Provost's Learning Innovations Grant for Faculty
Request for Full Proposal
2000-2001

Please send your completed grant proposal (4 pages, plus attachments), one original and
 eleven copies, to
Linda Banford, 4000 Eastman
by 4:30 p.m.
Monday, March 6, 2000.
No hand written proposals will be accepted.
Notification of awards will be made by Monday, April 17, 2000.

Project Title:

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Applicant(s):

Name: Dr. Robert Rothman ________________________________  Telephone: 475-5215
Department: Biological Sciences __________________________  College: College of Science

Name: Dr. Larry Buckley ________________________________  Telephone: 475-7507
Department: Biological Sciences __________________________  College: College of Science

Name: ________________________________  Telephone: __________
Department: __________________________  College: __________

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Department: __________________________  College: __________
Summary of Proposed Project:

The laboratory associated with the Vertebrate Zoology course in the Department of Biological Sciences involves dissection of multiple representatives of each major group of vertebrates (fish, amphibians, reptiles, birds, and mammals). In this project, we propose to create a digital image bank of dissected specimens that can be accessed from the web. These images can be used by the students to prepare for class prior to the lab, as a dissection guide during the lab, and as a study guide prior to lab practical exams. We feel that this web-based approach is unique and directly in line with RIT’s interest in developing new, and web-based teaching techniques. The goal of these dissections in Vertebrate Zoology is that students be able to identify various anatomical structures and compare them to understand patterns of character evolution.

The ability of students to fully understand each dissection depends upon them having an adequate dissection guide. However, the dissection guide for the course, indeed, all of the dissection guides currently available, make use of line drawings which are only helpful for general identification of structures, but are inadequate in communicating the true complexity of the anatomical relationships required for the comparative approach we employ. Additionally, evaluation of students’ understanding of the dissections is through a laboratory exam, often weeks after the original dissection. While of some help in identifying structures at the time of dissection, line drawings are not especially helpful to the students as a study guide for lab exams. In general, Dr. Buckley, who teaches the course, has observed that students tend to do about 5% better on lecture exams than on lab exams.

Given the expense of the specimens and the amount of time and space necessary to dissect them, the project will be carried out the next time that the Vertebrate Zoology course is in session, winter quarter, 2002, and developed as the course progresses. We would like to hire two students who, under Dr. Buckley’s supervision, will photograph specimens as they are dissected. By doing it during class time, there will be lots of dissected specimens to choose from, ensuring the best photographs possible. Then, under the supervision of Dr. Rothman, the two students will label the photographs and create the web site.

The first time through, therefore, the photographs will not be available for pre-lab and in-lab use, but they will be available for post-lab study. In the following year, 2001/2, the web will be fully available. The students will be required to use the site in a variety of ways. The laboratory, indeed the entire College of Science, is wired for web access, and the Department of Biological Sciences is making available to students a networked computer to be used in the Vertebrate Zoology teaching lab. This computer will be in the lab during the class sessions so that the students can have the photos available during the dissections. The digital image archive will also be used as the basis for a weekly quizzes, thereby encouraging students to use the site outside of class as well.

Targeted Learners:

The targeted learners are students in the Vertebrate Zoology course, a sophomore-level course that is required of all Biology majors. Biology majors represent about half of the majors in the Department of Biological Sciences, and 40-50 students enroll in this course each year.
Anticipated Impact on Teaching And/or Learning

In a typical laboratory setting, the instructor goes from station to station, asking and answering questions and giving advice. This one-on-one interaction is an important part of laboratory teaching, but often, the questions are repetitious and could be handled in a much more efficient manner. Once the images are available on the web, the instructor would be able to call up the images, project them on a screen and answer the basic questions with the class as a whole. If the most basic and repetitious of the questions can be handled this efficiently, it would leave more time during the one-on-one sessions to hold a higher level of discussion with individual students.

The use of real photographs of dissected specimens in addition to line drawings imparts a much more precise depiction of structures during and after lab meetings than does the current use of line drawings alone. Line drawings tend to be relatively inaccurate diagrammatic representations of anatomical structures, whereas photographs offer exact representations of material students examined in class.

How Will You Measure Impact / Report Findings / Share in Faculty Forum

The Vertebrate Zoology course has been taught three times since the new two year Biology core curriculum was introduced. As noted above, it has been Dr. Buckley’s observation that students consistently show a 5% higher class average score on lecture exams compared to lab exams. Students commented that pretest study guides for lecture helped significantly. There are, however, no pre-lab exam study guides available. An on-line image archive and quizzes will serve a this purpose, exposing students to exam material exactly as it will appear on a lab practical exam, as compared to the current use of line drawings which are diagrammatic rather than exact representation of tested material. Once the project is complete, and has been evaluated, it will be presented as a model of lab instruction during a department meeting, or at our annual summer retreat.

Rationale

A. Why Is it Not a Part of Regular College Business

For one of the investigators, (Dr. Buckley), the project is clearly a part of his normal college duties, as it will be carried out during the Vertebrate Zoology course, and he is not asking for release time. For the other (Dr. Rothman), the Vertebrate Zoology course is outside of his normal teaching duties. The approach originated when Dr. Rothman was teaching the non-majors general biology lab during the 19984 summer session. In that lab, the students were dissecting fetal pigs and were having a difficult time with the dissection guides. Dr. Rothman was also interested in exploring the quality of digital images of dissection specimens and arranged for several students to dissect and photograph pigs as an independent studies project. We now have a large archive of such images, but it is so time consuming to catalog, edit, and label the images, and to create web pages, that all that has been possible is the small pilot site: www.rit.edu/~rhrsbi/projectpig.html
B. Its Relevance to Required Competencies

As noted in the summary, the Vertebrate Zoology course is required of all Biology majors, which would equal about half of our sophomores.

C. Relevance to Other Faculty

This project can serve as a model for any descriptive lab course that makes use of specimens as part of the laboratory activities. It can easily be applied to the Invertebrate Zoology and Botany courses, and to specific labs in the first year and non-majors biology sequences.

D. Relevant Credentials of Faculty

Dr. Larry Buckley is an Assistant Professor in the Department of Biological Sciences. He is responsible for the Vertebrate Zoology course and is a major computer resource person within the department. His research on evolution of iguanid lizards includes the creation of a digital archive of museum specimens involved in his research on their comparative morphology. Dr. Robert Rothman is a Professor in the Department of Biological Sciences and a 1998 Eisenhart Award Recipient. He teaches the Vertebrate Evolution course and he and Dr. Buckley are the two experts on comparative vertebrate anatomy within the department. Dr. Rothman was a Faculty Associate in the Center for Digital Media in 1997 and created an interactive CD-ROM of images for Vertebrate Evolution. He has also created a complex web site for his annual Galapagos trip and a site for the Freshman Symposium course. Dr. Rothman is chair of a committee that is making an on-line legend for the artwork on the floor of the atrium in the Gosnell Building.