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3. A Collaborative Approach for Redefining a Program

by Brenda L. Wey and Mark Estepp

Graduate education plays a vital role in the overall mission of comprehensive universities. A quality graduate program enhances faculty opportunities to become involved in research projects, provides research and teaching opportunities for graduate students, and raises the overall prestige of the department. An active graduate program enlivens the department by allowing close interaction between faculty and students on an advanced level. Graduate level courses allow curricular experimentation and implementation of a wide variety of teaching techniques that are sometimes difficult to apply at the undergraduate level.

Curricular change is essential to the continued success of all academic programs, but particularly essential to technology-related disciplines. Falling behind in curriculum matters is often a matter of months in technical fields, where in other disciplines it is a matter of years.

However, curricular change should not be entered into lightly. The process should be designed to be thought provoking and offer the opportunity to gain insights, information, and ideas from fellow colleagues and professionals from industry. This documents the challenges and processes involved when a collaborative approach is used to develop and implement curriculum change. It offers perspectives on creative collaborations used to revise a graduate curriculum and shares the rewards of this collaboration beyond the scope of just curriculum changes. It creates a cooperative and revitalized commitment within the department to graduate education.

The Setting

Appalachian State University was recognized as one of the top industrial arts programs in the southeast during the 1960s and 1970s. During the 1980s the department changed its emphasis from preparing students for careers in teaching to preparing students for professions in industry and business at both the graduate and undergraduate levels. This change reflected a national trend based on student demand for nonteaching industrial technology degrees. The undergraduate program evolved from a degree in industrial arts at the undergraduate level to technology education and a degree in industrial technology with concentrations in appropriate technology, construction, electronic technology, graphic arts and imaging technology, industrial drafting and design, manufacturing technology, and technical photography.

The graduate curriculum remained basically the same through the 70s and early 80s . Changes that occurred in the mid 80s added a concentration in industrial technology for nonteaching majors and included a revision of core classes.

Program Review

In 1992 the graduate program was evaluated in accordance with the university's graduate program review process. The Graduate School dean appointed a review committee that included a mix of faculty from other departments and the Department of Technology. The committee collected and summarized information from interviews, surveys, and graduate records such as applicant information, students' scores for admission, graduation rates, and enrollment data. The review process included sending surveys to all graduate students currently in the program, all alumni who graduated in the previous five years, and all graduate faculty in the Department of Technology. Selected graduate students and alumni met to discuss their views on the graduate program. This meeting was conducted by committee members from other departments; technology faculty were not present.

These efforts resulted in a comprehensive evaluation of the department's graduate curriculum. It identified the strengths and weaknesses of the program. Strengths included the faculty, flexibility in program design, opportunity for advanced skill development, and the quality of experiences in the graduate assistantship. Recommendations included the restructuring of graduate courses to address the following concerns:

1. Develop a technology research course. Nonteaching technology majors needed more emphasis on experimental and scientific research specifically related to technology applications.

2. Delete graduate courses in specific technical areas that had low enrollment.

3. Add new courses that reflect current technology applications appropriate for all technical areas.

4. Develop concentrations for the industrial technology major.

This review process involved the collaboration of the departmental graduate faculty, students, and alumni, and faculty from other departments. The report was well received throughout campus, and it helped in the recognition of the purposes and goals for the Department of Technology on a universitywide basis.

Revising the Graduate Curriculum

Major revisions to the graduate program were completed during the 1997 spring semester. The new program went into effect during the 1997 fall semester. The curriculum changes were the result of the efforts and hard work of many individuals. Major components of this effort were the graduate program review at the university level; a self-study by students, faculty, and administrators in the department and college; alumni evaluations of the program; and discussions with a network of professionals from other universities and industry.

Goals for Curriculum Change

Critical to the process for the revision of the curriculum was the development of goals for change. These goals were developed from advisory committee recommendations. The advisory committee included departmental faculty, students, and alumni; faculty from other departments and universities; and industry representatives. The following three goals were identified:

1. Improve on the existing strengths in the program.
- Provide opportunity for advanced skill development that was viewed as a program strength in the 1992 Graduate Program Review Report.
- Develop concentrations that build on the strength of Appalachian's teaching tradition.

2. Adapt to change.
- Expand the core of professional courses to address the development of specified core skills.
- Add a course, Research in Technology, for non-teaching majors.
- Add a graduate level course on Technology and Culture to address social and cultural implications for technology.
- Change the skill development course to emphasize the research and development process, including the concepts of invention, innovation, and development.
- Include the computer applications course in the core requirements.

3. Prepare for the future.
- Promote core skills throughout the program that foster the development of graduates who can effectively interpret and manage the systems and products of technology by working effectively with others.
- Add concentrations for the Industrial Technology major that includes options for interdisciplinary course work.

Educational Objectives for Graduates

The core courses centered around developing and reinforcing specific skills and information from selected content areas. The goal was to prepare technologists either for teaching the concepts of technology education or working in industrial settings. This includes the understanding and application of technical skills in a variety of contexts with the ability to evaluate, synthesize, invent, and communicate this information effectively to others. Development of team skills and communication skills was considered critical in this process as well as direct and frequent contact with those currently working in education and/or industry.

Major concepts identified for the core classes and throughout the master's program are listed below:

- Technical literacy.
- Systems analysis.
- Technology transfer.
- Technology assessment/forecasting.
- Social and cultural impacts of technology.
- History of technology.
- Networking with industry and education: internships, visitations, speakers, training workshops, interviews, research in industries and schools.
- Strong communication skills: writing, speaking, listening, technical reports, presentation skills, computer skills, individual and group communication theory.
- Leadership and professional development: professional associations, conferences, workshops, administration skills.
- Research skills: statistical analysis.
- Problem-solving skills: the inventive process, design, creativity, scientific method, group skills.
- Management skills: coaching, team-building skills, management styles, work environments.

Challenges

Perhaps the biggest challenge in such an ambitious change to an existing program is gaining the support of others. Whereas undergraduate technical areas are under the direction of a small number of faculty, the graduate program spans all technical areas. All faculty needed to collaborate and have a voice in the direction of the graduate curriculum.

One of the challenges in gaining support from faculty within the department concerned the emphasis of the university on undergraduate education. Faculty in the department had a full load of undergraduate courses, and there was a continuing and growing demand for these undergraduate classes. Undergraduate courses traditionally have larger course enrollment than graduate courses. It was difficult to justify assigning a faculty member to teach a graduate class with five students when the same faculty member could teach an undergraduate class with 20 students.

The graduate program offered courses in specific technical areas that often had low enrollment but allowed graduate students to have close relationships with faculty in their technical areas. The opportunity for graduate students to work closely with faculty in developing advanced technical skills was recognized as a strength of the program by faculty, alumni, and students, but faculty were often overwhelmed by the individual instruction required of graduate students in addition to their regular course load.

A new course titled Technical Competency Development was conceptualized to allow students to update technical skills in their specific technical areas. This course replaced several advanced technical area courses that always had low enrollment. It could be repeated for additional credit. Fifty percent of the work in the class was in a structured graduate class meeting with a seminar format to cover the specific course topics and objectives. The remaining 50% of the work was based on an individual contract by each student for one of three options:

- Individual research and development in the student's technical area with their technical area advisor.
- Practical experiences in the student's technical area, either in industrial or educational settings.
- Students take a technical area course offered in the department in order to update technical skills that represent new/emerging technologies or in related/complementary technical areas.

There were several advantages for this course:

• Graduate students could work on a variety of problems in different technical areas. They have the opportunity to work in specific areas using faculty throughout the department as resources as well as contacts from industrial settings.

• Structured course activities include networking with graduate students through seminars emphasizing systems and processes that are related to all technical areas. Everyone learns from each others' activities.

• Graduate faculty have a reduced undergraduate load in order to teach a graduate class.

Other challenges existed due to the limited funding for the graduate program and the absence of a recognized reward and recognition for graduate faculty status. The support of the chair and dean for the revised graduate program and a commitment for recognizing graduate faculty status in promotion and tenure decisions, and a rotating reduction in undergraduate course loads for graduate faculty were clearly communicated to all faculty. Also faculty were continually provided with information about resources for graduate faculty through the graduate school for research, presentations, and the writing of articles. Priority for graduate assistant assignments was also given to faculty working with graduate students.

Networking Components of the Process

Throughout this process, technology faculty networked with other professionals. Faculty in the department met with faculty from other departments on campus to discuss interdisciplinary opportunities. Five interdisciplinary concentrations for the master of Industrial Technology degree were developed. These concentrations included selection of courses from 15 other departments on campus. Permission from these departments was needed for approval of the concentration options. For example, Technical Communications was an interdisciplinary concentration that included course options from the departments of Technology, English, Management, Curriculum and Instruction, and Decision Sciences, while the Appropriate Technology interdisciplinary concentration course options were from Technology, Anthropology's Sustainable Development Program, Biology, Geography, Political Science, and Sociology. Many departments were willing to work with us in developing these options. This provided a good opportunity to inform others on campus about our program areas in the Department of Technology and was, perhaps, part of the reason for the positive reception universitywide during the approval process of the final curriculum proposals .

Contacts outside the university were also instrumental in setting goals and establishing the direction for the revised curriculum. Correspondence with industrial personnel helped with suggestions for core skills in the program. Especially helpful were those involved in human resources, industrial training and educational programs, and management. The graduate courses emphasize networking with industry through practical experiences and internships. Guest speakers and field experiences are an integral part of the program.

Contacts with other universities, community colleges, technical schools, the public school system, and the State Department of Public Instruction also contributed suggestions for the graduate program.

Suggestions for core classes for teacher preparation were included in the revised curriculum.

Summary of Curriculum Changes

The curriculum changes involved the deletion of seven courses, the addition of seven courses, and changes to five courses. The graduate core of classes was expanded to include a computer skills course and a course addressing readings in technology and culture. A research class for industrial technology majors was added. Eight concentrations were developed for industrial technology majors. Technology concentrations were organized in two groups: interdisciplinary concentrations (Applied Electronics, Appropriate Technology, Industrial Technology, Technical Communications, Technical Training) and technology concentrations (Building Science, Graphic Arts and Imaging Technology, Manufacturing Technology).

The 1997-1999 Appalachian State University Graduate Bulletin provides the following description for the revised graduate curriculum:

> The Department of Technology provides programs in the study of technology. The department offers courses in a variety of technical areas including: manufacturing, graphic arts and imaging technology, appropriate technology, electronics, drafting and design, photography, technology education and construction. The student has the opportunity to develop technical skills in selected areas. Skills and experiences gained in these areas are related to professional development in the student's selected field of endeavor.
>
> The technology curriculum includes knowledge, concepts, and experiences which help the student interpret and manage the requirements of a technological society. Students will develop skills for understanding and effectively managing the systems and products of technology. Emphasis at the graduate level includes leadership, professional, and human relations skill development. A team based problem-solving approach to coursework and research is stressed. Practical experiences from industry and education are integrated into the core courses. The program's aim is to foster philosophies for lifelong learning and skills for being effective in environments involving continual change. Advanced technical skills are developed in relation to specific concentration areas.

Benefits of Collaboration

The benefits of collaboration when revising our graduate curriculum have surfaced in a variety of forms beyond the transformed courses and concentrations. Prior to this process it was difficult to motivate faculty to commit to applying and maintaining graduate faculty status, to participate in decision making regarding the graduate program, and to buy into the importance of the graduate program to the department. Since all departmental faculty had input and saw the interest of others outside the department during the revision of the program, the majority versus the minority now have a vested interest in graduate education. The majority of our faculty are now applying and maintaining graduate faculty status and are participating in teaching graduate courses and attending graduate committee meetings. The overall attitude and morale of the faculty have changed to reflect a deeper commitment to graduate education.

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4. Anticipating Rescue 9-1-1 in a Mobile Wireless Society

by Tim Obermier

Wireless telephones provide us with security, mobility, and peace of mind in unexpected situations. Those who have wireless telephones, commonly referred to as cellular telephones, probably could not imagine a personal or professional life without such conveniences. These seemingly simple devices have helped rescue stranded motorists and alerted emergency personnel to countless accidents, in effect, saving numerous lives. They have also become the personal convenience and efficiency devices of this decade.

While the benefits are obvious, the cellular telephone is contributing to a societal evolution—the evolution towards a mobile wireless society. Satellite television, paging, data, and voice are all wireless services many of us depend upon. With the correct complement of wireless devices, one can roam the world in the most remote regions and still maintain contact. Several research expeditions have included thousands of individuals, all thanks to wireless technologies. One of the many implications of this newfound mobility is a societal demand for additional security and safety. As people use their cellular telephones to report accidents, spot hazardous weather, and ensure personal safety, the device takes on more importance than simply the novelty it once was. Cellular telephones are becoming so prevalent in our society that they are currently reshaping the way emergency personnel receive notification and respond to accidents and emergencies.

Evidence of the increasing importance of the cellular telephone, and the evolution in process, exists with the large numbers of people purchasing them. According to the Cellular Telecommunications Industry Association (CTIA), there are currently 68 million wireless subscribers in the United States (Wheeler, 1999). Subscriptions for cellular telephones have increased at an average annual rate of 52% since the CTIA began keeping industry statistics in 1985 (CTIA, n.d.). According to a recent study conducted by the Consumer Electronics Manufacturers Association (CEMA), cellular telephones are in 39% of American households. Of those surveyed, 44% indicated that they purchased their cellular telephone to be able to communicate in an emergency (CEMA, 1998).

The Problem

With the growth of wireless subscribers and an increasingly mobile society, emergency calls placed by cellular telephones are increasing. Dr. Bob Cobb, director of education for the National Emergency Number Association, places the total number of 9-1-1 wireless and wireline calls at approximately 260,000 per day (personal communication, September 22, 1998). According to testimony before the U.S. House of Representatives speaking in favor of the Communications and Public Safety Act of 1999, Wheeler (1999) indicated that emergency 9-1-1 calls from cellular telephones total over 98,000 calls daily. In further testimony, it was noted that at least 35% of cellular telephone owners have used their telephones in an emergency or life-saving situation.

Wireline or landline telephones are those found in homes or businesses that are connected to the telephone network via copper wires to the local telephone office. Although the ever-popular portable telephones are wireless between the handset and base unit, the base unit must be connected to the wireline network. Portable telephones contribute to mobility, but only within the relatively short radius allowed by its base unit. The term *cellphone* or *cellular telephone* is used to refer to both forms of wireless telephones, analog cellular and digital personal communication system (PCS). The term *cellphone* has evolved from the theoretical engineering design of a cellular system that appears like a honeycomb or *cell* when drawn as a schematic.

Wireline telephone systems are static, and the geographic location of the telephone instrument is always known. Therefore, when an emergency call is placed to an enhanced 9-1-1 system through a wireline telephone, the Public Safety Answering Point (PSAP) can identify the name and street address of the caller. PSAPs are command centers from where 9-1-1 telephone operators dispatch appropriate emergency personnel in response to a need for emergency assistance. PSAPs are funded through monthly fees paid by everyone served by wireline 9-1-1 service. With the street address, PSAP operators can more efficiently dispatch assistance without first attempting to discern from the caller, who may have difficulty speaking, the street address where the assistance needs to be delivered.

While the mobility of a cellular tele-