

Pilot Laptop Program

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Abstract

This paper gives a brief overview of the pilot laptop program begun in the fall of 1998. We discuss the use of laptops in and out of the classroom as well as the course management system WebCT.

Introduction

In the fall of 1998, 105 Clemson engineering and science freshmen brought a prescribed laptop computer and software load to campus and matriculated in a minimum of three special courses taught in newly renovated classrooms. These classrooms provide a technology lectern for the instructor and power and network connections at the student tables. The laptop program is an experimental study of the use of mobile computing in support of an active learning model of instruction. The goals of this program include improvement in teaching and learning, retention rate, written and oral communication skills, team building skills, curriculum integration, and quantity and quality of applicants. Our challenge is to assess the value of this environment to meeting these goals. This paper describes what we have found after two semesters. For more details see the program web site [Moss].

Studio Classroom

A studio classroom provides technology for the instructor and computers for the students. Individual or group computer exercises simply become another option in the list of activities that can be used to break the traditional lecture into mini-lectures interspersed with active learning exercises. This is not a new idea. Some schools such as RPI have built special studio classrooms using desktop computers and introduced courses such as studio calculus and studio physics. With the advent of desktop equivalent laptop computers and inexpensive networking (including wireless), studio classrooms are within the reach of most universities.

Our college currently has fifteen laptop studio classrooms and two desktop studio classrooms in addition to our traditional computing labs. Our challenge is to assess the value of the studio classroom for teaching and learning and to determine what types of classrooms to build in the future. In this regard Bernadette Longo makes the following comments about laptop freshman English in the fall 98 semester. "I found that I was teaching more in a workshop mode because of the resources we had with the networked laptops. Instead of having students guess about what they should be doing out of class and then bringing their products to me for evaluation, I found that I could intervene in their work process real-time because we had many of the necessary resources right there in the classroom. I think this kind of coaching while students are doing the work is more helpful for their understanding of the writing tasks I was asking them to learn. If they had questions, they could get them answered right there, and other students

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probably had the same questions. When I saw questions cluster during the class sessions, I knew what I needed to cover more thoroughly for the whole class. So we both had real-time feedback on the learning.”

The use of computers in the classroom is discipline specific. Our laptop English classes used their laptops constantly while usage in laptop chemistry, calculus, computer science, and engineering during the fall 98 and spring 99 semesters varied from about one-third of the time to not at all. Our four-hour laptop calculus I course devoted one class meeting per week to a computer algebra system (Maple) project that was finished outside of class. Clemson does not have sufficient lab facilities to allow all calculus classes to meet once per week in a lab. We are currently teaching non-laptop calculus in studio mode using a graphics calculator but would like to move all calculus courses to Maple. Our choices are to continue with calculators, use laptops to create studio classrooms as needed, abandon the studio classroom concept, or use the existing lab facilities asynchronously.

Lab in a Book-Bag

Three or four laptop students often work together on group projects outside of class. These students are not limited to labs or dorm rooms for computer and network access and have great flexibility in choosing a location for group work. Students report that e-mail and bulletin board tools have become increasingly useful for asynchronous communication with their workgroups. Laptop freshman English students gave each other lots of (required and graded) feedback on their writing via the bulletin board. Through this process, students learned to be productive collaborators and to revise their writing based on peer and teacher feedback. Our assessment is that students learned much more about the writing process because of this facilitated feedback.

Students are staying “connected” throughout the day as they move around the campus. The old model of logging on once or twice a day in a lab or dorm room often does not suffice. Also, as the emphasis on group work has increased, the traditional lab layout has been found inadequate. The old model of meet in the library, go to the lab, and come back to the library is not efficient. We find that the block scheduling of our laptop students together with the heavy use of group projects is building a sense of community among the laptop students that is typically missing in the freshman year.

Professional Practice

A recent survey conducted by the University of Oklahoma, College of Engineering [Crynes] indicates that almost all 330 engineering programs in the United States will mandate student computer ownership within five years. Over 100 mandate programs will be introduced within the next two years and it appears that most will choose laptops. Two justifications are often cited for student ownership. The first is that students are already bringing computers to campus in large numbers. The second is that requiring student ownership allows the cost of the computer to be figured into financial aid.

The number of Clemson freshmen arriving with computers remained at about 50% for the last few years but is estimated to be around 70% for the fall of 98. About 10% of these students brought laptops not counting the students participating in the laptop program. Mobile computing is becoming part of professional practice in several disciplines. If mobile computing becomes a significant part of engineering practice, then immersing undergraduates in this environment is justified.

Active Learning

Active learning [McKeachie] occurs when students are engaged in doing something besides listening to a lecture and taking notes. Students may be talking and listening to one another, or writing, reading, and reflecting individually. Cooperative learning occurs when student interactions provide for interdependence, individual accountability, face-to-face interaction, self-assessment, and use of interpersonal skills such as leadership, communication, teamwork, and conflict resolution. Recommendations to laptop faculty include the following: devote at least 10 minutes of class

time to active learning exercises, use cooperative group assignments and projects, and use technology to encourage student-student and student-instructor communication. Research indicates a high correlation between the “passivity of the learning involvement” and memory. After two weeks we tend to remember 10% of what we read, 50% of what we hear and see, but 90% of what we say and do.

Course Management System

The Laptop Program adopted the leading full-featured course management system WebCT. We wanted our faculty to have access to the complete set of currently available tools which include private e-mail, bulletin board, chat, white board, individual and group student presentation areas, surveys, quizzes, grade maintenance, progress tracking, glossary and index, and content searches. WebCT was made available across the university and as a consequence approximately 8000 Clemson students were using WebCT by the spring of 99. A student survey indicated that students thought the positives far out-weighed the negatives. The most consistent positive response was “I love being able to see my grades anytime.” The most consistent negative response was “Why don’t all courses at Clemson use WebCT.” The use of online quizzes was a hot topic. Many students loved the immediate feedback. A few students did not like the impersonal nature of electronic communication, but many more said that WebCT made them feel that their instructor was available all the time. Laptop faculty members were given training in WebCT and one month of summer support for laptop course development. Technically advanced laptop students were hired and trained to provide technology assistance to faculty members, primarily in the area of WebCT course construction.

Assessment

Through surveys and interviews, we plan to compare the laptop students and a control group over the three-year life of the program. A November 1998 survey was conducted to establish computing experiences prior to entering Clemson. This survey showed that the laptop and control groups are well matched, and that our engineering majors have more experience than our science majors with e-mail, word processing, spreadsheets, and team activities. The spring 99 survey began to assess the value of laptop computing to teaching and learning. The laptop program attracted a number of technologically elite students. We have been surprised to find that it also attracted a group of technological neophytes.

References

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