Title: Meeting the challenges of the 21st Century: Teaching and learning in a digital environment

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Abstract

Educators and educational institutions are hard pressed to meet the needs of students and faculty in a rapidly changing society. At Ryerson University, most faculty and students look to the application of technology as a supportive mechanism to assist the teaching/learning process. The experiences at the School of Information Management (ITM) in a technology-enabled environment have raised a number of questions concerning course content delivery, and network performance issues, which are driving our research. The objective of this paper is to examine some of the pedagogical challenges and practical implications of teaching in this wireless environment at ITM, and to share the faculty experiences of a recent pilot, carried out by the school. The issues and challenges concerning pedagogy at the ITM School will focus on two areas. One area is the use of Web Course Tool (WebCT™) as a course delivery vehicle and communication tool, and the other area will explore issues pertaining to the wireless network. The addition of mobility into the pedagogical mix, through the laptop program, will form a basis for further research.

Keywords: WebCT™, wireless network, Internet, Web-based learning.

1. INTRODUCTION

At Ryerson University, the faculty and students of the School of Information Technology Management (ITM) look to the application of technology as a supportive mechanism to assist the teaching/learning process. This supportive mechanism includes the use of WebCT™ as a course delivery vehicle and communication tool and the "wireless" network infrastructure as the platform.

How could ITM migrate from the traditional "chalk and talk", paper-based environment to a ubiquitous digital environment with "less paper"? This transition defies the conventional wisdom of the teacher-centered learning paradigm. In addition, it also invokes concerns about network performance. The objective of this paper is twofold. First it examines some of the challenges and issues of using WebCT™ to deliver courseware. Second it explores the implications of adding a wireless network to the pedagogical mix at ITM. This paper will also share the faculty experiences of a recent pilot, carried out by the school.

2. WebCT™ AS A TOOL IN DELIVERING COURSEWARE

In this rapidly changing society, educational institutions are hard pressed to meet the needs of faculty and students. Duderstadt (1999) emphasized this notion:

> As our society becomes even more dependent on new knowledge and educated people —on knowledge workers —this global knowledge business must be viewed clearly as one of the most active growth industries of our times. It is clear that no one, no government, will be in control of the higher education industry. It will respond to the forces of the marketplace. Perhaps the most serious obstacle results from the view that the university has been, and should be, a community of learners (p. 11).

Furthermore, the needs of these learners (consumers) are becoming increasingly demanding as their circumstances change. (Moe & Gay, 1997) suggest that the Internet provides an opportunity to develop and deliver courses and programmes that will attract

adult learners whose needs are not currently well served by postsecondary institutions. In response to these demands, the School of Information Technology Management at Ryerson launched its eBusiness course called "Concepts of eBusiness" in the fall of 1999. "[This] course introduces the students to the Internet and the specific applications of electronic commerce" (Ryerson Undergraduate Calendar 2002/2003, p.618). The program consists of a two-hour lecture session and a one-hour hands-on experiential lab component.

The characteristics of this eBusiness course provide an opportunity for the school to demonstrate the use of technology as a tool in delivering courseware. It must be noted, however, that;

> "Because of the shortage of qualified faculty to deliver the course and the high demand for the course … it was decided to use the following delivery approach:
> ➢ A large-scale 2 hour lecture in a fully equipped presentation classroom (to approximately 200 students in each lecture)
> ➢ An "experiential" Lab and Tutorial, run for 40 students at a time, in a fully equipped multi-media Computer Lab, supervised by a junior professor.
> ➢ All course readings for each week provided by downloads or clickthrough links delivered through WebCT™.
> ➢ All assignments and tests assigned and submitted through the Internet.
> ➢ Teaching assistants to handle the bulk of the marking of assignments.
>
> We recognized that this was a "high risk" strategy, delivering a new course to a large audience with a partially unproven tool (several of the features of the WebCT™ software used in the course were not in general use at Ryerson). However, the alternative was to dramatically reduce the number of students allowed into the class" (Cukier et. al, 2001).

The importance of a course delivery tool such as WebCT™ cannot be overlooked as we serve a techno-centric community. Essentially, the eBusiness program caters to the needs of the, "Internet generation", students and our business partners in the new "knowledge economy".

3. CURRICULUM CHALLENGES CONCERNING PEDAGOGY AT RYERSON UNIVERSITY

Adapting course content and delivery styles to the digital environment, to meet the needs of faculty and students, raised many issues and challenges. In the past decade, educational theorists have described how technology has transformed educational and training experiences (e.g., Eastmond & Ziegahn, 1995; Haughey & Anderson, 1998; Kearsley, 1996; Khan, 1997; Romiszowski, 1997). Technology has driven radical change in learning communities as traditional forms of teaching and learning are converted into Internet, or Web-based environments. Critics suggested that if universities do not open themselves to new ways of organizing activities and instruction, more flexible institutions would overtake them. Specifically, successful institutions will be characterized by responsive and relevant programs, and provide competencies at a cognitive, communicative and collaborative level. Furthermore, these progressive institutions would foster this learning at any time from any place (Peters, 2000). As Evans and Nation (2000) observed, "...to remain static in the changed and changing higher education circumstance is to court disaster or, at least, gradual decay" (p. 8). Of course, some faculty members at traditional universities have been ardent defenders of their culture and traditions. They asserted some barriers to change are significant and resist implementation of new technologies (Garrison & Anderson, 2000). For instance, some academics are reluctant to change teaching assignments and delivery methods. At the ITM school, the administration responded to faculty trepidation by providing top-down support in the form of financial assistance and workshops for course conversion. These initiatives enabled faculty to migrate their courses to the WebCT™ environment.

Another challenge in the teaching/learning process is the manner in which students interact with information technology. For example, at the ITM School, we observed an increasing lack of students' attendance and participation at in-class lectures for quasi-online courses. Experience has also shown that the publication of course material via the Internet contributes to decreasing attendance. This phenomenon can be attributed to many factors. One such factor stems from the fact that, students prefer to communicate via the Internet instead of engaging in face-to-face communication. On the one hand, this medium allows students to access information, interpret data and participate in discussions. According to Marguerite Jackson, Director of Education at the Toronto District Board of Education, "… students have to have more than just technical skills. They must be able to interpret and synthesize the information which computers can expose them to,

and communicate their ideas … in a coherent fashion." (Financial Post Magazine, D'98 pg N10-N11). On the other hand, Internet communication inhibits the students' ability to develop "soft skills" such as reading a speaker's body language during a discussion, or engaging in oral communication in the form of in-class debates. Therefore, to improve attendance and to support "soft skills" development, ITM incorporated discussion items into the examinable course material. In other words, students are rewarded for their participation in the value-added in-class discussions.

A further challenge stems from the fact that, access to the Internet also introduces intervening distractions, such as games, e-mail and chat lines that can undermine the effectiveness of a lecture session, if these are left unmanaged by the teacher. In this information driven era, students quickly develop the ability to multi-task. Thus, the teacher operating in a multi-media environment has to find innovative ways to manage the classroom situation without stifling creativity. Jones and Valdez, (1994), observe that:

> In order to have engaged learning, tasks need to be challenging, authentic, and multidisciplinary. Such tasks are typically complex and involve sustained amounts of time. They are authentic in that they correspond to the tasks in the home and workplaces of today and tomorrow. Collaboration around authentic tasks often takes place with peers and mentors within school as well as with family members and others in the real world outside of school. These tasks often require integrated instruction that incorporates problem-based learning and curriculum by project.

According to the Financial Post Magazine, D'98 pg N10-N11, one of the biggest changes which media like the Internet have wrought is that they have made much more information available to young people, which in turn makes it far easier for students to explore the world around them and investigate subjects in which they have an interest. As a result, the traditional model of education in which teachers act as transmitters of information and all students are required to follow a standardized, one-size-fits-all curriculum is rapidly becoming obsolete. Students are expecting interactive modes of learning and evaluation. For instance, Professor

Dwight Leonard, one of my colleagues, introduced an activity called "Who wants to be an IT Professional" as an interactive activity in one of his courses. Ideally, this approach introduces competitiveness into the classroom and encourages the students to participate and learn in a familiar environment. It also blends the students' need for entertainment with their need for learning and reinforcement. Table 1 summarizes some of the issues and possible solutions identified by faculty.

Table 1 WebCT™ issues and possible solutions

WebCT™ Issues	Possible Solutions
Communicating with individual students using email is very time-consuming	Bring interesting email questions to the lecture and provide the answer to the entire class. Or use WEBCT™ to mass email the solution to students.
Many professors are not comfortable policing students to pay attention.	Use the "Lids down" ultimatum, meaning all computers are to be closed during lecture time.
Professors who publish a summary of a lecture on the web find that attendance is lower than usual.	Present the students with a skeleton set of topics on the web and build around the skeleton in the lecture
Due to email and Internet distraction, the class is often divided into 2 groups, those that pay attention and learn, and those that do not pay attention.	Technically it is not easy to have a switch in a classroom that will turn the Internet and email off and on. Such a switch is being researched.

4. CONTENT CURRENCY AND PREPARATION TIME

Essentially, programs, such as the eBusiness course that utilize a variety of online resources, require faculty to invest an enormous amount of time in order to maintain content currency. According to Montelpare & Williams (2000), the amount and growth of available information through the Internet is staggering; and as individuals become more involved with the uses of the Internet as a tool for research and presentation, they quickly realize the volume of data that are so easily accessible. The usefulness of this information depends on the accuracy of website content. Therefore, setting up a web-enabled course, on a platform such as WebCT™, requires time and effort to verify the appropriateness of content and the validity of the links to web-based resources.

Faculty constantly monitor these web-based resources and links and make updates to the course content accordingly. Occasionally, students discover broken links and they notify faculty of the situation via WebCT™ email utility. Students also participate in maintaining content currency by utilizing search techniques, introduced in class, to find a dislocated web-based resource. The new location of the resource is posted on the bulletin board. These efforts help to keep track of web-based resources and assist faculty in maintaining content currency.

5.   COLLABORATIVE WORK

The success of the wireless teaching/learning environment requires collaborative work from all stakeholders. These input range from course content preparation and testing to network support. The strategy of involving communities in the technology implementation and educational goals of the school helps improve student learning and motivation. According to the Panel on Educational Technology (1997):

> "There is also a growing consensus that technology should be applied in such a way as to foster broader [community-wide] involvement in the educational process. The linking of elementary and secondary schools with research universities, public libraries, and private companies, for example, could make valuable educational resources available to both students and teachers while simultaneously building awareness within each community of the needs of its local schools. 'Real-world' projects initiated by outside organizations often generate considerable enthusiasm among students and frequently prove effective from an educational perspective."

Many businesses develop specialized software tools that are available on a trial basis on the Internet. These tools provide an opportunity for students to acquire real-world experience within the relative safety of the teaching/learning environment. For instance, in the eBusiness course, students use a commercial software to build an eStore. This exercise allows the students to experience some of the difficulties and challenges that businesses face when setting-up a virtual store. Consequently, the constructive feedback from faculty and students will assist the business community in

improving their products. But, the search for an appropriate software tool that is capable of simulating the right environment for this activity is still on going.

6.   THE WIRELESS NETWORK AND ITS ISSUES

In the fall of 2001, the lab component for the eBusiness course was performed in a wireless environment using laptop computers. Currently, this lab serves as a pilot for the implementation of a proposed distributed learning facility within the ITM School. When fully implemented, the wireless capabilities of the network will provide increased mobility and campus-wide access for students and faculty. Research has shown that developing a technology-enabled teaching/learning environment introduces curriculum challenges into the organization. Relan and Gillani (1997) indicate that traditional instruction has been implicated as a major cause of a "dysfunctional and even an obsolete [educational system]" (p.41). C.J. MacDonald et al. (2001) quotes Drucker (1997) as suggesting that antiquated processes …and fixed class meeting places and times all indicate that institutions are not responding to the needs of their clients, nor are they taking advantage of universally available access to communication technologies. However, some educational institutions are making a paradigm shift from a teacher-centred learning environment to a student-centred learning environment. For example, Humber College in Canada and Wake Forest in the United States have responded to this need by implementing a "distributed learning environment" using laptop computers. The implementation of technology in the classroom also requires significant faculty support and a responsive technical team. Consequently, ITM faculty members were invited to volunteer to teach sections of their Winter 2002 courses in the wireless lab environment.

To achieve equity, David (1994) notes that technology must be readily accessible to educators as well as students:

> "Access to technology requires that it be readily at hand for use as needed, not simply for uses that can be predicted in advance and squeezed into a fixed time slot. For example, teachers are far more likely to use video instruction when the choice and timing are under their control. Similarly, teachers and administrators are less likely to use telecommunication networks when they must go to a remote location to do so. Nor can

students exploit the power of word processing if they must wait for their daily or weekly scheduled time in a lab. The technology must be readily accessible for use when it is needed."

Ryerson University's wireless pilot project addresses the above challenges by adding mobility to the teaching/learning mix. The network involves the use of strategically placed access points (network connection devices) that provide students and faculty with seamless connection to the school's network. Although the wireless environment provides ease of access and ubiquity, it also generates some concerns for the students and the faculty. On the one hand, students complain about the deteriorating network performance as increasing numbers of users login to the system. This situation becomes a source of anxiety for the students during tests and examinations. On the other hand, faculty are concerned about the potential security breaches to which the wireless technology is predisposed. Clearly, the wireless technology's convenience of access and ubiquity impose a degree of trade-offs and risks on all stakeholders. The question, therefore, arises; are these trade-offs and risks too high a price to pay for convenience? Table 2 summarizes some of the issues and possible solutions attributed to the network.

Table 2 Wireless Network issues and solutions

Wireless Network Issues	Possible Solutions
Slow network response time as the volume of users increases	Install more access points across campus
Many professors are not comfortable policing students to pay attention.	Use the "Lids down" ultimatum, meaning all computers are to be closed during lecture time.
Security concerns administering tests/examination on the network. For example, how can we avoid cheating?	Students can be accommodated in a test center that is provisioned with adequate power supply.

7. CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

This paper presented some of the issues and challenges that the ITM faculty experienced as we combined web-based content delivery and mobile computing. The addition of wireless laptop computers to the teaching/learning environment allows students and faculty freedom of movement and ensures seamless network connection. This increase mobility and web-based delivery capability require a different faculty mind-set. In addition to modifying their content delivery style, faculty needs to shift from a "central controller" role to a "student facilitator" role.

The proliferation of technology in education is dramatically changing the landscape of the teaching/learning environment. Teachers are required (or in some cases forced) to integrate the use of technology to develop and deliver content. Simultaneously, students are demanding more web-enabled programs. In addition, the business community expects university graduates to enter the workforce with the necessary mobile computing skills and competencies that will allow them to be productive in the marketplace. Moreover, educational institutions face a myriad of pedagogical and technological challenges as they respond to the increasing demands of an information-based society that is powered by technology. This semester (fall 2002), ITM enrolled the first group of 434 students into the wireless laptop program. The development of data collection instruments to assist in evaluating the effectiveness of the program will be the next step towards extending this research.

8. ACKNOWLEDGEMENTS

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