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Closing the Industry-University Gap through Web-Supported Course Partnerships

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Abstract

This paper discusses a course partnership involving Day & Zimmermann, Inc., a large engineering and professional services company, and Temple University. The course was taught between the months of May and July of 1999 and its main goal was to teach students business process redesign concepts and techniques. These concepts and techniques were used to redesign five real business processes from Day & Zimmermann's information technology organization. Day & Zimmermann's CIO and a senior manager, who played the key role of project manager, championed the course partnership. A Web site with bulletin boards, multimedia components and static content was used to support the partnership. The paper concludes with a set of lessons learned with emphasis on the role of the Web site as an enabler of the course partnership.

Introduction

Virtually every university in the US and overseas has seen a significant increase in demand for information technology (IT) courses and programs in the last five years (Greenspan, 1999; Monaghan, 1998; Ross, 1998). At the source of this is an ever-growing need for qualified IT professionals in most companies, whether the companies are in technology industries or not (Alexander, 1999; Andel, 1999; Trunk, 2000; Wilde, 1999). In spite of this, the gap between industry and academia in the field of IT (King, 1998; Richter, 1999) seems to be widening rather than contracting, which is evidenced by some symptoms:

- Students complaining about their lack of "real world" IT experience when they graduate.

- Industry representatives pointing out that universities do not prepare students for the challenges and complexity of corporate IT management.

- Faculty teaching topics that are related to their research yet far removed from the daily reality faced by IT professionals.

The symptoms above were addressed at a panel discussion sponsored by the Philadelphia Chapter of the Society for Information Management (SIM Philadelphia), on February 2, 1999. Six panelists were invited, each representing a university located in Philadelphia and vicinities. Several possible alternatives to solve the problems above were discussed, notably a better alignment of the topics covered in courses to address immediate industry needs, development of industry-oriented programs (e.g., technical IT diplomas), and expansion of internship programs (Carnes and Gierlasinski, 1999). Yet, these alternatives were seen as traditional ways of addressing the industry-university gap that had yielded modest results in the past.

A different and promising approach was also proposed: To conduct certain courses, particularly senior undergraduate and graduate courses, in partnership with Philadelphia companies. Such courses would be designed so that the concepts and theory discussed in class would be applied in a team course project geared at solving immediate problems at the company. Other fundamental characteristics of these course partnerships were discussed:

- ***All team projects should be conducted in one single organization***. Letting student teams identify organizations they would want to work with, based on criteria defined by the instructor, usually leads to different student teams conducting projects in different organizations, and thus to significant discrepancies in project complexity, project scope, and organizational support across different student teams. These problems can have a negative impact on

learning, and were seen as likely to be considerably reduced if all team projects were conducted in one single organization.

- *Potential projects should be identified in advance*. The identification of a potential project by student teams can take up to 5 weeks of a 14-week course. One may argue that this is acceptable, as long as concepts and theory are covered during those initial 5 weeks. However, in addition to identifying a project, a student team also needs to learn about the organizational culture, people and specific business processes they will be dealing with. This can easily take up another 5 weeks, leaving little time for other key project activities (e.g., business process redesign and IT implementation). The proposed solution for this problem was to identify potential projects in advance, prior to the formal start of the course, and distribute them among student teams in the first week of the course.

- *Top management should sponsor the course partnership*. Often, when students are asked to come up with their own course projects, the sponsors of the projects are not senior managers. As a result, a project sponsor may be reluctant or lack the authority to approve organizational changes or purchases of hardware and software necessary for a project to be effectively completed. These difficulties were seen as likely to be eliminated if top management were aware of and directly sponsored team projects.

It was clear to most of the audience of executives and academics that such course partnerships would likely require a considerable amount of extra time and effort from the students and instructor, well beyond what is usually expected in traditional courses. In addition to applying the concepts and theory learned in class, students would also have to learn "on-the-fly" how to effectively deal with issues that are found in the "real-world" (e.g., organizational culture and politics). The instructor, on the other hand, would have to also take on project management, industry-university liaison, and inter-organizational team facilitation responsibilities in addition to traditional course delivery and student mentoring duties.

Given this, and the prospect that partnerships could lead to valuable business improvements, it was proposed that organizations funded such course partnerships through small grants. These grants would be used to cover student expenses related to the course project, purchase equipment and software needed for the course, and provide a stipend to the instructor. The idea was positively received by most of the 30 industry representatives, mostly chief information officers (CIOs), present at the panel discussion.

Implementing a course partnership: Temple University and Day and Zimmermann, Inc.

We implemented the course partnership idea discussed above in the first session of Summer 1999. The course partnership involved two partners: Temple University, a large research university located 2 miles from downtown Philadelphia, and Day & Zimmermann, Inc., a US$ 1.5 billion engineering and professional services company headquartered in downtown Philadelphia. The course was a pilot version of CIS650 - Process Design and Information Technology, a newly developed course dealing with process analysis and redesign issues.

The course project required students to analyze and redesign five of Day & Zimmermann's business processes using the concepts, theory and techniques taught in class. The course partnership and related project had direct support from Day & Zimmermann's CIO, Brad King, from the outset. A senior manager at Day & Zimmermann, Camille Auspitz, was assigned the responsibility of managing the project together with Ned Kock, an information systems professor at Temple and the course instructor. The project involved, directly and indirectly, over 30 Day & Zimmermann employees and 26 Temple students.

The students were split into 5 process redesign teams, which periodically met with key Day & Zimmermann employees at the company's headquarters in downtown Philadelphia. Each team analyzed and redesigned one process, generated three reports, and delivered an oral presentation to Day & Zimmermann management at the end of the course. The first report generated by each team contained a detailed description of the process targeted; the second a detailed description of the redesigned process and the rationale behind the redesign decisions; and the third a detailed analysis of IT solutions to enable the new (redesigned) process.

Web site removes obstacles to participation

However, before we started this course partnership, two main obstacles had to be dealt with. First, Day & Zimmermann employees were expected to actively participate in the process redesign efforts. In order to do so, they had to understand the concepts and theory used by the students. Yet, most of the Day & Zimmermann employees likely to be involved in this project could not come to Temple to audit the course together with the students. Also, given that Temple students and Day & Zimmermann employees were not co-located, a great deal of their interaction would have to occur by means other

than face-to-face meetings. The solution to overcome these two obstacles was the development of a password-protected Web site, which allowed Day & Zimmermann employees online access to all course material. The Web site also supported interaction between them and Temple students through shared document areas, multimedia components and discussion boards.

The Web site had three main areas: General, project and course. The *general area* comprised links to the main page of the Web site, the Amazon.com entry for the textbook used for the course, and a description of Web browser plug-ins needed to view the different multimedia components of the Web site (all plug-ins were available free from the Web).

The *project area* contained a listing of the people involved in the project along with respective contact information. For the students, photos with names and RealVideo introductions were also linked to the Web site. The project are also contained a description of each of the processes targeted in the project, and Web-based bulletin boards supporting anyplace/anytime threaded discussions.

The *course area* contained a link to the instructor's Web page, Powerpoint slides covering concepts and theory related to process analysis and redesign, and related RealAudio files. The course area also contained a discussion of the tools used to support the course partnership through the Web including RealVideo full-motion screen-captured demonstrations of such tools. Relevant features of the following tools were covered in this module:

- Windows NT Server
- Internet Information Server
- WS-FTP
- FrontPage 98
- JavaScript
- VBScript
- Studio 400
- RealPublisher
- Ulead PhotoImpact
- Hypercam

Was the course partnership successful?

The project was considered a success by Day & Zimmermann management and employees as well as Temple students. Concluding remarks by Brad King and Camille Auspitz are available as RealVideo files from the main page of the Web site (the URL is provided later in the paper), along with a table summarizing anonymous Temple student evaluations of the course.

Both Brad King and Camille Auspitz emphasized the anytime/anyplace collaboration between Day & Zimmermann employees and Temple students enabled by the Web site as one of the key elements that made the course partnership a very successful collaborative effort.

Temple students emphasized the real-world experience as one of the most positive aspects of the course. Following is a representative comment by a student extracted from one of the anonymous course evaluation forms completed at the end of the course:

> *The learning experience was very rich. The group project gave us hands on experience in applying the redesign techniques we learned in the course. It was a great experience to work with upper level IT management!*

Several students pointed out that the course required considerably more time and effort from them than most traditional university courses they had taken before. In spite of that, their anonymous evaluations of the course were surprisingly positive. Table 1 shows the mean answers (on a scale from 0 to 4) for three questions extracted from the anonymous course evaluation forms completed by students.

An added benefit for Day & Zimmermann was the ability to identify young talent based on observation of business-relevant action (as opposed to the traditional analysis of resumes). Day & Zimmermann was able to observe a group of 26 students in action over a two-month period and identify several students whom they would like to consider hiring. This is not as easy to accomplish with other approaches for identifying new graduates for hiring, of which internships are perhaps the most popular.

Question	Mean answer
Overall, the instructor did an excellent job teaching	3.82
Overall, I have learned a great deal from this course	3.41
Overall, this is one of the best courses I have had at Temple	3.53

Range: 0 (strongly disagree) - 4 (strongly agree)

Table 1: Summary of anonymous course evaluations
(Note: There were few lectures in this course. The instructor spent most of the time facilitating the interaction between Temple students and Day & Zimmermann employees.)

There are two key reasons for this. First, the number of interns that could be hired for a two-month period by an organization would typically be considerably smaller, thus significantly reducing the number of students that Day & Zimmermann managers would be able to observe in action during that period of time. Second, the tasks that the interns would be assigned to would not usually be nearly as complex and strategically relevant as those carried out in this course.

Visit the Web site

Permission was obtained from Day & Zimmermann to make the Web site public. Before doing so, we had to remove the student team reports and bulletin board discussions, which contained information seen by Day & Zimmermann as confidential. The course partnership Web site is currently available from the URL below:

- http://ww2.cis.temple.edu/kock3

Lessons learned

The general perception at the end of the course partnership was that it had been an exciting and rewarding experience for all those involved. Students saw the course as a valuable experience that provided them with a unique view of IT management and which complemented the concepts, theory and techniques learned in the course and throughout their university program. Day & Zimmermann managers perceived the input provided by the students as very valuable and likely to lead to concrete business process improvements.

Also, a few lessons have been learned along the way that can be useful for universities and companies planning to implement similar course partnerships in the future. These lessons learned focus on the role played by the Web site as an enabler of the course partnership.

- **Information sharing does not ensure output integration in student projects.** One of the key lessons learned regarding the use of the Web site is that, even though all the documentation generated by each team was available to all the other teams through the Web site, process redesign and implementation proposals were developed in relative isolation. Most teams monitored the work of the other teams through the Web site, by reading team-specific bulletin boards and documents, and even posting comments and suggestions for other teams. However, it seems that the use of that information was restricted to monitoring purposes, so teams would know, for example, if what they were doing was "as good as" what other teams were doing. This lesson learned provides field support to the findings of an experimental study conducted by Dennis (1996), which found that even though some collaboration technologies may lead users to share more information, they may not ensure that the users effectively use the information shared. This may be due to information overload (Casey, 1982; Chervany and Dickson, 1974; Kock, 1999; Meyer et al., 1997; O'Reilly, 1980). That is, even though enough information about the work of each team was available to all teams, their members were not able to effectively process it, probably due to time constraints. This may also explain the fact that even though Day & Zimmermann's CIO had full access to the Web site, he preferred to be briefed about the main outcomes through a face-to-face project review meeting.

- **A combination of online and face-to-face interaction is preferable to either only one or the other.** This study suggests that asynchronous online interaction is preferable for certain communication and coordination activities than face-to-face interaction, and vice-versa. The combined used of the two modes of communication was seen as a major factor in ensuring the success of the course partnership. The following quote, from a manager directly involved in the partnership, illustrates many of the participants' views regarding this: *"It was fantastic how effectively the combination of online discussion and in-person meetings and reviews melded to create a truly collaborative experience…the success of this type of project seems dependent on a blend of both the online and face-to-face interaction. Too much of either would result in a need to extend the schedule, in the case of doing all the work face-to-face, or risking a lack of consensus or true teamwork/team spirit, in the case of a fully electronic experience."* This lesson is aligned with previous research findings by Kock (1999a) and Kock and McQueen (1998) based on the analysis of computer-supported process improvement groups conducted in New Zealand. However, the search for optimal combinations of communication modes suggested as relevant by this study is in stark contrast with most of the academic research on collaboration technologies in the 1980s and 1990s, which have focused on experimental comparisons between computer-mediated and face-to-face communication (Kock, 1999a).

- **The combined use of technologies and social interaction norms can remove computer-mediated communication obstacles.** Our study suggests that appropriate use of commercial Web-based technologies can compensate for some of the difficulties inherent in computer-mediated communication. Several empirical studies,

particularly those related to media richness theory (Daft and Lengel, 1986; Daft et al., 1987; Kock, 1998; Markus, 1994; Rice, 1992), have shown beyond much doubt that users see certain communication media other than face-to-face interaction as less appropriate for tasks as complex (or "equivocal" – see Daft and Lengel, 1986) as process improvement. For example, computer-mediated communication is seen as depersonalizing ideas, removing non-verbal cues and preventing immediate feedback, all of which are perceived as having a negative impact on the process and outcomes of teamwork. On the other hand, prior research findings also suggest that social and organizational norms, such as project guidelines set by management, may compensate for difficulties associated with computer-mediated communication (Markus, 1994). Our study provides confirmation for this hypothesis. Feedback immediacy, for example, was increased by both the instructor and project manager at Day & Zimmermann directing the participants (i.e., students and company employees) to check the bulletin boards available from the Web site twice a day and use them as much as possible for interaction regarding the project. As a result, over 300 postings were exchanged within a four-week period, all of which were about tasks related to the course partnership. In addition to communication behavior guidelines, two commercial Web-based technologies, Internet streaming and image processing, were used to mitigate the depersonalizing effect of computer-mediated communication. Video clips of the CIO, project manager, and instructor addressing important issues regarding the partnership were prepared and posted on the Web site along with video clips with team members' introductions. Pictures of the team members, with names added to them were also posted together with full contact information (address, phone, email etc.) for each member.

The amount of interaction during the course and the familiarity with which participants from Temple and eIT behaved toward each other toward the end of the course partnership is indicative of the "virtual community" sense fostered in part by behavioral norms, electronic interaction, and the multimedia components of the Web site.

After this experience, it became clear to us that similar Web-supported course partnerships involving universities and companies can be an effective way to bridge the IT gap between industry and academia. We hope that this paper will contribute to the decision by universities and companies to implement similar course partnerships in the future. We also hope that our case example and related discussion of lessons learned will contribute to the success of these course partnerships.

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