INTERFACE DISCIPLINES AT WPI: A CASE STUDY IN CREATING NEW PROGRAMS

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INTRODUCTION: In recent years, many faculty in engineering and science have observed a major shift in prospective employers interested in their strongest graduates. Increasingly, hitherto unusual employers, such as major law and finance firms, have eagerly been hiring engineering and science majors. Such employers have indicated that a solid grounding in how engineers think--especially their familiarity with mathematical modeling; with computer data bases, communications, and software; and with solving problems by deciding among various conflicting solutions--is ideal preparation for employment in their fields.

In the early '90's, WPI faculty and administration recognized a pressing need to create new opportunities for undergraduate engineering students to pursue unconventional career objectives in these fields at the "interface" between technologies and societal needs, such as pre-law or pre-health programs. Flexibility and minimal capital costs for such new programs were crucial in this "re-engineering," and in no case was a new department desirable. Instead, existing resources--especially WPI'S flexible, project-based curriculum and existing good corporate contacts--were re-aligned in new patterns to provide the academic matrix for what became new majors, concentrations, and minors.

EXPLAINING THE PROGRAM IN-HOUSE AND GETTING FACULTY SUPPORT: To draw upon the range of ideas and resources on campus, WPI developed an in-house RFP process with a critical review by a committee appointed by faculty governance. The RFP (presented in Appendix 1) asked for a full description of the program, including its market niche, existing and requisite resources, and brief business plan with "return on investment" information. The intent was to emphasize the necessity of marshaling and redirecting existing resources, not advancing a "wish list" for new ones.

Faculty response was immediate. Proposals for undergraduate interface discipline initiatives were submitted in American studies, museum and archival science; management, economics and technology; entrepreneurship; environmental programs; industrial engineering in a global economy; international affairs; pre-health and pre-law studies; quantum engineering; society, technology and policy; secondary school mathematics and science teacher certification; technical, scientific and professional communications; theater technology; and technology-based management and technology. Proposals for graduate-level interface discipline initiatives were received in computer and communication networks, fire safety distance learning, and technology and public policy.

Clearly, most of these titles suggest faculty from two or more disciplines seeking an educational and professional opportunity in the interface between a technical and a non-technical program and faculty. The bridge over the interface was most often proposed via the social sciences (for example, pre-law or economics and technology), though the humanities and arts also participated (theater technology; technical, professional and scientific communications.) In a few cases the two players were both in technical areas (like computer and communication networks where both the Departments of Computer Science and of Electrical and Computer Engineering equally participated.)

The faculty review committee recommended 10 new programs (of 18 completed submissions). The President and Provost accepted their recommendations and added several more promising programs. The

administration provided seed funding for programs in five major areas: communications, health-related, pre-professional, technology and management, and international studies.

INITIAL FUNDING: Roughly \$440,000 WPI dollars were invested in launching these new ventures. The range of these new “Interface Discipline” programs, at both the undergraduate and graduate level, is illustrated by the initial list of funded programs, with a brief abstract of the “deliverable” product:

COMMUNICATIONS

Computer & Communications Networks

An MS and BS specialization to prepare students for leadership roles in communications technologies, with an accelerated part-time calendar of afternoon and evening courses and industry ties and internships.

Fire Safety Distance Learning

Adaptation of existing graduate level Fire Safety courses for use in distance learning (interactive TV) teaching environments.

Technical, Scientific & Professional Communications

Creating both minors and majors combining a knowledge of science or engineering with a full range of professional skills in written, oral, and computer-based communications.

HEALTH-RELATED

Pre-Health (Gateway to the Health Professions)

Options for undergraduates at WPI to pursue programs leading to careers in medicine, dentistry, or veterinary medicine; biomedical engineering; or management and economics of health care systems.

PRE-PROFESSIONAL

Pre-Law

Definition of options for programs leading to careers involving law and technology, such as patent law, with internships in appropriate legal organizations and joint admissions programs with Suffolk University and Franklin Pierce Law Center.

Teacher Certification

Adding to the WPI B.S. degree those courses and projects needed to get preliminary teacher certification in Massachusetts in mathematics or science at the secondary school level.

Theater Technology

Building on WPI’s humanities and arts “minor” with a theater concentration, and its projects program, to structure programs for students in engineering or computer science to prepare them for “high-tech” jobs in the theater or music industries,

TECHNOLOGY/MANAGEMENT

Economics & Technology

A major in economics and strong minor in engineering or science, to prepare students for careers using economic theory and model building in areas such as law, public service and management.

Entrepreneurship

Scaling up the prototype WPI Entrepreneur’s Collaborative to a full-scale academic program in entrepreneurship at the level of an academic minor or concentration, targeted at US and international students.

Industrial Engineering

Revision of existing Management programs to offer an Industrial Engineering curriculum that would satisfy both ABET and AACSB accreditation guidelines.

Technology & Public Policy

A graduate level program to prepare for management careers in public policy fields where an in-depth knowledge of a scientific or technological field is required.

Environmental Policy and Development

Combining economics, political science and public policy with engineering and/or science to prepare students for careers in public policy, government, business or law.

INTERNATIONAL STUDIES

Developing WPI's already strong "Global Perspective Program" to offer minors, majors and double majors combining science and/or engineering strengths with historical, cultural and language capabilities leading to international careers.

HIGHLIGHTS FROM FOUR RECENT INTERFACE DISCIPLINE REPORTS:

Pre-medical. Professor and Biomedical Engineering Head Robert Peura and Professor and Biology and Biotechnology Department Head Ronald D. Cheetham reported that 200 high school juniors and 75 seniors responded to a brochure they received last winter about WPI's pre-med program. The course "Human Physiology" was taught to biology and biotechnology and biomedical engineering students using new computer software, with 147 students enrolled in these new labs. Department liaisons and a pre-health office have been established, and support for students preparing for the MCATS has been strengthened through the new Pre-Health Society, which now has 65 members.

Pre-law. Program director Kent J. Rissmiller, Associate Professor in Social Science and Policy Studies, has negotiated a modified joint-admissions program for the B.S. and J.D. with the Franklin Pierce Law Center (Rindge, NH) and with Suffolk Law School (Boston), such that students carrying out joint studies and maintaining high standards will move through the combined program and obtain both degrees. A Pre-law Advisory Committee has been established, and a minor in pre-law was accepted by the faculty.

Technical, Scientific and Professional Communication. This program, retitled from Interdisciplinary Technical Writing to indicate its breadth, has graduated 13 students in the last three years; 12 are working in the field. Much of the program support has been directed toward enhancing the faculty base (which now includes four disciplines) and marketing the existing program. English professor and program director John Trimbur believes it will be possible to recruit 30-40 technical writing majors each year.

Entrepreneurship. Like most of the other "interface" programs, entrepreneurship lends itself very well to becoming a minor for students majoring in a traditional technical field, as well as an area of concentration for some management majors. Fifty-two students, twice the anticipated number, enrolled in Introduction to Entrepreneurship (ID 1050) in Term C '95; the course will be repeated in Term C '96. Rolf Jensen, Chairman of the Board of Rolf Jensen & Associates, Deerfield, Ill., one of the nation's most distinguished consulting firms in fire safety, is WPI's first Entrepreneur in Residence. Professor Jensen will be involved in both the Entrepreneurship and Fire Safety Studies programs. An advisory committee of faculty and alumni guide the program, and provide the core of experienced entrepreneurs who present case studies in the popular ID 1050 course, which is coordinated by the program directors, Vice President Emeritus Don Berth and Professor Art Gerstenfeld.

ASSESSING THE SUCCESS OF THE WPI "INTERFACE DISCIPLINES" PROGRAM:

The first year of faculty activity in implementing the Interface Discipline Program was completed in fall 1995. At the graduate level, success--including financial--was immediately obvious. Both the graduate

level CCN and Fire Safety part- and full-time graduate programs developed through Interface funding returned enough income to repay the initial investment several fold.

Success at the undergraduate level is harder to measure, because undergraduates matriculate for many different reasons. It is certainly gratifying to hear from a young lady with admissible scores that the only reason she wants to come to WPI is that we offer the only undergraduate program she could discover in the economics of the environment and development. Certainly all these programs have enabled the faculty to mount an impressive collection of new program options (majors, minors, and disciplinary specialties), that present WPI as something in addition to its century-long reputation as a well-regarded engineering school. Fall 1996 is the first recruiting season in which the Interface program materials can make a difference, and while it is not yet possible to go beyond such anecdotes as the remark above, students' requests for more information have been gratifying.

Perhaps even more important, the Interface Initiatives Program exercise demonstrated the capacity to design new support structures at the college level, which are more flexible than traditional departments and which thus respond more quickly to changing market needs. The program has thus proven to be an important way of presenting WPI as an institution with, in some cases, novel or even unique programs blending technological and liberal arts studies. The Program also has demonstrated the very flexibility in planning and executing programs which our graduates will increasingly be required to demonstrate as they develop their professional careers.

APPENDIX 1

PROGRAM PROPOSAL FOR SUPPORT OF AN "INTERFACE DISCIPLINE"

BASIC INFORMATION

1. Title of proposed "Interface Discipline":
2. Check as appropriate: Undergraduate _____ Graduate _____ BS/MS _____
Other (such as part-time, continuing cd., etc.; please specify) _____
3. Faculty members (and their departments) preparing this proposal. You are encouraged to solicit student participation in project preparation--indicate any such participants. Please also indicate the contact person for the proposal. _____
4. Abstract of proposed program.

MARKET FOR PROPOSED PROGRAM

5. Kinds of career objectives for graduates in the program. Please specify any trends in professional practice that will affect career possibilities.
6. Kinds of students this program will attract (for example, intellectual interests, socioeconomic backgrounds, ethnic and gender distributions, and the like.)
7. Similar programs already in existence at other institutions. If possible, provide information on these programs from institutional documents.
8. Innovations in your proposed program that will distinguish it from existing programs.
9. Potential problems that can interfere with the success of your program.

10. Opportunities to use new technologies (such as compressed video) for delivery and for securing new markets.

RESOURCES

11. Existing resources to be tapped (faculty, courses, MQPs, IQPs, labs, industry, research facilities, or other professional contacts, the Worcester Consortium for Higher Education, etc.)

12. Costs and benefits. Please provide as much detail as possible, indicating dollar costs wherever quantifiable.

costs

Faculty time -- planning
Faculty time -- implementation
Space needs
Library and information resources
New faculty

Benefits

Impact of WPI mission and reputation
New research areas
New funding sources
New students: Please distinguish between
net new students and students who will likely
replace students in existing programs.

IMPLEMENTATION

13. Proposed time schedule, indicating planning, implementation, revision and assessment periods. Indicate “break-even” point on support investment.

14. On-going support -- once the program is begun and the “bridge investment” start-up funding is exhausted, please indicate what resources will be needed to maintain and expand the program, and where these resources will come from. For example, indicate what current activities could be reduced to free up resources to support the initiative, and what external sources are reliable for on-going support.

15. Plans to monitor success -- please identify appropriate metrics, and indicate at what point and by what standards you will reach the decision to continue the program.

OTHER

16. Other: anything you would like to add.

LANCE SCHACHTERLE joined WPI as an assistant professor of English in 1970, and served from 1984 to 1993 as chair of Interdisciplinary Studies, overseeing WPI’s unique Interactive Qualifying Project program with its extensive experimentation in global education. Schachterle was appointed an Assistant Provost in 1993, and led pre-development of the “Interface” program.