Promoting Cooperation to Enhance Teaching with Technology[1]

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Abstract

Faculty members have varying expertise, enthusiasm, and support for teaching with technology. The present project for animal science faculty was designed to: 1) increase faculty comfort level in computer-based teaching; 2) strengthen faculty communication with local and regional resources; 3) help faculty develop skills and identify relevant applications; and 4) recruit submissions to regional teaching databases in animal genetics, nutrition, and physiology. The University of Connecticut, Cornell University, and Rutgers University collaborated to conduct hands-on workshops for each of 14 participating institutions and to provide opportunities for further exploration, learning, and information-sharing. Up to three workshop participants from each institution received monetary awards for follow-up projects. Projects resulted in technological resources for both in-person and online instruction. Regional workshops in the following two years offered participants the opportunity to share their accomplishments and challenges and set goals for further activities. This project and its related activities increased interaction among faculty and instructional technology staff and has provided a strong base for continued collaborative efforts among universities to support and promote applications of technology in teaching animal science.

Introduction

This project emphasized a cooperative model for encouraging and supporting the implementation of teaching technologies in animal science. A consortium, initially known as the Mid-Atlantic Consortium (MAC), established the Animal Science Collaborative Agreement to enhance cooperation and share information at departmental, institutional, regional and national levels for the institutions involved. The consortium was later renamed the Animal Science Education Consortium (ASEC). Collaboration among faculty within and between universities is common in academia, but more prevalent in research than teaching (Mizell and Carl, 1994).

Most faculty face the ongoing challenge of multiple competing demands of teaching, research, and outreach, aggravated by shrinking resources. An added pressure for animal science departments in the northeast results from major changes in demographics, science, society, and industry. Applications of biotechnology and molecular biology, as well as demands for courses on companion, laboratory, wild, and exotic animals are common in the region. Although consumers continue to expect adequate production and distribution of wholesome food, traditional courses such as livestock and dairy production have lower enrollments at some institutions. At the same time, courses in animal reproduction, physiology, biotechnology, and other areas sometimes stretch departmental resources to the maximum limit. Additionally, animal science graduates pursue and obtain a diverse array of positions working for veterinarians, pharmaceutical companies, zoos, or employers connected with animal control, food safety, and zoonotic disease control. The overall goal of this regional coalition was to improve faculty efficiency by enhancing communication and sharing information and resources in education, research, and outreach.

Technology related to teaching and learning is advancing at a pace that makes it difficult to keep fully up-to-date, even with applications and equipment that are used every day. It is challenging to learn and try new instructional methods, and complicated to keep track of an exponentially increasing number of available options that may potentially enhance teaching and learning.

Individual faculty members incorporate technology into undergraduate and graduate instruction at

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widely varying levels. Some faculty members have taught for many years without technology and prefer to continue using the same methods; others cannot get enough of the bells and whistles and enthusiastically embrace new technology to support their pedagogy and to improve instruction and learning. Previous studies have shown that faculty members are often unaware of university-wide resources available to them, and some are not familiar with the successful technology-based teaching practices of colleagues in their own department (Dardig, 1997; Rups, 1999).

Most institutions of higher education encourage increased use of technology in teaching; some even require it. The University of California at Los Angeles issued a mandate as early as 1997 requiring web pages for all undergraduate classes in the College of Letters and Sciences (Young, 1997). Requirements and expectations for the use of technology in teaching have expanded along with other applications in education, business, and everyday life. Electronic storage and retrieval of information is rapidly replacing paper, and class discussions, assignments, testing, and grading may be done online. Most college students have grown up with computers. New faculty members should be well-versed in the use of educational technology, which will also strengthen their qualifications for positions of choice and optimize their potential for promotion and tenure.

Theoretical Background and Previous Studies

Individual faculty have a wide range of technological abilities, experiences, and comfort levels. Most institutions of higher education have instructional technology resource centers to help faculty with both pedagogical and technological aspects of teaching with technology. Many of these resource centers (which vary in name, structure, administrative location, and function) have evolved from earlier "excellence in teaching" centers (Shapiro and Cartright, 1998). In addition to each home institution's support, collaborative efforts among institutions as well as partnerships between education and industry provide opportunities for shared expertise, increased or pooled resources, and attention to a broader range of concerns and interests (Shapiro and Cartright, 1998).

University initiatives for enhancing technology address distance education, computer requirements, equipment upgrades, wireless networks, and many other diverse aspects of computer use. Areas of interest for this paper emphasize institutional support and resources, faculty development programs, and cooperative efforts among institutions. Instructional technology for in-class and class-related activities were of primary interest, rather than distance learning efforts.

Faculty give many reasons for avoiding technology in teaching, such as satisfaction with traditional lecture and discussion format, lack of time for learning new skills, and inadequate facilities and equipment. Although most of these concerns are sincere and reasonable, this project was developed based partially on the premise that many faculty members hesitate to use educational technology because they lack confidence in their skills. This lack of confidence indicates low self-efficacy. Bandura's Social Cognitive Theory (Bandura, 1997) defines self-efficacy as one's beliefs about their ability to perform a specific task. According to Bandura, self-efficacy can impact motivation, effort, and perseverance. The most influential factor affecting self-efficacy is enactive task performance the experience of learning through active task engagement (Schunk, 2000). Therefore, instructors who use computers for a variety of purposes will most likely have high self-efficacy in using computer-based technology in teaching.

When faculty have not developed technology self-efficacy through enactive task performance, modeling is an effective strategy (Bandura, 1997). In social cognitive theory, an effective model is a person with importance and relevance to the observer (Schunk, 2000). Faculty with low technology self-efficacy are hesitant to abandon traditional teaching methods to adopt technology formats that may not work smoothly and consistently. In this project, we believed that the best role models for animal scientists were their colleagues who had successfully used technology to teach the same discipline.

One of the primary functions served by modeling is observational learning. There are four subprocesses of observational learning: attention, retention, motor reproduction, and motivation (Bandura, 1997). Described below are a few examples from the literature that demonstrate successful applications of modeling, practice, and collaborative endeavors that have facilitated the four subprocesses of observational learning and support decisions made in designing and conducting the ASEC project.

Deden (1998) reported on a faculty development program conducted by the Royer Center for Learning and Technology at Penn State. The program was designed to enhance active, cooperative learning through technology at their 12-campus Commonwealth College and four other campuses. This program was designed to help faculty with instructional methods that encourage active, cooperative learning. Instruction and learning were at the center of the program, not the technology itself. Results suggest that helping large groups of faculty make small improvements with teaching technologies may have a more immediate and greater overall impact than attempting more extensive progress for only a few (Deden, 1998).

Drew University instituted an early initiative of distributing computers to all faculty and incoming students. Later, they found that the increased

computer availability did not directly translate into more effective use of computers in teaching (Candiotti, 1998). Therefore the University addressed the need for improved academic facilities and expanded faculty development programs. Faculty workshops were organized by discipline, allowing participants to focus on pedagogy within their own field and share ideas and concerns with colleagues. Workshops included an overview of institutional resources and support staff, presentations by in-house and invited speakers, and the planning and initiation of personal projects to be completed by faculty participants following the workshop. The workshops and follow-up projects resulted in increased dialogue between seasoned technology users and relative newcomers; greater awareness and more effective use of academic facilities and instructional technology departments; and more comprehensive use of technology in teaching and learning (Candiotti, 1998).

Western Michigan University established a program called Enhancing Teaching with Technology as a cooperative effort between Instructional Technology Services and the Office of Faculty Development (Rups, 1999). The initial workshops were provided as either lunchtime seminars or two- to four-hour hands-on workshops. Review of the initial program suggested that faculty needed more time and continued support to carry the information forward and incorporate it into teaching. In response, the University started the Enhancing Teaching with Technology Institute (ETTI), a more intensive, week-long event. The institute allowed faculty participants to incorporate computer-assisted technology into their own courses with expert staff assistance. The impact of ETTI extended well beyond the individual faculty participants and the specific activities of the workshops. Participants incorporated more technology into their own teaching methods, assisted and encouraged others in their departments with technology applications, strengthened their communication with instructional technology departments, and increased the use of academic facilities (Rupps, 1999).

Consortiums and partnerships for enhancing instructional technology have been developed to share ideas, information, and resources across a broader audience. Considering the broad-based access to the information superhighway, it makes sense to use electronic communication to share pedagogical information among educators and students as fast and effortlessly as jokes and chain letters move through friends and families. The American Association for Higher Education (www.aahe.org), as well as other organizations, has supported collaborative projects that encourage the use of instructional technology both within and across institutions (Shapiro and Cartright, 1998). In 2002, the University of Connecticut (UConn) became members of the Boston Library Consortium, which greatly enhanced access and sharing of documents and other information. UConn also participates in the E-Portfolio Project, a collaborative initiative to provide open-source software for students and faculty at multiple institutions.

Education/corporate partnerships can also be efficient, productive, and cost-effective models for faculty development in teaching with technology. In 1996, The Ohio Foundation of Independent Colleges (OFIC) and Ameritech started a multi-year, collaborative faculty development program that included summer workshops, statewide conferences, and searchable information web sites for 23 colleges (Shapiro and Cartright, 1998). OFIC continues to provide grant-supported faculty development programs for teaching with technology and also has agreements with software providers for large volume purchases, making software more affordable for participating institutions (www.ofic.org/collab.htm).

These examples show some of the successful approaches to faculty development for teaching with technology. The ASEC project shared many of the central themes of these programs. Workshops were organized by discipline; presenters and coordinators included animal science faculty and local instructional technology professionals; hands-on time was included in the initial workshops; and workshop participants were encouraged to conduct follow-up projects.

Methods

This project was coordinated by the University of Connecticut, Rutgers University, and Cornell University for the benefit of 14 total institutions in the Animal Science Education Consortium (ASEC). During the first year of the project (2000), the three cooperating institutions agreed on a format for workshops to be conducted at the partner institutions. They each developed one portion of the workshop with guidance from instructional technology departments at their institutions. The workshop agenda was consistent:

- Welcome and discussion
- Multiple uses of technology in-class presentations, web applications, and distance learning (included hands-on work)
- Discussion and planning time for individual projects
- Overview of host institution's instructional technology resources

The workshops had four goals:

1. Increase faculty comfort level in developing and using computer-based teaching methods
2. Acquaint instructors with local and regional technical and human resources for computer-based teaching
3. Help faculty develop individualized, computer-based teaching projects to meet their specific needs

4. Recruit submissions to shared teaching databases in animal genetics, animal nutrition, and animal physiology.

Collaboration and division of labor between the three lead institutions resulted in economy of scale and minimized duplication of effort. Because each school developed individual workshop components, which were then coordinated and combined, all workshops presented consistent information, while allowing for individual approaches. UConn was responsible for the in-class presentation section of the workshop and initiating the animal physiology database. Rutgers prepared the presentation on web applications for instruction and provided the follow-up relating to the nutrition database. Cornell developed the distance learning component of the workshop and focused on the genetics database. As noted, instructional resource centers worked together with animal science departments in planning and conducting these workshops.

The first workshop was held at the University of Connecticut in January 2000 with all three of the lead institutions presenting their own sections. The workshop was presented to all six departments of the College of Agriculture and Natural Resources (not just animal science) at the annual Faculty/ Staff Professional Development Workshop. This served as a trial run for everyone involved, and gave each presentation team the opportunity to see each component presented by the originating institution. The combined-team structure of the initial workshop allowed the collaborating presenters to work out the logistics of integrating the sections and to address any concerns that surfaced. After the UConn workshop, the three presentation teams UConn, Rutgers, and Cornell each conducted the complete workshop at approximately one-third of the other ASEC institutions.

During the workshops, participants were encouraged to submit a proposal for a follow-up project of their own interest. Three faculty members from each institution were selected to receive $500 for student labor, software, hardware, or other needs in their project. Presentation team members remained available to provide guidance and assistance with these projects. Faculty members working on projects were now more aware of the resources available "right in their own back yard," based on the involvement of instructional technology departments in the initial workshops. This provided ongoing discipline-based and technological support at both local and regional levels to facilitate project completion.

In the second year of the project (2001), participants from all fourteen institutions were invited to a follow-up workshop at Rutgers. The agenda included presentations and feedback regarding selected faculty projects from the previous year as well as formal presentations on current pedagogical and technological aspects of incorporating technology into the curriculum. This combined meeting encouraged participants to discuss the effectiveness of the workshops at each of their individual institutions and follow-up projects, as well as future directions for the consortium. Although not proposed in the original grant, the group decided to hold a second regional technology workshop in 2002. Participants and other colleagues have continued networking through electronic and phone communication.

Results and Discussion

Evaluations for workshops held at the individual institutions in 2000-2001 included two questions with a five-point (5=excellent) Likert scale, and four additional questions asking for feedback on anticipated technology use, perceived benefits of the workshop, and additional comments. Fifty-six participants completed evaluations. Responses to 2000-2001 Likert items are shown in Table 1.

Table 1: Survey Results, 2000-2001 Individual Workshops[1]

Item	Score[2]
Item 1: Please indicate your overall evaluation of the Teaching with Technology workshop.	4.4
Item 2: Did you find the topics discussed relevant to you?	3.9

[1] 56 participants who attended the workshop returned surveys. Response rate is not available.
[2] Five point Likert Scale with 5 being excellent.

Item 3 asked if workshop participants expected to increase their use of technology in teaching. All respondents except one planned to increase their use of teaching technology within the next semester or near future. Results indicated that these animal science faculty members considered technology useful and relevant to their teaching responsibilities and that most respondents thought they should increase their use of technology in teaching.

When asked to identify the most beneficial component of the workshop, faculty clearly indicated that exposure to current practices of colleagues was the most valuable. Workshop sections on course management software (e.g. WebCT and Blackboard), collaboration, distance learning, local resources and obtaining grants were also positively highlighted in responses. When asked about areas of concern, comments addressed the competing demands on time, and the difficulty finding enough time to identify, practice, and implement new technology in teaching.

In response to information obtained from the initial workshops, the evaluation forms for the 2001 regional workshop at Rutgers included an additional five-point Likert item: "I was able to discuss ideas about teaching with technology with others at the workshop." Fifteen people returned surveys. The results for the three 2001 Likert items are shown in the Table 2.

Table 2: Survey Results, Regional Workshop: May 29-30, 2001[1]

Item	Score[2]
Item 1: Please indicate your overall evaluation of the Teaching with Technology workshop.	4.3
Item 2: Did you find the topics discussed relevant to you?	4.4
Item 3: I was able to discuss ideas about teaching with technology with others at the workshop.	4.4

[1] 15 participants who attended the workshop returned surveys. Response rate is not available.
[2] Five point Likert Scale with 5 being excellent.

In 2002, a more comprehensive instrument was developed and distributed at the second regional workshop. This instrument included seven demographic variables and thirty-one Likert items divided into five sections: overall impact, institutional support, the $500 award for individual projects, shared teaching databases, and workshop format. Twelve participants of the 2002 workshop returned surveys and the central tendency data were reviewed. The items with the highest mean scores, although worded differently, were similar to results from earlier surveys: "Interaction with colleagues was valuable," "Presentations of faculty projects were valuable," and "presentations by guest speakers were valuable." Statements regarding the value and potential of shared databases, and the likelihood of faculty support and contributions were also among the high-scoring items. Results for these three items are shown in Table 3.

Table 3: Survey Results, Regional Workshop: August 20-21, 2002[1]

Item	Score[2]
Interaction with colleagues was valuable.	4.5
Presentations of faculty projects were valuable.	4.3
Presentations by guest speakers were valuable.	4.3

[1] 15 participants who attended the workshop returned surveys. Response rate is not available.
[2] Five point Likert Scale with 5 being excellent.

Summary and Conclusions

Workshop evaluations and participant feedback indicated that this was a worthwhile project. Theoretically, Bandura's (1997) Social Cognitive Theory suggests that enactive task performance, modeling, and observational learning are effective strategies for increasing self-efficacy. The activities of ASEC project addressed Bandura's sub-processes of observational learning and the overall goal of increasing faculty self-efficacy. The format, presenters, and opportunities associated with this project created a model that was effective in obtaining and maintaining the attention and interest of participating animal science faculty; helping them find ways to remember what they learn; allowing them to practice and apply skills learned; and emphasizing benefits in order to strengthen their desire to use technology in teaching.

Discipline-based workshops and presentations that highlighted colleagues' successful applications of technology in teaching animal science contributed to participation, interest, and relevance. Hands-on workshop time and opportunities for funded, individual follow-up projects encouraged and supported practice and increased self-efficacy. The struggle to find enough time to learn and incorporate technology into the curriculum was also addressed. The collaborative nature of these workshops resulted in an efficient and productive faculty development model that strengthened communication and helped participants recognize that they do not have to learn and do everything alone. The Animal Science Education Consortium has a promising start for a long-term plan for promoting cooperation to enhance the use of technology in teaching.

The limited number of returned surveys and missing response rates for this project were major weaknesses in assessment. Also, there were no baseline data to support a comparison of technology use before and after the workshops. The surveys completed after the initial workshops represented a favorable reaction to the workshop, but there was little information regarding demographics and long-term impact. The last survey included more demographic information and more detailed items regarding the project and participants' practices, perceptions, and concerns, but again, it was only completed by a small number of participants.

This project and related activities of participating institutions have provided a strong base for further

collaborative efforts in applications of technology in teaching animal science. Projects addressed during the span of this project resulted in technological resources for both in-person and online instruction. Although the goal of shared databases for animal science was not reached in this project, a follow-up project has been funded and initiated to specifically address this area of perceived need in animal physiology and animal nutrition.

This project was successful in increasing faculty comfort level, acquainting instructors with available resources, and helping faculty develop computer based projects specific to their own teaching needs. While the goal of developing a shared database of teaching resources did not occur during this project, it provided the foundation for a subsequent funded project which has accomplished this.

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