

**ESTABLISHMENT OF AND FUNDING FOR
INTERUNIVERSITY/MULTIDISCIPLINARY STUDENT EXPERIENCES:
A DEMONSTRATION CASE**

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ABSTRACT

This paper describes establishment of an inter-university and multidisciplinary student experience supported through an external grant. The process of establishing the program, obtaining funding for it, the specific student projects involved and benefits that were derived by the students also are discussed.

INTRODUCTION

Experiential learning has evolved from being an exploratory experimental technique in the 1950s and 60s to being common practice in a variety of learning settings (Graf and Kellogg, 1990). The central tenet of experiential learning is that one learns best by doing. The active involvement of students through experiential learning is considered an effective teaching technique which improves student understanding of the topic. Learning theory literature suggests that immediate reinforcement, such as that offered by experiential learning, plays a major role in determining the quality of learning (Estes, 1972).

Experiential learning took a significant leap forward this past year at Illinois State University when its institute for Entrepreneurial Studies partnered with Northern Illinois University's (NIU) Entrepreneurship Program, and the University of Illinois at Urbana/Champaign's (UIUC) Institute for Competitive Manufacturing to conduct a series of real-life projects for an Illinois-based manufacturing firm.¹ Project

funding for this joint endeavor was obtained through a Higher Education Cooperation Act (HECA) Grant from the Illinois Board of Higher Education.

The teams of business students from Illinois State University and NIU worked with a team of engineering students from the UIUC to carry out a series of projects keyed to improving the deteriorating competitive position of a manufacturer of wire storage products. More specifically, the student teams successfully completed projects ranging from cost-effective redesign of shelving to decreasing customer intimidation. The student teams' information and learning were then successfully transferred to manufacturers and the Virtual Manufacturing Community.

The sections that follow will briefly describe the Virtual Manufacturing Community concept, how the above-identified cooperative arrangements were established and funding secured, some of the details related to actual projects undertaken by above-mentioned teams of students, and the real-world benefits and experiences gained by students through those efforts.

¹ While not involving actual student participants, the cooperative partnership also included the Fox

Valley Educational Alliance and the Northern Illinois Manufacturing Extension Center at Rock Valley College.

**THE VIRTUAL MANUFACTURING
COMMUNITY**

The Virtual Manufacturing Community (VMC) is a take-off of the virtual team concept (Geber, 1995). Virtual teams are organizational teams whose members, though separated by several miles or even continents, are able to work together by communicating through modem technology. Technological advances that have made virtual teams possible include FAX machines, E-mail, videoconferencing, and a new generation of computer software called groupware. Groupware electronically links team members via computers, allowing them to instantly manipulate and trade information. The challenge of virtual teams is to get people to work together even though they cannot meet face-to-face. (Gerber, 1995).

The VMC mentioned above is designed to assist industrial firms seeking to improve their manufacturing competitiveness by making the resources of the higher education community more readily available to meeting business and industry needs, while simultaneously supporting the accompanying missions of education, research, and public service. The industrial base of Illinois has several unique characteristics that complicate effective manufacturing assistance efforts. Some of those characteristics include a broad variety of industries, a majority of manufacturers of small size (96% with fewer than 250 employees), the absence of a dominant industry, and a broad geographic distribution of population with only heavier density in a few communities. To more effectively serve the industrial base of the state, the Virtual Manufacturing Community was created.

The VMC is defined by two key terms--VIRTUAL, which means that it exists on the Internet and that it facilitates communication and information sharing outside of geographic or time boundaries, and COMMUNITY, which describes a partnership where members share learning of new technologies, tools, and techniques and their practical applications within

an industry, geo-political region, or business entity.

The network described above allows for the creation of a true market-driven delivery system in which various levels of assistance are possible. At the basic level, industry members are able to interact among themselves sharing solutions to a local problem with the only assistance provided being the facilitation of communications. At a medium level of assistance, materials developed by members of the academic community and affiliated service provider organizations may be posted to a community web-site and then accessed as needed by community members. At the highest level of assistance, university personnel or affiliated members may develop and deliver workshops on topics needed by the community. These presentations have the capability of being delivered via the Illinois Satellite Network from facilities on the UJUC campus or on-site at a facility in the community. As mentioned above, student teams' information and recommendations were transferred to this Virtual Manufacturing Community.

Obviously, to successfully carry out the activities described above takes resources as well as a well-coordinated effort among the parties involved. The funding necessary to support this effort was obtained through a grant from the Illinois Board of Higher Education.

**FUNDING FOR AND ESTABLISHMENT OF
A COOPERATIVE INTERUNIVERSITY
EXPERIENTIAL PROGRAM**

A grant has been created as a result of the passage of the State of Illinois Board of Education's Higher Education Cooperation Act (HECA). HECA funds are provided annually by the state to support programs and projects involving cooperation among two or more institutions or higher education that coordinate efforts on or about a major or topical educational issue. The act stipulates that programs receiving grant funds shall serve both a public and

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secular purpose and be consistent with Board of Higher Education policies and priorities. Grants are awarded on a competitive basis.

The type of grant (economic development grant) received to support the project presented here is intended to fund initiatives designed to link more effectively the state-wide telecommunications network, to expand economic development efforts of the state's colleges and universities, and to capitalize on the special capabilities and geographic advantages of the state's system of community colleges. The grant funds also are for projects designed to assist in providing solutions to economic development needs of a region by bringing higher education resources and expertise into that region. Highest priority is given to projects which, among other things, seek innovative uses of technology to improve curriculum and student instruction. The present project establishing this interuniversity, multidisciplinary cooperative endeavor meets all of the goals and expectations outlined above.

Multidisciplinary cooperation and team building have been significant focuses in the popular business press over the past decade or so. The literature related to teams first focused on use of problem-solving teams--an organizational team set up to help eliminate a specified problem within the organization (Shonk, 1992). Self-managed teams--an organizational team set up to plan, organize, and control its own work situation with only minimal direction from management--then became the craze (Zuidema and Kleiner, 1994; Abbasi and Hollman, 1994). More recently, however, the focus has been on cross-functional teams--teams composed of people from different functional areas of the organization who are all focused on a specified objective (Dentcn, 1992; Hull, Walker, Frankwick, 1995). The student teams assembled through the above-mentioned HECA grant would likely be categorized as a type of hybrid between problem-solving and cross-functional--engineering and business students working cooperatively to research, analyze and

make recommendations to resolve specific issues for a participating business organization.

How did this cooperative endeavor among ISU, NIU, and UIUC come to be? Successes in earlier academic partnerships between the entrepreneurship programs of ISU and NIU in 1992 (e.g., project involving marketing of nuclear power plant testing equipment in international markets) and between the entrepreneurship program at NIU and the industrial engineering program at UICU in 1994 (e.g., project involving redesign of retractable surgical device), led to common awareness of the capabilities of program participants at all three institutions. These experiences demonstrated several important principles to both the students and faculty engaged in the projects. First, the project work significantly improved the value of the learning experience for students. For example, as engineers worked to understand the needs of the marketplace, the business students also began to appreciate the questions of design and manufacturing. Second, all parties involved came to see the potential for leveraging resources and skills of each university. Finally, the combining of student teams, faculty, libraries, technology, and specialized staff provided an especially cost effective resource for business.

While the NIU/ISU cooperative effort concluded in 1993, the NIU/UIUC joint effort initiated in 1994 was expanded over subsequent years. However, in the summer of 1996 when a new project, entitled Enterprise "X" was rolled out, ISU was invited to become a member of the team. The enterprise in question (Enterprise "X" in this case) is a large midwestern producer of household storage products manufactured from welded wire or wood. The nature of the projects in the Enterprise "X" program and the experiential learning that resulted are outlined below.

A DEMONSTRATION CASE

The projects outlined below were initiated and

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completed during the Spring 1997 semester. The cross-university/cross-functional team involved in carrying out these projects included 34 NIU M.B.A. and undergraduate business students, 8 ISU undergraduate business students, and 7 UIUC undergraduate industrial engineering students.

Four specific sets of projects were agreed to and supported through the HECA grant. The first set of projects was keyed to understanding the behavior of end customers. That work, defining the requirements of end-customers, was accomplished by students from NIU and ISU and carried forward by the senior design students at UIUC. The senior design students worked to identify opportunities to apply appropriate technology to improving customer satisfaction, such as a design tool to permit the customer to specify proposed storage solutions from a range of solutions. Engineering students using the information provided by the NIU and ISU team members, also searched for simplified installation procedures and, in turn, made suggestions to improve the design of the product line to make both the purchase and installation processes more accommodating.

The second set of projects involved improvements to the firm's existing manufacturing processes to find new ways to test the quality of welds in nondestructive fashion. This inquiry also yielded a series of questions regarding the overall nature of the plant's quality processes.

The third set of projects, involving the entire extended team, consisted of fashioning a methodology which permitted the firm to accurately assess new product opportunities in original equipment markets. The business students were responsible for identifying the critical business questions involved in the method while the engineering students took charge of assessing the technical and manufacturing feasibility of those apparent opportunities.

Finally, the entire team proceeded with the development of the Virtual Manufacturing

Community. The goal for the VMC was to link the enterprise with customers, suppliers, and sellers. Further, the VMC was to serve as a link for the firm's geographically separated production, marketing, finance, and administrative facilities. The Internet based community, supported by the video-conferencing links, E-mail, bulletin boards, and regular meetings, made the resources of all the partners readily available to all participating firms, overcoming traditional time and geographic boundaries. These resources included faculty at participating institutions, the university laboratory facilities, computational facilities, and libraries.

REAL-WORLD BENEFITS AND EXPERIENCES GAINED BY STUDENTS

There are numerous benefits to be derived by students participating in projects of the nature presented in this paper. Some of the major benefits include:

- The experience helps develop a mature sense of responsibility in students.
- The experience better prepares students for their professional careers while enhancing their employment potential.
- The experience affords students the opportunity to enhance their interpersonal, teamwork, and communication skills.
- The experience helps sharpen students' conceptual, analytical/problem solving, and entrepreneurial skills.
- The experience permits students to test learned principles in real-world situations and address real business opportunities and problems.
- The experience permits students to expand their knowledge and expertise through interaction not only with peers and faculty from other institutions and disciplines, but also with the network of client firm's staff, customers, and suppliers.
- The experience helps students develop a wholistic view of business operations through

understanding functions and processes and the way they interrelate to affect overall firm performance.

-- In addition to all of the above, the experience allows students to earn academic credit.

As one can see from the above, students have gained a great deal from their involvement in the interuniversity, multidisciplinary projects supported by the HECA grant. This obviously is an excellent pedagogical tool that involves interactive learning whereby the focus of instruction/learning shifts from active teaching on the part of the instructor and passive participation by students to truly hands-on, active learning by the students with a facilitating supervisory role for the instructor.

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