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Computerized Pre- and Post-lab Assignments on LON-CAPA

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Abstract

LON-CAPA is a free, online course management system that instructors can use to create individualized quizzes, assignments, and exams for any type of course. In the fall 2008 semester, we used LON-CAPA to administer online assignments in two courses: a nonmajors biology class and an introductory zoology class. This workshop demonstrated how LON-CAPA works, showed some of the many types of questions an instructor can create in LON-CAPA, described LON-CAPA's strengths and weaknesses, and presented results from both courses for the fall 2008 semester.

Instructor's Notes

What Is LON-CAPA?

The acronym LON-CAPA stands for Lecture/Learning Online Computer-Assisted Personalized Approach. This teaching tool originated in a physics class at Michigan State University, but it has evolved into a free, open-source course management system that gives instructors in any discipline the ability to post materials, record grades, and create discussion boards. Other course management systems have similar features, but LON-CAPA has something the others do not: the ability to create randomized homework assignments with sophisticated question types, well beyond the standard formats (multiple choice, true-false, and fill-in). For many question types, LON-CAPA can generate a huge number of unique variations, so that each student receives a different version of each problem and assignment.

LON-CAPA is free to universities and other schools that can host the system on a dedicated server. For those that are unable or unwilling to devote a server to LON-CAPA, a company called eduCog can initiate, host, and maintain courses using LON-CAPA. Fees depend on course size.

LON-CAPA at the University of Oklahoma

At the University of Oklahoma, we have used LON-CAPA in two courses: Introduction to Zoology (ZOO 1114) and Concepts in Biology (BIOL 1005). ZOO 1114 is a mixed-majors course without a lab. Enrollment was around 900 students in fall 2008. BIOL 1005 is a non-majors course with a lab, with an enrollment of about 70 students in fall 2008.

The two courses used LON-CAPA in different ways. In ZOO 1114, twice-weekly LON-CAPA assignments replaced weekly online quizzes on WebCT. In BIOL 1005, weekly LON-CAPA pre- and post-lab assignments replaced weekly in-lab quizzes on paper. The new pre-lab questions on LON-

CAPA focused on the objectives, equipment, procedures, relevance, and logic of the experiments to be completed in that week's lab. Post-lab questions typically asked students to interpret sample results.

The Pros and Cons of LON-CAPA

LON-CAPA has many advantages for both ZOO 1114 and BIOL 1005. First, we found that a team of extremely helpful people, including instructors who use LON-CAPA and the technical people who actually run the system, supports LON-CAPA. Second, LON-CAPA had no problem handling the enormous class size of ZOO 1114, even as students rushed to turn in assignments at the last moment. Third, we appreciated the flexibility of LON-CAPA; if you can imagine a question that you want to ask students, there is a way to administer the question in LON-CAPA.

The shared resource pool is a fourth strength of LON-CAPA; instructors at more than 70 schools have contributed to a pool of questions related to biology and other natural sciences. LON-CAPA users can either use the questions directly or modify them to suit their own courses.

A fifth, unanticipated benefit is the LON-CAPA discussion board, in which students helped one another with specific questions, especially in ZOO 1114. Students learned very quickly that asking their peers something like "Is the answer C?" was unproductive when each student received a unique version of a problem. Instead, the discussions typically focused on working through course material and learning from each other's expertise.

Sixth, LON-CAPA generates a lot of data about question difficulty that could be useful for Just in Time Teaching (JITT). In one version of this teaching technique, an instructor can shape his or her lecture based on topics that students found most difficult, rather than spending class time on topics that students can learn on their own time. We have not yet attempted this technique but are interested in trying it in the future.

Most importantly, LON-CAPA worked. In ZOO 1114, student performance on LON-CAPA homework problems correlated better with exam grades than did performance on online quizzes in WebCT, indicating that the question types in LON-CAPA really do help students learn material. No such comparison was possible for BIOL 1005, but students reported spending an average of 24 to 76 minutes on pre-lab assignments, and between 7 and 26 minutes on post-lab assignments. Anecdotal evidence suggests that students spent more time completing pre-lab assignments on LON-CAPA than students in previous semesters spent studying for quizzes; moreover, the time spent was more focused on the most important things to understand before the lab.

The benefits of LON-CAPA are certainly substantial, but the system has some significant drawbacks. LON-CAPA is visually unappealing to both instructors and students. It is also difficult for a beginner to get started, with little indication about where to begin, how to create assignments, or how to create questions. In addition to overall organization, some of the terminology in LON-CAPA is different from every other course management system; small differences like using "weight" instead of "points" make LON-CAPA hard to understand, at least at first. The help materials offered little assistance; they seem to be written by and for experts. If we had not had LON-CAPA experts show us how to create assignments and write questions, we would have been lost. As it was, we continued to use Desire2Learn

(BIOL 1005) or WebCT (ZOO 1114) for other course management functions, such as posting grades and delivering course announcements.

Conclusions

In our opinion, student outcomes in both ZOO 1114 and BIOL 1005 justify the continued use of LON-CAPA at the University of Oklahoma. LON-CAPA offers a powerful, flexible way to generate unique questions that enhance student learning in ways that we have been unable to achieve using other course management systems. Both courses will continue to use the system in the future, and we recommend it to others. For instructors who are contemplating the use of LON-CAPA in your own classes, however, we suggest allowing plenty of time to set up, learn, and troubleshoot the system.

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Resources

eduCog website: www.educog.com

LON-CAPA website: www.lon-capa.org

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Doug Gaffin is a professor in the Department of Zoology and Dean of University College at the University of Oklahoma. He holds a B.S. degree from UC Berkeley and a Ph.D. from Oregon State University. Dr. Gaffin teaches Introductory Zoology to about 1200 undergraduates a year. He has received numerous university-wide and national awards for teaching. He is also past-president of the Association of Deans and Directors of University Colleges and Undergraduate Studies. His research focuses on understanding the special sensory abilities of scorpions.