Using Web Technology to Promote Student Internship/Cooperative Education in College of Engineering at Boise State University

J. C. Sener, R. R. Mirsky, D. R. Haws, S. B. Affleck, J. L. Mason, L. C. Aburusa Boise State University

ABSTRACT

The Internship/Cooperative (Co-op) Education Program in the College of Engineering, Construction Management Department of Boise State University (BSU) provides an opportunity for students to apply firsthand what they have learned in the classroom. Students gain practical experience in their chosen career fields by working in a professional capacity in business, industry and government. The program allows students to gain valuable on-the-job training in areas of professional interest while earning academic credits and making important professional contacts that supplement their degrees. In the past, information about the availability of student internships was usually provided by word-of-mouth, and by posting notices on bulletin boards. There was a need to improve communications about the availability of internships as well as a need to establish closer contacts with the businesses that might serve as potential sources of internships. It has also been difficult to identify internship positions unless businesses took the initiative to contact the university.

Recently, an internship web site was developed and linked to the College of Engineering Homepage on the World-Wide-Web. This site was designed to facilitate the link between potential internship opportunities and undergraduate students seeking to match their chosen major field of study with work experience in participating organizations. This paper describes: the development of the internship web site on the College of Engineering Homepage; its organization, planning and implementation; industry/academia interactions for interactive and integrative applications; analysis of the historical data collected prior to the availability of the web; and interim results and recommendations for improvements with an emphasis on the need for implementation and expansion of the internship program with the use of Internet technology.

INTRODUCTION

BSU was founded as Boise Junior College (BJC) in the 1930s. Many four-year programs were added as BJC progressed through being Boise College, Boise State College and finally Boise State University. Civil, Mechanical and Electrical Engineering are the latest four-year baccalaureate programs to be added. A separate College of Engineering was organized, effective July 1, 1997. The mission of the engineering programs is to offer an education that combines fundamentals with technical electives allowing students to specialize in specific areas. Professionalism among the students is encouraged by participation in student chapters of professional societies. An internship program provides students with the opportunity to work while they learn. A great deal of emphasis in all the programs (Civil, Construction Management,

Electrical, Instructional and Performance Technology, and Mechanical) is being placed on the importance of developing teamwork skills, developing presentation and communication skills and emphasizing engineering design concepts in courses taught through all four years of the curricula. Successful employment of graduates in industry requires favorable demonstration of these skills.⁴⁽¹⁾

BSU has developed and maintains a web site which provides university-wide information about the campus and student life, academics and research, administration, and events and activities on both campus and within the community. Within the structure of the BSU web site, the College of Engineering has recently developed an internship web page to facilitate the link between potential internship/co-op education opportunities and undergraduate engineering and construction management students.

At the time this paper is being prepared, the College of Engineering internship web site is a work-in-progress. It is therefore our objective to present: historical data, practical information on the planning and development of the internship web site, the rationale for web page organization based on the objective of enhancing mutually beneficial interactions between industry and the college, and the interim results of our experience and recommendations for departments that may be considering a similar program.

BSU'S INTERNSHIP PROGRAM AND PRESENTATION OF HISTORICAL DATA

The co-op education/internship (CE/I) program at BSU is a three-way collaboration between the potential employers, the students and the College of Engineering faculty. The program's basic purpose is to provide concurrent work experience that is directly related to the student's academic major and career interests. Participating employers develop closer ties with the academic institution by enlisting as partners in the education process and gaining access to potential future employees. In fact, 63% of the employers surveyed reported that the hired new college graduates with prior career-related work experience.⁽²⁾ A Georgia Bell study⁽³⁾, performed to determine the cost effectiveness of co-op education as a tool to recruit high-quality candidates for full-time employment found that 80% of all co-op students who were offered permanent positions were accepted.

Through BSU's CE/I program, students gain valuable work experience, make important contacts for the future, and have the opportunity to apply what they have learned in the classroom. On-the-job experience is supervised and monitored by the faculty (department coordinator) of the appropriate department to ensure sound work ethics and academic integrity, while offering the student an opportunity to assume greater responsibility.

The Construction Management Department of the College of Engineering has offered student internships for over 10 years. During this period (ended in 1996), over 130 construction management and/or engineering students have participated in a one-semester internship with 73 different employers in both the private and the public sectors. Of those 130 students, 32 (approximately 25%) continued their internship for a second semester, with 23 (approximately 70%) returning to the same employer. A small number of students (less than 10%) have

continued their internships for additional semesters. BSU's CE/I work experience classifications include the following:

- * <u>Credit Bearing; Internship</u> Less than 15 weeks, part-time occupation-related work experience, enrolled at BSU during semester of work, **1** credit per 50 hours worked.
- * <u>Non-credit Bearing</u>; <u>Internship</u> Less than 15 weeks, part-time occupation-related work experience.
- * <u>Cooperative Education</u> Six to nine month, full-time position that offers students an opportunity to alternate from classroom learning to participating in related work experience.
- * Part-time Job Part-time, occupation related work experience.
- * <u>Summer Job</u> Summer employment, occupation related work experience.

Most students prefer to work part-time while attending school. Others may choose to alternate semesters of till-time work, or work during summers only. Students receive challenging opportunities like participating in nationally recognized research activities, and working with state-of-the-art technology. These varied experiences are supervised by scientists, engineers, businessmen, and other leading professionals. In 1997, approximately 15 students participated in credit bearing internships, with over 50 additional students in non-credit bearing internship assignments. Students gained work experience with private industry, research institutions, and government agencies. Interns earn between \$7,280 and \$16,720 per year, which enables students to pay for their college expenses. Over 95 percent of intern students work in Boise or the surrounding areas. Employers are generally very flexible allowing students to focus on their academic work and continue involvement in professional and social organizations.

RATIONALE FOR WEB SITE ORGANIZATION

The CE/I program has traditionally relied on the initiative of the university and business personnel to establish contacts and match needs. While the track record in the Construction Management Department shows that this approach has been successful in the past, program administrators have recognized the Internet as an increasingly available resource to expand and improve the exchange of information between students wishing practical work experience, and businesses or government agencies with potential internship opportunities.

It is estimated that approximately 40 million people have access to the Internet.⁽⁴⁾ Users in universities, government agencies, businesses, and libraries routinely use the Internet to communicate and to search curriculum, research, and other databases. Business and education have recently begun to collaborate on distance-learning projects to provide continuing education programs for business professionals. A natural extension of this electronic relationship is the promotion of work-study or CE/I programs.

The Internet is an attractive tool for enhancing a student CE/I program due to the ease and speed at which the information is made available. Internet tools can be used to reduce the number of paper documents that are typically exchanged as well as the amount of time consumed to transmit those documents by mail. Instead of publishing and mailing company brochures, an employer can reach hundreds of students by establishing a web site. This contact is enhanced further if the university internship program has a web site with an active link to the employer's site. As soon as an internship opening is identified, qualified students can send resumes to potential employers via E-mail. Professionals with limited time will be much more willing to review information about potential interns electronically, rather than travel to the school for recruitment purposes.

The use of the Internet as a tool in an internship program requires some vigilance on the part of the administrator. While information on the Internet is readily accessible, the information itself is constantly changing. Unlike company or university brochures which are revised only occasionally and require reprinting and redistribution, information on the Internet can be revised or deleted with relative ease. As a result, frequent changes to web sites may result in new sources of information appearing overnight while others are taken off the Internet altogether.⁽⁵⁾ Such changes can be either a source of motivation or frustration for the user, by promoting more frequent use to keep up with changes, or by discouraging use because of invalid links. It therefore becomes the responsibility of the administrator of the web site to ensure that ail links are current, and that new information is highlighted when it becomes available. The experience of the user, whether student, faculty, or business is determined by how the web site is structured, and the manner in which it encourages communication and collaboration.⁽⁶⁾

DEVELOPMENT OF THE INTERNSHIP/CO-OP WEB SITE FOR BSU COLLEGE OF ENGINEERING

The work for the planning and development of the CE/I program web site for BSU's College of Engineering Homepage was initiated in the beginning of the Fall Semester of **1997**. It is continuously being expanded and/or modified as more information is identified for both employers and students. Since it is a work-in-progress, its effectiveness with respect to the relationship between students, employers and the College of Engineering has not yet been evaluated. The rationale for its organization is based on the enhancement of mutual interactions as shown on the integrated homepage site diagram in Figure 1.

The web site address is: <u>http://coe-uxl.idbsu.edu/Internship</u>/. The cooperative education homepage of the University of Alabama in Huntsville (UAH)⁽⁷⁾ was adopted as a preliminary model during development of our web site for the College of Engineering Co-op/Internship. The representative samples of web site pages are included in this paper.

The opening page of the web site presents general information for both students and employers, including a newsletter, calendar, employment announcements, and the names and addresses of potential employers. The page is also linked to the College of Engineering Homepage (http://coe-uxl.idbsu.edu/coe/), BSU Homepage, and the BSU Internship/Cooperative Education Homepage (http://www.idbsu.edu/internship/).

Upon activating "Learn about BSU College of Engineering Co-op/Internship", the pages of "Information for Students" and "Information for Employers" are linked. The "Information for Students" page accesses the following:

- General information about co-op/internships
- Co-op/internship department coordinators
- ▶ How do I find a co-op/internship position?

- What do I need to do to earn credit for my internship?
- Questions and answers about co-op/internships
- What students say about co-op/internships
- > Application form for internship/co-op education
- Co-op/internship student work reports
- ▶ BSU, College of Engineering co-op/internship Newsletter
- Orientation dates for Spring Semester 1998 (or the current semester)
- BSU Career Center
- BSU Career Fair

The following can be accessed from the "Information for Employers" page:

- **BSU**, College of Engineering Homepage
- Co-op/internship: A partnership that works
- ➤ A definition of co-op/internship
- Common co-op/internship qualities
- Student requirements for becoming a co-op/intern
- ➢ How to hire a co-op/intern
- ▶ What are co-op/interns paid?
- Professional responsibilities and Code of Ethics
- Employer's evaluation of cooperative internship student, and employer's final internship appraisal forms
- BSU, College of Engineering disciplines

The web site is being maintained with as much flexibility as possible to permit further refinements. Developments and expansions will continue throughout the remainder of this academic year. Major areas of future development will be establishing employer data base links, and the collection, evaluation and analysis of data. A development of a broadened employer data base is considered to be a key element, which when integrated into the existing system, will better meet specific needs in the area of student placement.

INTERIM RESULTS AND RECOMMENDATIONS

An attempt to review and evaluate the effectiveness of the CE/I program web site has thus far only begun. An analytical investigation of trends, relationships and patterns in the CE/I program will be made using the database developed through this system with the valuable aid provided by web technology. It is our intention to use this investigation to better understand the influence of individual factors on cooperative education.

Upon completion of the web site data evaluation the following will be monitored, investigated and the results compared with the investigations of similar programs elsewhere:

- What are the most important benefits of CE/I work experience programs for students, colleges and universities, faculty, and employers?
- What degree of correlation exists between the cumulative grade percent average (GPA) and the co-op work performance of College of Engineering undergraduates, and how does this correlation rank between the specific departments?
- What percentage of interns in respective departments who have completed the CE/I program earn higher starting salaries upon graduation?

- What percentage of co-op students in respective departments of the College of Engineering have been offered full-time job positions with their co-op employers?
- ▶ How do co-op wages and benefits compare with those of regular employees?
- ▶ What is the academic retention rate of co-ops as compared to non-co-ops?
- What percentage of co-op employers have offered their co-op students permanent positions, and what percentage of the job offers were accepted?
- What percentage of graduate co-ops received one or more promotion and/or merit salary increase in the same period, compared to non-co-op college graduates?
- What is the employer's recruitment cost for co-ops as compared to non-co-op graduates?
- ▶ What percentage of employers found that:
 - Co-ops had better communication skills than regular employees?
 - Co-ops had better technical knowledge than regular employees?
 - Co-op's ability to work with others was higher than regular employees?
 - Co-ops were more dependable than regular employees?
 - Co-ops had a better ability to follow instructions than regular employees?
 - Co-ops are better motivated than regular employees?
 - The CE/I program is an important recruitment tool in finding permanent employees?
 - The quality of work performed by co-ops was higher than that of regular employees?

Finally, it must be stated that without the aid of web site data handling capabilities, the above mentioned investigative goals can not be accomplished. Continuously unfolding technological innovations are the key to the success of the CE/I program in the future.

REFERENCES

- 1. Sener, J.C., Haws, D.R., Murgel, G.A., Hamilton, R. W., Affleck, S.B., 1997, "Teaching a Civil Engineering Senior Capstone Design Course," <u>Design Based Engineering Education (DBEE)</u>, First Annual Conference Proceedings, Boise State University, July 10 and 11, pp. 70-80.
- Potter, A., 1993, "Marketing Co-op: A Perspective for a New Generation," <u>The WRC Index</u>, The Western Resource Center (WRC) for Cooperative Education, published by WRC, Atascadero, CA, Vol. 14, Issue 1, pp. 1-3.
- 3. Wright J.J., 1980, "The Georgia Bell Study: Georgia's Cooperative Education Program," Georgia Bell System, Atlanta, GA.
- 4. Ragothaman S., and Hoadley, D., 1997, 'Integrating the Internet and the World-Wide-Web into the Business Classroom: A Synthesis," Journal of Education for Business, March/April, pp. 213-216.
- 5. Ryder, R., and Graves, M. 1996/1997, 'Using the Internet to Enhance Students' Reading, Writing, and Information-gathering Skills," Journal of Adolescent and Adult Literacy, December/January, pp. 244-254.
- 6. Iseke-Barnes, J., 1996, "Issues of Educational Uses of the Internet: Power and Criticism in Communications and Searching," <u>Educational Computing Research</u>, Vol. 15(1), pp. 1-23.
- 7. UAH, 1997, "The UAH Cooperative Education Homepage," The University of Alabama in Huntsville, Huntsville, AL, September 25, (http://coop.uc.uah.edu/).

JOSEPH C. SENER, PhD., P.E.: Assistant Professor. Specialized in geotechnical, environmental, materials and structural areas of civil engineering. He has over 25 years of diversified, private sector professional experience in North America and abroad.

REBECCA R. MIRSKY, Ph.D., P.E.: Assistant Professor. Specialized in construction management, planning, design and implementation of environmental remediation projects. Over 13 years of professional experience.

DAVID R. HAWS, PhD., P.E.: Assistant Professor. He received undergraduate degrees in English (University of California at Berkeley) and Civil Engineering (University of Utah), and completed master's and doctorate in Civil Engineering at Brigham Young University. He has completed postdoctorate course work in adult education, and instructional and performance technology, and is an Assistant Professor of Civil Engineering at Boise State University.

STEPHEN B. AFFLECK, Ph.D., P.E.: Professor. Chairman of the Civil Engineering Department. Specialized in chemical and environmental engineering. Professional and private sector experience in diversified engineering projects.

JON L. MASON, M.Sc., P.E.: Associate Professor. Chairman of the Construction Management Department. Specialized in construction management and planning of chemical and municipal waste water plants including refineries. Diversified professional engineering experience.

LEANDRA C. ABURUSA, B.Sc.: Student Support Coordinator. Oversees Coop and Internship for students in the College of Engineering. Identifies and develops cooperative education opportunities by initiating contacts with Boise area employers. Represents the College of Engineering for student recruitment and retention efforts. Coordinates special events including Idaho Engineering Science Camp, Job Fair, Open House, student orientation activities and college tours.



Figure 1: BSU, College of Engineering Co-op/Internship Homepage Site Diagram

.

http://coe-ux1.idbsu.edu/Internship/

Home Page



The BSU College of Engineering Co-op/Internship Home Page

The BSU College of Engineering Co-op/Internship Program provides the opportunity for the academic work of qualified students to be involved with practical work experience in business, industry, and government. It provides formal on the job training and professional contacts that will supplement the baccalaureate degree. Most students work part-time while attending school part-time or full-time. Others may choose to alternate semesters of full-time study with full-time work, or work during summers only. All co-op/internships give students the opportunity to gain work related experience to their engineering or construction management degree.

Students in all undergraduate disciplines are potential candidates for Co-op/Internship positions. There are nominal grade and credit hour **requirements.**

The BSU College of Engineering Co-op/Internship Program is open to qualified students, regardless of race, color, religion, sex, age, national origin, disability or veteran status. For more information....

Learn about BSU College of Engineering Co-op/Internship

- Information for Students find general information about BSU Internships, Questions and Answers, and quotes about Co-op/Internship form other students.
- <u>Information for Employers</u> find information about Co-op/Internship, student requirements, how to hire co-op/interns, suggested pay for interns, and other useful information.

BSU College of Engineering Co-op/Internship Newsletter Under Construction

Co-opInternship Calendar Under Construction

Co-op/internship Employers Links to home pages of BSU Co-op/Internship Employers

Orientation dates for Spring Semester 1998 List of dates for Co-op/Internship Orientations. Under Construction

WHAT'S NEW What's new at BSU Co-op/Internships. Under Construction

Employment, Announcements Current job, announcements. Under Construction

Q & A about Co-op/Internships

For more information contact the BSU College of Engineering Co-op/IInternship Coordinator. Leandra Aburusa at (205)385-4432 or send e-mail to: laburus@bsu.idbsu.edu

College of Engineering Home

Page

Boise State University Home Page

BSU Internship/Cooperative Education Home Page

12/26/97 11:09 AM

Information for Students

http://coe-ux1.idbsu.edu/Internship/studinfo.htm



Information for Students

General Information about Co-op/Internships

How do I find a Co-op/Internship Position?

What do I need to do to earn credit for my internship?

Q & A about Co-op/Internships

What Students Say about Co-op/Internships

Co-op/Internship Student Work Reports

BSU College of Engineering Co-op/Internship Newsletter

Orientation Dates for Spring Semester 1998

BSU Career Center

BSU Career Fair

Return to College of Engineering Co-op/Internship Home Page

12/26/97 I 1:09 A M

Information for Employers



Information for Employers

The Cooperative Education/Internship Program at the Boise State University College of Engineering links education and industry in a way that is beneficial to all parties. This guide is filled with information to aid in determining whether or not our Co-op/Internship Program can help meet your employment needs. In this guide, we define co-op/internship, describe its advantages for you and the students, and how to go about selecting a co-op/intern. If you have any questions not addressed in the following pages, contact our Co-op/Internship Coordinator, Leandra Aburusa at (208)385-4432 or e-mail: laburus@bsu.idbsu.edu

BSU College of Engineering Home Page

Co-op/Internship: A partnership that works

A Definition of Co-op/Internship

Common Co-op/Internship Qualities

Student Requirements for Becoming a Co-op/Intern

How to hire a co-op/intern

What are co-op/interns paid

Professional Responsibilities and Code of Ethics

BSU College of Engineering Disciplines

Return to College of Engineering Co-op/Internship Home Page

Read the College of Engineering Home Page

Read the Boise State University Home Page



Co-op/Internship Employers

Links to past and present* BSU College of Engineering Co-op/Internship Employers.

Engineering

B&A Engineering Boise Heating and Air Conditioning

Brownsfields

Bureau of Reclamation

*Carlisle Spring Brake

City of Boise Central Maintenance

Design Concepts International

*Engineering Consultants Inc.

First American Title

Hewlett-Packard

Hoff Forest Products

Idaho Army National Guard

Idaho Dept. of Fish and Game

Idaho Health & Welfare Dept.

Idaho Power

In-System Design

James M. Montgomery Engineering

*Micron Electronics

*Micron Technology, Inc.

Morrison Knudsen

Mountain Home AFB

12/26/97 11:11 AM

employers

http://coe-ux1.idbsu.edu/Internship/employer.htm

employers

St. Lukes Construction

Sundance Construction Management

Superconducting Super Collide

Superior Painting

Talboy Construction, Inc.

The Masonry Center, Inc.

Ugaki & Assoc., Inc.

Waldo Construction Inc.

Walker & Fox Masonry, Inc.

Westinghouse Idaho Nuclear

*Wright Brothers Construction

* Companies who presently employ co-op/interns.

Please note: BSU and BSU College of Engineering are NOT responsible for the content of these links. Links to nationwide companies may point to the main headquarters or to the Boise Branch office depending on availability.

If any of these links are incorrect or if you know a company link which is not listed, please **inform** Leandra Aburusa through e-mail: laburus@bsu.idbsu.edu.

Return to Information for Students

Return to College of Engineering Co-op/Internship Home Page

Page 3.623.13

12/26/97 11:11 AM



Professional Responsibilities and Code of Ethics

The vital relationships between employer, college, and student demand the highest levels of professionalism. The code of ethics serves as a guide for such professional conduct.

Student Responsibilities

The intern agrees to the following:

- Be registered at BSU as Internship/Cooperative Education student in good standing.
- Complete the co-op/internship during the dates specified unless special arrangements are made with the Cooperating Agency and the College of Engineering Faculty Coordinator evaluating the internship.
- · Comply with all Cooperating Agency policies and procedures.
- Work conscientiously under the direction of the supervisor assigned by the Cooperating Agency, submitting all reports, forms, and assignments as required.
- Comply with the rules of confidentiality regarding all information and data of Cooperating Agency.
- Report serious problems, including physical, safety and personnel, to the Cooperating Agency supervisor and the College of Engineering Faculty Coordinator evaluating the internship.
- Complete all BSU academic assignments and course work related to this internship as outlined by the applicable department.
- Purchase Risk/Liability Insurance through BSU Administrative Services

Boise State University Responsibilities

- Assume general responsibility for the pre-internship orientation, academic instruction, advisement and evaluation of the intern.
- Communicate and consult with the Cooperating Agency to facilitate the successful operation of the internship activity.
- Inform the Intern that he/she is subject to the general rules, policies, and procedures
 of the Cooperating Agency as such are provided to BSU by the Cooperating Agency.
- Respond in a timely manner via the Department professor evaluating the internship to any complaints concerning the intern.
- Approve, in consultation with the Cooperating Agency, the BSU students who will be placed in internship positions and the effective dates of work.
- Provide assistance to the Cooperating Agency in determining job assignments and work objectives.

Cooperating Agency Responsibilities

- Accept the primary responsibility for supervision and control of the intern at the worksite.
- Accept a qualified intern without discrimination because of race, color, sex, creed, national origin, religion, age or disability.
- Plan with the BSU Department professor evaluating the intern in selecting and implementing learning experiences for the intern in order to fulfill the objectives of

the field instruction.

- Provide or assist intern in developing a job description (internship objectives) and orient the intern to the cooperating agency.
- Take all reasonable and necessary precautions to provide safety for the intern including notification concerning any dangerous conditions or hazards to which he/she may become exposed.
- Assist BSU in the evaluation of the Intern's work and give BSU timely notification of any significant problems concerning any intern and the internship.
- Maintain the confidentiality of the intern's academic and personal records, and not transmit them to other parties not included in this Agreement without the express written permission of the intern.
- Designate a suitable qualified supervisor for each intern who will also serve as a liaison with the BSU department professor evaluating the internship.

Code of Ethics

Students

- Should honor policies and procedures of their institution of higher learning.
- Should honor the personnel policies of their employers.
- Should present their qualifications as accurately as possible when interviewing for co-op/internship positions.
- should interview with an employer only if there is genuine intent to acdept offers of employment.
- Should notify the employer of acceptance or rejection of employment offers within 48 hours.
- After accepting an offer, students should notify the university (co-op/internship representation) and other employers with whom offers may be pending.

Employer Professionals

- Responsible for the ethical and legal conduct of their employees throughout the Co-op/Internship process.
- Should respect the legal obligations of professionals and request only those services or information that can legally be provided.
- Should honor the policies and procedures of individual universities.
- Should not ask students to participate in any unethical or illegal activities.
- Should consider long-range plans of the individual student instead of immediate needs of the agency or company before offering full-time employment to the student before he/she has completed degree requirements.
- Should make every effort to honor offers of Co-op/Internship employment once they have been formally extended.

University Professionals

- Responsible for establishing and monitoring practices that ensure fair and accurate representation of students and Co-op/Internship to employers.
- Should respect student rights covered by state and federal privacy laws.
- · Should promote and follow non-discriminatory practices.
- Should promote the general concept of Cooperative Education as well as their own Co-op/internship Program.
- Should strive to develop new work opportunities for students rather than pursue co-op/internship positions developed by other insitutions.

Return to Information for Employers

12/26/97 11:14 AM

Return to College of Engineering Co-op/Internship Home Page