

## **On-Site Courses and Programs and Delivery of Student Services**

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### **Introduction**

This paper outlines the results of many different on-site programs and courses, credit and non-credit run by two departmental units at Northeastern University. A program description of each effort is presented. Each includes: the organization, the key outcomes, and an analysis of the effort.

This section is followed by the results of a survey developed by the authors and conducted by the staff of the Corporate On-Site Education group in Northeastern's Continuing Education Division. Information from the literature on advising on-site students was reviewed with the relevant articles summarized in this paper. The paper concludes with a plan for advising participants in on-site programs recognizing participant differences and program variables.

### **How Northeastern's Continued Education Organized and Scope of Program**

Continuing Education has three major units within the Division-State of the Art (Information Technology), Building Design and Management, and Corporate On-Site Programs. This group reports to University College, the part-time undergraduate college of the University.

Corporate On-Site Programs has a Director and a staff of three administrators. Two individuals handle the on-site programs from marketing through overall administration of course and programs. The third person handles the internal administration from book ordering through approving invoices as well as providing support to the staff. The group books over \$800,000 a year between courses and programs. The numbers of part time lecturers (adjunct faculty) vary widely as most courses are taught by one person and some involve multiple faculty per course or seminar.

The capabilities of the group are marketed through the advertising program of Continuing Education, information on the Internet, targeted mailings to companies and organizations, referrals from other units, and telephone solicitation. The unit also has a brochure that is included in a promotional folder with other material and given to prospective clients when making site visits.

## **The Academic Programs and How Offered**

The academic programs are offered by the Lowell Institute which is a part of the School of Engineering Technology and reports to the Dean of Engineering. Lowell offers the part-time programs which are identical to the day SET programs with a few exceptions. Two administrators reporting to the Director share the responsibility for the Lowell offerings. The unit offers five to twelve on-site courses at two to five different sites. These are delivered as single courses or part of a degree program for the academic year. Summer offerings are rare except for laboratory courses that are included in the degree programs. These courses are also taught by part-time lecturers though occasionally due to unique circumstances by full-time faculty as overload compensation.

### **Examples of On-Site Programs**

#### **Boston-North Shore Test Equipment Manufacturer**

About ten years ago the School of Engineering Technology was approached by a Software Engineer to teach an on-site Associates Degree program. The majors were Manufacturing or Electrical Engineering Technology and Business. This paper addresses only the technology programs. Northeastern has an accredited Electrical program and had to obtain approval for the Manufacturing degree. Using this proposed program as part of the justification, an Associate degree program was developed from the existing Bachelors' program in Manufacturing Engineering Technology. The program was designed and delivered teaching the traditional lecture courses at the company site, and students used a company van or car pooled to get to the Boston NU campus for the Laboratory courses. A group of fifteen started the program with nine graduating at the end. Since then, all but two have completed the degree.

The key to success to this program was definitely company support. The original contact person was the mentor to the students/employees solving scheduling problems, tutoring, discussing personal and financial issues, and addressing family problems. He also interfaced with the University to be certain that the schedules were set up to meet all concerns, books arrived on site on time, tuition billing was completed properly, and faculty were introduced to the site. Without the participation and effort of the on-site mentor, this program would not have been as successful. Certainly, the graduation rate would not have been as high.

The company has experienced downsizing and reorganization. A number of courses have been offered for groups of employees. These are not intended to be the entire degree offering, and the mentor is not nearly as involved. The results of the original program have not been repeated.

#### **Boston Area Camera/Film Maker**

This program was to be an on-site degree program. However, declining sales and layoffs resulted in the effort not reaching its full potential. Courses were run over several years in excellent classrooms by part-time faculty. There were several in-house training representatives in charge over the time period. The registration functions, book orders, and billing operations were smooth. There was no individual serving as mentor and available to deal with the unusual issues. Over a three year period, 25 courses were offered at up to three different locations.

## Boston I-495 Disk Drive Manufacturer

Computer hardware and software courses were critical in this highly successful and growth company. These were needed by technicians and skilled operatives. Several courses run each quarter on a regular basis. The purpose of the courses is to encourage the participants to become students in a degree program on campus. The on site staff works well on this program and offers some on-site advising. However, faculty is a scarce resource for this program. Delays in start up have occurred because of lack of staffing.

## Three Examples from a Southeastern Massachusetts Controls Manufacturer

The first program, via a set of review classes, prepares engineers to take the FE and PE exams so that they can become Registered Professional Engineers if they pass the exams. There are no on-site advisors for this program because it is a preparation course to take an exam. The participants are self-motivated. There is, however a substantial amount of support from the company to schedule facilities and provide faculty access. A different person teaches almost every class. They also answer many questions about the qualifications, registration process, and tests that requires the assistance of the NU Professional Engineering Program Coordinator.

The second program is a series of four courses to retrain mechanical engineers in the basics of circuits and electronics. The company's business is shifting from a mechanical-based product line to an electronics product line. This successful program is in its fifth cycle with 12 to 15 students.

The Professor Emeritus who teaches these courses serves as the class mentor. Most of these engineers are self-motivated to achieve their own professional development goals. However, occasional business travel or personal problems need resolution by the faculty member. General administrative support is provided by both Continuing Education and company training personnel to handle records and financial matters.

The last example is a program that grew out of the second program for engineers. However, this program focuses on technicians and designers. The emphasis is Data Acquisition (DA). Later, a software package to simulate DA setups and other instrumentation setups was adopted as the company standard. JIT Education™ was used to develop and integrate these two areas into one seamless package of three twenty hour courses. A certificate is awarded at the successful completion of the program. A letter grade and CEU's are posted to a permanent NU transcript.

Because of the uniqueness of this program, technical management from the company has been involved since inception. An Engineering Manager works closely on curriculum development and the evaluation of the course and serves as mentor to the participants. Communication between faculty and mentor is ongoing. The company training personnel handle general administration and scheduling. Continuing Education has a major role in reproducing course notes and class transparencies as well as its regular support functions. The program has completed its second cycle with plans for more offerings already in place.

## Eastern Massachusetts Photoresist Manufacturer

The company provides photoresist technology for most major semiconductor companies in the world. Northeastern's Microelectronics Certificate Program fits well into their business as all of their technical staff need product knowledge as they interface with customers. The first of three cycles was Research Engineers and Scientists as participants. The second was the Engineering staff, and the third is the equipment and field staff.

The certificate program is six twenty hour courses-four courses on the theory and practice of semiconductor theory and manufacturing and the last two on the latest semiconductor technologies customized to the company and its requirements. This is coordinated by Training through a contracted specialist and NU's part-time Coordinator for this certificate program.

These participants self-select training opportunities from the company offerings. Therefore, advising is minimal as the employees are self-motivated. Most of the issues are making up missed classes which are handled by the faculty. Administrative issues are handled by the Continuing Education staff or other NU departments. The program continues at this location because of its popularity and its relevancy to the company. The Program Coordinator for this subject area works with the company staff on problems as well as teaching one course and a half of a second course.

### **The Survey Results**

To assess the level of on-site teaching in the Boston area, a survey form was developed to gather information. Six schools were interviewed by telephone. The publicly funded institutions were: Massachusetts Bay Community College, Middlesex CC, and University of Massachusetts-Lowell. Independent institutions were: Boston University, Wentworth Institute of Technology, and Worcester Polytechnic Institute. The form is shown in condensed format in Appendix A.

The results are summarized. All of the independent schools and one public institution offer on-site courses or programs. The range of involvement in on-site efforts is from minimal to over 50% of the continuing education program. Another program is delivering interactive video courses. Billing and posting of grades are handled through the normal departments for most schools. Other administrative matters are the responsibility of the respective continuing education departments. There is no extraordinary effort to provide advising for these students. All institutions use traditional letter grading for evaluating the courses except one does grading on a pass/fail basis. There were no surprises from the response to the question on the direction the business. All indicated a growth pattern. Course offerings ranged from information technology and software courses to business and communication courses depending on institutional strengths of the school.

In summary, advising at any level is not a primary concern of the responding institutions. For some, on-site offerings are in the beginning stages. For others, the faculty is dealing with the issues. The questionnaire responses did not identify the involvement of a company advisor.

### **The Engineering Education Literature on Advising**

Recent articles on student advising both full and part time students with emphasis on integrating technology were reviewed. Summary information on relevant articles follows.

## On-Site Degree Programs

The first article by Warner et al <sup>1</sup> describes a manufacturing training program for displaced persons. The paper begins with an interesting perspective on the type of advising issues. “Renowned management consultant and author, Peter Drucker <sup>2</sup> reported that the cost of higher education has risen as fast as the cost of health care, without any visible improvement in either the content or the quality of education.....When institutions of higher learning listen to the customer, i.e., the student, to help direct new strategic initiatives in this area, perhaps the most startling observation that they will make is a marked change in the customer. Traditional college students (age 18-22 and full-time) are slowly being outnumbered by nontraditional college students. Tucker <sup>3</sup> reports that today 40-50% of college students are busy adults, i.e., they are older, wish to attend school part-time, and have limited time due to work and family responsibilities. Schools ...have had success when implementing as degree completion programs and continuing education courses aimed at this growing population of nontraditional students initiatives such as degree completion programs and continuing education courses aimed at nontraditional students <sup>4</sup>.”

The strategy of the program was “Given the content, the accelerated nature, and the limited time frame of the proposed program, the Manufacturing Assistance Center (MAC) used the following strategies ..... The first was to establish an integrative and parallel training curriculum. For example, since blueprints, math, and gage reading are used everyday by machinists and tool and die makers, these concepts would be covered in theory early in the program<sup>1</sup>....” This concept, Just-in-Time Education™, was developed by the authors of this paper<sup>5</sup>.

Reviewing the work breakdown structure for the program, it was noted that only five of the many tasks mentioned any reference to advising of the participants. Further, the results state “The aspect of mentoring as yet to take shape. Though many shops were invited to view the students working and/or interview them at the MAC during the program, none accepted. No shop volunteered to mentor any of the students in either class.” More reinforcement is presented in the conclusions the authors state “...the MAC will continue to evaluate and update its own screening process for this program. Perhaps,... local companies will gain confidence in the program and offer to mentor students....”

Future plans call for “New courses could be ...for those completing the current eight-week training program, or developing other introductory training programs..... One-initiative that is underway is the development of a 24-hour pilot course for working engineers. This course is a scaled-down version... of the eight-week training program.”

The next two papers by Peterson <sup>6,7</sup> describe the development of a unique manufacturing program that combines a community college program(MCC) with a university program to offer a Bachelor’ degree. Many of the issues are common to corporate on-site offerings. The need for local advising is raised in the opening of the paper. “Students... were able to complete the first two years of most engineering curriculums at MCC, but had to leave the ...area to earn an EAC/ABET accredited engineering degree. Many of MCC students went on to... to complete their engineering degrees; but for a variety of reasons, including family considerations and finances, many local students were unable to leave Muskegon to pursue an engineering degree.”

The second paper reports “Several valuable lessons (that) have been learned (are that)...student growth is slow; ...internships can impact enrollment;...an alternative to an engineering program for many students is needed;...flexibility in planning is critical; (and)...year around course offerings are needed”.

An example of an on-site manufacturing technology program offered by Oregon Institute of Technology(OIT) at the Boeing Company is described in a paper by Spektor and Buchanan <sup>8</sup>. “The challenges faced by OIT were formidable. In bringing the program to Boeing, it was understood that the program was to be eventually accredited by ABET. .... it was stipulated that test outs and/or portfolio verification for courses would be designed.”

The paper continues “Many valuable lessons were learned from our experience... One of the most critical problems noted was in the area of academic advising. The prior academic background of the students varied from no college credits at all to a baccalaureate in engineering. Work experience also varied widely, although not as much as academic background. Because of these variances, we found that academic advising was critical. Our chair therefore had one on one sessions with all the students to find what credit they had and what courses they were eligible for. This will allow ..individual plans of study and prepare curriculum maps for the future.”

In conclusion the authors state “...we have concluded that we must incorporate a concept called ‘active advising’ The curriculum map in the OIT catalog is a very helpful source for students at the Klamath Falls campus. However, it is impossible to have one curriculum map for all Boeing students.... We need individual curriculum maps tailored for each student. ...However, based on appropriate software programs, this task can be accomplished.... What is needed is a spreadsheet.... indicating which courses are completed by the students. ...This information will be used for optimum course scheduling... and the active student advising. In this way, we believe we can keep students.. and have a mutually successful outcome.”

#### Distance Education and The Future of Continuing Education Programs

The final delivery program is Distance Education taken from Britain’s thirty year old Open University <sup>9</sup>. “Almost anyone in Britain with a TV set has probably tuned into an Open University class at one time or another. The classes are mostly broadcast in the wee hours ...Perhaps the key to O. U. 's success, however, is the amount of support it gives its students. The school employs 7,000 part-time tutors. The technology department alone has 1,100 tutors and plans to hire an additional 500 to help cope with the 8,000 students taking the new computing class. The tutors schedule occasional group or individual tutorials, and are available ..via phone, fax, or e-mail. Computer conferencing has also become a.. way for students to stay with their tutors, but with one another. .Most tutors are moonlighting academics from other universities.”

Continuing, “Indeed, so many thousands of British academics have had good experiences working as O.U. tutors... While the tutor network is necessary, some faculty members miss having regular, face-to-face contact with students.’

Before turning to the integration of technology in the advising process, let us explore where continuing education including on-site offerings is headed. After an extended courtship,

technology and education seem ready for the next big step in learning from afar-with a big push from the Internet.

Grose continues “Colleges and universities are moving rapidly to offer Web-based programs for engineers, and Stanford University may be at the head of the pack. Stanford began offering a distance learning program for engineers in 1969,... Then two years ago it launched Stanford Online. Today, the majority of classes that are offered via two-way video are also available online. The difference is that the two-way video courses are held at a specific time and beamed into participating corporations' facilities, while the online courses are available anywhere, anytime.... Many engineering educators see the greatest growth of Web-based programs occurring in continuing education rather than in degree programs, as more engineers feel they have to upgrade their skills .....Studies show that there is a large potential market for Web-based education. For example, when the Office of Continuing Engineering Education of the University of Illinois sent out a survey to people on its mailing list, it discovered that 88 percent of the respondents said they would be interested in taking a course on the Internet.”

“By contrast, those who have used distance education to teach undergraduate engineering courses to traditional-age students have had less positive experiences. James Scudder, program chair of the electrical/mechanical engineering technology degree program at the Rochester Institute of Technology, says that ‘it is hard for 18-year-olds to have the discipline to study on their own without the reinforcement’ that comes from being in a regular class. More mature undergraduates--people in their upper 20s and 30s who generally are employed full time, tend to do far better..., says Scudder.”

The article ends with the following outlook for the future “Clearly, engineering education on the Internet is in its early stages. But as colleges and universities become more adept at offering courses online and as technology improves, making video easier to watch on computers, the popularity of Web-based engineering programs seems certain to grow....<sup>10</sup>”

### Technology in the Advising Process

The following two papers use the emerging Internet technology to augment the advising process. The first describes an advising system<sup>11</sup>. “The University of Texas mandates a one-week period to advise students... Many of the components of the university allow students to self advise, but the College of Engineering requires students to be advised in their resident departments and an electronic ‘bar’ is placed on the student's access to the registration system until the advising is completed.... In summary, our problem is that we must advise too many students in too little time with under-trained advisors.”

“An email message is sent to all students announcing the availability of HiTech... the records of student use are downloaded, reviewed, and printed out for hardcopy storage. Students with approved schedules are informed by email and their bars to the registration system are removed. Students with unacceptable schedules will be contacted to come in for advising (this has not happened to date).”

Regarding acceptance of the system, the paper states “The system was tested successfully with approximately 150 student during the fall of 1997, and student acceptance was very positive. ..57 students completed the form, with the following results: waste of time (1), some value (4),

useful (13), very useful (25), a great system (14). Future versions will offer much more planning information, be proactive in prioritizing course possibilities, and allow planning for multiple semesters into the future”.

Electronic portfolios are discussed in the final article appearing in the ASEE PRISM<sup>12</sup>. “They are touted as the ‘next step’ in student assessment, are a great tool to exhibit a st Rose-Hulman Institute of Technology is also adopting portfolios,....”

“What's in it for students? And what will motivate students to keep their portfolios current and take the project seriously? The system provides opportunities for students to customize their RosE-Portfolio Web site, and encourages them to use their portfolios as they seek internships, co-ops, or employment after graduation.

What's in it for faculty members? The RosE-Porttblio system is student-driven, eliminating the need for faculty members to be responsible for the collection of student material for submission. Faculty advisors will have access to their advisees' RosE-Portfolios for the purpose of reviewing their progress if needed. Academic advisors will receive periodic reports on the status of their advisees' RosE-Portfolios.”

The article states in the final paragraph: “The Bottom Line (is) when assessing student outcomes, multiple methods should be considered. Portfolios can add a breadth and depth of information ... Developing an electronic portfolio system can reduce the disadvantages of using portfolios and enhance the overall effectiveness of data collection, assessment, and improvement of engineering programs.”

### **An Advising Plan for On-Site Offerings**

Integrating the information presented from the literature and the survey, the following guidelines and suggestions are presented to provide an advising support system for on-site courses or programs either credit or non-credit. The amount of time spent on advising is dependent on the scope of the program, the background of the participants, the acceptance of the program to the corporate culture as well as other factors. Obviously, with a smaller the program the need for formal advising is diminished. Students in degree programs need to document past academic credits through traditional transcripts as well as portfolio documentation for other academic experiences. Large programs require formal advising by a company representative as well as the institution’s faculty member.

It is noteworthy that the organizational level of the company’s employee mentor is not important; respect is essential. It has been the authors’ experience over the last twelve years that a committed and concerned mentor leads to a more successful program. With a balanced and planned approach, students value the training or educational experience more, and the business supporting the program by paying the bills is more satisfied.

The next step is to integrate, not replace, technology into the advising process. The Internet and email are logical places to begin. Course and Program “Chat Rooms” may be a possibility for interchange among the participants. Email could deal with more personal or individual issues. Since faculty are part-time, email will link them to company site,



participants, and the campus. Faculty notes and problems can also be sent via email. Finally, relevant supplementary class information can be located on the Internet.

## Summary

This paper explored an institution's experience, a literature review, and a survey of others offering on-site efforts to develop an advising plan. The use of email and the Internet should be incorporated into the advising system and not displace the faculty and mentor. As competition for the training dollar becomes greater, institutions with the highest quality and most effective programs will continue to succeed. The placement of and emphasis on student advising for on-site offerings can be the competitive edge for future growth.

## Appendix A-Survey of Local Institutions

### Northeastern University Continuing Education Corporate On Site Education Survey of On-Site Course Delivery

The survey is being conducted to include a paper being presented at the annual conference of the American Society of Engineering Education. We feel there are unique problems in dealing with advising and processing these students through our educational systems. We will share the results of this paper with you.

Institutional Data:    College/University Name  
                                  Contact Name  
                                  Address  
                                  Tel #  
                                  e-mail

#### Questions:

1. Does your organization offer courses or programs at company sites? If NO, then go to questions 8 and 9.
2. What proportion of your continuing education programs is done at company sites? Express in percentage, dollar volume, number of courses, etc. - whatever is most convenient:
3. How, and who, handles registration, advising, billing, faculty assignments, posting grades, faculty evaluation. Other:
4. Do you provide any special advising/mentoring for off-campus students?
5. Give examples of programs/courses recently taught:
6. Are you actively pursuing additional opportunities to expand this area?
7. Do you develop unique courses/programs offerings for off-site versus your existing campus programs? Please provide illustrations:
8. Is continuing education declining, remaining stable, or growing?
9. Do you use your institution's traditional grading system for cont. ed., and what is it?
10. Please place additional comments here:

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ROBERT B. ANGUS is a Senior Lecturer at Northeastern University with 52 years of teaching experience covering mathematics, physics, and electrical engineering courses. He has authored or co-authored eight textbooks and numerous technical papers. He has also been an engineer, engineering manager, and senior engineering specialist for more than 20 years and has been an engineering consultant for the past 18 years, specializing in circuit and system design, curriculum development, and technical manual writing.