colorado.edu
One especially challenging set of concepts for students (and faculty) to grasp is electrochemical forces, equilibrium potentials, and ion flow. These concepts provide the basis for understanding electrical signaling in body (e.g., membrane potentials and changes in membrane potential due to the ion flow that results from electrochemical forces). Difficulty understanding these fundamental concepts can consequently act as an instructional bottleneck for students to progress in learning nervous system, and also cardiac, function. In this workshop, we will explore these concepts, and some strategies and activities for improving learning.

410A (G301 H) – **Using videos of anatomical drawings as a pre-class preparation tool for students** – 60 minutes
Bradley Barger, Indiana University, Jbvang@indiana.edu
In this workshop, the instructor will demonstrate the use of in-class drawings as a teaching tool, as well as demonstrate how these lessons can be recorded and used for pre-class preparation. You will be shown simple ways to highlight important anatomical landmarks by drawing basic geometric shapes that students can follow, even without any previous drawing experience. By producing videos of these drawings, students can follow them at their own pace, identify key anatomical relationships, and learn by making their own drawings. By using drawing videos as a pre-class preparation tool, flipped classroom techniques can quickly and easily be introduced.

411B (A210) – **Using LabTutor to develop and implement an inquiry-based ECG experiment** – 90 minutes
Aaron Fried, Mohawk Valley Community College, afried@mvcc.edu
Wes Colgan III, Ph.D., ADInstruments, w.colgan@adinstruments.com
*Sponsored by ADInstruments*
This is a demonstration of a customized laboratory exercise used at MVCC that demonstrates ECG data collection and cardiac electrophysiology. Using an ADInstruments data acquisition system, participants will participate in a guided inquiry oriented around collecting and analyzing human ECG data. In small groups participants will actively predict and test their hypotheses about ECG variables during a variety of changes in position and activities. This demonstration will also show the steps in planning, customizing, developing, and deploying the ECG exercise using ADInstruments data acquisition software and Lab Author.
412A (T123) – Creating Lessons with the Biopac Student Lab System – 60 minutes
Ken Graap, BIOPAC Systems, info@biopac.com
*Sponsored by BIOPAC Systems*

Learn how to use the power and flexibility of the Biopac Student Lab to customize existing lessons, create your own lessons, or design independent projects. Open to current BSL users and all instructors who want to see the full extent of the Biopac Student Lab’s capabilities. No programming required, just simple pull-down menu selections and easy to set presets and preferences. The BSL PRO software allows you to perform exciting lessons on human and animal subjects. A wide range of BSL PRO lessons are included with BSL Software—BSL PRO Lessons provide the lesson template file and lesson instructions.

Wednesday, Session 5

501 (G101) – Anatomia Italiana: Art and Anatomy in the Italian Renaissance – 90 minutes
Kevin Petti, Ph.D., San Diego Miramar College, kpetti@sdccd.edu
*Sponsored by HAPS-I*

Italy’s medieval universities established the study of human anatomy for physicians. To heighten their art, Renaissance masters examined anatomy through human dissection. The connection between art and science is best demonstrated by the genius of Michelangelo. Indeed, the wooden crucifix he carved in gratitude for secret access to corpses still hangs in the Basilica of Santo Spirito in Florence. This talk examines the nexus between art and science along the Italian Peninsula, and the history of anatomy education in the first universities. The opportunity to visit Italy as a component of a HAPS-I course will also be discussed.

502 (M2103) – Improving Student Performance through Extra Credit Homework Assignments – 90 minutes
Chad Wayne, Ph.D., University of Houston, cwayne@uh.edu

Homework assignments are generally believed to be an effective tool to promote independent thinking, improve retention, and student performance. However, because of the compulsory nature of most homework assignments, students tend to focus their efforts on assignment completion rather than practice which does not always result in positive outcomes in the classroom. Extra credit homework assignments were introduced into a physiology course as study tools to promote retention while attempting to avoid the negative consequences of compulsory homework assignments. This discussion focuses on the efficacy of these assignments on student performance over four semesters and suggests that extra credit (non-compulsory) homework assignments have a positive impact on student retention and performance.

503 (M2105) – Beginning with the end in mind: grading rubrics as mechanisms for instructor feedback – 90 minutes
Margaret Weck, St. Louis College of Pharmacy, Margaret.Weck@stlcop.edu

In this workshop we will examine what grading rubrics are and what they are not. Participants will engage in the process of developing their own rubrics suited to their particular courses and students. The utility of rubric development will be discussed as a means for clarification of what an instructor feels is the relative importance of concepts, skills, and habits of mind essential to success in a particular course or on a particular assignment. Use of grading/scoring rubrics is framed as a means for explicit communication with students about instructor expectations.

504 (M2106) – The HAPS Laboratory Instructor Survey: Final results and implications for instruction – 90 minutes
David Brashinger, American Public University System, david.brashinger@mycampus.apus.edu

The HAPS task force on Laboratory Learning Outcomes conducted an online survey of instructors for introductory undergraduate-level course sequences in human anatomy and physiology for the nursing and allied health student. The goal of this survey was to document the current learning outcomes and activities in the laboratory component of these courses. This workshop will review the final results of the survey and the comments collected at the HAPS Eastern regional conference in March, 2014. The role of the laboratory component in introductory anatomy and physiology and the implications for the HAPS course guidelines and learning outcomes will be discussed.

505 (M2107) – Scientific teaching, active learning and assessment in STEM – 90 minutes
Pat Cipriano, Florida State College at Jacksonville, Kent Campus, pciprian@fscj.edu
Becky Hailey, Florida State College at Jacksonville, R.Hailey@fscj.edu

After exploring how students learn, we will discuss scientific teaching and present examples of active learning with the goal to encourage student engagement, critical questioning, and personal responsibility for learning. We’ll talk about strategies to assess the process and end with an opportunity for participants to develop an active learning unit. This workshop was co-authored with Kim Conner, Florida State College at Jacksonville.

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506 (M2108) – Presentation Title: New ways to share the anatomy and physiology story – 90 minutes
Dennis F. Burke, RN, DC, Bunker Hill Community College, dburke@bhcc.mass.edu
*Sponsored workshop*
Abstract: As digital technology makes advances in the classroom, do you often wonder how to effectively use current technology to share the “Anatomy and Physiology” story with your students? This workshop will explore ways that digital technology can help engage, evaluate, and remediate students allowing for a more meaningful presentation of material.

507 (N244) – Engaging Students with Course Critical, Adaptive Learning Assignments that Provide Enough Data Analytics to Flip the Classroom – 90 minutes
Steve Sullivan, Bucks County Community College, sullivan@bucks.edu
*Sponsored McGraw Hill*
Flipping the classroom allows us to give more personal attention to students in class and turn our traditional lectures into discussions of concepts. To do that, we need to know exactly what the students are learning from our assignments. Tools are available that efficiently provide detailed data analytics from adaptive learning assignments that assess students’ knowledge, skill, and confidence, helping instructors bolster student understanding in areas they need to improve the most. By helping students focus their outside-of-class study time on the topics and concepts most challenging to them, they come prepared for a discussion, rather than a lecture.

508 (N245) – Pedagogical approaches to the development and use of anatomy and physiology videos – 90 minutes
J. A. Carnegie, University of Ottawa, jcarnegi@uottawa.ca
R. Guy, RMIT University, richard@guy@RMIT.edu.au
This workshop explores the use of pedagogical approaches (visual plus auditory processing, role of emotion in learning) to develop videos for health sciences students. Patient-centered videos focus on symptoms, treatment, and patient experiences to expand understanding of the physiological basis of disease. Additionally, short video clips encourage students to use active learning when studying physiological concepts by asking them to interact with video content. Participants will select a topic, identify key learning objectives, and create a “storyboard” outlining video scenes to address those learning goals. Conversion of physiological information to interactive learning experiences is not as easy as it sounds!

509 (G301 G) – Engage, challenge, and inspire your students to success – 90 minutes
Catharine C. Whiting, University of North Georgia - Gainesville, cathywhiting@ung.edu, Kalan Brown, University of North Georgia - Gainesville, Jonathan Casas, University of North Georgia - Gainesville, Mark Green, University of North Georgia - Gainesville, Bobbie Hewell, University of North Georgia - Gainesville, Kristi Palmer, University of North Georgia - Gainesville, Shannon Sutton, University of North Georgia - Gainesville, Nhuvi Thai, University of North Georgia - Gainesville
Creating an engaging and challenging learning environment can be a difficult task. In this workshop, I will share ideas for cultivating such an environment from the first day of class until the final exam. Specific topics will include: developing active learners, using teaching assistants effectively, building rigor into your courses, and encouraging critical thinking. The workshop will include a demonstration of how these techniques can be used to increase motivation and facilitate learning. You will be amazed at what your students can accomplish when they are engaged, challenged, and inspired!

510 (G301 H) – Teaching anatomy via team-based learning in an online 3D environment – 90 minutes
April Richardson Hatcher, College of Medicine, University of Kentucky, arich3@uky.edu
Christina Gazave, University of Kentucky, christena.gazave@uky.edu
The University of Kentucky has designed a new regional anatomy course for pre-healthcare professional students featuring Team-Based Learning (TBL) in the 3D virtual world of Second Life™ (SL). ANA 309: An Introduction to Regional Anatomy is a 5-credit hour online course that includes weekly synchronous virtual TBL exercises to reinforce anatomical concepts. Students study interactive regional anatomy modules, take an individual quiz on Blackboard™, and then log in with a 3D persona to complete group quizzes and clinical discussions in a virtual anatomy classroom. We will demonstrate the online TBL process and discuss results from two semesters of the course.

511 (A210) – Ultrasound in Teaching Anatomy and Physiology – 90 minutes
Richard A. Hoppmann, MD, FACP, University of South Carolina School of Medicine, richard.hoppmann@uscmed.sc.edu
Tripp Bell, MD, University of South Carolina School of Medicine, floyd.bell@uscmed.sc.edu
Victor Rao, MBBS, DMRD, RDMS, University of South Carolina School of Medicine, victor.rao@uscmed.sc.edu
The University of South Carolina School of Medicine has been using ultrasound to enhance the teaching of Anatomy and Physiology since 2006. The first part of this workshop will be a didactic overview of the basics of ultrasound and the ways in
which it can be incorporated into these courses. The second part will be a hands-on session in which participants will have an opportunity to perform some of the basic scans used in teaching Anatomy and Physiology. Approximately 30 minutes will be didactic and the remaining 60 minutes will be hands-on scanning.

512 (T123) – 3D printed micro and gross anatomy tactile learning objects – 90 minutes
Michael A. Kolitsky, Ph.D., University of Texas at El Paso, makolitsky@utep.edu
Many 2D images of microanatomy (Histology and Cell Biology) and gross anatomy (cadaver dissection) can be made into 3D printed tactile learning objects especially useful for students who are blind or are kinesthetic learners. Workshop will cover how 3D print files (stl files) can be made from 2D photos of cadaver dissection and microscope slides using PhotoToMesh software or from using 3D scanning technologies such as MakerBot’s Digitizer or Autodesk’s 123D Catch. 3D printed tactile learning objects from the presenter’s collection will be available for a touch and feel experience and some can be seen at www.nextgenemedia.com/3DPrint/3DprintExamples.html and www.nextgenemedia.com/3DPrint2/3DprintExamples1.html.

Wednesday, Session 6

601 (G101) – The value of lab kits for online, hybrid, and even traditional A&P courses – 60 minutes
Dr. Brian R. Shmaefsky, Lone Star College – Kingwood, Brian.r.shmaefsky@lonestar.edu
The use of at-home laboratories in distance education A&P courses is the cause of much controversy about course delivery effectiveness. Many colleges are hesitant to teach fully on-line A&P courses because of concerns about the pedagogical value of at-home and virtual laboratory activities. Several programs that adopted fully on-line anatomy and physiology are showing the student learning outcomes are met using at-home laboratory lesson strategies. Plus, educational research studies are supporting arguments about effective learning using at-home exercises using kits and virtual activities. Many of these studies were conducted by university educational researchers. However, the rapid growth of on-line delivery has compelled on-line delivery providers to commission independently-conducted studies about the value of completely on-line coursework compared to hybrid and traditional classes. This session will summarize the findings about the effectiveness of completely on-line anatomy and physiology. Comments from allied health faculty about on-line A&P will also be discussed. Examples of completely on-line delivery can be enhanced to make student learning in lecture and lab sessions equivalent to traditionally structured courses. Audience participation will be encouraged in this session.

602 (M2103) – How to effectively teach students studying advanced human physiology to write a journal article – 60 minutes
Brianna L Julien, La Trobe University, B.Julien@latrobe.edu.au
Louise Lexis, La Trobe University, L.Lexis@latrobe.edu.au
An important skill for scientists to master is the ability to communicate research findings in the form of a journal article. Because students who see the relevance and real-life significance of a task are more likely to be intrinsically motivated, and to take on a deep-learning approach, an authentic assessment task asking students to present the findings of their own research in the form of a journal article was a perfect opportunity to engage them in this process. We developed tools and resources, including a rubric marking scheme, to assist students with writing a journal article in human physiology.

603 (M2105) – Flipping the Classroom with A.D.A.M. OnDemand Mobile-Ready Learning Programs – 60 minutes
Timothy Spaid, A.D.A.M., a business unit of Ebix, timothy.spaid@ebix.com
*Sponsored by A.D.A.M.*
Do you have a flipped classroom environment or have students eager to have an engaging self-study program for their iPad or tablet? A.D.A.M. Education will present its new offering, A.D.A.M. OnDemand, a suite of off-the-shelf or custom mobile Learning Programs. Capture and review data to understand when students login, activity minutes spent, which programs have been completed and more. Let your students take their A&P learning tools with them wherever they go.

604 (M2106) – “Hormones – It’s a Balancing Act” – 60 minutes
Steve Kish, Zane State College, skish@zanestate.edu
The endocrine system functions as an important regulatory system. The various glands found throughout the body produce and secrete a wide variety of hormones that affect tissues. Participants will build the major glands of the endocrine system using Maniken™ models, looking at the hormones produced, their targets and actions.
605 (M2107) – A human-size cell may grab your attention! - Interactive educational event as learning and teaching tool – 60 minutes
Santa Makstenieks, Concordia University Wisconsin, santa.makstenieks@cuw.edu
We as educators know the joy of sharing our knowledge. In this workshop I will talk about two original and successful class projects. They are aimed at teaching students to showcase their newfound knowledge in innovative, interactive and memorable ways to the entire campus community. These projects are multi-step tasks which require practice in professional communication skills, time management, independent in-depth learning, and creativity. The assignment culminates in an exiting educational event with prizes for the winners. Come to find out more and get handouts with project layout details, grading scale, gains and pitfalls discovered along the way.

606 (M2108) – Using Technology to ‘Turbo’ Through Assessment and Accreditation – 60 minutes
Nahel Awadallah, Johnston Community College, nwawadallah@johnstoncc.edu
Many of us teaching A&P seek to assess student understanding for every chapter. Assessments are part of the accreditation process that touches everyone, from top-level administrators to teaching faculty. The College must demonstrate that specific learning objectives are being met by students under the guidance of their instructors. This presentation will discuss technology used to streamline and simplify assessment/ accreditation tasks that would otherwise take us inordinate amounts of time. Existing classroom management solutions can be for assessment / accreditation process what TurboTax is to tax preparation, making it automated, easy, and, above all, accurate.

607 (N244) – Pedagogical tools to enhance learning in microscopic anatomy laboratory – 60 minutes
Dr. Hisham S. Elbatarny, St Lawrence College, Queen’s University, HElbatarny@sl.on.ca
Histology can be a challenging science to study. I will present three different pedagogical tools used in teaching histology in my A&P lab prior to students’ use of the light microscope. The first tool provided oral explanation of the slide. The second consisted of the display of electronic diagrams of standard slides using power point presentations. The third tool involved the use of a microscope fortified with a built-in camera projecting real-time images on a big screen. I will show the effectiveness of each approach and how the third one improved students’ understanding and skills of learning histology.

608 (N245) – Diagnosing how students organize their knowledge – 60 minutes
Eileen Bush, Mohawk Valley Community College, ebush@mvcc.edu
Many instructors wonder if students are making accurate, meaningful connections between various concepts during their study of anatomy and physiology. The use of concept maps is just one way instructors can uncover the accuracy and depth of connections being made between concepts during the learning process. If you are unfamiliar with the use of concept maps and would like to explore their use with students, this workshop is for you.

609 (G301 G) – How to become a HAPS-I instructor and teach a HAPS-I course – 60 minutes
Peter English, HAPS, peter@hapsconnect.org
*Sponsored by HAPS-I*
HAPS-I is a vibrant program that offers graduate-level courses in Anatomy and Physiology in a variety of settings. The design of a course is completely defined by the instructor. Courses can be online, a mix of online and in-person, or wholly in- person. The mechanics of designing a course and shepherding it through the approval process are far more streamlined than many imagine, and approvals take place in a fraction of the amount of time that many of us experience at our home institutions. Peter English, HAPS Executive Director, will discuss requirements of courses and the approval process, mechanics of teaching, the online course management system, and answer questions.

610 (G301 H) – Biopac Student Lab: Budget Beating Physiology Lab Solutions – 60 minutes
Ken Graap, BIOPAC Systems, info@biopac.com
*Sponsored by BIOPAC*
Students use the Biopac Student Lab system to record life science data from their own bodies. Each lesson includes onscreen guiding text, sample data, and videos to help students focus on principles, not procedure. This workshop is aimed at current Biopac Student Lab users, or those instructors who want to see the full extent of the Biopac Student Lab’s capabilities to engage student minds & increase learning! BSL systems are intuitive and extremely robust. Use the 4-channel MP36 system or the new handheld 2-channel MP45 system with BIOPAC’s extensive curriculum library (60+ lessons) and broad range of transducers. Easily add experiment segments for active learning. Add BSL PRO software to create your own lessons and for independent projects. No programming required, just simple pull-down menu selections. Attend the workshop and be amazed by the power, flexibility and budget beating price options.

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Team based learning (TBL) is a style of teaching used in business schools, medical schools, and other professional schools for years. Undergraduate education has caught on to the trend of more interactive classes as opposed to traditional lecture style. We currently use TBL in undergraduate and graduate anatomy, physiology and neuroscience courses. In the undergraduate physiology course, several supplements came with the text that made development of class activities rather easy. However, that was not the case with neuroscience and the graduate level anatomy/physiology courses, where our creativity was put to the test. We will present some of our activities.

Wednesday, Session 7

701 (G101) – Conscience in crisis: the Nazi academics. – 60 minutes
Aaron Fried, Mohawk Valley Community College, afried@mvcc.edu
Anatomists benefitted from the Nazis. Universities accepted bodies from political prisons. Prisoners executed for espionage were being used for teaching and research. Academics were flourishing with a large supply of cadaver materials for research and teaching. After World War II, most who worked the Nazi camps were tried as war criminals while the academics kept working without rebuke, often using the source materials gained unethically. This workshop will examine the history of academic anatomists under the Nazis. How should these specimens have been dealt with? What do you do with the knowledge gained from experiments and work with these tissues?

702 (G101) – The “M.S. in Human Anatomy & Physiology Instruction Program”- graduate/student/faculty panel discussion – 60 minutes
Robert Crocker, New York Chiropractic College, rcrocker@nycc.edu
Innovated in 2010 at New York Chiropractic College, the M.S. in Human Anatomy & Physiology Instruction Program (MSHAPI) is an online multidisciplinary science/pedagogy graduate degree program that fuses anatomy and physiology content expertise with graduate pedagogy training to develop a highly effective educator focused on undergraduate A&P instruction. In this workshop, graduates of the program will join current students and members of the faculty to discuss the mission and vision of the program, the educational experience, and the impact it has on professional development and career advancement.

703 (M2105) – How to effectively teach students studying advanced human physiology to write a literature review – 60 minutes
Louise Lexis, La Trobe University, L.Lexis@latrobe.edu.au
Brianna L Julien, La Trobe University, B.Julien@latrobe.edu.au
A well-written literature review should effectively educate the reader on the current knowledge of a topic area. Conducting a literature review is a difficult task, as the author / student is required to engage in all six cognitive skills, as defined in Bloom’s taxonomy. The levels of cognitive thinking, listed in ascending order are: knowledge, comprehension, application, analysis, synthesis and evaluation. We have developed tools and resources, including a rubric marking scheme, to assist students with conducting and writing a literature review in an advanced human physiology capstone program.

704 (M2106) – It’s flippin’ fun: Evaluating the pros and cons of a flipped classroom – 60 minutes
Wendy Riggs, College of the Redwoods, wendy-riggs@redwoods.edu
In a flipped class, students learn new content on their own time, and then engage in active learning during class time with the direct support of an instructor. After flipping my Anatomy and Physiology classes for four semesters, I have many thoughts about the flipped approach. In this workshop, we will look at different ways you can flip your classes, how to justify the change to your students, what to do during class time, and how to evaluate the effectiveness of the pedagogy.
705 (M2107) – Incorporating a modified “Interteaching” methodology into Anatomy & Physiology lecture settings – 60 minutes
David Mercer, Salem State University, dmercer@salemstate.edu

Interteaching is a technique developed by behavioral analysts to promote deeper student learning by encouraging student teaching. Several studies demonstrate improved student test scores when compared to traditional lecture methods in diverse fields of study. This workshop will describe interteaching in its original format, its use in an Anatomy and Physiology course, the improvement in test scores compared to lecture only classes, and the limitations when used in its original form. In addition, the workshop will introduce modifications made to the interteaching technique to make it more engaging and acceptable for students in learning the complex concepts of human physiology.

706 (M2108) – Getting Started with a Flipped Classroom – 60 minutes
Jeanine L. Page, Lock Haven University, jpage2@lhup.edu
Joshua Drouin, Lock Haven University, jdrouin@lhup.edu

So you have decided to flip your classroom; now what? Getting started is with flipping a class is a daunting task. What is the best way to record my lectures? How can I ensure my students are prepared when they arrive? How do I best utilize the classroom time now available to me? How can I create engaging activities to develop and assess student understanding? In this workshop, our goal is to answer these questions. We will utilize the flipped classroom model to help you. An online presentation regarding technologies and ways to record your out-of-class material will be made available to all participants. The workshop will be focused on working collectively to create a series of activities corresponding to the cardiovascular system, respiratory system, endocrine system and the urinary system. Using a team-based approach with the participants themselves, we will build a toolbox full of useful and interactive assignments that the students can complete in-class. These assignments will be designed to enhance both student engagement and understanding.

707 (N244) – Conversion of a graduate neuroanatomy course from traditional (face-to-face) instruction to a blended (hybrid) format featuring asynchronous instruction combined with monthly “institutes” with technology based learning, active learning and traditional laboratory exercises. – 60 minutes
Thomas P. Arnold, NOVA Southeastern University, tarnold1@nova.edu

A foundational course for health professions programs, neuroanatomy, was redesigned from traditional to hybrid format. Blended (hybrid) course delivery combines on-line lecture instruction and interaction with periodic face-to-face and kinesthetic learning. Instruction for this course is packaged into modules with supporting scaffolding including active learning aids, on-line lectures, videos and asynchronous discussions. The lecture materials, lab resources, course management and communications are delivered via a web based platform. Assessments are accomplished in four, week-end “institutes” incorporating a mix of traditional and virtual kinesthetic experiences including learning matrices, laboratory practica, anatomage and written exams. Structure and best practices will be shared.

708 (N245) – Best Practices in Teaching A & P – 60 minutes
Dr. Lisa Hight, Baptist College of Health Sciences, Lisa.Hight@bchs.edu
Michelle McDonald, Baptist College of Health Sciences, Michelle.McDonald@bchs.edu

Effective student learning is a primary goal for HAPS participants. Achievement of this is possible when you integrate a variety of methodologies into your A & P course. Combined 30 years of teaching experience and multiple HAPS conferences have led us to assimilate a combination of effective strategies in the traditional and hybrid small to medium-sized classes (50 or less students). This workshop is designed for the novice instructor as well as to solicit input from experienced faculty to share what has worked for them.

709 (G301 G) – Let their goals be your guide: How to develop a writing exercise using student career plans – 60 minutes
Keely Cassidy, Indiana University School of Medicine, kmcassid@indiana.edu

Designing an authentic writing exercise in anatomy and physiology courses is often a challenge to instructors. Another common struggle is getting students to have a vested interest in the assignment. How can we alleviate both these issues? In this workshop, we will discuss the development and implementation of such a writing exercise used in an upper-level pre-medical human embryology course that used student career goals in the public health and healthcare professions to tailor the final writing assessment. Participants will then work in small groups using the principles discussed to design writing assessments for their own students.
710 (G301 H) – **Increasing student success and retention using comprehensive peer-reviewed Open Education Resources** – 60 minutes  
Nicole Finkbeiner, Rice University, nicolef@rice.edu  
David Harris, Rice University  
*Sponsored by OpenStax College*

Studies have shown that students are increasingly foregoing purchasing textbooks and other required resources due to costs and accessibility. In this workshop, attendees will learn about peer-reviewed open education resources, including a FREE peer-reviewed A&P textbook, and how faculty across the country are increasing student success and retention using these resources.

711 (A210) – **The Histology Challenge Wants YOU** – 60 minutes  
Nina Zanetti, Siena College, zanetti@siena.edu  
*Sponsored by HAPS*

This workshop will explore an exciting feature on the HAPS website, the Histology Challenge. This feature presents actual patient cases, accompanied by photomicrographs of biopsy or surgical specimens. Each case features a series of questions that guide participants through the process of interpreting micrographs and “solving” the case, in an online discussion. In this workshop, we will examine the features of Histology Challenge and will review a few cases, to see how they reinforce basic histology and introduce clinical applications. We’ll invite participants to share ideas on how these Histology Challenges can be used in A & P courses, and how we can encourage increased participation in the online discussions. We also hope to recruit some volunteers to help produce future Histology Challenges.

**Wednesday, Session 8**

801 (G101) – **How to use the Homeostasis Conceptual Assessment as a Formative Assessment** – 60 minutes  
Dr. Ann Wright, Canisius College, wrighta@canisius.edu

Homeostasis is an important core principle for undergraduate physiology students to understand and apply. Assessment of student conceptual understanding of homeostasis is important for teaching and learning, especially formative assessment to reveal students’ incomplete understanding and ‘misconceptions’. The 3 step process to develop a Conceptual Assessment of Physiology (CAP) instrument for homeostasis will be described. Starting with the conceptual framework for homeostasis that identified component ideas appropriate for undergraduate physiology developed and validated by a cohort of faculty at 2&4 year colleges, universities & medical schools. Next common student conceptions regarding homeostasis and its component ideas were identified (from physiology students and faculty). Finally, multiple choice questions to assess important homeostasis component ideas were developed and tested in student interviews. These questions were then vetted by a cohort of faculty from diverse institutions and students in physiology courses. We will present the CAP questions on homeostasis, the physiology faculty data on the appropriateness of these questions for undergraduate students, and the results of initial testing with students will be presented and discuss how the questions are linked to the conceptual framework and student conceptions & incomplete understandings. Workshop participants will be asked for feedback on the questions and how they would use this assessment.

802 (M2103) – **Utilizing the Anatomy & Physiology classroom as a platform for interprofessional education** – 60 minutes  
Dr. Cathleen Murphy, St. John’s University, College of Pharmacy and Health Sciences, murphyc@stjohns.edu

Currently accreditation mandates are requiring interprofessional education in Allied Health including Physician Assistant and Radiological Science programs. In order to foster interprofessional education practices in these programs, activities must be constructed to bring this to fruition. This presentation will work to provide ideas for utilizing the Anatomy & Physiology classroom as a platform to encourage students to work with other future members of the healthcare team. This presentation will focus on active learning activities, which will foster interaction between students of different programs and build on the relevance of learning Anatomy & Physiology to their defined fields of study.

803 (M2105) – **Active Learning in Anatomy and Physiology** – 60 minutes  
Jay Gump, Greenfield Community College, gumpj@gcc.mass.edu

Most instructors agree that active learning exercises improve student learning outcomes. We will discuss strategies for incorporating active learning into anatomy and physiology classes, including the types of activities that best lend themselves to class time. We will talk about utilization of online resources to deliver content and provide an active interface. Most importantly, we will discuss planning strategies that allow instructors to experiment with new teaching methods without overwhelming the classroom or the instructor’s capacity for creating new curricula.
804 (M2106) – Teaching (radiological) anatomy through repeated testing – 60 minutes
Jon Jackson, University of North Dakota, jon.jackson@med.und.edu
Christina Conneran, University of North Dakota, christina.conneran.2@my.und.edu
Repeated low-stakes testing has been shown to be effective at fostering learning of all kinds of complex new material, from algebra to Swahili. Its utility has moved from primary and secondary education into the curriculum of many universities and professional schools. This workshop will demonstrate how we use repeated testing in conjunction with our cadaver labs, share outcomes data, and provide attendees with materials that they can use immediately to help students master the often difficult translation of 2D radiological images into a complex 3D understanding of anatomic relationships. This workshop was co-authored by Alexis Hanson and Haris Ali, both of the University of North Dakota.

805 (M2107) – Are you ready to “Flip”? – 60 minutes
Karen R. Clark, Davenport University, karen.clark@davenport.edu
The flipped classroom concept has been “the topic” in education. The premise behind the flip is students watch instructor prepared videos on their own time. Freed class time is utilized by engaging students in applying what they have learned. This past year, I flipped units in my Anatomy & Physiology II course. During this workshop I will share my experiences as a first time flipper: successes, challenges, mistakes and student perceptions. If you have incorporated the flipped method into your classroom, please come and share your experiences!

806 (M2108) – Introduction to comparative anatomy of humans and other vertebrate animals – 60 minutes
Stacey Dunham, Indiana University, dunhams@indiana.edu
Did you know that fish scales and human teeth are homologous? The session will introduce attendees to the basic anatomical similarities and differences observed in classes of vertebrates. We will examine the morphology of the integumentary, skeletal, muscular, circulatory, urinary, and reproductive systems. Attendees will gain knowledge about the comparative anatomy of vertebrates and a better understanding of the evolutionary inheritance of vertebrate features. While the session will have time for only a basic overview, attendees will receive a digital copy of more detailed anatomical information.

807 (N244) – Regional anatomy for undergraduate students – preparing students to use anatomy in the real world – 60 minutes
Mark Nielsen, University of Utah, marknielsen@bioscience.utah.edu
Robert Tallitsch, Augustana College, roberttallitsch@augustana.edu
We noticed on the HAPS List Serve numerous inquiries about teaching anatomy using a regional approach. As professors who have each used this approach with great success with undergraduates for approximately 30 and 39 years respectively, we thought it would be informative to share our experiences. We will share the pros and cons of this approach and share what we have learned in using and adapting a regional anatomy approach to teach first-time anatomy students. We will discuss how it enhances a dissection-based lab experience and describe available tools to make this a viable option to teach undergraduate anatomy.

808 (N245) – Construction and use of a magnetically articulated human skeletal model in teaching anatomy and physiology labs – 60 minutes
Joe Shellhammer, Wichita State University, joe.shellhammer@wichita.edu
Brandon Williams, Wichita State University, bmwilliams3@wichita.edu
We will present an educational resource workshop that implements the use of a magnetically articulated skeleton that we assembled from a disarticulated plastic human skeletal model and small, rare earth magnets. We already had a complete disarticulated human skeleton of relatively new plastic bones and cartilage. One of my teaching assistants for the Human A and P class that I teach noticed that students really struggle with how bones articulate with one another when viewed in small combinations, such as a couple of bones, without the context of the complete skeleton. Students are evaluated over such details on lab quizzes and practicals. To facilitate efforts to teach articulations as well as the bones themselves, the TA decided to lay out a disarticulated skeleton, a few groups of bones at a time and noticed that it helped not only explain, but reinforce the learning of bones and articulations. To further enable future TAs’ efforts to teach in the same way or with similar resources a proposal was made for building a case with a foam cut-out where each bone would be held in correct location with articulating bones. Furthermore, through using magnetically articulating skulls we were using, it became evident that an entire articulating skeleton would be practical, useful and feasible. The only additional resource we purchased was a set of small cylindrical magnets of various sizes and strengths to hold articulating plastic bones together. The skeleton has been constructed and is now being used in lab for the A and P classes that I teach each semester.
810 (G301 H) – Making students do the lifting – evolving pedagogy through flipping and writing – 60 minutes
Dr. Hiranya S. Roychowdhury, New Mexico State University-Dona Ana Community College, hroychow@nmsu.edu
Flipped classrooms take off the load of delivering content in a content-heavy classroom. It is even more useful in community colleges where we serve nontraditional students who are either “too busy” to study between lectures, or too afraid to ask questions in the classroom. I will be discussing the tools and best practices I use to engage my students actively in their own learning and in making them effective communicators through semester-long writing projects that involve the “WAC” principles. Through assessments and frequent tests, I have been collecting evidence of their improved learning. I will sharing these findings.

811 (A210) – How is College Different from High School? Helping Students Understand to Succeed – 60 minutes
Dr. Daniel Kifle, The Community College of Baltimore County, dkifle@ccbc.edu
Mrs. Ellen Joyce Lathrop-Davis, The Community College of Baltimore County, elathrop@ccbc.edu
Dr. Ewa Gorski, The Community College of Baltimore County, egorski@ccbc.edu
Student populations in higher education range from very recent high school graduates to older returning students. Often faculty must remind students what is expected of them. This session will provide the opportunity to discuss differences between high School and college and help students take “ownership” of their own learning.
ANIMAL USE
Robert Tallitsch, Chair
Distributing the HAPS policy statement, developing animal use Internet links onhapsweb.org, monitoring relevant legislation, and creating a resource packet for HAPS members.

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Click here to visit the HAPS committees webpage.