Effective use of course management systems to enhance student learning: Experimental Biology 2007

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1 Memorial University of Newfoundland, St. John’s, Newfoundland, Canada; 2 Mohave College, Lake Havasu City, Arizona; 3 Universidad de Santiago de Chile, Santiago, Chile; 4 Indiana University, Bloomington, Indiana; and 5 University of Maryland-Baltimore County, Baltimore, Maryland

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Kibble JD, Kingsbury J, Ramirez BU, Schlegel WM, Sokolove P. Effective use of course management systems to enhance student learning: Experimental Biology 2007, Adv Physiol Educ 31: 377–379, 2007; doi:10.1152/advan.00064.2007.—Course management systems are software packages that support teaching and learning by providing web-based tools, services, and resources. Electronic course management can facilitate course organization, teaching delivery, communication, collaboration, and assessment. This article reports on a symposium on the use of course management systems, presented by the Teaching of Physiology Section of the American Physiological Society, at the Experimental Biology Meeting of 2007.

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The goal of the symposium was to showcase examples where course management systems were used to engage student learning. Beatriz Ramirez challenged the assumption that students come to universities with sufficient levels of skill and confidence to use online tools productively for academic studies. Incorporating simple online tasks into a program of team activities significantly increased student confidence in their use of internet resources. Phillip Sokolove demonstrated several types of online discussion boards, with the aim of extending collaborative learning outside the classroom. Examples included open discussion, in which students answered each other’s questions, with minimal facilitation from faculty members. Other examples included discussions based around study problems posted by faculty members and peer review of abstracts posted by students. Participation rates were high, and attitudes toward the experience were positive. Whitney Schlegel was also successful in using a course management system to foster collaborative learning. Small teams of students developed portfolios throughout a semester. Team portfolios were made visible to the whole class through the course management system. Attributes of successful student teams were also documented. Jeffrey Kingsbury demonstrated how using a course management platform can help integrate laboratory experiences into a program of anatomy and physiology. Students were able to experience virtual dissections, together with other course materials, via a course management system. Examination outcomes were positive, and the intervention met with a high degree of student acceptance. The symposium reinforced the importance of active learning strategies in general and how course management systems can facilitate their incorporation into a teaching program.

Electronic Course Management: a Tool for Improving Student Skills?

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It is a popular belief that students that are currently accepted at universities are competent internet users because they can search the internet for school homework and communicate socially by e-mail. However, teachers at our Faculty of Medical Sciences complain about the difficulty in getting first-year students involved in the use of internet sites for learning. So, either students are not skilled or they do not use their abilities for academic purposes. This situation was evaluated in the second-year group of students that took my Physiology course.

The grading system used in this course is flexible, because students may get the final grade through mandatory individual tests only or get 0–20% of it by participating in team activities (laboratories, case analysis, and problem solving) for which each group participant gets the team grade and/or a participation mark. Last year, requests to answer three “online” questionnaires and to upload a photo were added to the team activities (for participation marks only). Because team grades are usually high, students should be eager to individually access the course website to make these latter tasks.

The effect of the intervention was evaluated by comparing the results of self-evaluation of internet skills applied at the beginning and end of the Physiology course. Eighty-five percent of the students answered both surveys. Student internet literacy was improved mainly in file uploading (bad: 45% decreased to 8%) and online test performance (bad: 82% to 23%) but also in the ability to find websites, download files, and perform critical web searches (bad: 20% to 2%).

These results clearly indicate that students must learn the use of internet for learning, despite that fact that they may be skilled in its social use. Technology incorporation in teaching may provide training to develop such skills.

Electronic Course Management as a Tool to Facilitate Collaborative Learning

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Online collaborative learning can be facilitated by effective use of discussion board forums on the Blackboard (or other) course management system (2, 3). In the introductory majors
course Biol 100 taught at the University of Maryland-Baltimore County, large-enrollment (n ~ 260–290) lecture sections are taught by the author (P. Sokolove) in both the Fall and Spring semesters. In both classes, a variety of teaching approaches are used to engage students in “active learning,” but permanent collaborative learning groups (“teams”) are a feature only of the Spring section. The Blackboard discussion board is set up at the beginning of each semester with two major forums centered on student questions: a “content questions” forum and a “procedural questions” forum. Students post their questions about course content and concepts (resulting from either the lecture or textbook or from another source such as a newspaper article or news broadcast) or on course procedures (and exam question disputes), and other students are encouraged to answer. No point credit is given for participation in the discussion board exchanges, but at the end of the semester, students in the top 10% of online participants are automatically given the higher course grade if they are on a grade borderline. No or minimal participation of the instructor or teaching assistants is essential to maintain a moderate to high frequency of student interactions (2). Two other forums found to engage students in online collaborative learning include an “abstract” forum and a “preexam study questions” forum. Survey data indicate that the Blackboard discussion board is regarded positively by a majority of students in both the Fall and Spring semesters, but significantly more students in the Spring semester rate it as positive. Likewise, Blackboard statistics show a consistent and significantly higher frequency of postings by students in the Spring versus Fall semesters on the content questions and procedural questions forums.

Investigating the Intersections of Teaching and Learning by KEEPing Faculty Practice and Student Learning Visible
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The KEEP Toolkit (http://www.cfkeep.org/) developed by the Carnegie Foundation for the Advancement of Teaching and Learning (http://www.carnegiefoundation.org) has supported a community of scholars from diverse institutions and disciplines investigating the intersections of teaching and learning and has contributed to the building of the field of the scholarship of teaching and learning by fostering a visual and virtual “Teaching Commons” (4). Faculty members have extended their engagement with the KEEP Toolkit to their students, developing frameworks and prompts within the tool to scaffold course and curricular goals for student learning and linking student learning directly with faculty pedagogical intentions (Fig. 1) (example: http://www.cfkeep.org/html/snapshot.php?id=47771375298287). Electronic portfolios developed by students provide evidence of student learning that can be used to inform practice and that can be linked with faculty course and curricular portfolios (1, 5). For example, student team e-portfolios developed using the KEEP Toolkit in a senior, Biology major, integrative, human systems physiology course (http://www.cfkeep.org/users/schlegelw/team e-charts) provided evidence for how students were working in teams. Higher-achieving teams documented a focus on working together and used more “we” language, whereas lower-achieving teams focused on individual work and used more “I” language. Higher-achieving teams were specific in their descriptions of problems and strategies for

Fig. 1. Course management systems and student electronic portfolios scaffold student learning by providing course content and performance expectations with a process for exploring and developing ways of knowing and habits of mind. These tools move student learning beyond the classroom with intentionality and context. The learning community is made visible in ways that support intellectual and personal growth. The evidence of student learning captured can be utilized in real time and later reflected on to make evidence-based changes in teaching practices.
improvement, whereas lower-achieving teams documented vague or generalized understandings of problems and strategies. Incorporating the KEEP Toolkit with online course management software, such as IU Oncourse (https://oncourse.iu.edu/), further grows and supports learning communities while providing for reflection and creative documentation and integration of course content (6, 8). The KEEP Toolkit and IU Oncourse are part of the Sakai Project (http://sakaiproject.org), which is an open-source application software collaboration (9).

Investigating Software-Driven Curriculums and the Use of Electronic Media in Course Management: an Evaluation by Outcomes Assessment

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The use of electronic course management systems, and software-based curriculums, is now widespread in science education. Our research has shown that these strategies can significantly enhance student learning. The advantages of this educational modality include the ability to efficiently distribute learning materials, improved communication and collaboration among students and faculty members, and the ability to perform repetitive tasks (i.e., dissection) outside the scheduled laboratory session. Anatomy and physiology are disciplines where all of these attributes provide significant benefits to the educational experience. Many educators have recognized this, and the use of software-driven laboratory exercises is becoming increasingly popular. Our research strongly suggests that the use of computer software and hardware is as effective, and perhaps preferable to, traditional cadaver-based exercises in achieving course goals and objectives. As a new innovation, however, this modality of instruction has not been seamlessly introduced into the curriculum. In fact, the most common criticism from both students and instructors is the apparent disconnect between software-based instruction material and traditional course tools of cadaver dissection and anatomic models. Our study has been an ongoing assessment of the student experience, measured objectively (student performance) and subjectively (student opinion), using both modalities. Student evaluation records and exam performance records were recorded over a 10-semester period. These were divided into two groups: group 1 experienced primarily traditional methodology (cadaver dissection and physiology laboratory exercises) and group 2 experienced primarily digital laboratory exercises. The mean class test score in group 1 was 74.6%, and that in group 2 was 78.8%. The average student evaluation scores were 2.88/3.00 in group 1 and 2.98/3.00 in group 2. By Student’s t-test on the binomial distribution, student performance was statistically different among the two groups. Our results suggest that use of computer software and hardware is an effective method of teaching human anatomy and physiology. Our results show it to be as effective and perhaps preferable to traditional cadaver-based exercises in achieving course goals and objectives as well as student satisfaction. This work was supported in part by a grant from Hewlett-Packard.

REFERENCES