INTEGRATING TECHNOLOGY IN TEACHING STATISTICS IN HIGHER EDUCATION IN UNITED ARAB EMIRATES

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This paper focuses on strengthening of statistics education program through technology enhanced classroom in four academic institutions in United Arab Emirates (UAE), two universities one in governmental sector (UAE University), and one in private sector (Ajman University of Science and Technology , AUST). In addition to a higher college of technology (HCT) and Dubai Police (R&S). Our approach, to development that we will outline, takes participants through a series of overlapping and continuing phases: Describing the current situation, familiarization with software, partnering with mentors, developing individual projects, and becoming mentors in statistics. This paper details progress in technology-centered faculty development in the teaching statistics program at the four academic institutions in UAE.

HISTORICAL BACKGROUND

Historically, faculty development has never been a priority item in the budgets of UAE colleges and universities. Support took the form of time-off or travel funds so that faculty could pursue their own interests. The impetus for expanding faculty development activities aimed at improving teaching competencies arose from criticism of teaching by college students on few campuses in late1980's.

Over the past twenty years, the phrase faculty development has emerged as the umbrella term for most faculty-centered approaches, at least general usage. It stands for a collection of those activities designed to encourage the faculty members to improve and to grow by making planned changes in their expertise, skills, attitudes, career path, or personal lives for the betterment of the individual, the students, and the institution.

The explosion in technology in the last decade has placed enormous financial and faculty development pressures on governmental universities, as well as private ones. Concurrently, the growing expectation held by many college administrators is that today's beginning teachers will be computer literate and familiar with educational computer programs.

At the UAE University, faculty of statistics has worked with other faculty on campus to devise creative strategies for the acquisition of hardware and software, with the support of the academic computing committee, this group has developed a model for delivering the training and education programs, in statistics, necessary to enrich the

teaching competencies of established and entering faculty members. By enlarging the sharing resources, teacher education faculty are able to engage in the professional development necessary to successfully integrate technology in the teaching of statistics. While AUST and HCT did not have any difficulty for this implementation. That might be because of their recent establishment. AUST has founded in 1988, and HCT in 1993, where UAE University has been founded since 1977. The (R&S) has an annual intensive criminal justice statistics course for officers within the police force. This started in 1992, on a four weeks basis.

The model for faculty development in information technologies consists of five components which overlap and are ongoing:

- Familiarization with the software,
- Partnering with mentors,
- Developing personal projects,
- Becoming mentors, and
- Keeping current with new knowledge, and technology innovations.

In constructing the model, distinctions were made between training and education. The term training is commonly used to define all activities associated with professional development and, in particular, those related to learning statistics with the technology.

Both training and education are necessary in learning how to fully utilize technology in teaching statistics in UAE. In the model, familiarization with the software is a training component. Though the partnering with mentors, project development, and becoming mentors components may require some training, the emphasis in each is on educating faculty. It is essential to provide activities which encourage faculty to share sources of information, risk making mistakes, and cooperatively analyze and solve problems. These are, after all, competencies we want to see in our statistics instructors.

FAMILIARIZATION

This phase of the model is a two step process. The initial step is to inform faculty about the technologies which are currently available. On UAE University campus, these include a computer laboratories, lap-tops for use in any classroom. A second enhanced teaching space is a multimedia classroom that offers audio and video projection and laser disc and compact disc-read only memory (CD-ROM) players. However, this is not in used

by statistics department. In addition, this classroom offers access to the campus local area network as well as distant electronic bulletin boards via modem. Similar, with some modification, equipment are available in the rest of the institutions.

A “show and tell approach” has proven very effective in stimulating faculty interest in learning about and using technology equipment and enhanced teaching spaces. Faculty participation in these sessions is viewed as a critical first step in bringing about the infusion of technology in the program. Broad discussions of possible applications of technology in teaching are encouraged following demonstrations of a variety of software programs that support the instructional process.

The second step in this component of the model is a series of focused workshops designed to provide faculty with the competencies necessary to independently operate equipment and maximally use teaching spaces. Written instructions detailing set-up and utilization accompany the verbal directions given during each workshop. A trouble-shooting guide is included.

PARTNERING WITH MENTORS

Coaching is one approach that can be used to sustain the cognitive momentum created through workshops as faculty explore implementing new skills and knowledge in their teaching.

In this second component of the model, novice users of technology are paired with more experienced faculty who serve as mentors. The emphasis is on individual needs. Mentors assist their partners by clarifying concepts, discussing problem areas and collaborating to find workable solutions, and tutoring in the use of hardware and software. Through this process, novice faculty gain confidence in their ability to thoughtfully integrate technology in their teaching.

Development activities initiated by the mentor may warrant both training and education. When partnering activities focus on using software, as in the initial workshops, the novice is receiving training. Examples may include the acquisition of basic skills such as connecting a laptop to the campus network or formatting a class lecture using presentation software. As the mentoring partners engage in analyzing software, applying prior learning to new situations, solving problems, and evaluating the effectiveness of those solutions, development activities center on education.

PROJECT DEVELOPMENT

Three common approaches taken in our program are modeling, facilitating activities that directly involve students, and placing our students in technology friendly field sites. Modeling the use of computers and other equipment takes place in the methods courses. In the statistical methods course, for example, direct teaching is supported with a visual outline of new material using the presentation program, Microsoft PowerPoint. A more direct approach to modeling involves students in the process. Instructors working in small groups, generate collaborative solutions to situational problems. A recorder maps the group's thinking using word processing. Each group then presents their ideas to the whole class using LCD projector and a computer.

The contributions of each group are saved, printed, and distributed to the class for future reference. Updating and expanding students' work is easily accommodated as well. The use of technology to facilitate collaboration is experienced first-hand.

Faculty should design activities and projects that require instructors to use technology in meaningful ways. Instructors will evaluate software in the statistical methods courses. Several features of a variety of programs are reviewed including graphics, help screens, options, interactively, content, and possibilities for higher level thinking. Before fully judging the overall effectiveness of programs, instructors are encouraged to explore the programs with students in the field placement sites whenever possible.

As part of the assignment, students in the program must design learning experiences that blend statistical content and other content areas using some form of technology e.g., computers, video equipment, and so on. A follow up assignment requires that the student implements the learning experience in the classroom. Once all students have met the requirement, the course instructor facilitates a discussion of the benefits and difficulties associated with technology use in the classroom.

To facilitate the use of technology by our preservice teachers we are working on the creation of a set of templates in Hypercard and Hyperstudio. These templates will serve as a background for student projects in content areas such as science and history. Each template is an electronic "canvas" upon which the student could place the graphics and text necessary to develop a topic. Graphics could include still pictures or Quicktime™ movies while text could be in written or spoken form. The major advantage

to these templates is to decrease the amount of computer programming preservice students need to learn.

Clearly, as faculty devise strategies for integrating technology in courses of statistics the stress is on educating the instructors. Attention is centered on how to enrich teaching and learning experiences through technology use rather than how to set up equipment. The computer applications course that all program students are required to take prior to enrolling in the methods courses addresses most of the training needs of students. Although, in some cases, instructors in courses have taken on the role of trainers, particularly when specific software (i.e. Minitab, or SPSS,…etc.) is required.

In the development of the projects described, the support of a mentor was critical. The mentors shared knowledge with learners, make learners feel more comfortable with technology, coached learners to pursue personal development interests, and collaborated with learners in solving problems as they arose.

BECOMING MENTORS

The two most important characteristics necessary to become a mentor are knowledge of specific technology use and a willingness to share that knowledge with other faculty. The second characteristic implies that the mentor is willing to give time and energy in support of someone else's professional development. Compensation is mostly intrinsic since there is not a budget to support the program, though mentoring is recognized as service.

KEEPING CURRENT

Given the rate at which technology has evolved in the last decade, even the most advanced users find staying abreast of innovations in hardware and software quite challenging. As an outgrowth of UAE Universities information systems assessment, a campus wide technology policy and planning committee will be formed. This committee is charged with monitoring trends in information technologies, developing a long range plan for ongoing integration of technology, and formulating policies to guide the budgeting of funds for technology.

CONCLUSION

Integrating technology in teaching statistics is a necessity, not a luxury. Effectively applying technology is high on the list of what old instructors should know and be able to do in today's classrooms. Those who enter the job market without the requisite skills and knowledge will be at a distinct disadvantage. While monetary restrictions often limit the infusion of technology in governmental sectors, slow the pace at which instructional technologies are adopted.

A critical, but often neglected factor in effectively integrating technology in statistics programs is faculty development. This paper detailed the five components of a comprehensive model for faculty development that we hope to implement in UAE academic institutions. The components are: familiarization with software, partnering with mentors, developing personal projects, becoming mentors, and keeping current with new knowledge and technological innovations. Although the program will be new, indications are that it effectively supports faculty as they initiate and implement projects that utilize technology in the courses of statistics. Many of the activities that faculty partners and the students participate in combine aspects of training and education.

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