

Lab Science Courses Can Now Be Fully Online

The 2008 Sloan Consortium Report, "Staying the Course," reflects that online learning is growing at a faster pace than campus based education. The 12.9 percent growth rate for online enrollments substantially exceeds the 1.2 percent growth in campus-based students. Unfortunately, lab science courses have not shared this dramatic growth. Why are these vital science courses lagging in this trend?

The hesitancy to offer online lab science courses is primarily due to two factors: students' experimentation needs and instructors' online training needs. Science educators universally agree that the best way for students to learn science is by hands-on "wet laboratory" experiences. However, most educators are stymied by how to provide these experiences to fully online students. Further, since science instructors tend to be newcomers to the online realm, many lack the knowledge, skills, and confidence required to transition their course content from face-to-face to online delivery.

It is evident why higher education institutions must offer lab science courses online. Beyond their lack of adequate laboratory space and funds for additional facilities, they must now meet students' growing demands for the convenience and flexibility of anytime-anywhere education. Much of this demand stems from 'non-traditional' students who require online courses to accommodate schedules complicated by work commitments and family obligations. These students start or return to college for knowledge and skills that match current employment opportunities in health care, green energy,

and environmental fields. These students tend to be more mature, focused, responsible, and capable of working independently.

Traditional aged college students are also driving the demand for online courses. Raised on technology, this generation is comfortable with asynchronous communication and with interacting in online formats. Both groups are attracted to online education to save travel time and transportation related costs. Other major consumers of online courses include military personnel and rural students beyond campus commuting distance. These varied online populations share a need for lab science courses as a part of their degrees and training programs.

We know what students want. The questions now are: how do we meet students' need for genuine lab experiences off-campus and how do we provide science educators with the tools they need to transition from classroom to online teaching? Surprisingly, there are easy answers to both questions.

To complete the lab component, growing numbers of community colleges are using commercially produced lab kits called LabPaqs® – www.labpaq.com. These academically aligned boxed collections of science materials allow students to perform rigorous, college-level science experimentation on and/or off campus. Today's learning management systems (LMS) allow instructors to effectively deliver course content

and communicate with their students. New Web 2.0 tools facilitate and improve course design, development, presentations, interactions, assessments, and integrity evaluations. The majority of science educators not using LabPaqs and advanced technology tools simply do not know about them and their proven effectiveness. This lack of awareness needs to be rectified.

A laboratory component is vital for science learning according to the major educational institutions and science associations, including the American Chemical Society, the College Board, the National Science Foundation, and the National Science Teachers Association. NSTA states, "For science to be taught properly and effectively, labs must be an integral part of the science curriculum." National education standards require hands-on, 'wet lab' experiences to earn accredited and transferable credits.

LabPaqs are academically aligned to course curriculums and provide an accredited substitute for campus lab experiences. As with textbooks, online science educators adopt LabPaqs to fulfill the laboratory component of their courses. Use of these kits has proven that students can safely yet effectively complete traditional lab assignments at home. This has paved the way for lab science courses to be more widely offered online.

Offering online courses requires colleges

to provide a Learning Management System for its educators and students. This is a software platform that allows educators to present class and course content information and facilitates interaction with students.

Content typically includes course contact information; a class syllabus; assignment details and calendars; educational materials such as lecture notes and Power Point presentations; assessment tools; and an integrated electronic grade book.

Instructors have the option of including enhancements such as photos, illustrations, videos, podcasts, and multiple discussion boards to further explain information and add sensory stimulation. Some of the more commonly used LMSs are Blackboard, Desire2Learn, Angel, and Moodle, which is a free, open source LMS.

Within this environment, experienced online instructors are using interactive multimedia and Web 2.0 technologies to enrich students' learning experience and increase the appeal and accessibility of their courses.

There are many creative curriculum development options in addition to the old standbys, Word and PowerPoint. Web 2.0 tools for course design include SoftChalk, Adobe Captivate, Open Office, Mediasite, Web Assign, Math Type, Turn It In, and others. There are also free programs called Google Aps that provide similar types of programs licensed by Microsoft. These include word processor, messaging, spreadsheet, shared calendars, e-mail, and other software tools that do not require a server or an IT department to maintain.

Web conferencing and collaboration tools are important for online classes. Webinars, podcasting, and vodcasting fall into this category and offer a variety of communication functions. Some are free, some have licensing fees, and some may be free for a limited number of users. Examples include Skype, Elluminate, WebEx, CONNECT, Dimdim, ooVoo, Pronto, and MeBeam. Other collaboration tools include PBwiki, Buzzword, and Blogger.

Educators now use popular social networking sites including FaceBook, Twitter, MySpace, LinkedIn, DIGG and Delicious to encourage communication with, and among, students. Additional ways to offer and encourage creativity are by using YouTube, iTunes, SoundCloud, Vlog It, Flickr, Glogster, and VoiceThread. Use of virtual environments like Second Life is also becoming popular. Both educators and students utilize Wikipedia and other online research tools. Viper and Turn It In are plagiarism identification programs educators can use to ensure academic integrity.

With all these engaging tools to teach and learn science, online lab science courses are now a reality and will continue to expand. ▲

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