

IMPLEMENTATION OF A MOBILE, LOW-COST, WIRELESS NETWORK FOR PROBLEM SOLVING IN THE CLASSROOM

John C. Chen¹ and Shreekanth Mandayam²

Abstract – Our goals for this project are to implement a mobile wireless network of laptop computers for problem solving in engineering courses. Motivation for this project include the existing low cost of hardware and software to realize such a network, the benefits for student learning when computing power is readily available in the classroom, and the poor access and suitability of conventional computer laboratories as a teaching environment.

Successful completion of this pilot study will have a high local impact given our engineering school's desire to make computing resources more widely available to students while containing the cost of the initiative. This same issue is being faced by many engineering schools across the country, and this project can serve as a model of efficient use of computing resources.

The cost of hardware and software needed to realize a wireless local network of laptop PC's has plummeted to the point that it is now cost effective to bring the PC lab to the classroom – any classroom – rather than to bring the students to the laboratory. There are many advantages to this mode of technology use, including the flexibility it provides to faculty, rapid deployment in nearly any classroom environment, and access to computing power for problem solving in the classroom. Furthermore, there have been many reports in both conference proceedings and archival publications that document a wide range of pedagogical activities that access to computing in the classroom makes possible.

Our objectives for this project are: (1) to implement a mobile, wireless network of laptop computers for problem solving in various educational settings; (2) to limit the cost of this network (hardware and software) to \$10,000; (3) to assess the network's "useful life" period; and (4) to measure its contribution to improvements in student learning.

Educational research has informed educators that active, hands-on activities in the classroom result in enhanced learning and retention of information, and improve students' attitude toward classes. We seek to promote active and experiential learning through real-time problem solving and student-to-student interactions in the classroom. Many studies exist in the literature that describe computer-based pedagogical activities that promote active learning such as simulations, multimedia lecture, and the use of software tools.

We will pilot-test these activities through four professors teaching four courses. They differ not only in discipline, content and academic level, but also in course format (lecture/laboratory). In this way, our study will determine improvements in student learning in a variety of settings. The four courses involved in the pilot study will all be taught in the Fall 2001 semester and again in the Fall 2002 semester. This provides us the opportunity to implement changes and improvements. The courses involved will be: Thermodynamics (Mechanical Engineering/junior level/lecture format), Electromagnetism (Electrical and Computer Engineering/sophomore level/combined lecture and laboratory format), Fluids Engineering Laboratory (Civil and Environmental Engineering/junior level/laboratory format), and Heat Transfer (Chemical Engineering/junior level/lecture format)

In this work-in-progress report, we will discuss our implementation of such a network in a variety of environments, including the hardware, software, and system economics. The determination of the network's useful life period will be critical in determining the project's cost effectiveness, and tools for measuring this parameter will be developed and benchmarked in the coming months. In addition, we will describe a sampling of activities and processes using this network. Finally, we will describe our plans for assessing the improvement in student learning as a result of this project.

¹ Department of Mechanical Engineering, Rowan University, Glassboro, NJ

² Department of Electrical & Computer Engineering, Rowan University, Glassboro, NJ