

## Final Academic Technology Grant Report 2008

**Project Title:** Enhancing Zoology with Digital Technology: Digital Microscopes and the Production of the DVD Manual, "A Practical Laboratory Guide to Invertebrate Structure, Function and Behavior"

**Project Type:** Professional Development Grant

**Principal Investigator:** Dr. Rick Hochberg, Assistant Professor of Biology, University of Massachusetts Lowell

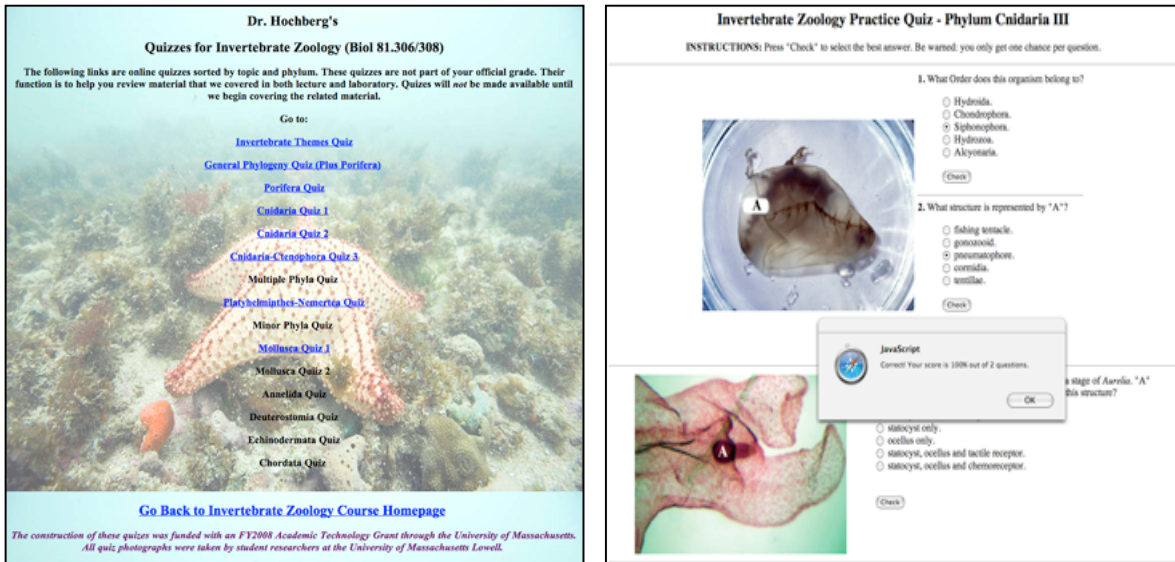
**UML Student Investigators:** Graham Lilley, Ryan Brown

The original purpose of the AT Professional Development Grant was two-fold: 1) construct a DVD of images for use by students in courses in Invertebrate Zoology and Advanced Invertebrate Zoology at UML, and 2) make photomicrography available to these students to improve their learning experiences. Partial funding of the project meant a scale back in how the images were to be delivered to students in the two courses. The AT Grant reading committee recommended that the product be made available on the web instead of DVD, thus insuring greater accessibility for the students. I followed this recommendation.

To begin, I hired two undergraduate students, Mr. Ryan Brown and Mr. Graham Lilley, over the summer of 2007 to photograph invertebrate specimens and microscope slides. The students amassed over 1000 images to be used in the construction of the DVD. However, as mentioned, partial funding did not allow us to produce DVDs. Instead, we made the photographs available via the Internet. With the help of both students, we designed a website linked to the professor's course homepage of Invertebrate Zoology. The images were categorized and made available to the students of Invertebrate Zoology in fall 2007. However, a poll of the students in that class indicated that they found the images by themselves of limited use. Instead, the students recommended that the images be used to produce online quizzes (non-graded). After some deliberation and additional recommendations by the students, we designed a series of online webpage quizzes for the course (see Fig. 1).

The online quizzes were not completed until spring 2008, so polling data on the effectiveness of the quizzes remains to be determined for that course. However,

undergraduate and graduate students in Advanced Invertebrate Zoology were directed to the website and provided valuable input that improved course web design. The webpage quizzes are designed as multiple-choice questions that require students to identify the name/structure/lifestage of a particular species or group of animals. Once they select their answer, they press the “Check” button to see if they are correct. Their total score (% correct) is displayed as they move through the quiz.



**Figure 1.** Homepage (left) of the Invertebrate Zoology online quizzes. An example (partial view) of a quiz is on the right. The homepage web address is: <http://faculty.uml.edu/rhochberg/hochberglab/Courses/InvertZool/quizes/Quiz Page.htm>.

The second part of the project – to make digital photomicroscopes available to students in select courses – was delayed due to backorder of the microscopes, so they were unavailable to students in Invertebrate Zoology. However, the microscopes arrived in time for Advanced Invertebrate Zoology in spring 2008. The students in this advanced course (Parasitology) used the microscopes to photograph dissections and slide specimens for use in their notebooks. This exposure to digital photomicrography was novel to most students in the course. They found it to be a unique and innovative approach to construct a notebook and study for an exam, and all students appreciated that

this technology was finally made available to students that do not work in a research laboratory (where such technologies are generally only present). Many students gained valuable experience in not only producing digital photomicrographs, but also labeling those photomicrographs, which is similar to what is done for scientific publications. By the conclusion of the course, the digital stereomicroscope provided the best images and proved most useful for the course. The compound microscope had numerous software problems and was therefore sent back to the warehouse several times for replacement. Both microscopes are now available for student use in Olsen Hall 509, and will be ready for students in fall 2008.

While the original purpose of this grant was to make DVDs available for students' personal use, the outcome proved to be much more effective and economical. The online quizzes are much easier to update than are DVDs and do not require students to possess a DVD drive on their personal computers. Additionally, students in Olsen 509 can now use the digital photomicroscopes to take photographs of material that is relevant to any course that utilizes the classroom (Invertebrate Zoology, Advanced Invertebrate Zoology, Marine Biology, Immunology, etc).

As stated, the production of online materials versus DVD materials was also a more economical method of making the material available to students. To date, only \$5855.29 of the original \$6645.00 has been used. The remaining \$789.71 is to be relinquished back to the President's Office.

I would like to thank the AT Committee for providing me the opportunity to improve the organismal courses here at UML. I expect the online quizzes and digital microscopes to greatly improve student interest in the courses, and I predict that student use of these technologies will highlight UML's commitment to improving undergraduate education.