

## **Using Technology to Enhance Learning about Soils**

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Since the late 1960s when Jim Ahlrichs and Bill McFee converted the Introductory Soil Science Course from a conventional lecture-lab format to an audio tutorial course, technology has played a major role in helping Purdue students learn about soils.

Initially, students were directed to the many soil monoliths, displays, and experiments in the Soils Resource Center using audio instruction from reel-to-reel tape players. Kodak slide projectors showed students pictures of soils in the landscape, nutrient deficiencies, and erosion features. Cassette tape players replaced the reel-to-reel players in the early 1970s and in 1979, the first computers were introduced to help quiz students and do interactive instructional modules.

Today, students enter the Soils Resource Center and go to individual booths where computers with high-resolution monitors direct the learning experience. Hands-on activities and personalized tutoring continue to be the hallmark of the Resource Center. However, the computers allow course instructors to carefully and personally direct students through each week's learning activities using audio and visual stimuli. This approach allows students to use integrated self-tests, personalized problem sets, and supplemental learning modules to progress through the approximate three-hour, weekly learning experience at their own pace. With the Soils Resource Center open approximately 38 hours per week, students can come and go as they choose. Students enjoy this supportive learning environment where they control the pace and process by which they learn about soils.

In the last two years, the integration of learning technologies and the Internet have greatly expanded our instructional capabilities. In several soils courses, all the students have a personal response device that allows them to respond to the instructor's questions individually. When the instructor poses a question in lecture, each student answers using his or her personal response device. Immediately, a graph is projected that tells the class and instructor how well the students understood the concept. Teaching now becomes focused on helping those students who did not understand the concept rather than focusing only on the students who gave the right answer.

The Internet now allows instructors to organize all their teaching materials in one location so students can easily access syllabi, lecture notes, handouts, homework, and supplemental learning modules. Adobe Presenter, which directs student learning via the computers, permits instructors to develop supplemental learning modules that are easily accessed over the Internet from anywhere in the world. An example of one of the modules is available here:

<http://www.agry.purdue.edu/courses/agry365T/Nutrient%20Deficiencies/index.htm>

New technologies such as Adobe Connect allow instructors to invite guest lecturers from all around the world. This semester, Gebisa Ejeta discussed his work in Africa with Purdue students via a live, interactive Internet connection from his office in Nairobi, Kenya. Students could see and hear him as they viewed his PowerPoint presentation. George Van Scoyoc, while at a conference in California, presented his Soil Fertility lecture to his students from his hotel room in Anaheim.

Adobe Connect also allows instructors to tutor students via the Internet. In addition to regular office hours and scheduled help sessions, faculty can arrange time when they will be available via a specified Web site to help students with homework assignments or help them prepare for exams. The student clicks on the Web address and is immediately in the instructor's "meeting room" where they can pose questions either by typing them or speaking into microphones attached to their computers. Each student sees and hears the instructor as he answers the question using text material, PowerPoint slides, or an interactive white board on which he writes equations, draw graphs, or asks new questions that students can easily see on their own computers. This means professors can conduct these tutoring sessions and students can access them from any location in the world! An example of one of these tutoring sessions is available here:

<https://breeze.itap.purdue.edu/p29015750/>

Instructional technologies have not reduced faculty-student interaction in Agronomy but have provided new and exciting ways of fostering the learning experience for our students and have enhanced their connectivity to our faculty and others around the world.