

ABSTRACT NUMBER

T-1

Student Author(s): Richard Alston III

Department(s): Zoology

Teaching Mentor(s): Betty Black/Zoology

Title of Presentation: Preparing Digital Images of Cat Anatomy for Use in Teaching

Overall, the purpose of the project was to document the internal organs of a cat using digital media to provide anatomy study references for students. The project was designed to provide clear images of single internal organs as well as organ systems of a cat. While the particular project designated was dissecting the cat and capturing images, the final product that Dr. Black will use consists of a program that adds moving arrows, pop-up text, and audio to make the images a better learning tool. In addition to background research on anatomy, the project utilized a digital camera, dissecting kit and pre-preserved female cat. Initially the entire thoracic cavity was opened, but the dissections continued next from the heart proceeding to the posterior of the cat. After images of the partially dissected cat were captured, individual organs were removed photographed separately. Images with the best resolution and perfect focus were chosen to be part of Dr. Black's ongoing project on "The Interactive Cat." The images will serve as valuable resources for students in ZO 370,371 and other classes and labs as they refer to the feline anatomy or use it as a reference point for a wide range of gross anatomy subjects.

ABSTRACT NUMBER

T-2

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Department(s): Biological Sciences
Microbiology
Molecular and Structural Biochemistry

Teaching Mentor(s): Amy M. Grunden/Microbiology

Title of Presentation: H5N2 Human-to-Human Transmissible Avian
Influenza Pandemic

Disease is a common problem occurring since the dawn of time and can be responsible for destruction of entire civilizations if not treated effectively. The goal of this ALS 398H section was to use human-to-human transmissible diseases as a learning tool for understanding the pandemic spread of disease. The Avian Flu is currently considered a significant global health issue and as such provides a perfect model for examining the path of a disease from its emergence to full-fledged pandemic. In preparation for the class's development of a hypothetical

pandemic, the class met with speakers from the public health sector and pharmaceutical industries, was provided relevant research and popular press articles, and was shown videos that related to the spread of known worldwide pandemics. This background instructional material was ultimately used by the class to forge the basis of the class's research project, the development of a hypothetical outbreak of human-to-human transmissible Avian Influenza, and led to the organization of the class into three different focus areas: Pathogenesis/Epidemiology, Public Health Response, and Treatment via Pharmaceutical and Government Efforts. The Pathogenesis/Epidemiology group was responsible for explaining the methods and effectiveness of disease transmission and establishing the number of individuals affected. Public Health Response involved development of a plan of action to counteract the spread of disease and to minimize/prevent more transmission. Pharmaceutical and Government Efforts covered methods in which federal/local governments collaborate with drug companies to develop and manufacture effective treatments/vaccinations. Within the three focus areas, students further divided into groups responsible for completion of a written research paper, an oral presentation, and the symposium poster. This innovative, multidimensional learning experience gave students a chance to participate in a cooperative learning experience focused on investigating the emergence, proliferation, and public health response to a modeled human-to-human transmitted avian influenza pandemic.

ABSTRACT NUMBER

T-3

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Department(s): Animal Science
Biological Sciences
Microbiology
Zoology

Teaching Mentor(s): Vivek Fellner/Animal Science, Nutrition and
Biotechnology

Title of Presentation: Dying the "Good Death": Ethical Considerations
of Animal Euthanasia in Science and Society

Euthanasia—a good death by definition—warrants ethical inspection as the pain and suffering to be minimized are gauged perceptions. The word alone, does not examine if humans have the right to end an animal's life or the consequences delivered to society, the environment, and to future science. In order to create guidelines, local laws have been enacted as well as state and federal laws. Most notable are the Humane Methods of Slaughter Act and Animal Welfare Act. The USDA, Institutional Animal Care and Use Committees, and AAALAC enforce these guidelines and laws. While such laws are in place, different societal standards arise for euthanasia of companion, production, and research animals. Other major considerations are the effects on the environment as a whole. For example, some diseases such as Mad Cow disease, Foot and Mouth disease, and Avian Influenza dictate how the euthanasia must be performed and the disposal of carcasses. Using such knowledge along with the biological considerations of pain, the American Veterinary Medical Association has compiled a review of the major euthanasia techniques and their appropriate uses, advantages and disadvantages. In the decision of selecting euthanasia, the overall context of the situation must be considered: the well-being of the animal, reason for euthanasia, urgency of the situation, and repercussions of the act. Thus, while no clear-cut mandates have been established, the ethical debate over euthanasia remains ongoing on a personal, state, and federal level.

ABSTRACT NUMBER

T-4

Student Author(s): Brad E. Damratoski
Department(s): Zoology
Teaching Mentor(s): Marianne Niedzlek-Feaver/Zoology
Title of Presentation: Experimental Invertebrate Zoology: A New Course

Zoology 495, an experimental course in invertebrate zoology, was paired with an experimental lab in which several small experiments were attempted to supplement the lecture and determine procedures and protocol for future course offerings. In the lab new stereoscopes and microscopes were used along with video software, creating an enhanced learning experience by having access to quality equipment. Five experiments were done including: eversion of imaginal discs in response to steroids in *Drosophila*, sponge reassociation, the effects of diethylstilbestrol on molting and sex determination *Daphnia magna*, territoriality and competition among male fiddler crabs, and the culture and differentiation of cells in slime molds. In *Drosophila*, metamorphosis begins approximately 120 hours after fertilization, during which larval tissues are replaced by adult structures derived from imaginal discs. Three different steroids were used to observe their effects of adult structure formation from the discs. Sponge re-association is useful for demonstrating the diverse cellular forms found in all species of sponges. Three species were disassociated and allowed to re-associate over a few weeks. Although re-association occurred in all species, the sponges did not attach to a substrate and new sponges did not form in entirety. *Daphnia magna* is an aquatic species that is useful in determining the effects of synthetic agents on freshwater organisms. Cultures of *Daphnia magna* were treated with diethylstilbestrol, a potent teratogenic agent. This experiment was useful in demonstrating how *Daphnia* can be used as a model in studying freshwater ecosystems and demonstrating the effects of synthetic agents on invertebrate species. Fiddler crabs were kept in tanks in the lab for several weeks to allow them to become familiar with their environment and fellow crabs. Intruders were placed in the tanks and their resulting behavior was videotaped. This experiment was useful in determining how behaviors can be monitored in the classroom.

ABSTRACT NUMBER

T-5

Student Author(s): Amanda M. Davila-Flores
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Department(s): Biological Sciences
Zoology

Teaching Mentor(s): Thomas R. Wentworth/Botany
Kristen M. Rosenfeld/Botany

Title of Presentation: Enhancing the Undergraduate Introduction to Ecology Laboratory Experience through Student Involvement

Current trends in science education encourage the integration of both active and inquiry based educational experiences. In a large undergraduate ecology course, one of the best ways to accomplish those goals is to incorporate highly interactive field-based laboratories into the curriculum. Our objective was to enhance teaching and learning experiences in an existing course, BO365, Introduction to Ecology Laboratory. Five students explored four different components of the course. Their efforts resulted in the following improvements: identification of a safer, more environmentally sound stream ecology location; a laboratory website for student usage; a complete laboratory equipment inventory; and a process for implementing student independent projects. Each of the students also assisted a graduate laboratory instructor in at least one section of the course, enhancing their knowledge about the teaching and learning process, and improving the experience for the other undergraduates in their sections. Including undergraduate students in the process of designing new or improving existing active and inquiry based educational experiences is a rewarding way for all parties to accomplish the goals of higher learning.

ABSTRACT NUMBER

T-6

Student Author(s): Anand Doraiswamy
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Department(s): Biomedical Engineering

Teaching Mentor(s): Chunming Jin/Biomedical Engineering
Roger Narayan/Biomedical Engineering

Title of Presentation: Teaching Biomaterials Using Problem-Based Learning

Problem-based learning is an instructional technique that challenges students to "learn to learn" by cooperatively working in groups. Course content is introduced in the context of complicated real-world problems and situations. Students working in small groups must identify what they know and must acquire skills and knowledge to solve the problems. Problem-based learning prepares students to think analytically, and to utilize appropriate resources. Examples of problem-based learning in biomaterials education are presented.

ABSTRACT NUMBER

T-7

Student Author(s): Anna W. Ervin

Department(s): Biological Sciences, Nutrition Concentration

Teaching Mentor(s): Sarah Ash/Food Science

Title of Presentation: MyPyramid.gov: Better Than the Original Food Guide Pyramid?

The objective of this project was two-fold: to create a meaningful but also easily graded homework assignment and to assess the effectiveness of the original Food Guide Pyramid and the new MyPyramid.gov. In 2005, the United States Department of Agriculture released MyPyramid.gov to replace the original Food Guide Pyramid. MyPyramid.gov was designed to incorporate the *2005 Dietary Guidelines for Americans*, to individualize the approach to improving diet and lifestyle by creating a website that gives a personalized diet, to encourage people to make moderate improvements in their diets, and to emphasize physical activity every day. The homework assignment was intended to make the students visit and read the MyPyramid.gov website and assess its effectiveness by conducting a survey of 10 people. Students' willingness to follow directions, the depth with which students would answer the questions without detailed instructions, and the amount of thinking versus reading and repeating they would have to do were all considered when writing the assignment. Overall, the assignment was effective, as most students followed directions and seemed to learn about MyPyramid.gov. The more accurate and complete papers were easier to grade than the papers containing many errors. The survey results were very interesting. Of 1163 people surveyed, only 22.3% had used the original Food Guide Pyramid as guidance, 20.4% had heard of the new MyPyramid.gov, and of those who had heard of it, 45% had visited the website. Some students think that, similar to the original Pyramid, this new device will never be successful because too many people do not care enough about their health to change their lifestyle. However, most students agree that in order to be successful, the new MyPyramid.gov needs to be highly publicized so people are aware of the improvements and benefits of this new tool.

ABSTRACT NUMBER

T-8

Student Author(s): Georgia K. Gourley
Department(s): Biological Sciences
Teaching Mentor(s): Gerald Van Dyke/Botany
Title of Presentation: Do Hands-on Learners in Botany 200 Laboratory Enjoy the Laboratory More than Other Learning Styles?

The Botany 200 laboratory is a hands-on based laboratory where students are taking the topics that are covered in class and are able to observe and understand the ideas more. I did my research on whether hands-on learners enjoyed this lab more because it was based more on the style of teaching that they are labeled to enjoy. To conduct my research, I first had the students fill out a worksheet that would show what learning style they were. Next, each student filled out a questionnaire about the laboratory. From this questionnaire, I compared the results of the hands-on learners to the other students in the class. My results were not supportive of my hypothesis that the hands-on learners enjoyed laboratory more. While it showed that the vast majority in both groups enjoyed the lab, the students that had learning styles other than hands-on actually showed a higher percentage that enjoyed doing things such as making their own slides. My research was done to see if there were changes that needed to be made in the Botany 200 laboratory. From my research I would conclude that although the laboratory is hands-on, that no student has a disadvantage, and they can all enjoy the laboratory while they learn.

ABSTRACT NUMBER

T-9

Student Author(s): Christopher H. Hooks

Department(s): Zoology

Teaching Mentor(s): Marianne Niedzlek-Feaver/Zoology

Title of Presentation: Assessing the Functionality of Wireless Handheld Computers and Their Effect on Enhancing Student Learning in a Classroom Setting

As an undergraduate teaching assistant at North Carolina State University, I have observed the utilization of the Palm Tungsten T5 handheld computers with wireless Internet access. Through my own observations, research, and student surveys, I then assessed the functionality of these handheld computers within a classroom setting. These handheld computers served three key function: 1) students constructed concept maps using Inspiration software and share them with the class for discussion; 2) students located and accessed articles or images via the Internet, took notes, then posted their notes or essays on a shared class web site for other students study; 3) students critiqued research papers, and then presented their results to the class and incorporated any comments from the audience before they posted their notes on the web. The effectiveness of this technology on student learning was assessed through the use of surveys, student journals, and analysis of student responses to exam questions in which material was covered in Palm-based exercises. I concluded that students preferred both in-class collaboration and the use of the Internet when participating in active learning activities. These activities allowed the students to gain a better understanding of the material through the use of these collaborations and Internet accessibility. Due to the small screen size compounded with daily malfunctions and web browser limitations, the students found the Palms themselves to be undesirable. As a result, I would recommend that any further learning activities, which are designed to enhance the learning experience, should utilize laptop computers instead of handheld computers.

ABSTRACT NUMBER

T-10

Student Author(s): Joy Osborne
Department(s): Zoology
Teaching Mentor(s): Roger Powell/Zoology
Title of Presentation: Teaching Experience in Wildlife Management

As a teaching assistant for Dr. Powell's Wildlife Management class in the fall of 2005, I learned how to become a better speaker and that being prepared for a presentation is important. I assisted Dr. Powell in several aspects of the class, learning that teaching is difficult and admirable. The class taught me that I am able to give lectures, but that I need to work on some aspects of my presentation. All the lectures that I gave were well received, but the one on salamanders seemed to be the best according to the class. I enjoyed the experience and gained valuable information.

ABSTRACT NUMBER

T-11

Student Author(s): Suzanne B. Rhodes

Department(s): Biochemistry

Teaching Mentor(s): James Knopp/Biochemistry

Title of Presentation: Effectiveness of the Third Edition of "Knopp's Knotes" as a Biochemistry Study Tool

Principles of Biochemistry, BCH 451, is an introductory biochemistry course that explores a wide array of fundamental biochemistry concepts including biochemical structures, properties, functions, enzyme kinetics, and various metabolic pathways. "Knopp's Knotes" is a biochemistry workbook used in BCH 451 classes at North Carolina State University, and this workbook proves extremely useful to any introductory biochemistry course at the college level. My honors teaching project consisted of revising and improving the second edition of "Knopp's Knotes" in order to publish an updated and advanced third edition of the workbook. The overall goal of the workbook revision was to create a valuable study tool for biochemistry students by adding more depth and subject matter as well as correcting minor errors in the book. In order to complete my project, I served as a BCH 451 teaching assistant for two semesters with my mentor, Dr. James Knopp. The final additions to the workbook consisted of a two-page student's guide to completing the workbook, 53 multiple-choice format questions, over 15 open-ended questions, and two entire chapters-- a total addition of 35 pages. I conducted two separate surveys throughout the semester in order to evaluate the success of the project. In these surveys, all BCH 451 students were asked to give input on the usefulness of the revised workbook as a biochemistry teaching tool. Furthermore, students were asked to rate the effectiveness and clarity of each section in the workbook. The results indicated that as the semester progressed, there was a significant increase in the number of hours per week that students spent using "Knopp's Knotes" as a study tool. In addition, all sections of the workbook received positive ratings from the students.

ABSTRACT NUMBER

T-12

Student Author(s): Ivonne Silva
Department(s): Animal Science
Teaching Mentor(s): Sarah Ash/Food Science
Title of Presentation: Olive Oil and Cardiovascular Disease

Cardiovascular disease (CVD) is the leading cause of death today. Researchers became interested in the effect of olive oil on CVD risk when cross-cultural studies revealed that people from the part of the world consuming a “Mediterranean diet” had a lower risk of CVD. At first researchers believed that this effect was due to monounsaturated fatty acids (MUFAs) because the olive oil used in cooking the Mediterranean diet is high in them. As scientists delved further into the study of the Mediterranean diet some came to the belief that phenolic compounds (PC), found in olive oil, may play a key role in the apparent reduction of CVD risk. A lot of research has confirmed that olive oils that differ in their PC concentration have varied effects on CVD risk. Olive oils with the highest PC concentration have the most beneficial effects. As further studies continue to explore the relationship between olive oil and PCs and CVD, researchers gain better understanding on how diet may help prevent and treat CVD.

ABSTRACT NUMBER

T-13

Student Author(s): Tyana J. Summers

Department(s): Biological Life Sciences

Teaching Mentor(s): Harold F. Heatwole/Zoology
Betty L. Black/Zoology
Marianne Niedzlek-Feaver/Zoology

Title of Presentation: bioMovies: An Interactive Medium for the Examination of Microscopic Life

Video microscopy has become an essential component towards the dissemination of biological knowledge in the academic setting. As more information is acquired concerning microscopic organisms, there must be an effective means by which these advances are illustrated. A further inquiry was conducted towards the microbial diversity of specific protozoans, metazoans and algae. Optical illumination of the specimens was achieved via the use of a compound light microscope apparatus equipped with a video camera connected to a computer. Utilizing image analysis software such as BTV Pro Carbon and QuickTime Player, enhanced video clips and image stills of the organisms were generated from the input source. As a result of the electronic imaging, further information could be addressed regarding the unique characteristics of the unicellular/multicellular eukaryotes as well as the plant-like algae protists. These videos and image frames provide an interactive venue for students to examine individual features of the microorganisms such as their behavior in response to the given environment, anatomical morphology, symbiotic relationships, respective life cycle stage, mode of nutrition and basis of locomotion.

ABSTRACT NUMBER

T-14

Student Author(s): Chantry Tagalk

Department(s): Biochemistry
Biological Sciences

Teaching Mentor(s): Thomas R. Wentworth/Botany
Kristen M. Rosenfeld/Botany

Title of Presentation: Implementing Active Learning Exercises in a Large Undergraduate Ecology Class

Large, undergraduate survey courses have traditionally been taught by the lecture method. However, evidence suggests that active, rather than passive, learning allows students to encounter new material more readily and construct new knowledge more permanently. We reformed a large, junior-level introductory ecology course by reducing the time spent lecturing and incorporating active learning exercises during the majority of class periods. Work done in previous semesters with active learning exercises indicated that successful implementation of such a program requires a substantial administrative effort. A team of an undergraduate assistant, a graduate assistant, and the faculty instructor resulted in a more successful implementation of this program. The active learning component of the course comprised 10% of the students' overall course grades, consuming between 15-45 minutes per week of 150 minutes of weekly contact time and 2-3 hours per week of administrative supervision. We observed high attendance and high levels of in-class interaction among the students and the instructors. We were impressed with the quality of students' responses, and we found that nearly 100% of students attending class, on days in which active learning exercises were conducted, made conscientious efforts to complete the assignments. Reading the students' responses on these exercises also enhanced our ability to detect and react to student misconceptions. Anecdotal evidence, gathered from students who did well in the course, indicates that the active learning component enhanced the students' experiences in the course by (a) "breaking up" the lecture portion of the course, (b) providing an active method by which to learn the material, and (c) providing additional study tools to be used for exam preparation. Future versions of this course will focus on quantifiable assessment of the active learning component.

ABSTRACT NUMBER

T-15

Student Author(s): Whitney N. Thomas

Department(s): Molecular and Structural Biochemistry

Teaching Mentor(s): Miriam G. Ferzli/Biological Sciences

Title of Presentation: Biology in Large Lecture Settings: Strategies for Enhancing Learning

The traditional format for introductory biology courses is the lecture/lab setting. The problem is that as enrollment in the biology program and in other life sciences increases, the ability of this format to provide interactive and engaging learning experiences decreases. The goal of this project is to explore multiple facets involved in the development and implementation of activities that can enhance learning in large lecture settings by increasing student interactions with the course material as well as with peers. We developed supplemental activities involving problem-solving, web quests, concept checks, and ethical issues discussions to enhance the lecture experience for students taking Biology 181 and 183, the introductory biology course sequence for all biology majors. Teaching aids also made available to students included study and lecture guides, multiple on-line resources and other web tools, all of which were included in the course web site. After completing the various activities, students completed a survey that included both objective- and short-response-type questions. Survey results show that students using the enhanced-learning approach were able to apply their knowledge to real-world scenarios, understand how to find and use web-based information, and learn difficult concepts. Overall, students reported wanting more small-group interactions along with opportunities for exploring the course material in formats other than the traditional lecture. These findings demonstrate the need to continue researching innovative approaches for the teaching of large lecture courses.

ABSTRACT NUMBER

T-16

Student Author(s): Melissa A. Vogeler
Department(s): Animal Science
Teaching Mentor(s): Billy L. Flowers/ Animal Science
Title of Presentation: The Development and Effectiveness of a New Equine Management Lab for ANS 150

In the class, Introduction to Animal Science, ANS 150, students are introduced to a variety of animal species and given hands-on experience through the laboratory. The purpose of this teaching project was to design a new equine management lab for the course; since in the past, the equine lab has not been as interactive as the rest of the labs for the course. The newly designed lab was developed and tested during the fall semester of 2005 and students rated the lab based on the organization of the lab, their enjoyment, the educational value of the lab, and the if the lab adequately prepared them for their lab practical. This information was collected and then compared to the comments made about the old equine management lab in the past years. We also took into consideration the students' level of horse experience when analyzing the data. The results proved that the new equine lab was successful in that the comments from the new lab significantly improved in comparison with those from the last ten years.

ABSTRACT NUMBER

T-17

Student Author(s): Sara Woolard

Department(s): Zoology (Biological Sciences Program)

Teaching Mentor(s): Robert Beckmann/Zoology

Title of Presentation: The Effectiveness of a Voluntary Study Guide and Review Session on Student Understanding of Cellular Respiration

Introductory Biology II (BIO 183) is the second course in an introductory series of basic college level Biology that exposes students to the adaptive strategies used by organisms to survive diverse environments and the role of natural selection in evolving life forms and how they can use skills such as critical thinking and problem solving to understand these concepts. The topics taught in this course lay a foundation for advanced scientific courses many of the students will take in the future such as Genetics, Microbiology, Ecology and Biochemistry. One of the more difficult topics in this introductory course, cellular respiration, was chosen to develop a study aid to assist in establishing a foundation of this introductory Biology topic. A worksheet style study guide was created that incorporated various learning methods with the intention that students would gain a greater understanding for the material thus improving their grades and foundation for future development of this concept. With the aid of the instructor, the study guide was created and given to the students to voluntarily complete using their textbooks and lecture materials. A review session was opened to all students of the class before the exam on the material to go over the study guide, answer any questions or clarify concepts on cellular respiration. 42 of the 202 students attended the session (21% of the class). A survey was taken by students on how effective the study guide and the review session (those that attended) were to learning and understanding the material. Results from the survey illustrated that students found the worksheet helpful. Students attending the review session stated that live explanation and interaction helped in clarifying more difficult concepts within cellular respiration. Using the information from this teaching experiment, future subject specific study guides can be created to aid students' learning.

ABSTRACT NUMBER

T-18

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Department(s): Biochemistry

Teaching Mentor(s): Clay Clark/Biochemistry

Title of Presentation: Programmed Cell Death: A Look at Apoptosis and Autophagy

Autophagy and apoptosis are both mechanisms for human cell death. As a group, we investigated the similarities and differences between these two mechanisms, including mechanical and biological processes. Some of these processes consist of protein functionality as well as the specific medical complications due to under or over expressions of certain genes. To further our knowledge and understanding of these concepts, we examined diseases in which autophagy and apoptosis both play an essential role. The autophagy aspect mainly focuses on the beneficial versus harmful effects of autophagy as it pertains to neurodegenerative diseases, cancer, and the aging process. The apoptosis section focuses on the lack of cell death in cancer. In addition to this, we studied existing and novel treatments to induce cell death in cancerous tissues.

ABSTRACT NUMBER

T-19

Student Author(s): Patrick Marshall Rachel Mueck
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Department(s): Animal Science
Engineering
Zoology
Biochemistry
Biological Sciences
Microbiology

Teaching Mentor(s): Kenneth Esbenshade/Associate Dean and Director
of CALS Academic Programs

Title of Presentation: Ebola: A Survey of History and Research

Ebola is a zoonotic RNA filovirus that affects many species but is especially deadly in nonhuman primates and humans. There are four known strains of Ebola: Zaire, Sudan, Reston, and Ivory Coast. Ebola-Zaire is the most virulent strain to both humans and nonhuman primates, whereas Ebola Reston is asymptomatic in humans. Infection in humans begins with a headache and fever and then progresses to bloody or black vomit and eventually death. One of the most probable modes of transmission in humans is direct contact with bodily fluids or infected persons. Ebola also affects animals due to its zoonotic nature but in most species is asymptomatic. Only nonhuman primates show symptoms from the virus, which makes finding the natural reservoir difficult. Current studies speculate that the most likely reservoir is a species of African fruit bat. There is no standard treatment or vaccine presently available for this virus. Most current research is concentrated on prevention and control of the virus. Future research should focus on the areas of animal infections, treatment options and options for eradication.

