

Innovations in delivering up-to-date education/training by higher education institutions

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Abstract

The cost of upgrading and maintaining modern equipment and facilities is staggering. Some colleges and universities have come up with innovative and cost-effective ways to provide the opportunity for their students to work with the latest instruments and machineries available on the market. This article presents two examples of the innovative methods being used today. It will also identify other options that could be implemented in future. Adopting these measures creates a win-win situation for both the institutions of higher education and to the same extent benefits the other organizations involved in these cooperative endeavors.

I. Introduction

With the rapid pace of technological changes and the need for qualified personnel graduating from colleges and universities it has become very challenging for the institutions of higher education to stay up-to-date in multiple venues. Often students graduating from these institutions need to be retrained at the company level to become compatible and qualified with the work force working in industry. One of the reasons for this technological gap is the financial capability of these institutions to purchase and equip their facilities with state of the art technologies available on the market. Other reason is the lack of trained faculty and staff who can deliver these new technologies to others in a reasonable amount of time in the form of teaching and training.

To remedy the problems mentioned above institutions have started to look at options such as fostering university-industry cooperation in technology training through structured networking, university-personnel exchange, and joint training projects ². Also, the federal Manufacturing Extension Partnership with university-based technology transfer initiatives has been fostered to assist small and medium-sized enterprises in modernizing production ¹.

This article looks at two examples. First, fostering university-industry cooperation in technology training. Along this continuum the partnership arrangement between Mazak cooperation and Northern Kentucky University is explained. Second, the federal Manufacturing Extension Partnership program with Marshall University is explained.

II. University-industry cooperation in technology training

During the past few years, the Department of Technology at Northern Kentucky University (NKU) has provided collaborative and partnership arrangement with businesses and industries in the northern Kentucky and greater Cincinnati area. Northern Kentucky University in an attempt

to provide quality education and training needed by individuals to function effectively in a technological environment has developed a partnership arrangement with Mazak Corporation to open new opportunities for students in the area of manufacturing ⁴. This arrangement has enhanced the quality of instruction and improved the learning environment for manufacturing engineering students. The collaboration has also provided technical training for a pool of potential employees in obtaining advanced training while working on their undergraduate degrees. The responsibility of NKU is to teach all courses with assistance from Mazak personnel. Each course is promoted and taught, encouraging continuous enrolment at Mazak and NKU. In-turn Mazak has devoted its Technology Center to be utilized for maximum of fifteen students in each class. Students that successfully complete the courses taught with the cooperation of Mazak, will be awarded a certificate of training, in addition these courses count toward the Manufacturing Engineering Technology bachelor program at NKU. Examining Mazak corporate structure in the area of technology partnerships, reveals that the company believes, Technology Solution is not just a product. It's a process. At Mazak's National Technology Center, the company provides innovative solutions through unique partnerships, one of which is the partnership with NKU. The company stresses on engineering development and training to provide its customers tangible value-added benefits through advancements in machine tool technology, and CAD/CAM ³.

Up-to-date one group of students have taken the course required to receive their certificates. This is due to the recency of the agreement between NKU and Mazak. The number of students graduating with Mazak certificates is expected to grow during the next academic year.

III. The Federal Manufacturing Extension Partnership program

The Robert C. Byrd Institute for Advanced Flexible Manufacturing (RCBI) is one example of the Federal Manufacturing Extension Partnership program established in mid 1990's in conjunction with Marshall University to provide access to advanced technologies and technical training ⁵.

Since opening its first manufacturing technology center in Huntington, WV, RCBI has worked closely with Marshall University and the Marshall Community & Technical College to provide hands-on instruction and training with the latest technologies and computer-controlled equipment that meet or exceed current industry standards.

RCBI operates a facility with state-of-the-art and computer-controlled, manufacturing equipment. This equipment (which includes a Charmilles Technologies Robofil 510 Wire EDM, a Cincinnati Milacron Lancer 1000 Machining Center, a Giddings & Lewis Coordinate Measuring Machine, an Okuma "Cadet" CNC Turning Center, a CIM cell equip with robotics, CNC machines, vision center and an Automated Storage Retrieval System (ASRS), latest CAD/CAM and other manufacturing related software) is available to industry for training its personnel as well as to lease for actual production runs. The hands-on possibility for instruction on this manufacturing equipment allows Engineering Technology students in the Marshall Community & Technical College to experience manufacturing processes in action. Instructors of various courses, including Flexible Manufacturing, Computer Aided Design, and

Manufacturing Processes, have regularly taught their classes at RCBI for utilization of the key technologies available.

Through its national domestic and international internship programs for undergraduate and graduate students enrolled at Marshall University, RCBI provides direct, hands-on, practical experience with manufacturers and industry across West Virginia and the surrounding region.

To increase both its industry and university outreach efforts across the region, in January 1998 RCBI established a physical presence in South Charleston at the Marshall Graduate College campus by opening an additional Manufacturing Technology Center. The facility was constructed jointly by Marshall University and RCBI. RCBI provided two full-time staff members and approximately \$700,000 worth of state-of-the-art and -market manufacturing equipment for student and industrial use, thus bringing the experience and benefits of RCBI staff and its technical expertise to the graduate college students as well as industry across the greater-Kanawha Valley.

Additionally, A Machinist Technology program was established in 1998 providing a unique opportunity for the students to become certified machinist through the state of West Virginia. Students are provided a comprehensive program designed to meet National Institute for Metalworking Skills (NIMS) standard. Upon successful completion of the courses, and the certification process, students are eligible to receive certification from NIMS. The program offers students the opportunity to apply course credits earned through this program toward other undergraduate or graduate level degrees at Marshall University.

The Machinist Technology Program is a key component that further demonstrates RCBI commitment to industry's workforce needs as well as its commitment to Marshall University and educational efforts for the state's work force. This technical program provides hands-on training that enables individuals to perform entry-level machinist jobs and encourages them to further their skills and achieve higher levels of performance to advance in their professions.

The Machinist Technology Program is modular in nature and offers an alternative to traditional education for those individuals who need to enhance or expand their technical workplace skills for today's demanding market. One of the program's options allows participants to earn Associate of Applied Science in Technical Studies degrees in conjunction with academic classes through the Marshall Community & Technical College. The overall effort will ensure a pool of technically talented individuals from which manufacturers can choose. Both full and part-time programs are now in place to ensure that those individuals who work full-time jobs can also take courses and complete the program that will enhance their skills levels and allow them to further their careers. The program is now offered in multiple locations, at both Huntington and Bridgeport Manufacturing Technology Centers. The first full-time, formal class at the RCBI Bridgeport Manufacturing Technology Center began November 1, 1999 with eight participants and part-time evening program enrolment in Huntington and Bridgeport Centers are respectively eight and sixteen participants as of January 10, 2000. In addition to the formal full and part-time training programs, RCBI provides customized training of varying lengths that

meets the individual needs of manufacturing clients involved⁵.

Another method of cooperation between RCBI and Marshall University involves the RCBI Interactive Distance Learning Room, which permits live, interactive, satellite broadcast of courses for distance learning opportunities. RCBI has provided broadcast of courses ranging from “Nursing Leadership” to “Statistical Methods” classes, during semesters when the university’s Instructional Television Services’ resources were overburdened.

RCBI remains committed to providing the educational experience necessary to ensure that a technically-capable work force is available to meet industry needs and to provide a full and realistic learning experience to students enrolled at Marshall University and the Marshall Community & Technical College.

Program	Discipline	Type of task/training	Number of students
Graduate	Engineering	Designed inventory control software, ACAD drawing, programming of rubber mold prototypes	7
Undergrad	Computer related training (CAD, CAM, etc.)	Basic classes in design (CAD), computer operating systems (Windows), and Computer Aided Manufacturing classes using SmartCAM and other CAM packages.	Average 15 / semester
Undergrad	Internship	Students assisted manufacturers in design and production runs of their parts produced at the center.	6
Undergrad	JTPA	These students went through a series of courses essential to their employability in manufacturing and design.	18
Undergrad	Machinist Technology	Training related to the curricula in this program.	29 first year
Undergrad	Engineering Technology	Training related to the curricula in this program.	Average 30 students / semester

Table 1. Summary of the major cooperative teaching/training projects between RCBI and Marshall University.

IV. Conclusion

Institutions of higher education are using varied innovative tactics to stay technologically up-to-date. University-industry cooperation in technology training and the Federal Manufacturing Extension Partnership programs are two of these methods discussed above. Other methods such

as university-industry personnel exchange, and joint training projects are some other methods that can reduce the level of technological gap that exists between universities and industry owned facilities. As the number of such partnerships increases, students will have better opportunities to receive quality education and skills needed to perform more effectively in today's fast evolving technological environment.

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