The Multimedia Instruction Initiative: Implications for Engineering Education

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Recently, East Carolina University reiterated its commitment to the delivery of high quality and effective instruction through their Multimedia Instruction Initiative. The purpose of the Initiative was to assist faculty in integrating electronically based instructional computing technologies into their respective curricula. A request for proposals yielded 39 applications from a variety of disciplines. Conveyed in the various proposals were a variety of approaches to the integration of multimedia technology, a variety of instructional settings in which the multimedia technology may be integrated, and a variety of perspectives on multimedia instruction. All have implications for the delivery of instruction in engineering education.

INTRODUCTION

The purpose of this paper is to convey to ASEE members selected approaches to the integration of electronically based instructional computing technology, including those of the authors'. This will be achieved by sharing with the membership approaches to the integration of multimedia technology in instructional settings, the variety of instructional settings in which the technology may be integrated, and to offer additional perspectives on multimedia instruction. The objective is to encourage members to consider and to explore possible options to the integration of such technology. The ultimate goal is improvement in the delivery of instruction in engineering education.

THE MULTIMEDIA INSTRUCTION INITIATIVE

Developed by the Division of Business Affairs in cooperation with the Division of Academic Affairs, ECU (East Carolina University), the MII (Multimedia Instruction Initiative) provides appropriate resources to assist faculty in integrating electronically based instructional computing technologies into the curriculum (T. E. Yarbrough, personal communication, April 20, 1995). Specifically, it provides hardware, software, and support to faculty members so they may explore and incorporate a wide range of multimedia computing technologies into classroom and laboratory instruction. The Initiative encompasses traditional multimedia hardware/software, including full motion video, sound, graphics, and CD-ROM based resources using computer assisted learning/instruction, instructional datasets and methodologies, and simulations (laboratory or classroom). Its focus is on enhancing classroom based instruction and the learning process. As well, the Initiative focuses on and encourages team work among faculty and the promotion of stewardship of scarce University resources.

SYSTEM CONFIGURATION

The MII provides same-unit, two-member faculty teams the opportunity to submit proposals for multimedia packages consisting of two portable computers and a LCD (liquid crystal display) projector. Specifically, the packages consist of either two IBM ThinkPad 755CD laptops or two Apple Macintosh Powerbook 540c laptops paired with a Sharp 850 LCD projector. A total of twelve packages consisting of a LCD projector and six pairs of IBM laptops and six pairs of Apple laptops were awarded.

IBM ThinkPad 755CD

The authors, along with five other teams, anchored the pursuit of their goals with the IBM ThinkPad 755CD based multimedia package. The 755CD is a multimedia platform, and is configured as follows:

- IntelDX4 100-/33-MHz microprocessor
- 16K of RAM
- 810MB hard drive
- Built-in modem
- CD-ROM that swaps out with the diskette drive

Apple Macintosh Powerbook 540c

Six other teams anchored the pursuit of their goals with the Apple Macintosh Powerbook 540c based multimedia package. The 540c, like the 755CD, is a multimedia platform, and is configured as follows:

- 040 microprocessor
- 12K of RAM
- 500MB hard drive
- Built-in modem

Instructional Technology Software

The following are among the instructional technology software included with the multimedia packages:

- Microsoft PowerPoint
- Microsoft Word
- Microsoft Excel
- Asymetrix Toolbook (IBM recipients) or Apple Hypercard (Apple recipients)
- Adobe Photoshop

The laptops were also preloaded with multimedia and utility software intended to support the respective laptops features.

LCD Projector

In addition to the laptops, each team received a Sharp 850 LCD data/video projector. While the projectors were intended for the primary (but not exclusive) use by team members in developing substantive

discipline specific course materials, they may be used by other faculty within the team members' College or School.

The following highlight some of the notable features of the LCD projector:

- Lens that can be raised and lowered to minimize or eliminate "keystoning"
- Additional modes that complement the standard front projection--reverse image projection for rear projection and inverted projection for ceiling mounted applications
- Screen projection adjustment ranging from 25 to 200 inches
- Built-in 3W amplifier and speaker
- A multi-scan RGB Input that accepts signals from VGA, EGA, CGA and Mac II compatible computers (640 dots x 480 lines) without the need for additional hardware
- High quality pictures resulting from the three LCD panels that contain 309, 120 pixels with up to 500 TV lines of resolution
- Video projection choices of Normal (4:3), Vista (16:9) or Cinema Scope (21:9) mode

ADMINISTRATION OF THE RESOURCES

Resources awarded through the MII is intended for the use by the team members who were awarded the multimedia packages. Ownership of the resources will remain with Computing and Information Systems for the first 24 months following distribution to the team members. If selected conditions that were agreed upon at the onset are not met, the MII resources may be reclaimed for distribution to other applicants. Upon fulfilling the agreed upon conditions, the resources will be reassigned to the team members and the LCD projectors will be assigned to the team members' College or School.

The intent of the program is to encourage the recipients to continue developing course modules and integrating instructional computing into their respective curricula following completion of this Initiative.

AWARDS

Of the thirty-nine proposals submitted, twenty-four were for the IBM based system, fifteen were for the Apple based system. The six teams that received IBM based awards were from the Departments of Decision Science, Exercise and Sports Science, Finance, Geology, and Industrial Technology, and the School of Human Environmental Science. The six teams that received Apple based awards were from the Departments of Anthropology, Biology, Philosophy, and Special Education, and the Schools of Art and Music.

In addition to the software provided through the MII, many of the awardees were using or were familiar with other multimedia products at the time of the award. Many of the awardees were also aware of additional pieces of hardware, such as cameras and scanners, and had access and had experimented with that hardware.

Department of Decision Science

This team's focus is directed at enhancing instruction in two courses, one of which is a service course, the other a major's course. While PowerPoint and Compel, along with multimedia features such a animation and digital video are in use, the team is expanding their efforts to include (1) interactive computer-based learning exercises and increased use of animation, digital video, and electronic keypads to provide a mechanism for active learning; (2) internet training, including a multimedia "how to" package that covers the

use and development of WWW (World Wide Web) pages and other internet tools; and (3) GIS (Geographic Information Systems) exposure to assist in the training of decision makers and planners, and virtual reality multimedia technologies to improve student participation in lectures (B. L. Killingsworth & B. E. Mennecke, personal communication, May 22, 1995).

Department of Exercise and Sports Science

This team will focus its efforts on the outcome of two graduate courses. They will use their award to (1) apply the component approach for analyzing motor patterns of children and (2) study the relationship of teaching practices to developing motor patterns of individuals. Their strategy will center on the use of Compel to integrate oral presentations, video tape excerpts, voice overs, the integration of hyperlink information, and the integration of photographs and graphics to illustrate research techniques. Their products will include materials on teaching practices and learner outcomes, illustrated teaching strategies that, in turn, elicit student motor response, and component approach hyperlink/multimedia presentations (B. Boswell & L. Rickard, personal communication, May 22, 1995).

Department of Finance

This team's efforts will be directed at enhancing a specific course taken by students pursuing either a major or minor in finance. Specifically, their focus will be on animating presentations with video and the use of interactive software and wireless student response keypads. Examples of the former include video clips that introduce lease analysis, study stock valuation methods, examine how changing interest rates affect the value of bonds or how changing compounding periods affect present value through animated graphs, and the calculation of beta for real work companies and show how their stock returns react under different market conditions. With the latter, the team anticipates improvements in student involvement in lectures by constantly challenging them to solve problems and answer questions (S. Eakins & S. Below, personal communication, May 17, 1995).

Department of Geology

This team's strategy consists of three components. First, they plan to use the award in a couple of introductory courses the team members teach regularly. They envision the integration of interactive tutorials in small classes and labs, and plan to introduce concepts with the aid short animations and video clips as supplements in introductory lectures held in large classrooms. Second, they plan to improve the delivery of computer models and programs instruction to majors. This will include the teaching of high-level modeling, mapping, and logging programs. Their third focus will be on the analysis of visual and quantitative geologic data and will include instruction in the use of geological resources available on the Internet (C. A. Rigsby & S. Snyder, personal communication, May 18, 1995).

Department of Industrial Technology

This team will pursue three goals within the context of the MII: (1) to enhance the delivery of instruction through the appropriate application of multimedia technology, (2) to introduce students to the appropriate use of multimedia technology, and (3) to make the community aware of the team's multimedia capabilities. Their strategy is two-fold. First, they plan to use Lotus ScreenCam and Asymetrix Digital Video Producer to enhance instructional materials currently in use by adding full motion video capabilities, oral prompts and instructions, and background music. Second, they plan to integrate commercially available

multimedia design and presentation products into the curriculum and the delivery of instruction (A. R. Frank & R. A. Chin, personal communication, May 22, 1995).

School of Human Environmental Science

This team's use of the MII award includes the storage and retrieval of slides and scanned graphic products aided by a CD storage medium. Originally develop either as 35mm or PowerPoint slides, the materials will now be available for use by students outside of normally scheduled classes. Because of a CD's capacity, they will also be able to incorporate substantial amounts of documentary text for each image. As well, they anticipate that full motion video will be added to complement the still slides (M. L. Gallager & E. V. Ryan, personal communication, May 8, 1995).

Department of Anthropology

This team's focus will be on demonstrating to students that computers must become an essential part of the personal as well as professional life of their students and graduates. The team's strategy includes replacing overhead and slide projector technology with pre-packaged CD-ROM software and taking advantage of multimedia technology to deliver slides of features, artifacts, and other images from archaeological excavations. As an example, the technology will allow the them to zoom in on specific features, adjust the contrast of the zoom, sharpen the image, and randomly seek out specific images. They also envision improving the effectiveness of delivering the analytical process of transforming field data into finished maps and graphs (C. Ewen & L. D. Wolfe, personal communication, May 10, 1995).

Department of Biology

This team's effort is part of a commitment on the part of their parent department to enhance the quality of education through the use of multimedia technology. The team's focus includes drawing on the expertise of a recently hired staff member who possesses experiences in multimedia techniques and will be a resource for developing multimedia materials. The team's initial foray with multimedia technology involved the use of Persuasion (an Aldus product) to support lectures in a course that deals with dynamic processes. Their plans include the development of additional computer lectures and provisions to assist colleagues in the use of the technology (C. P. Evans & M. Farwell, personal communication, May 8, 1995).

Department of Philosophy

This team hopes to achieve six goals--increase information retention, improve reasoning skills, stimulate in-class learning, increase student engagement, introduce multimedia technology, and motivate other faculty to introduce multimedia technology. Their strategy involves the use of SuperCard-based applications to present text and low-resolution graphics internal to the stack, and will access separate high resolution graphic, sound, and QuickTime video files. The stacks are intended to be use in classroom settings, small groups, as well as by individuals--homework stacks (F. Murphy & G. Bailey, personal communication, May 11, 1995).

Department of Special Education

This team's goal of improving the delivery of special education instruction and the training of special educators is consists of three components. They are interested in delivering anchored instruction in courses in special educational instructional methodology, providing students majoring in special education with models of effective multimedia design and strategies for integrating multimedia into instructional delivery, and providing colleagues with models of multimedia enhanced instruction and assistance in the development of their own multimedia materials. Through the development and appropriate use of multimedia materials, they hope to

serve as role models for colleagues and special education graduates to emulate (D. A. Powers & M. A. Darrow, personal communication, May 15, 1995).

School of Art

This team's focus is on the development of presentation applications that are to be used as teaching tools in the studio/classroom. It is anticipated, too, that the applications will be used to acquaint graduate (teaching) assistants with design and drawing concepts faculty feel are appropriate for the studio/classroom. In an attempt to disseminate ideas, the team is also looking at taking the presentation applications on the road. That is, they are examining its potential use in informing community colleges of the kinds of foundation art concepts encouraged by the School of Art. Because of the quantity of material, delivery will be achieved by means of locally produced CDs (D. R. Sexauer & C. C. Walker, personal communication, May 2, 1995).

School of Music

This team will focus its efforts, first and foremost, on the integration of existing material available on CD-ROM. Their work will take place in the areas of music history and applied music. Their efforts will focus on not only sound, but music's visual components as well. And because of the writing intensive nature of their courses, it is anticipated by the team members that CD-ROM music indices will be used to demonstrate research skills (J. Jarvis & C. Ulffers, personal communication, May 19, 1995).

SUMMARY

The intent of East Carolina University's Multimedia Instruction Initiative was to provide resources and support to faculty members to explore and incorporate a wide range of multimedia computing technologies in classroom or laboratory instruction. This encompasses traditional multimedia hardware/software including full motion video, sound, graphics, and CD-ROM based resources using computer assisted learning/instruction, instructional datasets and methodologies, and simulations (laboratory or classroom). Its focus is on enhancing classroom based instruction and the learning process. In addition, the MII emphasizes team work between faculty and promotes stewardship of scarce University resources.

To be considered for the resources--one of twelve packages consisting of two laptops and a LCD projector--and support, proposals were solicited from same-unit, two-member faculty teams. Awards were made to twelve distinctly different teams, representative of the campus' academic offerings.

The purpose of this paper was to provide insight into those twelve approaches to the integration of electronically based instructional computing technology, including those of the authors'. Specifically, an attempt was made to share a variety of approaches to the integration of multimedia technology, the variety of instructional settings in which the technology may be integrated, and to offer additional perspectives on multimedia instruction. The authors would like to encourage readers to consider and explore the options that have been shared and other possible options to the integration of such technology.

AUTHOR NOTES

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BIOGRAPHICAL INFORMATION

ROBERT A. CHIN joined the ECU faculty in 1986 and has been responsible for the engineering graphics curriculum and the design and drafting concentration. He is active in a number of professional organizations including service as a reviewer for the *Engineering Design Graphics Journal*. More recently, he had a co-authored paper published in the proceedings of the 50th Annual Mid-Year Meeting of the Engineering Design Graphics Division, ASEE and one published in the proceedings for the ASEE/SE Section Meeting.

AMY R. FRANK has been teaching engineering graphics and computer-aided design and drafting at ECU since 1992. She is an active member of the National Association of Industrial Technology where she currently serves on the Executive Board as President of the Student Division. In November, she delivered a co-authored paper in Ames, Iowa in conjunction with the 50th Annual Mid-Year Meeting of the Engineering Design Graphics Division. As well, she delivered a co-authored paper at the ASEE/SE Section Meeting in Gatlinburg, TN.