

SCBIZHELP: Information System for Linking Students with Real Business Problems

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Abstract

Academic institutions have come to recognize the value of involving business students in solving real business problems, but most lack a way to systematically and reliably bring the needs of the business community and the resources of the academic community together. Responding to this need, a Web site was developed to promote linking students with real business problems. It has helped identify projects in various functional areas that aided businesses and enhanced student learning. It is capable of supporting multiple universities within the state and across multiple states. Currently, business representatives can search for student expertise. A future version will also allow business users to post their needs to the Web site.

Keywords

Web based system, Inter-organizational alliance, Databases, Electronic channel

Introduction

Importance of academia – industry linkage

Throughout the 1990s, students, parents, employers and the government criticized business schools for the limited effectiveness of their instructional methodologies and the consequent inexperience of their graduates in dealing with real-world business problems. At the root of these criticisms was the perception that academic institutions were not engaged with the surrounding business community. The main criticism was that academicians were simply imparting knowledge to students, without sufficient regard to its application or relevance (Richter, 1999; Kellogg Commission Report, 2001). Changes have resulted from this criticism, including the American Association of Collegiate Schools of Business (American Assembly of Collegiate Schools of Business, 1998) revising its reaccreditation guidelines to emphasize the value of integrating real business problem solving into the curriculum (Blum, 1991; Ahire, 2001; Mc Keachie, 2002).

One way of integrating real world business problem solving into the curriculum is by students undertaking projects that address problems faced by industry. Students retain concepts they learn when they apply them to solve real problems. Learning by doing, or experiential learning, deservedly enjoys wide popularity as a learning style (Fellers, 1996; Levasseur, 1996; Nilson, 1998; McKeachie, 2002). Projects force students to deal with the inevitable trade-offs, conflicting business goals, data management problems and the myriad of other issues found in the messy “real world” (Grossman Jr., 2002).

Student projects benefit faculty teaching and research. Teaching improves because projects provide faculty with clear, useful feedback about what students have learned (Grossman Jr., 2002). Faculty members receive feedback from observing student performance during project presentations, informal conversations, business client statements, and written reports. Student projects also provide faculty with opportunities for applied research, including case studies (Grossman Jr., 2002), and pre/post intervention comparisons (Applegate, 1999; Benbasat & Zmud, 1999; Davenport & Markus, 1999; Lee et al., 1995; Barman et al., 2001).

Student projects addressing real world business problems benefit industry, especially small businesses and nonprofit organizations that have far fewer resources than large businesses (SBA Office of Advocacy Office of

Economic Research, 2004; U.S. Small Business Administration's Office of Advocacy Report, 2004). Often they lack the expertise, and rarely can they afford the fees of professional consultants.

Problems faced in establishing academia – industry linkage

Educational institutions have developed different strategies to set up an academia – industry link. Many universities ask their final year students to find suitable industry projects, but, this is a difficult and time consuming task. For example, MBA students in Ahire's (2001) operations management class searched for projects by making cold calls on local firms. At some universities, faculty members take responsibility for identifying suitable industry projects for their students. But making useful contacts in the business community and finding meaningful projects on a continuing basis is often easier said than done. For example, Kock et al. (2003) mention the tremendous efforts required by faculty at Temple University to find suitable student projects at Day and Zimmermann Inc. Generally, academic institutions have not structured or organized themselves in a way that would encourage or facilitate the provision of student and faculty expertise to the business community (Kellogg Commission Report, 2001). Similarly, businesses find communicating with faculty or finding expertise on a university campus daunting if not impossible (Murphy, 2002). Simply put, for a number of reasons universities represent a largely untapped source of business and community assistance.

A review of the literature (Table 1) reveals many publications that discuss initiatives taken by individual faculty (Weal, 1991; Bennet and MacFarlane, 1992; Wouters and van Donselaar, 2000; Ahire, 2001; Grossman Jr., 2002; Kock et al., 2003), or relationships between a large corporation and a top-tier university (Mead et al., 1999; Martin-Vega et al., 2002). Many of these initiatives are restricted to a specific functional area of business or are just one time efforts to link academia to industry. There is a need to find a way to bring together the business and local communities with the resources of universities in a sustained long-term manner. There has been little research on this issue, yet there is significant potential for benefits for all parties. In this paper, we describe an effort by the Alliance for Small Businesses and Nonprofit Organizations in South Carolina to initiate academia – industry linkage. This remainder of this paper is organized in four major sections that describe: the Alliance; the new information system created to facilitate a sustained academia–industry linkage; the impact of this approach on the students, faculty, and community; and finally, conclusions highlighting the limitations of the present system and future plans.

Table 1. Literature on initiatives to promote academia – industry linkage

Study by	Focus of the study	Strengths of the initiative	Limitations of the initiative
Weal (1991)	An initiative between a university and a company in Swinburne.	1) Twelve month project work. 2) Company financed student project work. 3) Company reported benefits.	1) Involved only undergraduate students. 2) Limited to Operations Research projects. 3) Only a one – time initiative.
Bennet and MacFarlane (1992)	Department-level internship program at Strathclyde University.	Company funded student work.	1) Very short duration project. 2) Limited to Operations Research.
Wouters and van Donselaar (2000).	An initiative between a university and three companies to improve supply chain operations. Involved 15 students and 7 Professors.	1) A part of Masters thesis work. 2) Companies financed student work. 3) Companies reported benefits.	1) Only a one- time initiative. 2) No systematic mechanism to link students with industry projects.
Grossman (2002)	Experiences of faculty assigning Operations Research / Management Science projects to undergraduate and MBA students.	1) Involved nearly 500 students. 2) Improved student learning. 3) Provided faculty clear feedback about students' capabilities.	1) Only a one-time initiative 2) Students had to identify their own projects and faculty only helped them while doing their projects.
Martin – Vega et al. (2002)	National Science Foundation funded	1) Funding from NSF. 2) Involved multiple projects.	No support for faculty identification of industry

	program for academic liaison with industry.	2) Produced results valuable to industry.	projects.
Ahire (2002)	Operations management projects at the Indiana University, USA.	1) Involved over 70 projects. 2) Reported benefits to participating MBA students.	1) Identifying many projects required students to make cold calls on local firms. 2) Only a one-time initiative. 3) Restricted to operations management projects.
Meed et al. (2003)	Survey of formal industry / university collaborations in the field of software engineering.	Reported benefits of fourteen formal collaborations between industry / US universities in the field of software engineering.	1) No aids for identifying projects 2) Limited to software engineering.
Kock et al. (2003)	Online IT course that facilitated university – industry linkage.	Students applied concepts of IT design and development to real industry problems.	1) Only a one time initiative 2) Limited to IT projects.

Alliance Motivated Academia – Industry Linkage

The formation of the Alliance for Small Businesses and Nonprofit Organizations in South Carolina motivated the development of our linkage system. With a goal to establish bridges between the academic and business communities, the Alliance for Small Businesses and Nonprofits was formed in 2001 as a union of: the Business Councils of South Carolina (that includes small businesses, and representatives from six public and private universities), the Greenville County Library System, SCORE (counselors to America’s small business), the Small Business Development Center of South Carolina, and the South Carolina Center for Grassroots and Nonprofit Leadership. In its commitment to small businesses, the Alliance addresses most of the businesses in the state of South Carolina. Of the 89,300 full-time business firms with employees in South Carolina, 97 percent are small businesses (independent businesses with fewer than 500 workers). In addition to these businesses, there are 117,112 full-time self-employed persons in South Carolina (U.S. Small Business Administration's Office of Advocacy Report, 2004). Likewise, the purview of the Alliance includes many of the students in the state, including those at two of the larger state universities, technical schools and private colleges and universities.

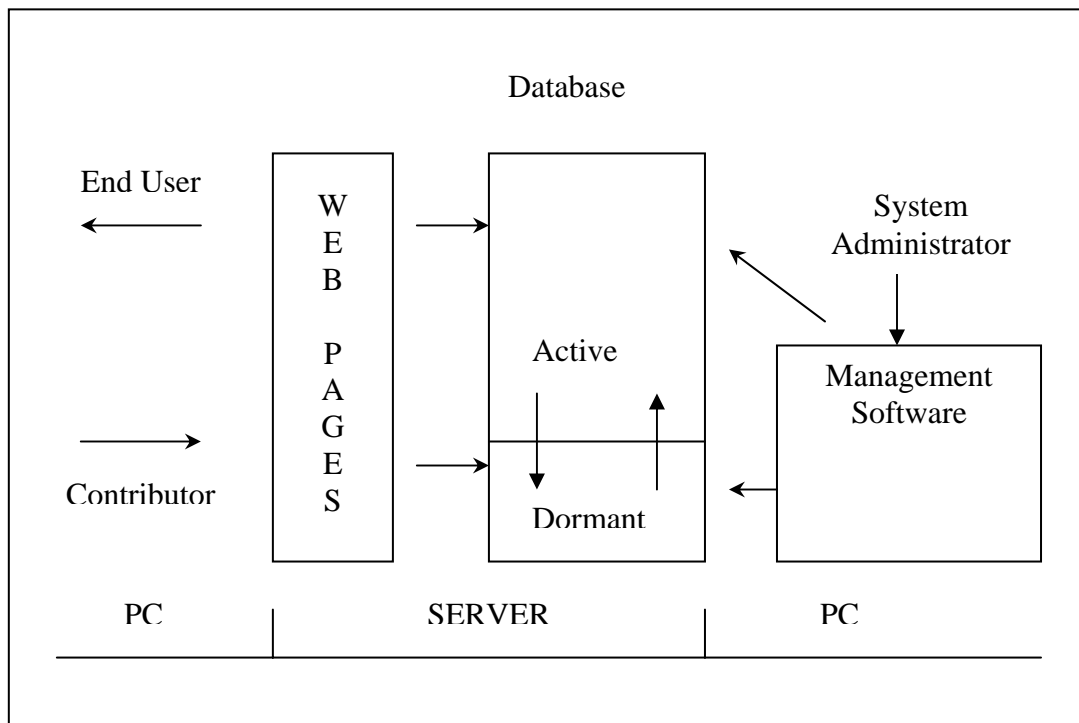


Figure 1. Components of SCBIZHELP

To help match student resources with business needs, as well as to facilitate sharing of various resources among its members, the Alliance used grants from the Kellogg Foundation through Alliance 2020 and the School of Business and Leadership at Clemson University to support development of a Web site nicknamed SCBIZHELP (South Carolina business help), www.scbizhelp.org. This Web site provides continuous internet access to Alliance resources by the business community.

SCBIZHELP: Information System to Facilitate Academia – Industry Linkage

Design

SCBIZHELP has two major components. The Web-based component includes Web pages linked to a database (Figure 1). The management software component permits the system administrator to control data validity.

SCBIZHELP accommodates both assistance seekers (end-users) and assistance contributors. Generally university faculty are contributors. Business representatives could play both the roles of end-user, e.g. to seek student project assistance, and contributor, e.g. to sponsor an internship, to offer a plant tour, or offer to speak to a class.

Data entry and validation

A contributor is identified simply by an email address. Therefore, one may enter or modify information without having to remember a password.

When any new contributor enters information into the system, or when any previously entered information is changed, that information is initially dormant (not viewable). The system automatically sends email messages to a pre-designated representative of the contributor’s institution and to the system administrator (as an alert that a response should be forthcoming from the institution representative). The representative of the contributor’s institution notifies the system administrator whether the new information is valid. If valid, the system administrator changes the status from dormant to active.

Information retrieval

Business users can search for expertise by selecting keywords from multiple categories. For example, current categories include e-commerce, finance, marketing, human resources management, improving operations, logistics, and business research. After a user selects keywords, the system retrieves and displays brief summaries of project capabilities from the database (Table 2).

Table 2. Example project summary

Contact	Project Details
Charlie Emery	Project name: Business Student Projects Institution: Lander University Keywords: Family-owned Business, Marketing Research, Strategic Planning, Total Quality Management Project: Students will work on faculty-approved projects in the business community as part of their assigned coursework under the supervision of business faculty. However, these projects must be successfully completed within one semester. Projects will be associated with specific courses. Not all courses will be offered each semester. Consequently, there may be times when a class of students will not be available for projects.

The user can click on a project summary to see complete information that generally includes: contact information, willingness to undertake projects and consulting services, compensation requirements (if any), project capabilities, duration of project capabilities, and constraints (such as place where project work must be performed).

Software designed for maintainability and scalability

The software used for SCBIZHELP was designed for maintainability with separate tiers for the user interface, business rules, and database interaction. Dividing the system into tiers allows for changes in one part with few side effects in the other parts (Sadoski & Comella-Dorda, 2000). For example, it allows changing the underlying database management system without requiring any significant changes to the rest of the application. Because this project followed an incremental development method (Sharrell and Chen, 2001; Avison and Fitzgerald, 2003) and requirements evolved gradually, such flexibility was important.

We developed the current Web application using Microsoft® Visual Studio® .NET 2003 with a Microsoft Access database. This simple database is sufficient at this point, as it is unlikely that large numbers of users will simultaneously access the system.

Nevertheless we have designed the software for easy migration to a more robust database management system should it become necessary. For example, a change would require only minor modifications to data access routines that are isolated in one module. For the system administrator we built a Visual Basic application that runs on the administrator's desktop computer and communicates in XML over the Internet with the database that resides on a Web server.

We designed the system for scalability in terms of workload on administrators as well as increase in simultaneous Web traffic. The system requires little administration because the various categories of users are responsible for posting and maintaining material. The administrator does not have to monitor system activity on a daily basis because the information need not be real time. Managing a system that serves several universities in a state may require less than an hour a week. The Web site was designed for efficiency of user interaction, including conservative use of graphics to reduce time to download Web pages.

Special features

To the best of our knowledge this is the first site of its kind available to the business community. There is a somewhat similar Web site available in New York City (<http://www2.nysl.org/smallbiz/programs/index.html>) that links universities to the business community but it differs from ours in a number of ways. The contact information does not contain live email links. The information is not available in a report form that can be emailed. There is no provision for those who cannot use the Web site or those who are not Internet connected. University postings do not offer specific student resources but instead indicate which academic programs could provide course content bearing on the topics being searched. We do not know of any other system that offers direct contact with professors and students, and allows professors from multiple universities to enter data on their courses at their convenience, in their own words, using a Web interface.

Data entry is flexible. For example, time limits can be placed on a project to correspond with a semester. The entry will automatically expire at the ending date specified by the faculty member, but he or she can easily reactivate it later without re-keying. A professor may create new keywords or categories as necessary to describe a project.

Small business and nonprofit managers also may contact the Greenville County Library System's Reference Department. Library staff will conduct a search on behalf of a user and send the results by regular mail, email (an option is available at the Web site to send the search results directly to an email address) or fax. This low-tech service benefits small business users lacking Web access or computer literacy. Members of the Alliance will also run inquiries for users that request this service over the phone.

This Web site could involve students in multiple projects across very different classes and in multiple academic years, providing the potential for a far richer context of project work than one course or one project for final year students.

The system not only helps to set up student projects addressing industry problems but also helps arrange industry support for education. Industry users can volunteer to become involved in classes and other activities of the universities listed in the database.

We know of no other similar system having a reliable procedure for validating information posted to the Web.

Benefits of SCBIZHELP

Academia-industry linkage

SCBIZHELP has helped link students with a number of industry needs, in the areas of Management Information Systems, E-Commerce, Operations Management, and Human Resources Management (Table 3). These projects provided students an opportunity to apply concepts and techniques they had learned in the classroom.

Table 3. Examples of student projects

Organization	Purpose of project
SENIOR Solutions	Designed database design for volunteer management and meal delivery
SENIOR Solutions	Designed and implemented a Web site
Big Brothers and Big Sisters	Built database to track match ups between the brothers and sisters
Piedmont Home Textiles	Conducted feasibility study for adoption of a pull system
Piedmont Home Textiles	Analyzed warehouse management procedures
Piedmont Home Textiles	Identified bottleneck areas inside the plants and applied Theory of Constraints
Piedmont Home Textiles	Developed incentive pay plan
Carolina Circuits Inc.	Identified areas for quality management and continuous improvement
Park Place Inc.	Supported ISO certification process
West Point Stevens Inc.	Identified opportunities to apply lean manufacturing and continuous improvement
Greenville County Library System	Developed job documentation
Park Place Inc.	Developed job documentation
Park Place Inc.	Assisted performance appraisals
Anderson Restaurant Group	Conducted area wage surveys
Anderson Restaurant Group	Revised employee manual
Anderson Restaurant Group	Produced management policies and procedures manual for the corporation
Anderson Restaurant Group	Conducted marketing study on new advertisement media for their new restaurants
Anderson Restaurant Group	Conducted marketing study for an additional restaurant

Students worked on projects in various functional areas of business. In the Operations Management area, several projects were conducted in evaluation of existing manufacturing planning and control systems, quality audits, lean manufacturing, flow analysis and identification and removal of bottleneck in operations. For example, in the warehouse management project students first identified the root causes of problems using the fish bone technique. They applied optimization techniques to the problems considering the set of constraints in the warehouse facility. After a feasibility study they developed recommendations for allocating floor space during the peak / lean seasons, changing the packaging mix, stocking methods for normal orders and special orders (using well established methods for stocking and tracking), and handling variability in arrival of carriers. In the MIS area, students used the System Development Life Cycle approach to design databases and develop Web based applications for service organizations. For example in the database and Web page design projects for SENIOR Solutions, they were involved from the start of the project (eliciting user requirements) to system implementation using ASP.NET. In the human resources management area, students were involved in projects on job documentation and performance appraisal systems. For example in the job documentation project at Park Place, students created templates for job documentation (job description and specifications), in consultation with management. Templates included corporate logos and format consistent across jobs and with federal laws. Job incumbents and supervisors were interviewed and new job documentation was created and approved for 35 jobs.

Impact on students

We interviewed participating faculty about the quality of student projects in several functional areas of business and about the impact on student learning outcomes. Several professors indicated students were motivated to participate in these projects because they knew their work would be useful to industry and because they could

meet and work with practicing managers in industry. They were able to address “messy real world” problems that helped them hone their skills.

Impact on faculty

Faculty indicated SCBIZHELP has increased the number of projects addressing real industry problems and identified new opportunities for future projects that would not otherwise have come to their attention. They said SCBIZHELP has reduced the time and effort to arrange student projects addressing real industry problems. Also, they opined these projects helped reinforce concepts covered in their courses. For example, one MIS Professor said SCBIZHELP made possible innovative student projects that involved the community and she intends to continue to use this system to help create worthwhile projects that make teaching more effective.

Impact on business

Involved business managers have cited benefits. For example, the supervisor of the implementation of the incentive pay plan at Piedmont Home Textiles, said, “The incentive payment plan student project alone resulted in a cost saving of \$500,000 for the company and it was a laudable achievement. The company had so much confidence in the student projects that it allowed students to undertake many more projects.” The comptroller said the student projects were tremendously beneficial to his company.

Carolina Circuits Inc. implemented some of students’ suggestions from their quality audits. It reconfigured the business processes so as to improve process capability.

One team of students documented 165 jobs in several organizations thereby helping them save over \$5,000.

Impact on community

The Alliance for Small Businesses and Nonprofits made SCBIZHELP a central part of its application for an InnoVision Community Service Award. The Alliance’s application was reviewed by an outside panel and was among the three finalists for the community service award in 2003. Founded in 1999 by Deloitte & Touche, this award is dedicated to the advancement of technology in education and communication.

Conclusions

Since December 2003 users have accessed the Web site 1327 times and it has facilitated academia – industry linkage. User experience suggested some recent enhancements.

Formerly the system did not allow an open search. Instead the user had to choose keywords already in the database. This restriction was intended to ensure that someone using the search feature would not come up empty handed. However an open search function is commonly available on Web sites and many users expect it. So we included a free search capability in the current version. In the event that a user finds no available assistance in the database, whether using the free search capability or not, he or she will be prompted by the Web site to send an email inquiry to the system administrator. The system administrator will then solicit this previously unavailable assistance from the network of faculty and nonprofit organizations and correspond directly with the user. These revisions make the system easier to use, better aligned with user expectations, and more flexible, thereby increasing its usefulness to the end user.

Formerly there was no way for business users to post their needs to the Web site but we added this feature.

Success of the system depends upon support of faculty and cooperation of other organizations such as the library system and the South Carolina Small Business Development Centers. Enlisting this support requires substantial effort and generally requires personal contact.

Members of the Alliance plan to distribute this system to several organizations in South Carolina and later extend it nationwide. Although technically a single instance of the system could support the entire nation, system

management (including the assurance of information integrity) would be more practical if each system installation covered a smaller region.

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