

**AC 2007-288: EXPANDING A SUCCESSFUL INDUSTRY-BASED PARTNERSHIP
BEYOND THE TRADITIONAL COOPERATIVE EDUCATION EXPERIENCE**

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Expanding a Successful Industry-based Partnership Beyond the Traditional Cooperative Education Experience

I. Abstract

Hands-on experience allows students to better comprehend the theory discussed in the classroom. This comprehension of the integration of theory and practice is particularly important in engineering and technology. Cooperative education is an excellent method of providing students with this critical real-world experience. Students with cooperative education experience are typically more successful in obtaining that all-important first job after college. Successful cooperative education programs also benefit the sponsoring organization by providing a pool of familiar, well-trained employees. One university engineering and technology department has expanded a successful industry-based partnership beyond the traditional cooperative education experience. Department faculty and industry representative interact throughout the entire cooperative education process from initial selection to placement of students to placement of students to enhance their personal abilities and build on classroom topics. Besides providing real-world experience for the students, this partnership has expanded to participation on the department's Industrial Advisory Council, assisting in the development of curriculum, and new student recruiting. This paper will describe the development and benefits of this expanded cooperative education partnership.

II. Introduction

Historically the economy of the southeastern region of the U.S. has been heavily influenced by manufacturing. Most of this manufacturing, however, was considered low-tech and labor intensive; textile manufacturing serves as a classic example. In recent years, the region has become increasingly dependent on high technology manufacturing with the automotive industry leading the way. Recognizing the importance of manufacturing, one university engineering and technology department has offered degree programs supporting the needs of regional industry. This department worked to establish a strong partnership with the largest automotive manufacturers in the region. The department is a nationally accredited industrial technology and engineering department that serves approximately 250 students in four different undergraduate academic majors: electronics, occupational safety and health, industrial management, and computer-integrated manufacturing. The department offers Bachelor of Science degrees in each of these four areas and a Master of Science degree in manufacturing management.

One of the successful areas of this industry-based partnership is in cooperative education. Cooperative education is an excellent method of enhancing student learning by providing real world experience. The need for better integration of theory and practice, particularly in engineering and technology, has been an issue in education since the first cooperative education program was established in 1906^[1]. The value of cooperative education is well documented. A recent survey conducted by the National Association of Colleges and Employers reported that 29% of interns were "converted" to full-time employees and 55% of new employees hired by manufacturers have coop-type experience^[2]. A 2004 survey of college graduates conducted by Monster TRAK indicated that 74% thought relevant work experience was the most important factor in securing employment and that 52% of employers agreed^[1]. The same survey indicated

that 41% of the students had received no relevant experience during their undergraduate careers. The results of this survey support the need for increasing the number of effective cooperative education programs.

The department and the industry partner have worked together to develop a relationship that includes an innovative program designed to enhance students' learning experiences through cooperative education. Although the department has cooperative education programs with several industries, this particular partnership involves on-going collaboration to provide "world class" experiences for students. The entire process, from initial selection of participating students to the structure of the students' learning experiences in the plant, involves a high level of interaction between faculty and representatives of the industry partner. This relationship makes the program adaptive in an effort to maximize the benefit to the participating students. In addition, there are benefits to the industry partner. Since the industry is growing and in need of skilled professionals, this program provides an inexpensive method of preparing a pool of trained employees that can be matched with a department that best fits their individual talents and aspirations. Furthermore, numerous other benefits beyond the cooperative education program have resulted such as participation on the department's Industrial Advisory Council, development of courses, courses video streamed directly to the industrial partner's site and plant tours for recruiting new students considering a career in manufacturing.

III. Cooperative Education Program

The distinctive aspects of this industry-based partnership and cooperative education experience are evident beginning with the selection of participating students. Interested students submit resumes to the university placement office. The university placement office ensures that the student is eligible for the cooperative education program and coordinates the scheduling and contacting of students for interviews. The interviews are conducted in the technology and engineering department building. The interaction of department faculty and industry representatives begins with a discussion of eligible students. This is not a discussion of which student should be selected but an exchange of student strengths and potential benefits, both academic and work-related, from participating in this cooperative education program.

This cooperative education experience exists as a classic alternating "co-op" arrangement. The student works fulltime one semester with the industry partner and then attends school full-time the next semester. A unique advantage of location and course scheduling enables the student to enroll in up to six semester hours during their "working" semester. The industry partner is approximately 30 minutes driving distance from the campus and the university department offers a full schedule of courses in the evenings. This minimizes the delay in graduation that often deters students from a participating in a cooperative education program.

The industry partner is a large automotive manufacturing and assembly plant that offers a wide range of manufacturing experiences for the student. In order to maximize this opportunity the student rotates between departments each semester during their co-op experience. This provides the student with a broad knowledge of the operation of the facility. This allows the student to connect the activities of the various departments and enables the student to see the "big picture". This makes the student a more valuable future full-time employee to the industry partner. This is

important in the view of the industry partner since they indicate that one of the major problems they have in retention of engineering professionals is dissatisfaction with the work required for a given position. This program allows the industry to “fit” the potential future employee with the job. Another benefit for the industry partner is that students having experience in several departments can be temporarily moved during the middle of a semester if an unexpected need arises in a particular department. This rotating schedule also exposes the student to areas beyond their degree program of study enhancing the learning experience and provides the student with an enhanced appreciation for the overall operation of the manufacturing enterprise. This enlarged exposure helps the student validate their chosen career path. As a result of this validation experience, students have added majors or changed majors. For example, one student realized that they would not enjoy the volume of paperwork involved with a career in occupational safety and health but really enjoyed their experience in manufacturing engineering. As a result this student changed their academic major. After completing a semester of co-op working in the safety and health department, another student majoring in industrial management stated that he had never realized the impact that workplace safety and health had on the overall operation and success of a manufacturing facility and decided to add occupational safety and health as a second major.

IV. Enhancing Student “Soft Skills”

Common deficiencies mentioned by employers of recent college graduates are not the lack of technical skills but of the so-called “soft skills”. For example critical skills such as effective communication and personal responsibility top the list. Many cooperative education opportunities allow the student to build some of these “soft skills”. Examples include the ability to be on time, keep a deadline, prioritize tasks and maintain a professional appearance. This cooperative program, like many others, compels the student to develop and demonstrate these essential “soft skills”.

With this industry partner co-op students are allowed and even encouraged to identify and report process deficiencies and problems any where within the facility. Typically, when a co-op student identifies a problem they are given the responsibility to develop and communicate a solution. Co-op students are provided the opportunity to explore innovative solutions and sell their ideas to stakeholders. As a result, co-op students must formally present their ideas to both hourly associates and top management to build support. This provides the co-op student a unique opportunity to develop both effective verbal and written communication skills. Building support for their ideas also exposes the co-op student to constructive criticism from various levels within the organization. In one particular instance, a co-op student identified a need for new tool on the assembly line. This student was required to cost justify this change to management, communicate and establish support of the production associates, write new work procedures, and conduct a safety analysis.

Another “soft skill” enhanced by this particular cooperative education experience is the ability to effectively function as a member of a multidisciplinary team. The industry partner’s organizational and management style fully incorporates the use of multidisciplinary teams. Co-op students are immediately placed on one of these cross-function teams and exposed to the unique characteristics required to be a successful team member. Co-op students often have

simultaneous responsibilities over various areas of the facility requiring the student to both work as a member of a team while serving as team leader in another area.

Based on this wide range of exposure and the innovative freedom of this cooperative education program, students are presented the opportunity to practice ethical decision-making. Whether it is the student taking responsibility for a decision, or taking the initiative to investigate a solution to a problem the student is expected to act ethically. As a result, ethics moves from an abstract theory discussed in the classroom to a real-world experience. As a result of this exposure to ethical issues students are better able to understand the value of ethical behavior and begin to develop methods of resolving ethical dilemmas.

V. Expanding Benefits

The industry partner agreed to have two representatives participate on the departmental Industrial Advisory Council. This council is a group of manufacturing professionals with job responsibilities that directly relate to the department's degree programs. The representatives from this industrial partner have been very effective in communicating the specific needs of the automotive related industry and manufacturing in general in providing assistance with curriculum development issues. This is particularly important based on the expansion of the automotive industry within the region. These representatives have also proven to be great ambassadors for the cooperative education program described in this paper and have influenced some of the other council members to discuss the development of such a program within their own organization.

This industry partner is very committed to education and seeks opportunities for all of its associates to be able to pursue further education. An idea (currently under review) that originated because of the cooperative education program is a proposal to offer video streamed courses to the industrial site. If developed, these video courses could be taken by co-op students as well as any full-time associate that meets the university's admission requirements. Furthermore, this partnership has provided the opportunity for department faculty to conduct on-site industrial training for full-time associates.

In addition, the industry partner's Grant Foundation is considering the approval of a monetary grant to the university department that will provide the workstations needed for the establishment of a Manufacturing Design Laboratory.

Finally, the close proximity of the industrial partner is allowing the department to schedule plant tours for students that are considering a major within the department as part of an introductory class that is available to these students. This opportunity is very beneficial to the students and to the department. As pointed out in the introduction, manufacturing has changed drastically in our region and many of our students grew up with parents that worked in the low technology, labor intensive industries. Exposure to a highly efficient, heavily automated manufacturing facility serves to alleviate the fears of some students that may have negative images of what a career in manufacturing may involve.

VI. Conclusions

Both the industry partner and participating students report high levels of satisfaction with this particular cooperative education program. Consequently, nearly 100% of co-op students at this facility are offered full-time employment after graduation and a majority accepts the employment offer. Finally, the university department attempts to provide students with skills and knowledge that will allow them to be successful in their professional career. This cooperative education program enhances the classroom education by providing an opportunity to integrate classroom theory and practical application. This real world experience allows the university department to complete the educational loop. This cooperative education program allows the student to demonstrate their technical skills in an industrial setting and allows the student to “practice” the implementation of various “soft skills”. The university department intends to continue this industry-based partnership and use this cooperative education program as a benchmark at other facilities.

VII. References

1. Akins, Thomas M., 2005. A Brief Summary of Cooperative Education: History, Philosophy, and Current Status. *Educating the Engineer of 2020*. The National Academy of Sciences.
2. National Association of Colleges and Employers, 2003. *Job Outlook*. LRP Publications.