

## RESEARCH GRANT PROPOSAL for 2003-2004

**Author:** W.C. Muellner, CSIS Department

**Project Title:** *A Exploratory Study of Distance Learning Techniques & the Development of a Multimedia-Based Distance Learning Model for Teaching Information Technology Courses.*

**Summary:** Numerous distance learning models have been developed and implemented by colleges and businesses throughout the world. This project will perform a comprehensive study of these to determine those features that are truly successful at providing distance learning and then draw upon these to create an innovative, multimedia-based, distance learning model that will eventually be used to develop a distance-learning based IT curriculum.

**Abstract:** Many colleges and universities have distance learning programs that provide the student the opportunity to acquire a variety of certificates and degrees, including baccalaureate, masters, and PhD degrees. A number of businesses also use distance learning for training employees in new skills and competencies. The approaches taken by these programs are varied and use a myriad of techniques, methodologies, and technologies. Some simply supply the student with a textbook and a study guide, while others use interactive CD or DVD ROM computer programs to instruct and test the student. Still others use the Internet as the instructional delivery vehicle or use TV video systems that have the instructor at one location and students at other locations. The study I am proposing will examine each of these approaches and attempt to determine those features of each that are most successful at providing high-quality instruction and a suitable vehicle for delivering this instruction. The results of the study will then be used to formulate a model that will be applied in the development of distance learning courses for the Information Technology undergraduate degree program.

**Narrative:** With the explosive growth in distance learning programs in recent years, I have had for some time an interest in carrying out the type of study I have proposed and using its results to formulate a model I could then use for some of our CS, IS, and IT courses. This interest was further piqued recently when I learned that some members of the Board of Trustees and the Administration at Elmhurst College would welcome having the CSIS Department pursue the development of distance-learning based courses in the Information Technology curriculum. It seems our mutual interest in this topic arises, in part, from the College's goal of creating high-quality academic programs that will generate new sources of revenue. While I agree with this goal, I am also interested in this project because of my personal intellectual curiosity as regards how students learn and how distance-learning in particular can assist students in learning. However, before getting to the stage of actually developing distance-learning courses, I need to perform an exhaustive research study of existing programs in distance learning at other institutions of higher learning and business and governmental organizations that use distance learning to train their employees. The results of this study will then, hopefully, allow me to develop a high-quality model for distance-learning courses that can be applied to courses in my department.

Many colleges and universities in recent years have developed distance learning programs, some of which have met with great success, while others have failed dismally. That distance learning as a means of college instruction is very popular at the present can be attested to by the success of

programs such as those at the University of Phoenix (where over 125,000 students are enrolled), Colorado State University, the University of Minnesota, and others. As to the future (with the advent of wireless technologies) one can expect “elearning” to allow exponential growth in distance learning. The following quote from *eLearning Magazine* gives an indication of what this type of learning might provide.

“ Wireless networks and devices are advancing at record pace with new services being touted monthly. Distance learning wireless ...opens unlimited opportunities. While killing time at an airport, an employee could use his PDA to access company-sponsored classes and lock up his promotion without ever setting foot inside a classroom. Or an MBA student in London could participate in a lecture given by a professor in Baltimore, all with the touch of his WAP-enabled phone.”

A second quote from *eLearning Magazine* by Randy Hinrichs, Group Program Manager for Learning Science and Technology at Microsoft Research, further emphasizes the expected future growth in electronic-systems based distance learning:

“Using technology in education is in its infancy; we haven't seen valid techniques and methodologies for enhancing project-based, hands-on learning with technology. We'll see emerging technologies inside and outside of the classroom: ...collaborative video conferencing, learning Web services, self-correcting learning environments... Innovations will move us away from classrooms, lectures, test taking, and note-taking into fun, immersive interactive learning environments that allow students to envision their own learning, participate in explorations both alone and with others, and participate in an extremely high level feedback world in which they practice skills until they can use the same behavior outside of the learning environment. We're going to see innovation, and an explosion of ideas that focus on learning science, math, engineering, technology and the humanities.

The study I am proposing would examine not only eLearning, but all other methodologies and technologies currently in use by a number of the more successful distance learning programs. This would involve, for example, carefully examining distance learning ‘for-credit’ computer courses offered by institutions like DePaul University, Colorado State University, the University of Minnesota, the University of Phoenix, and others, as well as non-credit instruction offered by private organizations such as the Association Of Computing Machinery (ACM) and the Institute of Electronic and Electrical Engineers (IEEE). Researching these programs would allow me to determine first hand which distance learning approaches seem to work the best and which seem of perform poorly. I also plan to meet with individuals who oversee, develop, and teach in distance learning programs at other schools and companies so that I might learn from them what has worked the best in their particular programs and what sort of learning experiences they went through in developing these programs.

Upon completing my study of distance learning programs and deciphering which techniques, methodologies, and technologies seem to work the best at present, and may work the best in the future, I will then develop a model for distance learning that can be applied to courses we currently offer on a ‘traditional’ basis in the Information Technology curriculum. Since I won’t know exactly the format (using CD-ROMs, DVDs, On-Line techniques or some combination of these and other

methods) we will use to offer these courses until my research described above is completed, I am at the 'best guess' stage of knowing what this model may look like. However, I feel quite certain that computer-based technology will play an important role and that I will be using various software tools to develop the eventual model to be used. The model I envision at present will make use of a variety of multimedia tools and be extremely interactive. It will also most likely be 'deliverable' on-line and/or via CD-ROM or DVD format.

Once fully developed, the model will be applied initially to create at least one distance learning IT course that will be offered to interested students. Feedback from these students, as well as from others (including faculty) who will be invited to take this course, will be used to evaluate the effectiveness of the model in presenting a high quality and rigorous delivery of course content. Following the evaluation process, the model will then be used to develop other distance learning IT courses. The model will also be distributed to other faculty who may have an interest in developing distance learning courses, as well as to those who, even though they don't wish to develop a distance learning course, may find the model useful in developing a supplemental complement to their classroom teaching that uses a distance-learning approach. Since the best method of instruction is one-on-one, having part of a course available in a 'one-to-one type' distance learning format should greatly enhance classroom teaching and thus greatly enhance the learning environment for the student. Lastly, it is expected that a paper written to describe the model and its effectiveness will be presented at national meetings of the IEEE, ACM, and ASEE (American Society of Engineering Education) -- I am a member of all three societies -- and for publication in appropriate journals of these organizations.

For many years now, my expertise in using technology with a 'distance learning flavor' to develop curricula has been demonstrated. I currently, for example, use CAI (computer aided instruction) type 'multimedia' programs (employing graphics and audio) I developed in several of the courses I teach. I have also contributed to an on-line based tutorial we use in our graduate program, and I have written a number of self-paced, "hands-on", lab-based assignment manuals that are used in many of our CS and IS courses and which could be easily adapted to a distance learning approach for these courses. And finally, having taught for over 30 years, I have honed my educational skills and talents so as to be able to identify what works and what doesn't work in addressing the academic needs of students.

### **Time Line**

I do not expect to have any other commitments during the time of the project. The time line I expect to adhere to follows:

May-June: Investigate and collect data on distance learning programs at other colleges and universities, as well at companies and governmental agencies that provide these types of programs.

June-July: Decipher the data collected and determine what technologies, methodologies, and techniques will be most suitable for developing a distance-learning model that could be used at Elmhurst College.

July-August: Using the model developed, I will secure appropriate software and/or hardware that may be needed and use these to apply the model to courses that are part of the IT curriculum.

### **Budget**

1. \$1000 - This will be used to pay to enroll in distance learning courses or obtain instructional materials from other schools and/or organizations so as to study their technologies and methodologies.
2. \$500 - This will be used for travel expenses expected to be incurred by visiting individuals who oversee, develop, and teach in distance learning programs.
3. \$500 - This will be used to buy any software or ancillary supplies needed in the applying the model.
4. \$1500 - Faculty salary.

### **Current and Previous Grants**

I do not hold any current grants. I last received a grant from the College in the mid-1980's that was used to take non-credit accelerated courses at DePaul University on Windows application programming. My most recent grants include those I received in 1997 and 1999 from the IEEE for travel to conferences on embedded computer systems (July, 1997, Vancouver, Canada) and computer-aided instruction (May, 1999, Washington, DC).

### **Publications and Presentations**

Publications and presentations from the last three years.

*A Hands-On C++ Tutorial*, West Publishing, Published 2000.

*Client-Side JavaScript Programming*, Wrox Press, to be published latter half of 2003

*Using Genetic Programming in Computer Aided Instruction*, presented at ACM Summer, 2002 meeting