



INFORMS Transactions on Education

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

A Brief Guide to Student Projects with Industry

Mark E. Hillon, Yue Cai-Hillon, Darrell Brammer,

To cite this article:

Mark E. Hillon, Yue Cai-Hillon, Darrell Brammer, (2012) A Brief Guide to Student Projects with Industry.
INFORMS Transactions on Education 13(1):10-16. <https://doi.org/10.1287/ited.1120.0092>

Full terms and conditions of use: <https://pubsonline.informs.org/Publications/Librarians-Portal/PubsOnLine-Terms-and-Conditions>

This article may be used only for the purposes of research, teaching, and/or private study. Commercial use or systematic downloading (by robots or other automatic processes) is prohibited without explicit Publisher approval, unless otherwise noted. For more information, contact permissions@informs.org.

The Publisher does not warrant or guarantee the article's accuracy, completeness, merchantability, fitness for a particular purpose, or non-infringement. Descriptions of, or references to, products or publications, or inclusion of an advertisement in this article, neither constitutes nor implies a guarantee, endorsement, or support of claims made of that product, publication, or service.

Copyright © 2012, INFORMS

Please scroll down for article—it is on subsequent pages



With 12,500 members from nearly 90 countries, INFORMS is the largest international association of operations research (O.R.) and analytics professionals and students. INFORMS provides unique networking and learning opportunities for individual professionals, and organizations of all types and sizes, to better understand and use O.R. and analytics tools and methods to transform strategic visions and achieve better outcomes. For more information on INFORMS, its publications, membership, or meetings visit <http://www.informs.org>

A Brief Guide to Student Projects with Industry

Mark E. Hillon, Yue Cai-Hillon

Harmon College of Business and Professional Studies, University of Central Missouri,
Warrensburg, Missouri 64093 [hillon@ucmo.edu, cai-hillon@ucmo.edu]

Darrell Brammer

Small Business and Technology Development Center, University of Central Missouri,
Warrensburg, Missouri 64093, brammer@ucmo.edu

Student projects with industry have much to offer in terms of enhanced student learning, but they can be difficult to create, plan, and manage sustainably. This paper details and distills the best practices from a four-year process to develop an undergraduate business strategy course around a student project with industry. This reflexive process revealed that our traditional analytical approach to business strategy was not teaching students how to create strategy in practice. Integration of course learning objectives with project deliverables was a key to replicating a practical project-based learning experience each semester. The needs for an industry liaison, additional student preparation, and active client engagement in the learning process are also discussed.

Key words: small business development center; industry liaison; project deliverables; strategy; experiential learning

History: Received: June 2011; accepted: June 2012.

Introduction

Student projects with industry are not for everyone, but they can offer practical learning opportunities to help students bridge the gap between classroom instruction and challenges facing real businesses. This paper is based on four years of experience in creating and sustainably managing a course built around a student consulting project for an actual client. Our course deals with business strategy, but the lessons distilled from our approach could be used to replicate a similar interdisciplinary student learning experience in any field of study. The brief guide that follows presents student projects with industry as a process of long-term relationship building involving students, faculty, local business clients, an industry liaison, and the educational institution.

Background on the Course

As in most business schools, all of our senior business students are required to take an integrative capstone strategy course before graduation. However, the integration tends to be more theoretical than practical because the typical capstone experience for business majors consists of textbook case study analysis and a competitive computer-based simulation. Published case studies may have useful lessons to teach, but studying a past strategy is quite a different process from creating a practical strategy for an uncertain

future. Likewise, a business simulation unrealistically simplifies the world into a set of knowable rules to govern all actions. Success in this sort of learning environment may not adequately prepare students for critical thinking and creative problem solving with incomplete information and other resource constraints. Unfortunately, a student project with industry is not part of the typical capstone experience in our field.

Our strategy course did not differ from the mainstream current in business education, but a fortunate contact made during a local entrepreneurship workshop led to a total redesign of the course around a student project with industry. During the workshop, one discussion illustrated the difference between an academic exercise and practical applications of academic concepts. Entrepreneurs discussed how the “Business Plan” had become an institution unto itself that served no practical purpose beyond supporting an optimistic lie to persuade bankers and investors to fund a startup company. However, they all admitted to doing “business planning” on a continuous basis to keep the company running and moving forward. Our strategy course had never lived up to the requirements of an integrative studies capstone as described in our university policies. Apparently, this sort of course was supposed to offer students an opportunity for interdisciplinary problem solving in a realistic and

complex context. Admittedly, we were not delivering that experience, and we suspected that our traditional approach to business strategy did not equip our students with practical skills coveted by employers. Therefore, we redesigned our strategy course to feature a student project with industry as both a practical learning opportunity and a challenge to assess our students' work readiness.

A wide variety of course curriculum design and team-based experiential learning references are available to guide instructors in building a project-based course to fit their particular situation. Therefore, we will only note here that beyond the basics of student accountability, feedback, and group management, successful team learning depends upon the instructor designing the project as a significant problem requiring application of relevant concepts from the course. After applying course concepts to find potential solutions, students must then be required to make a specific decision and report their findings for feedback (Michaelson and Sweet 2008). We had tried working with multiple clients before but found that students had no common frame of reference to discuss shared learning points. Also, our course is a required capstone for all students in the college and large class sizes limit the number of different projects that can be successfully completed each semester. Therefore, we designed the student project with industry with a single client and as a competition among teams across multiple sections of the same course.

Contrary to intuition, the major challenge in implementing the course makeover was not curriculum related. These changes were relatively straightforward because we simply asked what lessons need to be included in the course to help students learn how to create a comprehensive business strategy for a real client? The answer was not the glamorous corner-office view of strategy, nor even the academic retrospective analysis approach, but rather the grueling grunt work of competitive intelligence research that provides the necessary information for strategy creation. Our revised course learning objectives still resembled those of traditional strategy courses. However, the new crucial difference was that students had to gather their own data to conduct all of the analyses to understand the client's capabilities, industry competition and business models, technology changes, social and economic trends, and customer value propositions.

The major challenge in the course redesign was in translating the student learning objectives into a set of deliverables that could be repeated each semester. This was perhaps the most crucial lesson from our experience because the integrity and sustainability of

the course required total integration of learning objectives with project deliverables. Our previous attempts to add projects to the learning experience were often a forced compromise between our own vague learning objectives and client needs that were somewhat tangential to the course. This lack of integration did not enhance student learning. Thorpe (1990) observes that there is quite a lot of research describing what managers do, but very little dedicated to what they ought to do to be effective in their work. We found the same to be true in creating business strategy, and we suspect that many fields suffer from the same difficulty in translating academic analysis to practice in industry. To facilitate this process, it may be helpful to rewrite the course learning objectives in terms of observable skills or competencies that can then be verified with industry contacts. The practical relevance of specific competencies do change over time, just as a firm's unique competitive advantage today will be easily copied tomorrow (Meyer and Semark 1996). However, in our field, we have found that descriptive techniques for strategic analysis change over time, but the basic research and planning process for creating a non-generic strategy has remained constant. Our realistic deliverables mirror these constants so that the variations for each new client are largely cosmetic.

To further complicate implementation of the new course, we needed a steady supply of real clients willing to work with students for a mutually beneficial outcome. Although college professors generally maintain a few industry contacts, we realized that an industry liaison was essential to the long-term viability of our new project-centered course. The new emphasis on practical application of students' skills and knowledge required an abrupt educational turn for senior students and presented somewhat of a cultural challenge from an institutional perspective. To address concerns of all stakeholders—students, faculty, local business clients, industry liaison, and institution—our emphasis on student projects with industry required long-term relationship building.

Industry Liaison

It would be difficult for us to overstate the importance of an industry liaison to recruit and communicate with clients for student projects. Watkins et al. (2008) described the process of finding appropriate clients without a liaison for an integrated product design program. They ran ads in four newspapers, made an appeal on a local television show, and networked through local employment agencies and contacts just to find a pool of candidates. Clients were then chosen after conducting an initial screening, a survey, an hour-long interview with graduate student consultants, a second survey, and an entrepreneurial aptitude questionnaire. Not surprisingly, Watkins et al.

(2008, p. 362) rate the addition of a liaison to recruit clients and manage project communications as “the most significant jump in our 12 years” in the program.

The fortunate contact made during the previously mentioned entrepreneurship workshop was with our local Small Business and Technology Development Center (SBTDC). The federal Small Business Administration supports small business development centers (SBDC) in every state by partnering with universities to host a network of local offices (Nnyssbdcn 2009). The distinction between an SBDC and an SBTDC is that an SBTDC has gone through a quality accreditation process in order to offer a higher level of technical services to local businesses (SBA 2007). Our research indicates that SBTDC offices in only four states have tapped into the student talent available on their host university campuses. Student projects with industry are a tremendously underutilized resource: only the North Carolina SBTDC has implemented a statewide plan to involve graduate students as industry consultants. However, the program appears to be designed for internships instead of class projects. For the much larger population of undergraduate students, only a few SBTDC offices in Arkansas and Missouri appear to be actively pursuing student projects with industry. Internet links have been provided in the appendix for more information. From the SBA perspective, student projects with industry can help to leverage limited resources in improving economic opportunities for small businesses everywhere.

Preparing Students to Solve Industry Problems

Grandin and Johnson (2009) have observed that students with some sort of hands-on experience tend to be better prepared to understand constraints and solve real problems than are students with only abstract knowledge. Although we teach seniors who have been through at least four years of academic coursework, our course is often their first experience working with a real business. Most make the learning style transition, but a few never quite realize that the client is not part of a pre-scripted case study. A few also have trouble letting go of stereotypical solutions grounded in their academic majors. For example, a common mistake is to recommend that the client lower prices without considering the cost structure or the customer’s perceived value. However, the greatest barrier to students succeeding on a project with industry is the fact that there is not a single “right” answer to the client’s problem, and this sort of real-world ambiguity conflicts with the certainty that they have come to expect from previous courses.

Instruction during the first part of the semester, prior to the project, helps students learn a comprehensive interdisciplinary process for identifying and

gathering relevant information to develop a viable strategy to fit a specific context and need. Because of the nature of higher education, students acquire knowledge in small chunks over several years, and most of those chunks remain irrelevant and unconnected to their major program of study. This problem is especially acute in business education, so we begin the semester with a skills assessment to set up balanced interdisciplinary teams. Several graded peer evaluations throughout the semester then help students hold each other accountable for contributing their skills to the team effort. The emphasis is on constructive feedback so that students have multiple opportunities to improve their performance before beginning the project with industry. Students spend the first 8 to 10 weeks of the semester learning and applying the skills that will be needed on the project. This slow-motion training period is followed by an intensive four-week student project with industry. The ideal project length will of course vary by field, but experience led us to four weeks at the end of the semester as the optimal length for a strategy project. For our field, this is also a realistic timeframe for the work that students must complete for the client. In a sixteen-week semester, this schedule allows for adequate preparation prior to the project and sufficient time afterward for peer evaluations, debriefing, and assessment of learning.

At the outset, students perceive a lack of structure in projects with industry simply because they are unfamiliar with the client’s business, the industry competitors, and the market demands of customers. They also are not accustomed to adapting their skills to solve problems in a broader context beyond their specific majors. However, as students research and learn about the client’s challenge, they see that there is indeed a structure that will shape their solutions and they learn how to apply their skills to make themselves useful. If we proceeded directly into a full-semester project without any training, the client would unnecessarily have to endure the students’ often vocal frustrations, growing pains, and evolving level of professionalism. Instructors must be patient enough to let students discover the underlying industry structure because their previous educational experience has likely conditioned them to expect quick answers without the need to synthesize solutions from many different data sources. The ability to make decisions with incomplete information has been cited as desirable to employers, but some have argued that the traditional case study approach does not develop this skill (Gloeckler 2008). Much of the industry and social trend data that our students gather is secondary, so we include lessons on critical thinking skills such as text deconstruction (Boje 2001) to help students assess the credibility of sources. Creative thinking lessons also help students develop

lateral thinking skills to develop multiple alternatives before settling on their best course of action (de Bono 1970). Thinking skills are crucial to keeping students from taking disastrous shortcuts, such as choosing a solution without a thorough understanding of the problem. For example, a past client had developed a thermal imaging core for a camera but realized that the core was versatile enough to use in other products. An underachieving team did not learn enough about thermography to properly segment competitors and customers. Hence, their recommended home inspection market niche was already dominated by a low-cost competitor, and the core's capabilities far exceeded the customer requirements for the segment. Another team working on an LED lighting project developed a branding campaign with a new logo and color scheme for business cards, billboards, and employee uniforms. All very nice, but the solution did not address a strategic need for the client.

Dealing with the uncertainty and ambiguity of many possible solutions is a new experience for most students, and they express some grade anxiety when they realize that the client's choice of the most viable solution depends upon thorough research and a persuasive presentation. To alleviate some of the anxiety, we assess the students' process in researching, developing, and communicating their solutions and weight a peer evaluation into the grade to adjust for variations in individual contributions to the team. The client's ranking of each team's performance provides a measure of the market value of their solution and how well they delivered the deliverables.

In searching for published materials, we found no strategy textbooks on the market that could adequately prepare students for the project. However, we had translated our course learning objectives and client deliverables into a concrete set of competitive intelligence research and decision-making skills. As a result, our library database and freely available resources offered a plethora of specific and highly focused reading materials to meet our needs. For example, primary data collection methods are essential to our course, so we include readings on open systems planning, participant observation, interviewing, and survey design. Some of the readings on deconstruction, system dynamics, and quantitative data analysis are much more challenging than a typical undergraduate textbook, but eliminating the expense of a textbook was an attractive exchange for most students.

Motivation for Faculty Involvement

Innovation in education generally proceeds incrementally instead of by leaps and bounds. Therefore, it may be tempting to simply slide a project requirement into the syllabus and rely on students to form

teams, find a client, and do something meaningful. An instructor has a lot of discretion in conveying course concepts to students, but one should "never leave to willpower and self-discipline what you can do with environment" (Grandin and Johnson 2009, p. 191). Managing team-based experiential learning requires thorough reflection of your own teaching practice, intended learning objectives, and the resulting performance of students in demonstrating their understanding of course concepts. Such reflection usually points to the need to create a more effective learning environment. In this *Field of Dreams* ("if you build it, they will come") approach, most students will learn if you build a practical learning opportunity. However, when students take responsibility for their own learning, they tend to think more critically about their experience during the semester. Therefore, paradoxically, an instructor's standardized course evaluation scores may decline as student learning improves.

The primary faculty role during a project is that of a facilitator or coach to guide students through the process of learning to solve a practical problem for the client. If this is an unfamiliar role, remember that too much instructor involvement will inhibit students from discovering information, making decisions, and developing their own solutions. The secondary faculty role is that of project manager throughout the process. This role begins several months before the semester begins and requires collaboration with the industry liaison and client to agree on deliverables and schedule all project events (e.g., introduction, tour, final presentation, and judging). There is a great deal of work involved in preparing for and carrying out a successful project. Other than the motivation to improve student learning, why would anyone take on so much extra work?

A professor's available work time is divided among obligations for teaching, research, and service. On the surface, the lack of time might seem like a valid reason to reject student projects with industry. However, if student learning is a priority for deans, department chairs, and administrators, then it is rather easy to show that student projects with industry cover aspects of all three faculty obligations. For teaching, projects provide a realistic context in which to apply course concepts and offer students the opportunity to learn how their academic skills will be used in their work for future employers or for their own businesses. Most universities recognize the value of service to relevant industry stakeholders in the professor's field of study as well as the need to stay current with new developments in practice. Concerning research time constraints, projects with industry and the professional contacts that they develop can be a source of data or useful ideas for publications. As noted earlier, our industry liaison is part of a

national network of local offices tasked with helping small businesses. The potential for productive and mutually beneficial collaboration with local companies far exceeds the supply of faculty willing to engage with industry for better student learning, service to a profession, and opportunities for research. The literature review in Handfield et al. (2011) offers numerous examples of publications that were made possible by faculty participation in student projects and consulting courses.

Client Engagement

Humans have a built-in bias to seek out information that confirms what we believe rather than to challenge our assumptions about the world. Sterman (2001) notes that this common mistake of confirmation bias blocks our senses from perceiving relevant data needed to form and test theories. It is therefore necessary to explicitly discuss the client's expectations prior to the student project in order to surface any hidden biases and to develop objective criteria for evaluating the deliverables. "For most students this is their first experience in which they are compelled to behave as professionals" (Martinich et al. 2006, p. 1580). The client must understand that he or she has an active role to play in the students' development into professionals. This requires greater patience than would be expected with an employee or a paid consultant. Depending on the semester, we have between 80 and 130 students or 18 to 28 teams competing to create the best solution. Performance on the deliverables will vary from truly thought-provoking at one end of the spectrum to sadly abysmal at the other end. Most teams fall in between the extremes and need constructive feedback to bridge the gap in performance expectations between student and professional. The client's engagement with students during the entire process will ultimately improve the quality and usefulness of solutions.

We do not limit our client selection to a specific industry. Rather, the selection of a client is directed by the course learning objectives and whether the deliverables are appropriate to answer its specific question or problem. The identification and selection of a client also depends on its willingness to support student learning as the primary purpose for participating in such a project and its willingness to work with the students during the process of the project. Clients must be reachable, not a large corporation physically located in another state, and they must have a vested interest in the development of the local economy. They need to have not only an interest in the project but more importantly a serious business outlook and a sincere attitude toward implementing sensible recommendations by students to address their business question.

We intentionally designed this project-based learning experience to allow students to act as professional business strategy consultants. A four-week timeframe is realistic for the deliverables, yet seems to be short enough to sustain a high level of client and student involvement. The timeframe has also proven to be sufficient for students to make a significant and meaningful contribution to improve the client's business. Non-business disciplines requiring longer project durations would be advised to select critical points for client interaction instead of expecting continuous engagement. Standard industry practices for the type of work to be completed offer the best guides to setting realistic project timespans.

The most common issue during a project concerns communication. Although students have several face-to-face meetings with the client, email messages are often the most efficient means of asking and answering questions. The client usually designates a contact person who can relay the question to the most appropriate subject matter expert at the company. Teams often have similar questions for the client, so instructors are carbon copied on all email communications, and questions and answers are then posted on the Blackboard class page for all teams to view. With 18 to 28 teams competing each semester, one might think that the client would be overwhelmed with email traffic. However, a thorough project introduction, sharing of relevant internal documents, and a tour of the client's facility all help to reduce the volume of follow-up email questions. Students must cover their own travel expenses to and from the client, but all project companies are local and ridesharing reduces the cost and allows time for teams to discuss their progress and next steps. It is a misconception that businesses must share all financial information in order for consultants to develop value-adding recommendations. However, the client must be open to sharing appropriate business information to give students the opportunity to adequately research and answer the project question. Students and instructors sign a confidentiality agreement to protect the client's intellectual property and agree not to disclose any information related to the project.

Concerning resource commitments, the client needs to be fully aware that its investment of time, energy, and human resources into the project is not trivial. The monetary value of these investments can be calculated using socioeconomic analysis of hidden performance (Savall and Zardet 2008), as demonstrated in Table 1.

Institutional Concerns

We are fortunate that our school encourages experiential learning and welcomes interaction between

Table 1 Value of Client Investment in Student Projects with Industry

Position within company	Estimated tasks and time spent during a 4-week student project		Average salary*	Total \$ value of time contributed by client (\$)
President and CEO	Project introduction trip to campus	4 hrs	\$158,833/year	1,985.36
	Company tour	4 hrs	÷ 2,080 hrs/year	
	Answering questions and responding to student emails	10 hrs		
	Judging final presentations	8 hrs		
	Total	26 hrs	\$76.36/hr	
CFO	Answering questions and responding to student emails	4 hrs	\$111,070/year	640.80
	Judging final presentations	8 hrs	÷ 2,080 hrs/year	
	Total	12 hrs	\$53.40	
Chief engineer	Answering questions and responding to student emails	4 hrs	\$82,239/year	474.48
	Judging final presentations	8 hrs	÷ 2,080 hrs/year	
	Total	12 hrs	\$39.54/hr	
Total				3,100.64

*Average salaries for a small company, between 10 to 199 employees, from PayScale.com (2011 Data).

students and their future industry employers. However, we realize that all institutions have policy constraints, accreditation issues, and strategic objectives that can conflict with attempts to have students work with business clients. The most encouraging aspect of student projects with industry, from an institutional resource perspective, is that they do not require additional resources. Our university is not unique, in that the campus community is filled with talented people, specialized labs and equipment, and other underutilized resources that can be brought to bear on projects with industry. If done well, a useful service is rendered to a local business, students develop skills valued by employers, and the university receives free and favorable publicity.

The only potentially negative institutional influence that we have experienced surfaced after the development process had evolved through three years of projects. We issued a press release after each project concluded to recognize the company and the work of our students. Feedback from clients was also favorable, and they reported value and utility from student projects, so the question arose from some of our administrators as to whether or not the university should be compensated for students' work. Anyone interested in student projects with industry as an integral part of a course should have an answer ready for the day that someone opens this can of worms.

We had redesigned the undergraduate business strategy course around a student project with industry in order to create a better learning opportunity. In our view, the client's compensation to the university was the donation of time, expertise, patience, and active participation with students during the project. With the primary objective of creating a practical student learning experience, we cannot guarantee that the client will always receive contracted deliverables

as required by a pay-for-service model. Also, tuition-paying students know that they will have to work in their classes to develop marketable skills, but that understanding of "work" does not include compensating someone else for their labor. We know this from hard-earned experience. Our earlier attempts to cobble projects onto courses—before we learned that course learning objectives had to be integrated with project deliverables—were confusing to students. Complaints increased and motivation declined because they suspected that their professor or university was benefitting financially from their labor. Therefore, we learned that it was necessary to stress that the SBTDC offers services free of charge to benefit local businesses and that this model ties in with the dual mission of the college to prepare students for successful business careers and to support the greater economic development needs of the state. In the long term, our graduates will be better prepared for work and competition in the job market, local employers will have more favorable attitudes toward hiring our graduates, and future students will choose to study here to prepare for their careers. For our purposes, delayed compensation in these three forms offers a much greater return on investment than an immediate pay-for-service model. Fortunately, we eventually determined that our university's intellectual property ownership policy on educational material development did not apply to our redesigned project-based course. The reason, ironically, was that student projects with industry required no additional university resources.

Recommended Best Practices

Handfield et al. (2011) found that most student project initiatives have an informal structure, meaning that a faculty member teaches the course with limited

institutional support and consulting is not offered on a fee-for-service basis. Although a successful program can add prestige and attract donors to a university, the fundamental reason for creating a project-based course is “to provide students with an opportunity to plan and execute a real-world, live business-consulting project of significant importance to an actual manufacturing or service firm. The course is a bridge to business for the students who must transition from a traditional academic setting to a field setting upon graduation” (Gorman 2010, p. 432). With such tremendous potential, it can be easy to forget that projects are not for everyone. Before integrating a project into a course, reflect on what you, your program, and your college already do to help students develop and apply practical skills. If a student project with industry fits your situation and will enhance student learning, then consider the following points before you begin:

Choosing a Client

- An industry liaison is essential for recruiting clients. Liaisons can be found through Small Business Administration SBDC or SBTDC offices located in every state.
- Write your course learning objectives as a set of project deliverables, discuss them with your industry liaison, and then ask him/her to search for appropriate clients who need what your students can offer.
- Choose clients that fit your learning objectives. Politely say no to the rest.

Preparing Students

- An experiential learning environment must be created and managed by the instructor in order for students to have a realistic chance of achieving viable project deliverables.
- Students will need supplemental reading materials to bridge the gap between theory and skills application.
- The lack of a single “right” answer is unfamiliar territory for most students. Structure will emerge from this perceived ambiguity as they research the client’s problem, industry, and other relevant factors.
- Performance must be monitored by peers and instructor and accompanied by constructive feedback.

Faculty Concerns

- Evaluate the institutional and cultural barriers to interaction with local businesses.
- Combine teaching, research, and service obligations to save precious time.
- Learn to facilitate or coach students instead of telling them what to do.

A successful student project with industry depends upon a set of relationships involving students, faculty, local business clients, an industry liaison, and the educational institution. It is a long-term relationship building process that makes student projects possible. Patience and persistence in developing this effort is extremely important.

Appendix. SBTDC Internet Links Involving Student Projects with Industry

- Arkansas SBTDC Annual Report: <http://asbdc.ualr.edu/media/2010-annual-report.pdf>
- Eastern Michigan University Center for Entrepreneurship Internships <http://www.cob.emich.edu/include/templatesubpage.cfm?id=1114>
- Missouri State University SBTDC Feasibility Study <http://sbtcd.missouristate.edu/52437.htm>
- Missouri University of Science and Technology Student Business Incubator <http://www.missouribusiness.net/newsletter/0610.asp>
- North Carolina SBTDC Accelerated Graduate Student Engagement <http://www.sbtcd.org/recovery/ecr.asp>
- Southern Arkansas University <http://web.saumag.edu/news/2010/08/25/sbtcd-and-college-of-business-offer-market-research-to-local-businesses/>
- University of Missouri Environmental Assistance Center Service Learning <http://www.muserves.missouri.edu/partners/show/937>

References

- Boje, D. 2001. *Narrative Methods for Organizational and Communication Research*. Sage Publications, London.
- de Bono, E. 1970. *Lateral Thinking*. Harper and Row, New York.
- Gloeckler, G. 2008. The case against case studies. *BusinessWeek* (February 4) 66–67.
- Gorman, M. 2010. The University of Dayton operations management capstone course: Undergraduate student field consulting applies theory to practice. *Interfaces* 40(6) 432–443.
- Grandin, T., C. Johnson. 2009. *Animals Make Us Human*. Mariner Books, Boston.
- Handfield, R. B., S. A. Edwards, J. S. Stonebraker. 2011. NC State’s supply chain resource cooperative. *Interfaces* 41(6) 548–563.
- Martinich, J. A., S. L. Solarz, J. R. Lyons. 2006. Preparing students for conservation careers through project-based learning. *Conservation Biology* 20(6) 1579–1583.
- Meyer, T., P. Semark. 1996. A framework for the use of competencies for achieving competitive advantage. *South African J. Bus. Management* 27(4) 96–103.
- Michaelsen, L. K., M. Sweet. 2008. The essential elements of team-based learning. *New Directions Teach. Learn.* 2008(116) 7–27.
- New York State Small Business Development Center Research Network 2009. Small Business Development Centers: It’s no secret. *Industry Word*. Retrieved May 26, 2011, <http://community.sba.gov/community/blogs/expert-insight-and-news/industry-word/small-business-development-centers-its-no-secret>.
- Savall, H., V. Zardet. 2008. *Mastering Hidden Costs and Socio-Economic Performance*. Information Age Publishing, Charlotte, NC.
- SBA. 2007. Office of entrepreneurial development annual report. Retrieved May 26, 2011, http://www.sba.gov/sites/default/files/ed_annual_report_fy2007.pdf.
- Sterman, J. D. 2001. System dynamics modeling: Tools for learning in a complex world. *California Management Rev.* 43(4) 8–25.
- Thorpe, R. 1990. Alternative theory of management education. *J. Eur. Indust. Training* 14(2) 3–15.
- Watkins, T. A., M. J. Russo, J. B. Ochs. 2008. Can students in technology entrepreneurship courses help foster start-ups by the unemployed? *J. Small Bus. Enterprise Development* 15(2) 348–364.