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USING INFORMATION TECHNOLOGY (IT) TO ADD VALUE TO THE LEARNING PROCESS: PRE-CONDITIONS FOR SUCCESS

An undergraduate management professor and her technology assistant use an Information Technology based project to explore how IT can be used to create value-added learning experiences. Undergraduate students from three international universities participated in the project. Structural constraints and the processes key in overcoming these constraints are discussed. Recommendations are made with the intention of helping similar projects in the future.

Introduction

Recently, there has been a major transformation occurring in university classrooms. Information Technology (IT) not only challenges the standard 'tools' of university teaching - blackboards and overhead projectors – it also challenges the very way in which learning occurs. Yet, despite the capacity to use IT for 'adding value' in the classroom, its utilization often falls short of expectations.

Although some faculty members embrace the technology, others abhor it. This is not unusual as individual and organizational resistance to change are well documented (Staw, 1982). Individual faculty members may resist using information technology in the classroom for a number of reasons: fear of the unknown, lack of proficiency in using the technology, no perceived benefit, insufficient understanding of its potential, or threats to the status quo such as a need for pedagogical changes.

At the organizational level, one reason why technological change is not accepted is because the corresponding changes to the organization's structure are not made (Katz and Kahn, 1978). It is generally understood that any significant changes in objectives demand changes in the way people work together to accomplish these objectives (Chandler, 1962; Amburgey and Dacin, 1994). Arguably, when the aim is to 'add value' to the learning process through the use of IT, there will be a need for process participants to change the way in which they work together to achieve this aim. It is ironic that universities, which exist to create inquiring minds and to challenge the status quo, have resisted changes to their bureaucratic structures. As this paper will show, to capitalize on opportunities to create new learning experiences for students by using IT to link them internationally, a number of structural constraints need to be dealt with.

The complexity inherent in an international collaborative effort involving students, faculty and IT resource personnel requires a considerable amount of planning. Yet, there has been very little attention paid in the literature to the planning process and its impact on success, despite a growing number of descriptions of how IT is being used in the classroom (Upbin, 1999; Downey 1998; Tucker 1997; Holmes and Duffey, 1994). In addressing this issue the aim is to contribute to a better understanding of how IT can be used to create value-added learning experiences. The paper begins by exploring what adding value means in a university context. Next, we provide an overview of the project and its design challenges. Then we explore the key

success factors in meeting the challenges associated with technology-based project planning. In concluding, the paper offers some recommendations for improving the design of technology-based value-added learning projects.

Adding Value in a University Context

In a business context, focusing on activities that add value for customers, employees, and shareholders is closely associated with the success of organizations (Dess, Rasheed, McLaughlin and Priem, 1995). Businesses that are successful in adding value for customers and other stakeholders do so by being responsive to changes in market needs. This requires sharing information and opportunity (Anonymous, 1999). Increasingly, success is being measured according to how quickly and effectively an organization operates with outsiders.

While information enables businesses to succeed in adding value, information is not an end in itself (Pacanowski, 1995). Similarly, while IT plays a key role in redefining business relationships (Anonymous, 1999) both within and between organizations, it is a means to achieving the organization's objectives.

Relative to the traditional learning modes, the project described below represents a very unique way to learn about management. Arguably, the use of IT adds value to the learning experience by enabling students to acquire timely, first-hand information about managing that would be inaccessible to them through any other means.

Project Overview

The vision for the project, as originally conceived in the spring of 1998, was to develop an international student research project that would enable students in different countries to learn first-hand about the issues and challenges that managers are facing. By standardizing the interview questions, students would concurrently interview managers of similar businesses. Using technology to link the partnering universities, students could then exchange the transcripts of their interviews to gain insight into the international similarities and differences among managers.

In March of 1998, the first formal step was taken in turning this vision into a reality. At that time, an application was make to the student technology intern program to have a student assume responsibility for the technical aspects of project design. This program, initiated to assist faculty in developing their skill in using technology to enhance learning, provides 100 hours of student assistance. Upon being approved for the program, the faculty member focused on the following challenges:

- recruiting partners in other universities (began June 1998)
  - identifying prospects
  - determining how many partners would be optimal
  - obtaining a commitment
- negotiating the nature and logistics of the project (began August 1998):
  - developing a tentative list of businesses which might be common to each location irrespective of community size
  - determining the number of different types of businesses that would be needed to form the core for the data analysis
  - designing a standardized interview to facilitate comparative analysis
  - determining how to deal with different numbers of students in each location
  - determining a minimum value for the project grade to ensure relatively equal commitment, participation
  - determining how much time would be needed to conduct and post the interview transcripts

- determining whether the interviews would be done individually, in groups or a combination thereof
- identifying any semantic differences between locations

The newly appointed technology intern focused on identifying and dealing with the technology issues including:

- determining which form of communication and subsequent software would best meet the needs of the project – i.e. listserve, discussion group…
- developing a set of instructions that can be used by all students
- provide a common set of guidelines for the project

Dealing with these various design issues took an extensive amount of time and planning as is reflected in the fact that the project did not transpire until March of 1999 - a full year from the time that work on the project formally started! It involved close to 300 students enrolled in business programs at three universities - St. Francis Xavier (St. F. X.) University in Canada, California State University in Long Beach (CSLB), USA and Rhodes University in Grahamstown, South Africa, one faculty member from each institution, and two student technology assistants (one from St. F. X. and one from CSLB)[1].

Conceivably, the time lag between conception and implementation might be partially attributed to the inexperience of both the faculty coordinator and the intern in developing a project of this nature. However, evidence (as illustrated in Table 1 below) suggests that this time lag is largely a function of the inherent structural constraints of working within an international university milieu.

Table 1

Structural Constraints to International University Collaboration

	Academic Year	**Number/Duration of Terms**	**Technology Infrastructure**	**Course/ class sizes**
St. F. X., Canada	September to April	Two15 week terms	Above Average[2], Highly Standardized[3]	4 sections/ 40 per class
California State, Long Beach USA	August to May	Two 15 week terms	Above Average, Standardized	Multiple sections/ 130 students in each
Rhodes, South Africa	February to November	Two 7 week terms One 10 week term One 13 week term	Average, Non-standardized	420 students (number of sections unknown)

These constraints leave little room for maneuvering as changes to academic calendars, first-level course/class sizes, and the existing technology are beyond the purview of faculty

[1] Students conducted the interviews from March 8th to March 22nd and were required to post their interview transcripts to the relevant discussion group no later than March 25th. The dates and content of student reports/oral presentations were set by the individual instructors.

[2] Indicates the availability of the latest versions of hardware and software as required to meet users needs.

[3] Standardized means the degree to which institutional computer systems run identical software applications.

members. Consequently, while some efficiencies might be gained through experience in any project that is based upon international collaboration, our experience indicates that technology-based project planning involves four key processes; developing communication, actively seeking compatibility, building commitment, and promoting coordination.

The 4 C's: Key Success Factors in Planning

This section describes the processes identified as key to the successful implementation of the project. The three main interest groups that will be affected by these key processes are professors, technology support personnel (TSP) and students. There were three professors directly involved in the project, one from each university. The second group consists of any technology interns procured for the purpose of the project and TSP – any individual or group of individuals who assist the faculty of the university to "make effective pedagogical use of computer technology" (Eley & Eley, 1995). The third group, students, though inarguably the focus of the project, were not involved in the planning stage.

Communication

From our experience, a project of this nature requires mutual understanding between the interest groups. Clear communication is the foundation needed for mutual understanding to occur. An open channel of communication is equally strategic in effectively conveying the desired message. When either element of successful communication is not apparent, the information is not transmitted properly, confusion is created and problems arise. Effective communication, therefore, is crucial in preventing complications. Clarity and channel of communication, the basis for effective communication, is discussed in respect to the three main relationships formed by the project; professor to professor, professor to TSP, and TSP (specifically technology intern) to TSP.

Professor/professor relationship. The professors relied solely on electronic mail (e-mail) for their communication. Indeed, geographic distances and cost made any other form of communication impractical.

The purpose of communication is to convey messages in an open and clear manner to ensure the development of mutual understanding. E-mail, however, did not always achieve this objective. Body language, tone of voice, gestures and facial expressions – used as feedback, indicating how successfully a message has been understood – were unavailable when communicating via e-mail (Robbins 1997). This lack of feedback created confusion when one professor did not fully comprehend the importance of the schedule in place. The professor arranged for his students to conduct their interviews two weeks after the date proposed in early e-mails. A result of inadequate feedback, this mistake delayed the work of the other students in the project.

Professor/TSP relationship. It is also essential in an IT-based project for professors to communicate effectively with their TSP and vice versa. Similar to the professor to professor relationship, it is imperative to have an appropriate channel of communication. In our project, selecting an appropriate channel proved to be challenging. For example, when problems ensued during a trial run, attempts were made by the professor and her technology intern to notify the other TSP of the situation - firstly by e-mail, then by telephone and finally by scheduling a face-to-face meeting. Intuitively, e-mail would seem like an appropriate means of communicating with TPS. However, only the face-to-face meeting garnered timely results.

Effective communication requires that TSP acquire clear and concise descriptions of situations and problems from the professor so that appropriate steps might be taken. Likewise, professors require clear communication from their technology support personnel. Henry (1994) suggests that "what may be simple to the professional (in our project, the technology support

personnel) may actually be too complex for end-users (professors)". Explanations filled with technical jargon which are clear to the technology professional will only further confuse the professor needing assistance. Moreover, most professors may not understand enough IT to know what resources they need in building a workable project. Therefore, it falls on the TSP to help turn a professor's vision into a tangible plan of action. The pioneering professor from St.F.X. knew the project design she wanted but needed the TSP's expertise to suggest which technological tools would be needed to successfully execute her ideas.

Technology intern/TSP relationship. The third path of communication connects the technology intern to the other TSP. When problems develop that extend beyond the capabilities of the technology intern, the intern turns to other TSP for assistance. This assistance is asked and provided for through a pre-selected channel of communication. The technology intern will then know how they can communicate and to whom they should apply for guidance.

The technology intern and TSP are computer literate thus technical jargon will not pose a considerable problem to the clarity of understanding. The need for concise and time-efficient communication is increased, however, by the various other university-related technological responsibilities of the TSP. The intern had to be thorough yet brief when seeking aid because of the time constraints of the TSP. The intern had to communicate clearly the first time as there was not always opportunity to arrange a second meeting within the time available. Thus precision and comprehensibility was a forced necessity in the intern/TSP relationship.

Compatibility

The second process critical to the planning phase involves compatibility. To facilitate the aims of the project, it is important for both the technology at each university to be compatible as well as the professors' competence in using it. Technological compatibility was identified early in the planning process. Pre-testing of the hardware and software enabled any problems in this area to be detected and dealt with directly. A related issue is one of access to the aforementioned hardware and software. It was discovered that not all students at Rhodes had their own email accounts or equal access to computer labs which left them at a disadvantage.

It is also crucial that professors from the different universities have similar base-line computer knowledge and be able to function within the technological demands imposed on them by the project. The professors need to be familiar with the same or comparable software packages that may be used during the implementation stage of the project. In our experiment, two of the professors had both adequate computer skills and previous experience with the software being used to access the discussion group and to transmit information (Netscape Navigator 4.0 or higher and Microsoft Office 95/97). The third professor had formerly acquired basic computer knowledge but was unfamiliar with the particular software selected. This situation impeded progress in later phases of the project.

Commitment

Our experience suggests that enthusiasm and a shared project vision are essential for developing the third key process, commitment. Commitment is necessary for accomplishing both the long-term learning objectives and the short-term tasks (e.g. replying promptly to emails) of the project. Professors will support a project vision if they believe it contributes to their class's purpose and "feel that it will positively impact on their students' lives" (Holmes and Duffey, 1999). It was intended that professors would be chosen who instructed classes at similar academic levels and who pursued common class objectives, namely undergraduate management students. This would ensure the professors would support the project aims and goals. Unfortunately, one professor involved his graduate-level students in the project instead. The commitment level of that professor subsequently decreased as he did not feel his students would benefit as much from the project.

It is also strategic to the success of an IT-based project to build commitment of the TSP and technology interns. TSP who feel directly responsible for the success of the project and believe the work they do "will make a difference in students' lives" (Holmes and Duffey, 1999) will develop more commitment to a project of this nature. In our experience, it appeared that some TSP did not feel responsible for or optimistic about the work they did. This decreased commitment and made it difficult to rely on long-term or continuous technology support.

Coordination

Coordination of efforts and activities is required by both the professors and the TSP to facilitate the objectives of an IT-based project. In the absence of formal control mechanisms, the faculty coordinator plays a critical role in ensuring the project moves forward. Filling this role requires achieving a delicate balance between 'telling' and 'selling' various aspects of project design. On the one hand, input from all faculty is very important in building a sense of joint ownership of the project. On the other hand, *someone* needs to make a final decision as to how the issue in question will be dealt with.

In using e-mail as the sole means of communication, it is important to ensure that discussion of an issue is limited to a reasonable number of iterations. For example, reaching agreement on the number and type of businesses that students would draw interviews from proved to be a challenging, time-consuming task. Despite a clear request for colleagues to select their 10 preferred choices from a list of 35 potential businesses, responses were received only after much prompting. While a face-to-face meeting can be used to settle project development details quickly when only one institution is involved, this is not a feasible option in a project of this nature.

Coordinating the technological support side of the project entails ensuring that resources and tools are available at the right place and at the right time. Coordination of problem-solving efforts is also a critical component of TSP responsibility. This helps ensure that any problem is handled in a timely, systematic way by a person or group of people given responsibility and accountability for the outcome. In the trial run of our project, the task of setting up the electronic discussion groups was given to the TSP but no one was given responsibility for the work. Three days before the trial was to commence, the discussion groups were still not working properly, causing considerable distress and apprehension. Clearly, the tool was not made available at the right time to meet the needs of the project.

Project Outcomes

Despite the challenges of designing a technology-based international project, the outcomes indicate that such a project can add considerable value to a student's education:

- opportunity to gain first-hand knowledge of international similarities and differences in managing
- provides practical experience in dealing with issues related to team-work, communication, analysis
- builds competence in electronic communication, interpersonal communication (interviewing), analysis, and synthesis
- develops skills needed to share information with outsiders
- develops a better understanding of how information changes the nature of relationships within and outside organizations
- provided students with an opportunity to cope with complexity (as the students were member of cross-functional teams which required coordination/collaboration among groups)

Conclusion and Recommendations

In participating in this IT-based project, students gained an understanding not only of the nature of relationships within and between organizations that might be needed to work effectively in the global economy but also of the key role information plays in the process. However, while IT can facilitate these innovative learning experiences, constraints imposed by traditional university structures require extensive planning and a realistic time horizon. Forming communicative relationships, selecting compatible partners and technology, fostering commitment and developing coordination of efforts, are four processes that can help overcome any structural constraints.

Our experiences planning an IT-based project resulted in the following recommendations that may used for future attempts in a project of this nature:

- In a university offering computer science or information systems courses, the technology intern could be a student assigned from a senior-level computer class. Part of the student's mark in the computer class could be based upon his/her work on this project.
- Find universities with a well-developed technology support infrastructure who have the resources to provide their own primary TSP.
- In any stage of the project, allow time for dealing with contingencies, especially when dealing with people in other countries and/or unstable technology.
- When selecting software to use in the project, obtain advice from two or three different sources –technology professionals, professors and faculty, user-groups – and consider each group's opinion before making a decision.
- Design a project that can be used in multiple years so the time spent planning – by far the most work-intensive phase – is not lost.

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