

# ABSTRACT NUMBER

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**Student Author(s):** Catherine T. Boles  
**Department(s):** Biological Sciences  
**Teaching Mentor(s):** Jenny Campbell/Biological Sciences  
**Title of Presentation:** BIO 181 Teaching Project with Focus on the Duke University Primate Center Lab

I participated in a teaching project involving the BIO 181 lab. My activities included working with students, setting up and performing labs, assisting with the teaching responsibilities, writing exercises, and redesigning the Duke University Primate Center (DUPC) lab. This lab entails the students traveling to the DUPC and touring the facility. There, they observe the different lemurs in order to learn about evolution. The lemurs are an excellent example of evolution because they have been geographically isolated for millions of years and have evolved into a wide variety of unique species. However, the students were taking the tour and only learning about a few nominal characteristics about animals they were seeing. They were not receiving information connecting the lemurs at the DUPC with evolutionary concepts they were learning about in lecture. I redesigned the lab to give the students a clearer understanding of this important connection. I also tied in some important ecological concepts that were illustrated well by the lemurs. My efforts included writing a new packet for the BIO 181 lab with background information discussing generalized concepts of evolution and ecology and then relating these concepts to the lemurs of Madagascar. I also worked with the staff at the DUPC in order to coordinate a new tour that involved incorporating evolutionary and ecological concepts into the presentations they gave the students.

**Student Author(s):** Tyrsa L. Creel  
**Department(s):** Zoology  
**Teaching Mentor(s):** Marianne Niedzlek-Feaver/Zoology  
**Title of Presentation:** Multimedia Teaching Aid: Seahorses

Reading, listening, and interacting, all different methods applied to teaching and all used cooperatively in the educational world to teach students effectively. But what resources are available to students which incorporate all these teaching styles? Just a few, which cost more than the average student can afford.

Through personal experience and investigation, I have discovered that the best teaching devices involve multimedia incorporating all learning styles. Multimedia presentations provide the best of all learning experiences while allowing the students to interact and learn efficiently. I am one of many who are working on short multimedia presentations that provide information on anything from introductory laboratory rules and regulations to the biology of all different types of animals. We hope to distribute CDs free of charge to introductory biology courses as a supplement to the material being taught in class and in the lab. Through self-quizzes provided on the CD and evaluations of this product, we hope to learn if this supplemental material is beneficial to teachers and students.

I have chosen to teach the biology of seahorses. I have gained information concerning this animal through specie books, research papers, websites and even a seahorse expert herself, Amanda Vincent, by a video produced by NOVA. Through seahorses, students have the opportunity to look at an extraordinary creature. With their unusual mating behavior, including the gestation and birth completed by the male and the simple fact that these animals are considered fish, students can start to develop an appreciation for the diversity of life in this world. This teaching aid also provides an understanding of an endangered animal and what is being done to protect this mythical creature. In the end, I hope this teaching product will enhance students' knowledge of these animals in the most fun, creative and efficient way of learning.

**Student Author(s):** Emily S. Crowell

**Department(s):** Agricultural and Resource Economics

**Teaching Mentor(s):** Barbara Kirby/CALS Academic Programs

**Title of Presentation:** Enrichment Components as part of the Honors Contract for Introductory Topics in Agriculture and Life Sciences (ALS 103)

Freshmen honors students share various characteristics, including creativity, task commitment, and the ability to excel academically. They also experience various needs as students that can be fulfilled by enrichment activities. By participating in the Honors Contract for Introductory Topics in Agriculture and Life Sciences (ALS 103), students were exposed to Time Management and developing their Four-Year Plan as well as Service-Learning and Research opportunities at NC State University. After conducting a survey of the students, the findings were that students found the Service-Learning, Research, and Four-Year Plan assignments compelling while they were not compelled by the Time Management Assignment. Recommendations for future years, as indicated by feedback from students and observations by the instructors, would be to offer the class as a separate course from the ALS 103 class, listed as ALS 103H, in order to aid with organization and create an intimate atmosphere. Furthermore, we would recommend that the components that the students found to be the most compelling (Service-Learning, Research, and Four-Year Plan) remain part of the course. The other component (Time Management) should be adjusted to better suit the specific needs of honors students so that it enhances time management skills they may already possess.

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**Student Author(s):** Winston J. Garris  
**Department(s):** Zoology - Biological Science  
**Teaching Mentor(s):** Wendell H. McKenzie/Genetics  
**Title of Presentation:** Genetics in Human Affairs Teaching Assistant

Genetics in Human Affairs (GN 301) is a large enrollment course of approximately 700 students per year. This course is unique in that it presents the profound influence that genetics has on not only individuals, but also in society. The instructor, Dr. Wendell H. McKenzie, has numerous responsibilities in addition to his obligations associated with GN 301. These responsibilities often take him out of state and command a large portion of his attention. As a result, it is important to have a coordinating teaching assistant who can assume a leadership position and attend to the minor problems that inevitably arise as a result of routine class procedures and requirements. During the course of the semester I have been available to students through office hours in which I tutor students who are having trouble grasping the concepts presented by Dr. McKenzie, or any guest lecturers who may speak throughout the semester. I host at least one help session per test in which I not only review the material that is important for the test in question but also hold a question and answer session for students still struggling with the material. This presents a wonderful opportunity to not only assimilate information, but to develop and test my ability to be able to present it to other students in a manner that is easily comprehended. My other responsibilities include organizing PowerPoint presentations for the GN 301 lectures, collaboration in writing the tests, and grading papers.

**Student Author(s):** Jessica J. Griffin

**Department(s):** Science Education

**Teaching Mentor(s):** Samuel Mozley/Zoology

**Title of Presentation:** Does Supplemental Instruction in Life Science Courses Help Improve Students' Academic Achievement?

After spending four years at NC State University, I have often questioned the effectiveness of the tutoring programs that are offered to undergraduate students and wondered why some subjects were represented while others lacked representation. The subjects of chemistry and physics are highly represented in supplemental instruction; however, the majority of life sciences, including zoology and biology courses, have no representation.

The objectives for my research were to hold weekly supplemental instruction sessions for the students in Dr. Mozley's ZO 150 lectures, provide support and encourage appropriate study habits and skills while studying life sciences at the university level. Over the course of the 15-week semester I spent an average of 6 hours a week working to prepare for the weekly review session, attending lecture sessions three times a week and conducting the supplemental instruction sessions.

At the conclusion of the semester I calculated the average grades of the students who attended supplemental instruction at least once over the entire semester and compared it to the average grades of the students who did not attend a single supplemental instruction session. The averages that I calculated were based solely on their exam grades for each lecture exam because I did not have the students' final course grades. After calculating all of the research data, the average of the students who attended supplemental instruction was 2.7% higher than the students who did not attend supplemental instruction. The average grade for all of the students in the ZO 150 lecture using only four exam grades was a 74.2%. The students who attended supplemental instruction averaged 75.9%, while the students who did not attend supplemental instruction averaged 73.2%.

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**Student Author(s):** Emma-Catherine Hix  
**Department(s):** Biological Sciences  
**Teaching Mentor(s):** Wendell McKenzie/Genetics  
**Title of Presentation:** Taking the Distance Out of Distance Education

After completing Dr. McKenzie's course, Genetics in Human Affairs (GN 301), a student will have increased their knowledge concerning the principles of genetics. Students will know how to relate those genetic principles to human diversity, development, and disease. Students will also have considered numerous international issues whose solutions would require previous understanding of genetics. As this spring semester's GN 301 Video/Cable Teaching Assistant Coordinator, it has been my responsibility to oversee the work for all Distance Education students enrolled in GN 301. Aside from the typical teaching assistant duties of grading papers, it has been my job to make learning for GN 301 distance education students as easy and personal as possible. By streamlining the process I am able to return student's work faster, and with weekly email updates I have helped personalize communication between myself and the students. Also, for the first time this semester a new question and answer system has been implemented via WebAssign. Known as the GN 301 "Bulletin Board", it is a new method to have student's questions answered instantly, and allows for communication from student to student. Our GN 301 "Bulletin Board" also provides for instant student feedback. For those students requiring one-on-one attention I also provide tutoring. Distance education takes hard work and dedication, and I see to it that such students get the special attention they deserve.

**Student Author(s):** Nolen E. Morton  
Amanda L. Smith

**Department(s):** Zoology

**Teaching Mentor(s):** Samuel C. Mozley/Zoology

**Title of Presentation:** Cladogame: An Exercise in Phylogeny and Cladistics

Zoology's animal diversity course, ZO 150, consists of a comprehensive survey of the earth's current fauna as well as that of prehistory. A large part of the course focuses on phylogeny and cladistics, or the organization of this information based on shared characteristics of the animals and the order in which they diverged from a common ancestor. This is a mass of information that can often overwhelm students. It can be difficult for them to organize the specific topics covered in lecture into a comprehensive understanding of all of the course material. Therefore, we formulated an activity, which offers students a blueprint for organizing the course material which especially facilitates visual and hands-on learning in the form of a tree with interchangeable leaves. The tree form represents a phylogenetic tree while the branch spacing emphasizes cladistics. From opinions gathered in the way of a survey during a focus group in honor of the activity, we conclude that current ZO 150 students would like to have this tool to help them as they study, and former students wish they had had a study tool of this type when they took the course. We also concluded that our activity is quite helpful in organizing the material in a way which is conducive to students' understanding and mental organization of the information.

**Student Author(s):** Kathryn L. Price

**Department(s):** Animal Science

**Teaching Mentor(s):** Liv J. Sandberg/Animal Science

**Title of Presentation:** Effectiveness of Utilizing a Web Page as an Additional Study Aid for an Introductory Hands-on Animal Science Course

ANS 202, Techniques of Horse Care, is an undergraduate course for students with little or no hands-on horse experience. Throughout the semester, students are introduced to several pieces of equine tack and equipment, with only a course packet to use as a reference outside of class. This web page was developed to serve as another study source. The page consists of links to power point presentations (tack, feed, breeds, equipment, and conformation), two practice quizzes, a guest book and a visit counter. Each presentation consists of 20-30 slides with pictures and a brief description of items seen in class. The practice quizzes served as another study aid for the students. The guest book was used to gather feedback about the page. The counter tracked the number of times the page was viewed; recording 122 visits between 10/2/03 and 3/21/04.

To help determine the usefulness of the web page, students were given a pre and post questionnaire regarding their familiarity with horses and the Internet. Pre questionnaire questions included: level of comfort with horses; none (6.25%), very little (50%), some experience (18.75%), or extensive (25%); level of comfort working with the Internet; comfortable (93.75%) or not comfortable (6.25%); is a web page for the course a good idea; yes (100%) or no (0%). Post questionnaire questions included: did you use the web page; yes (66.67%) or no (33.33%); was it a useful study aid; yes (66.67%) or no (33.33%); was it easy to use; yes (66.67%) or no (33.33%). At the end of the semester, 8 of 16 students verbally said they used and liked the web page. The web page appears to have been successful in providing an additional study resource outside of the class period for students enrolled in ANS 202.

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**Student Author(s):** Joseph C. Procita  
**Department(s):** Biological Sciences  
**Teaching Mentor(s):** Lisa D. Parks/Zoology  
**Title of Presentation:** Development of a Biology 183 Lab with Time Constraints: Group Experiment of Bacterial Growth Under Student-Chosen Variables

Brought about by a need for laboratory experimentation that can teach the same principles of an already established experiment, but under the time constraints of summer sessions one and two (five weeks each), this experiment utilizes rapid growing organisms in place of the plants and flowers used in the Phytotron lab. In Biology 183 Lab, students learn how organisms meet common challenges in diverse environments, critical thinking, problem solving, experimental design, and effective communication. All said aspects are taught in this ongoing experiment through the duration of a semester, which culminates in a PowerPoint presentation on the results: complete with pictures, graphs, charts, and a conclusion. Twelve different species of bacterium were selected from Carolina Biological Supply Company, researched, and predictions were made as to how each would react in five different variables. The five variables that the students could elect to test are: various nutrients in agar, aerobic versus anaerobic conditions, antibiotic susceptibility, sugar response, and temperature fluctuations. The actual project parallels the basic layout of the already used Phytotron experiment to ensure that when used, none of the goals of the class would be lost. Students are afforded the opportunity to choose their own bacterium from a list, choose which variables they want to test, and collect their own data two to three times a week. Students will not only learn about different microorganisms, but also proper microbiological testing techniques, data collection, teamwork, and presentation skills. All of the above goals and learned skills will prove to be useful as they continue their undergraduate studies at North Carolina State University.

**Student Author(s):** G. Ryan Rieser  
Courtney R. Bass  
Trent M. Bishop

**Department(s):** Biomedical Engineering  
Zoology  
Biology

**Teaching Mentor(s):** Robert Grossfeld/Zoology

**Title of Presentation:** Spinal Cord Injury and Repair, Honors Teaching Project

Spinal cord injury is a devastating event that can affect many physical and emotional aspects of a person's life. The topic is very broad, requiring consideration of causes and consequences of injury, molecular, cellular and physiological approaches to repair and regeneration, rehabilitation, development of neural prostheses, and social/political/ethical issues relevant to promoting recovery. There currently exists no course offered at N. C. State that covers this material. The purpose of our honors teaching experience was to develop and teach a course covering this topic to other honors students. The main objectives were to help the students understand the structure and function of the normal and injured spinal cord, the effect of a spinal cord injury on an individual's life, current research approaches to repairing the spinal cord and rehabilitating the patient, and how ethical and political issues affect progress in applying research findings to medical practice. The majority of the course content was gathered from textbooks and articles from peer reviewed scientific journals. In ALS 498H, during the fall 2003 semester, the information was collected and synthesized into Power Point lecture presentations, which were rehearsed with the other course instructors, critically reviewed, and edited. During this spring 2004 semester, the presentations have been fine-tuned, rehearsed, and revised before presentation to the class. The value of the course is being assessed through student research papers and oral presentations, results on two exams, and final student course evaluations.

**Student Author(s):** Tiffany A. Root  
**Department(s):** Animal Science  
**Teaching Mentor(s):** Bob Harrell/Animal Science  
**Title of Presentation:** Performance of Animal Science Majors vs. Non-Majors in ANS-150: Introduction to Animal Science

The objective of this project was to evaluate performance of students in ANS 150 by major and class. We expected students in our curriculum to outperform students from other curriculum, particularly upper classmen. Students (n=104) in the spring semester of ANS 150 were separated into classifications of major (Animal Science Major vs. Non-Major) and by class (freshman, sophomore, junior, senior). Performance of students was evaluated from two in-class exams and two laboratory practicals. Test questions were identified prior to examination time as either Animal Science-based or General Biology-based. The laboratory practical was assumed to be entirely hands-on Animal Science material, in the same classification as an Animal Science-based question on a lecture test. Upper classmen outperformed lower classmen on the Laboratory Practical. In general, students had higher scores on Animal Science-based questions than General Biology-based questions. All majors performed equally well on Animal Science-based questions and General Biology-based questions. In conclusion, student majors did not affect performance in an Animal Science course, but upper classmen had a greater level of performance in a Freshman level course.

**Student Author(s):** Christy L. Shelby

**Department(s):** Biological Sciences  
Spanish Language  
Psychology

**Teaching Mentor(s):** Marianne Niedzlek-Feaver/Biological Sciences

**Title of Presentation:** BioMovies: Enhanced Learning Through  
Technology

For my project I worked with BioMovies to design interactive media for use in science classrooms. Media was captured via video and digital camera, often in combination with microscopes. Captured video and picture was then enhanced using Apple's Quick Time Virtual Reality Studio, Adobe Photoshop, Final Cut Pro, and various other software editors. I worked in collaboration with previous developers on an interactive 360° rotational microscope, with "hot spots" leading to demonstrational videos for such topics as fine and coarse focus, slide preparation, and lens adjustments. I also began work on a video describing sexual dimorphism and nesting habits of birds, editing footage previously taken by faculty members.

**Student Author(s):** Ashley Swinson

**Department(s):** Biological Sciences with a Nutrition Concentration

**Teaching Mentor(s):** Sarah Ash/Animal Science

**Title of Presentation:** The Effectiveness of Peer Advice Versus an Instructor's on Test Performance

This project was performed with Dr. Sarah Ash and focused on the NTR 301, Introduction to Human Nutrition class. Issues related to test preparation can, at least in theory, have positive effects on students' testing abilities, whether it be studying further in advance, or reviewing material a class offers as study guides. Instructors always give their own advice on how to prepare for a test; however, students do not always seem to take that advice to heart. Our thought is that by providing students with their peers' comments regarding the strategies that they did or did not use and how they think that impacted their successes or failures on tests may help future students perform better. First we needed to know how students currently enrolled in the class felt about their performance on a test, how they had studied for it and what they would do differently for future tests. So we did our initial research in the fall of 2003, taking a mid semester survey after the students took test 1. Our objectives for this survey were to see the differences in test preparation between those who said they did better and those who said they did worse than they thought they would on the first test. We assumed that those who did better would be more likely to report the types of study habits recommended by the instructor. We wanted to use these differences to illustrate to the students in the next semester's class how choices of study methods could influence things such as whether the test questions seemed tricky, and we also wanted to see what changes the students would make in the future. After gathering this information for the ALS 498 portion of the project we handed out an overall report of the differences among the students that was handed out before the first test in the spring of 2004. We then did another mid semester survey in the spring class regarding their perceived effectiveness of the peer advice. We hope this will tell us whether peer advice regarding study techniques are considered more valuable to students than suggestions from the instructor.

**Student Author(s):** Lindsey E. Viens  
**Department(s):** Biological Sciences with a Nutrition Concentration  
**Teaching Mentor(s):** Sarah Ash/Animal Science  
**Title of Presentation:** Learning to Think Critically

Thinking is a natural process that we all do. But much of our thought does not think deep enough to ask the questions needed to see all sides of a situation. The objective of this teaching research was to introduce the students of NTR 419, Nutrition and Disease, to the principles of critical thinking. To begin, I read through *The Miniature Guide to Critical Thinking Concepts and Tools* by Linda Elder and Richard Paul, which illustrates the elements of thought that leads one to raise the important questions and issues involved in a situation. The students in NTR 419 were given articles to read and then were asked to find the main points in these articles. I graded these papers using *The Miniature Guide to Critical Thinking Concepts and Tools* as a guide to give feedback to the students to begin to teach them the questions they need to raise when trying to find the main point of an article. Towards the end of the semester, the students were asked to answer some questions concerning this process of learning through feedback. From the questionnaires, the results showed that the majority of the students appreciated the feedback and actually found it helpful. As I graded the papers, I did not see a lot of improvement. To improve this process of learning, I think one should give a guideline to the students that will tell them the key elements of critical thinking. Once doing this, the students will have a better idea of what critical thinking is and how to assess the main points in an article.

**Student Author(s):** John D. Waldrep  
Ashley Weaver

**Department(s):** Materials Science and Engineering  
Animal Science

**Teaching Mentor(s):** John G. Vandenberg/Zoology

**Title of Presentation:** Possible Health Risks of Endocrine Disrupting  
Chemicals in Commercial Plastics

Since their discovery approximately 150 years ago, use of manmade plastics has dramatically risen to affect nearly every aspect of modern life, as their unique and highly modifiable properties afford many advantages. Such advantages include ease of processing, availability, ductility and low weight. As such, plastics have augmented and replaced the use of traditional materials in such areas as sanitary food containers, medical applications, and molded components, often enabling new technologies. Though copious amounts of research have been put into the chemistry of their production and although chemical inertness is generally associated with many plastic materials, many questions remain about the biological activity of the chemicals used in their production. While more classic forms of toxicity have been avoided, the more insidious threat of endocrine disruption has recently been considered. One polymeric chemical that has received a lot of investigation as a potential endocrine disrupting chemical (EDC) is Bisphenol A (BPA). BPA is the monomer of the widely used plastic, polycarbonate, and bears a resemblance to the notorious drug DES. BPA has clearly been shown to leach heavily from mistreated polycarbonate caging materials for mice, and similar exposure levels have been linked with a multitude of problems in lab animals, including increases in meiotic aneuploidy, mortality, reproductive tract tumors, proliferation of MCF7 breast cancer cells, as well as reduced litter size and altered maternal behavior. The question of whether EDC's in plastics pose a human health risk is a complex and ongoing one. The FDA maintains that all "food contact surfaces" on the market have been determined to have "levels well below" those for toxic effects in animal studies based on available knowledge. However, there are several steps cautious consumers may wish to take based on current evidence, until a more complete picture is obtained.

**Student Author(s):** Mary K. Williams  
**Department(s):** Biological Sciences  
**Teaching Mentor(s):** Robert Beckmann/Biological Sciences  
**Title of Presentation:** New BIO181 Enzymology Lab Procedures

In BIO 181, students perform many introductory labs to familiarize themselves with biological concepts and become more comfortable in a laboratory setting. One lab deals with the subject of enzymes and rates of reactions involving enzymes. In this lab, students test the effects of the enzyme lactase on different sugars by measuring the amount of glucose produced in the breakdown of the respective sugars by this enzyme. Currently, the glucose amount is measured with a common instrument, the glucometer, which is used by diabetics. Since these instruments are not standard laboratory instruments and are not capable of accurately detecting glucose in the levels as low as these reactions produce, it is evident that this lab is in need of a different design that allows for more accurate quantitative measurements of glucose. One way to more accurately measure glucose is through a color change produced by a glucose assay reagent in the presence of glucose. This color change may be measured through a spectrophotometer to obtain the absorbance of a solution and then compared to a standard curve of known concentrations of glucose. Through this new protocol, students are not only given the opportunity to gather more accurate data, they are exposed to one of the most fundamental instruments in a laboratory setting – the spectrophotometer. To enhance this enzymology lab, I would like to add in a second part, involving a microbiological aspect of enzymology. Some bacteria produce enzymes known as proteases that break down proteins. To illustrate one way in which proteases work, the students would use basic microbiological methods to plate bacteria on milk agar. Those bacteria that utilize proteases, specifically those that break down the protein caseine found in this agar medium, would create clear patches in the milky agar.

**Student Author(s):** Elizabeth K. Wilson

**Department(s):** Biological Sciences

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

**Title of Presentation:** Development of an Honors General Microbiology Laboratory Supplement for the Identification of Unknown Antibiotic-Producing Microorganisms

One of the laboratory modules previously featured in the Honors Microbiology Laboratory course (MB 352H) at NC State University involved the isolation of antibiotic producing organisms from soils. In the original design of this laboratory module, the nature of the antibiotics produced by the soil isolates were determined by the students; however, there were no attempts to actually ascertain the identity of the antibiotic-producing organisms. Since being able to identify the isolated organisms would significantly enhance the teaching goals of the original laboratory module by introducing students to current molecular biological techniques used in microbial identification, an addition to the module was designed for this purpose. Organism identification was achieved by amplifying the 16S or small subunit rRNA from the genomic DNA of the unknown organism. The 16S rRNA fragments were sequenced using a commercial sequencing service, and the identities of known and unknown organisms were established by comparing the 16S rRNA sequences to 16S rRNA sequences in a database maintained by the National Center for Biotechnology Information (NCBI). The procedures developed for the unknown identification project involved modification of several standard molecular biology kits to improve procedure reliability. Also, modifications to the project were made so that the module addition fit within the time constraints of the existing MB 352H course. In the Fall 2003 semester, several MB 352H students performed the 16S rRNA isolations for identification of their unknown antibiotic-producing organisms.