

DEALING WITH THE CHANGING TECHNOLOGY OF DISTANCE EDUCATION

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Abstract

The purpose of this paper is to describe the problems encountered in changing from one generation of Information and Communications Technology to the next from the points of view of the administration, the professors and the students involved in the distance education programmes at the Royal Military College of Canada (RMC). RMC is a small university that operates distance education programmes for students located across Canada and at various locations worldwide.

Introduction

Moore's law (Moore, 1965), which was first promulgated by one of the founders of Intel, has been interpreted as indicating that the processing power of computers will double every eighteen months. For the past 40 years this has been essentially correct. More powerful computers have lead to more capable software. Perhaps nowhere has this been more evident than in the field of distance education.

At RMC, our initial distance education programme consisted of onsite courses at distant locations and paper-based courses delivered to individual students off-site (Dececchi & Dececchi, 2007). Then, we made the switch to teleconferencing, and finally to web-based education having chosen to make use of the Learning Management System (LMS) Web-CT. However, technology has been improving, and we are now faced with the decision of how to switch from our outdated, but simple version of Web-CT to one of the newer, more sophisticated and more complex Learning Management Systems. We are estimating the costs, and monitoring the problems and benefits associated with the transfer, of four courses currently offered (bilingually) on DND Learn. We are also in the process of redeveloping two very complex courses on DND Learn in order to better understand the differences between our current LMS and DND Learn. DND Learn

is the implementation of Desire 2 Learn (D2L), the LMS that has been adopted by the Department of National Defence, and which will be implemented as the LMS at RMC.

At RMC, within this climate of change, we are experimenting with new ways of providing reading materials within the courses. Previously, we used standard texts, and additional materials such as in-house developed readers and/or Subject Matter Expert (SME) developed course notes. The course notes contained material, which supplemented the text, or in the case of graduate courses were used in conjunction with the course readers as replacements for course texts. The course readers contained copies of articles or chapters of books related to the course content. We are investigating other ways of providing these additional materials to the students and currently are considering three ways of providing readers. The first is to work with firms that supply electronic access to large numbers of journals, creating the electronic equivalent of the paper-based readers. This is flexible, but expensive. The second is to make use of the extensive materials provided on the web sites associated with many of the textbooks. This is much cheaper, but less flexible. The final method is to provide students with electronic reading lists, and electronic access to the RMC library, teaching them how to do library based research. We are in the process of evaluating different implementations of these ideas, and will report on this work.

Changing Distance Education Delivery at RMC

In 2001, Marc Prensky coined the terms Digital Native and Digital Immigrant to describe the difference between students and professors when it came to studying, learning and living in a digital world (Prensky, 2001). Digital Natives were those who have lived their whole lives under the influence of modern Information Technology, including the Internet and the PC. For most of their lives cell phones and the web have allowed for instantaneous and asynchronous communications. Prensky argues that the students today have changed not incrementally from previous students, but that a true discontinuity has occurred between previous generations and this one. He is not the only researcher who argues that students today are significantly different than students of previous generations. Dzubian et al. (2005) also talk about the New Learner suggesting that there is a fundamental difference in the way that they approach both knowledge acquisition and problem solving, as well as how they approach moving into the world of work. They argue that the first generation to grow up completely in a PC enhanced world has now reached colleges, universities and graduate schools. They use technology effortlessly, and have little patience with rules and regulations designed for ease of administration, after all, one of the most critical strategic uses of IS/IT over the past 20 years has been to allow organizations to provide customized products/

services to clients, for the price of off the shelf. These Digital Natives expect this customization in their education as well — “I’m piecing together a program from four departments” (Dzubian, Moskal, & Hartman, 2005, p. 4), is not an uncommon refrain today.

The familiarity, or expectation of computer use in education has meant that many if not most university courses today are offered in some type of blended fashion, e.g., they are offered as a classroom course with materials posted on the Web, or as a classroom course with web-based activities, or as a course with both classroom sessions and web-based discussion forums. It also means that many students now expect advanced communications tools to be used in post secondary education. As Davison says:

Communication is a fundamental part of learning. As instructors, we communicate with each other, as well as with our students, who also interact with us and each other. Indeed, we can go further and assert that communication is a fundamental aspect of the human experience. It is not surprising therefore that a wide variety of IT-based Communication tools have been developed, and that many of these have found application in the context of learning. (2007, p.1)

Yet with all of the technology, it is important to focus on the pedagogy and instructional design, which are correlated with student learning, rather than the technology which is not. However, technology may enhance or degrade teaching effectiveness (Kilgore, 2004).

Problems such as academic misconduct are also related both to the digital native/digital immigrant debate, and the changes that technology has brought to our lives. Many researchers have noted that one of the underlying problems that face academic administrations today is academic misconduct. Students and faculty disagree as to what constitutes misconduct. An interesting example of this was a case of a student accused of academic misconduct at Ryerson University in Toronto Ontario (CBC News, 2008). This student ran a Facebook website where students were encouraged to post solutions to assignments in a particular first year course. From the administrations point of view this was problematic, since the instructor had specifically told students that they were to submit their own work, as the assignments were being graded. This case generated a great deal of discussion both in the media, and in other university classrooms. From the students’ point of view, Facebook, a social networking site, was like meeting in the cafeteria to work on assignments in a group. As long as you didn’t copy, it was okay. They felt that this was a problem of the “older generation” not understanding how “everyone” used technology today, rather than a problem with rules being deliberately broken.

Adult students are most often Digital Immigrants, or non millennium students in contrast to the younger students, that is the traditional student cadre who are primarily Digital Natives. In addition to the different ways that they view and make use of technology, the adult learner is, with self-reflection, able to identify not only who they really are, but who they wish to become (Tennant, 2000). The adult learner has passed through a series of developmental stages (Erickson, 1959; Gilligan, 1982; Havinghurst, 1970; Mackeracher, 1996) to reach the stage at which they are capable of forms of thinking and reasoning which are qualitatively different from adolescents (Brundage & Mackeracher, 1980; Knowles, 1980; Mackeracher, 1996).

Therefore adult learners' philosophical beliefs greatly influence the direction of the adult education programmes and therefore the educational experiences of the adult learners (Blodgett-McDeavitt, 1995; Darkenwald & Merrimam, 1982). That is to say they will influence both the collaborative learning that can take place and the situated cognition (Davis & Watkins, 2000). Mackeracher (1996) outlines the learning and facilitating practices that promote adult learner success. These principles include a non-threatening culture that promotes self-reflecting two-way communication. Adult students therefore are less likely to ignore the rules, or invent their own, and much more likely to work as a team with both other students, and with their teachers. Similarly they are much more likely to share similar views with the academic staff regarding the use of technology, as well as regarding what is appropriate academic behaviour.

RMC — Moving to All Electronic Learning Resources

At RMC, like many other institutions, we deliver courses to both onsite and online students. The majority of our onsite undergraduate students are under 24 years of age, and these students are Digital Natives, or members of the millennium generation. The majority of our online and graduate students are Digital Immigrants, as are all of the faculty, and most of the support staff. Like most other universities we are implementing multiple types of blended learning initiatives. For example, many of our undergraduate courses offered onsite are web-assisted, in that professors make use of the either our LMS or the RMC Intranet, or the Internet in their courses. The way that professors make use of these resources can vary with professors, who can do any or all of the following:

- expect students to make use of the Internet or other online resources for research,
- use the RMC Intranet or the RMC LMS as a repository for course information, course notes and overheads,

- use the LMS as a means of giving students a secure means of submitting assignments, and returning assignments to students,
- run additional discussion forums asynchronously.

On the other side of the fence, we offer distance courses online, and at times offer two sections of the same course in a “blended fashion” with some students taking the course online and other students taking the course onsite. Finally we have graduate programmes that are offered either onsite, or online, or both.

As a small university we need to develop standards for programme development and delivery and cannot afford to invest in multiple Learning Management Systems (LMS) or communications technologies. Nor can we afford to custom design individual courses, or develop our own LMS. We need to find a way of meeting the needs of both Digital Native and Digital Immigrant students, while ensuring that Digital Immigrant instructors make the best use of the technology in enhancing rather the learning experiences that they provide to all of the students.

Recently we have experimented with ways to improve student access to electronic course materials. In the past the majority of our graduate and undergraduate courses were developed in a traditional distance education manner, with a subject matter expert (SME) creating the course materials with the aid of an instructional designer (ID). For many courses this involved the creation of a course reader. The reader consisted of articles from refereed journals, textbooks and the popular press. Preparation of the reader involved: making copies of these materials; getting copyright permission to make use of them; assembling the materials into a reader; creating a proper index with sources where the articles came from; getting the reader printed; and then distributing the reader to students for a fee. This was a time consuming and expensive process particularly for courses where the material became dated quickly. For some of these readers the cost, because of the small numbers of students taking these courses, and the high cost of copyright was as high as \$200. This included neither the cost of the time spent by the SME in assembling the material nor the cost of the time spent by the ID in obtaining copyright permission. From an institutional perspective the costs involved meant that the readers could not be updated more than once every three to four serials of the course. From the students perspective this meant that the material was often dated, expensive, and being physical or paper-based, difficult to transport. The transportation of physical readers created problems for the Division of Continuing Studies as well as the distance students at RMC. Our student base at RMC consists primarily of Canadian Service personnel, and civilian members of the Department of National Defence. These military members can be stationed anywhere in Canada, or in a number of hard to get to foreign countries, or operational military theatres. Therefore shipping readers in a timely fashion to many of these locations is more complex than phoning Purolator or FedEx.

We have tried three types of electronic readers and have found problems with all of them. Similar to the issues described in usability testing by Barnum (2008), it is often impossible for developers to determine the usability of courseware, or features of online education until students are actually given them. We believe that this has to do with the differences in how different students relate to the material, meaning that while some students may not find problems with particular adaptations, others will find them particularly problematic. In two graduate courses this year we attempted what we thought was a simple fix to the student reader problem. Instead of providing the students with a physical reader, the student was provided with an index listing of the articles for each segment of the course. Since the students had access through a Virtual Private Network (VPN) to the library e-journals, this allowed them to access the articles one by one.

This system significantly reduced the cost of the reader, since there was no longer a need to make physical copies of each article, which was one of the more time consuming steps in the reader production process, nor was there a need to obtain copyright permissions for each article (and there could be as many as 150 articles in the reader) since the students were accessing the journals as e-journals online. The simplicity also meant that the work involved in updating the reader would be minimal for the professor teaching the course so that they could be expected to do this as part of their preparation each year reducing the need to find an SME to create a reader for a course for the next few years. Updating would now involve the professor going over the list of articles, and if any appeared dated finding new articles to replace these older articles in the e-journals that were available in the library, and inserting the proper citation for the new article in the list, while deleting the dated citation.

The new system reduced the cost for the students to essentially zero, and it allowed them to have electronic access to the articles, which reduced the amount of paper that they needed to carry around, which was perceived to be very important for part time graduate students who often worked on the course from a variety of locations, both at home and abroad.

However, the students found the electronic readers to be very cumbersome for a variety of reasons. Our older graduate students were mainly true Digital Immigrants (Prensky, 2001) and often created paper copies of the online materials, finding it easier to read and “mark up” paper documents. This meant that it took them up to an hour a week, depending on the number of articles, and the speed of their printer to find and then to create the copies, before they had even begun to read them. This was assuming that they had access to a high speed Internet connection. In many remote locations in Canada, or in operational theatres where our students are often posted, access to the Internet is either slow or limited, which further increased access and document creation time. In addition since they were

mostly working professionals, and many of them were “sponsored students” who could get all or part of their course related costs reimbursed by their employers, they would have preferred to have bought a reader rather than having to download the articles, which they felt was taking too much time for “non productive” purposes. A final problem was that the online library at RMC was not easy to access, that is the process was non intuitive, and members of the support staff were not always available when the students were working. When taken together these problems lead to significant student discomfort with the readers.

Our younger students found other problems with this concept. Most of these students were quite comfortable with searching for information on the “web” and reading and working online. However, because of the interface chosen by our Computing Services department, students couldn’t link to online articles directly from the “electronic reader.” Students had to go to the library site, and enter the e-journal section (which required a number of steps for off campus students, including signing on to a secure “Portal”). Students could then search the e-journals for each article, one at a time. These Digital Natives, who were used to Google or Yahoo, found this process to be awkward. They had difficulty understanding why this process was so convoluted and rebelled against it.

Compounding the problems faced by both groups were the differences in how various browsers interacted with the LMS (as mentioned previously we are using an old version of WebCT) and how the military’s Defence Wide Area Network (DWAN) supported Internet browsing. Mozilla and Netscape allowed users to access and download the reader pages from each topic section as Word documents. This made many other operations simple. Internet Explorer users found that the Word documents were presented as HTML, which was not as simple to work with. Military members who were taking the course as a professional development activity found that many of the file types could not be accessed from the DWAN as the internal firewall judged them to be potential security threats. This meant that professors teaching either of the two courses with electronic readers, who were on the Internet, not the DWAN had difficulty in providing support to the students, and often could only tell them to contact the WebCT support staff, or their local DWAN support staff. This was problematic, because it delayed the discussion forums, and interrupted the flow of the classes, putting these particular students at a disadvantage.

These problems have to do with the usability and the perceived usability of the changed format. Saade et al. (2007) state that when discussing system success, one should use similar metrics to those used in the IS literature, since often it is difficult to measure systems success directly. This has been a relatively well known phenomena in IS research, with several authors commenting on the problems associated with measuring success using outcomes in complex situations

(Ives, Olsen, & Baroudi, 1983; Lucas, 1986). If we put in place a LMS and associated tools that the students find difficult to use, they may still “succeed” or pass the course by working harder. This would only be because the objective of passing the course is of significant value to them and the most common alternative for adult students, voting with their feet and leaving (Knowles, 1980), has too high a cost. This, however, does not mean that the implementation of this new “support system” is a success. We have created an institutional barrier to education (Cross, 1981), which reduces the probability of student success. In addition, this barrier may lower the number of future applications to the programme, particularly if the programme is dependent upon “word of mouth” advertising from current or past students.

Saade et al. (2007) have made use of a model taken from IS research, a technology acceptance model (Davis, 1989). Although this is a relatively old model, the issues that it raises with respect to the implementation of technology, or the forced use of technology are still of concern. In this model the influence of other variables on technology acceptance is mediated by two individual beliefs — perceived ease of use (PEU), and perceived usefulness (PU). That is to say that the actual use of the system (given that we have a discretionary user) is determined by the users’ behavioral intentions to use the system. This intention is in turn a function of the users’ attitudes towards using the system and the perceived usefulness of the system. If a discretionary user makes little use of the system, then the system cannot be said to be a success. But if a non-discretionary user is forced to use a system that they find either difficult to use, or of little use for what they see as reaching their goals (usefulness), then they will not view the system as successful. In our case of IS for educational support this means that if either:

- (1) the users feel forced to use the system because it is the only way that they can access information, or
- (2) the users feel it necessary to find other ways to access as much of the information as possible because of the difficulty of using the system and therefore don’t use the system

then the students will have found the implementation of the new system to be unsuccessful. Since our students found that they were forced to use the IT interfaces to access the material for the course, and they found the interface difficult or at least awkward to use, the PEU would act to lower the acceptance of the IS we were using to provide the educational experience. In addition, since they found that the previous system had provided them access to the same materials, they found little utility in the new arrangement, which again led to a decrease in their willingness to accept the information technology we were using to provide the educational experience.

Lessons Learned

Most Western militaries have adopted a practice of taking “Lessons Learned” from both wartime experiences and other operations and exercises. A “Lessons Learned Center” exists in Kingston for the Canadian Forces, as they attempt to codify and store the knowledge of those senior officers who have had these experiences. RMC is trying to do the same type of exercises as it grows its distance education programme. Since the RMC graduate programme features small classes and a high level of professor accessibility, the technology was seen as a barrier to the educational experience rather than an enhancer of that experience. Neither Digital Natives nor Digital Immigrants found this technology to be easy to use, nor did they find it to be an improvement over the paper-based readers. Students complained to both the professors and to the Department of Continuing Studies, and received little satisfaction.

However, economically the RMC Division of Continuing Studies needs to make use of some form of electronic readers; therefore we had no choice in implementing this new technology — electronic readers. But the trial shows that our initial implementation was a disturbing failure. The technology or new system, that is the type of electronic reader that we implemented, was perceived as difficult to use by many of the students and at least one of the two professors involved in the trial. Pedagogically these electronic readers were a major impediment to student learning at the graduate level. They required significantly more work by the students, and the students did not perceive any significant advantages to using the new technology, or advantages that would make the extra work worthwhile.

In the future to ensure the success of this use of the e-library students will require more support and instruction than had been provided by DCS for the trial courses. This should include providing instruction on: how to use the e-library; e-library access methods for distance students; and how to use the electronic readers in a particular course. In addition, a better, more user-friendly interface to the e-library needs to be designed. Professors will need to have a better understanding of the potential problems when making use of e-readers, so that they can be in touch with their students and guide them to the resources that exist to help them with their particular problems as they occur.

RMC is in the process of transitioning to a new LMS, as their old LMS is no longer supported. One hopes that the interface between e-learning materials and whichever new LMS is chosen will be less cumbersome and will make the use of electronic resources as an enhancement to the learning process.

References

- Barnum, C. (2008, February 8). Best practices: What do you mean when you say "usability"? *eLearn Magazine*. Retrieved April 15, 2008, from http://www.elearnmag.org/subpage.cfm?section=best_practices&article=43-1
- Blodgett-McDermitt, C. (1995). A profile of critical thinking, problem solving and learning to learn among adult and continuing education administrators. *Proceedings of the 1995 American Association for Adult and Continuing Education Conference*, Kansas City, Missouri.
- Brundage, D., & Mackeracher, D. (1980). *Adult learning principles and their application to program planning*. Toronto: Ministry of Education.
- CBC News. (2008). *Student accused of cheating on Facebook appears before expulsion hearing*. Retrieved April 15, 2008, from <http://www.cbc.ca/technology/story/2008/03/11/facebook-cheating.html>
- Cross, K. (1981). *Adults as learners*. San Francisco: Jossey Bass.
- Darkenwald, G., & Merriam, S. (1982). *Adult education. Foundations of practice*. New York: Harper and Row.
- Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- Davis, M., Milton, J., & Watkins, K. (2000). Virtual learning communities: Creating meaning through dialogue and inquiry in cyberspace. *Proceedings of Technology in Teaching and Learning in Higher Education*, Samos Island: National Louis University.
- Davison, R. (2008). Learning through blogging: Graduate student experiences. *eLearn Magazine*. Retrieved April 15, 2008, from http://www.elearnmag.org/subpage.cfm?section=best_practices&article=44-1
- Dececchi, T., & Dececchi, B. (2007). From face to face and paper through continuous enrolment, distance education at RMC. In K. Fernstrom (Ed.), *Proceedings of the ICICTE 2007*. Abbotsford, BC: UCFV Press.
- Dziuban, C., Moskal, P., & Hartman J. (2005). Higher education, blended learning, and the generations: Knowledge is power: No more. In J. R. Bourne, & J. C. Moore (Eds.), *Elements of quality online education: Engaging communities*. Needham: Sloan-C. Retrieved April 15, 2008, from <http://tlc.ucalgary.ca/documents/chuck.doc>
- Gilligan, C. (1982). *In a different voice*. Cambridge: Harvard University Press.
- Ives, B., Olson, M., & Baroudi, J. (1983). The measurement of user information satisfaction. *Communications of the ACM*, 26(10), 785–793.
- Lucas, H. (1986). *Information systems concepts for management*. New York: McGraw-Hill.
- Kilgore, D. (2004). The medium is the message: Online technology and knowledge construction in adult graduate education. *Adult Learning*, 15(3/4), 12–15.

- Knowles, M. (1980). *The modern practice of adult education from pedagogy to andragogy*. New York: Cambridge Press.
- Mackeracher, D. (1996). *Making sense of adult learning*. Toronto: Culture Concepts.
- Moore, G., (1965). Cramming more components onto integrated circuits. *Electronics*, 38(8). Retrieved May 12, 2008, from http://www.intel.com/museum/archives/history_docs/mooreslaw.htm
- Prensky, M. (2001). On the horizon. *NCB University Press*, 9(5), 1–6.
- Saade, R., Nebebe, F., & Tan, W. (2007). Viability of the “Technology Acceptance Model” in multimedia learning environments: A comparative study. *Interdisciplinary Journal of Knowledge and Learning Objects*, 3, 175–184.
- Tennant, M. (2000). Adult learning and self work. *Proceedings of AERC 2000*, Montreal: University of British Columbia Press. Retrieved April 14, 2008, from <http://www.edst.educ.ubc.ca/aerc/2000/tennantm1-final.PDF>