Educational Technology: Enhancing Port Training

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Proceedings, 17th International Port Training Conference, Hamburg, Germany, June 2003

Introduction

Continued improvements in educational technologies through such media as CD-ROM and the Internet enhance student learning both within the classroom in a face-to-face mode and at a distance. Within the classroom, improvements in the campus Local Area Network (LAN) such as fibre optic connections and broad band width linkages to the Internet enable instructors to access a wide range of material in support of their lectures. At a distance, students are faced with the difficulties of accessing personal computers that link to the Internet through the World Wide Web (WWW). In many developing countries, finding suitable computer access with appropriate bandwidth and updated software may be problematic for distance education students. This paper will consider the major elements involved in developing and using enhanced educational technologies for port training, both in the classroom and at a distance. Specific examples of educational technology use will be cited in the paper.

In this new millennium, students in developed countries have ready access to a wide range of educational technology. They can access libraries around the globe; download papers, articles, reports, databases and other relevant information; prepare comprehensive analyses and reports based on a wealth of information and materials that were not dreamed of a few decades ago. Most universities and many colleges are connected to a broad-band width fibre network enabling students and their instructors to access and download video and other graphic material to improve understanding of complex issues. The same cannot be said for students in poorer, developing countries. Access is not universal. Their connection to the Internet may be limited to a twisted pair of telephone lines providing narrow bandwidth and slow speeds in obtaining information - assuming, of course, that students can even access a computer capable of downloading the educational materials being distributed over the Internet.

During the last decade, the use of the Internet has proliferated as a user-friendly means of accessing and interacting with others in a global electronic communications system. The explosive development of the Internet can be traced to two factors: the exponential growth of the WWW as common communications tool and the rapid increase in the number of low cost PCs as a common office and, in many cases, household item. The WWW was conceived as a user-friendly, effective navigational user interface to allow PC users to search for and access material on the Internet. The WWW communications protocol is http (Hyper Text Transfer Protocol) that links data objects (text and graphics) through a web of "pages." Http complemented new Internet browser software that was made available through common operating systems such as Microsoft's "Windows" and Apple Macintosh. The WWW tool was quickly adopted by the growing Internet community and led to increasing numbers of non-technical users accessing the Internet. The explosive growth of the Internet and the use of the www led to a demand for increased bandwidth (expanding the size of the "electronic pipe" connected to the personal

computer) coupled with more powerful computers to enable users to move beyond limited text based materials to more elaborate graphics, pictures, interactive video and video streaming. The Internet's ability to convey increasingly sophisticated material on-line to individual users worldwide has opened a new era for the development and use of web-based material for classroom use and for student learning at a distance.[1]

Continually improved educational technologies can be used in face-to-face delivery in a classroom setting to improve the traditional, linear, "push-based" learning process. The increased use of suitable graphics, simulations, videos, and other technological enhancements aid in reinforcing the students' learning process. In distance education, the traditional "talking head" mode of classroom delivery can be challenging. In the classroom, the instructor can rapidly shift direction or repeat materials in various ways if they notice that students' are not getting the full message. A good instructor is very sensitive to the students' body language and unconsciously repeats or modifies the message to ensure the learning process is maximized. The same process of sensing body language cues are not available in a distance delivery mode. Even with interactive video, where the instructor can see the students in a remote location on a video monitor or screen, these subtle cues are not necessarily noted. In the classroom, a dynamic instructor can hold the student's attention by varying the message as body language cues dictate. In a distance education setting, students must be highly motivated to continue to practice "active listening" to ensure they receive the full message. These many difficulties in distance delivery of educational material means a different pedagogical approach is needed. One where the students have more say over the type and process of educational materials being provided. In other words, education at a distance needs to be more "pull-based" where the students can readily access the information they need when they need it rather than awaiting for the information to emanate from a distant instructor.

When we add distance delivery by electronic means for students in an international setting, more pitfalls emerge. Sensitivity and care is needed to ensure the material does not inadvertently insult the students in many and various cultures. Humour, which may be acceptable in one setting may not be received well in another. The educational material itself may reflect an ethnocentric bias in that it inadvertently professes the superiority of certain national or community approaches over others. In developing and providing port training materials in a global setting, care must be taken to ensure it is appropriately culturally sensitive.

Lessons from Linear Learning

The traditional learning process, exemplified in classroom delivery, is a linear process. One that depends on the development of a stringed narrative to develop the students' understanding of the subject material and their thought process. The linear method is well entrenched in the learning process. In mediaeval monasteries (the forerunners of the modern university), monks who were

literate read lessons to their students from rare, hand-written books. Students gained knowledge from listening to the monk expound on the written material. This traditional process is reflected in many modern classrooms, although as a result of the revolution in automated print, written source material is readily available for student use. Many educationalists and others involved in the development of educational technologies argue that the development of the Internet and the WWW is as revolutionary in the learning process as was the printing of the first Gutenberg bible.

The printed text implied a linear learning process. In a similar fashion as this paper, the arguments are developed and lessons offered in a written format follow a strict linear process, moving from one page to the next. We have all learned in this fashion - a set of sequential discrete steps in the learning process. Students are familiar with the narrative, story-telling process. They use it when watching television and films, reading books, and accessing one-way communication devices.[2]

Providing lesson material in a linear fashion is referred to as a "push" method - one in which the instructor "pushes" information and material to the student in a logical, step-by-step fashion. Students learn early in their education that learning material will be provided to them as they need it by their instructor. The obvious advantage to linear learning is the logical sequence in the providing lesson material from start to finish. Lessons tend to be divided into distinct modules, each one building on the other. The linear learning method is typically most comfortable for instructors - it leaves them in control of the various elements in the learning process. A process that reinforces the traditional "power-relationship" between instructor and student.

The obvious disadvantage to the linear learning process is that not all students fit the mould of being a logical thinker. Many have found other, less linear, methods of gaining knowledge to be more suitable to their personal learning needs.

Linear thinking often leads to a more restrictive thought process - one that is fine in a rule-bound world. However, linearity can curb creativity, as unique "out of the box" ideas and concepts often emerge from looking at the world in very different and non-linear ways. For example, the engineering profession tends to focus on linear thinking as a logical means of conveying needed information to students. This same linearity in the educational process and latent inherent conservatism in engineering programs often limits student creativity.[3] So much so that recent changes to the Canadian accreditation process for university engineering curricula requires an additional creative design element in the learning program.

Linear education has its place, particularly in classroom delivery. Students and instructors are familiar with and often expect this form of learning. On the other hand, such delivery by electronic means at a distance is tedious and often inappropriate as it does not tap the enormous potential of emerging educational technologies to allow students to readily explore other means of gaining knowledge.

Lessons from Non-Linear Learning

A typical non-linear educational model is "problem-based learning" - a process whereby a group of students simulate the "real world" by being tasked to solve a complex problem. They must identify what the real problem is, and then seek resources such as information and knowledge to enable them to develop alternative solutions, test them, and then implement the best approach. The problem-based learning model typically involves small groups of students who tackle the stated problem by considering all the issues, concepts, theories and principles related to it. "Students also spend time outside the small group setting and this work facilitates the development of skills such as literature search and retrieval, critical appraisal of available information and the seeking of opinions of peers, specialists and even the general community."[4] By finding their own way through a mass of information and data to isolate relevant material and apply it to the solution of the complex problem students are encourage to become self-managers and gain responsibility for their own learning.

Today's educational technologies lend themselves to problem-based learning and other non-linear methods of encouraging creative solutions to real-world problems. Non-linear learning processes reflect "pull-based learning." A process whereby students learn on their own to access discrete information that does not necessarily appear on a page-by-page basis in their course textbook. Links to other sites on the Internet enable students to explore, in-depth, specific aspects of the subject that particularly interests them. In the "pull" mode, students determine for themselves when, where and what to learn. In a non-linear process, students are encouraged to "surf" the WWW to obtain the information and knowledge they need. In this personal exploratory adventure, a considerable amount of incidental learning emerges.

Tools of Non-Linear Learning:

Non-linear learning tools include: simulations, programmed instruction, and cooperative learning. Effective simulations are only possible due to the immense computing power of today's electronic systems. "A simulation is an abstraction or simplification of some real-life situation or process."[5] We have all heard of, seen or been trained on ship bridge simulators. These complex devices are used to train marine officers in ship-handling as well as manoeuvring procedures. By working through a simulated problem in real time, students learn the basics of ship handling without jeopardizing or tying up an expensive vessel. The advantages of simulation as a non-linear learning process is that it provides a realistic, safe and simplified method of conveying critical information to students by allowing them to learn from simulated "hand-on" experience. It is an effective process of learning by doing. Despite their benefits, simulation systems are expensive and complex, often requiring dedicated technical staff to operate and maintain the underlying computing technology. There is also an inherent danger of "over-simplifying" the

simulation experience. Further, simulations can lead to imperfect understanding of the complex problem being tackled. For example, dissecting a real frog in a biology laboratory is not at all the same as "virtually" dissecting a frog through the use of a CD-ROM. Electronic multi-media processes typically incorporate images, text and sounds. Such stimuli are less rich than a real-life encounter with a frog dissection or other simulated event that involves touch, taste and smell.[6] This lack of some of the more sensitive aspects of the human condition reduces, but does not eliminate the use of simulations as a suitable tool for solving complex problems in a non-linear fashion.

Programmed learning involves a process where students spend much of their time performing the skills they are seeking to learn, with some reinforcement for success. Hence rather than sitting and listening in the traditional approach, programmed learning involves learning by doing.[7] Programmed learning is best exemplified by the self-taught process incorporated in the first Improving Port Performance module (IPP1), "Management of General Cargo Operations." In this popular UNCTAD course, students work through a series of lessons, view slides to reinforce the written text, interact with local facilitators, and respond to self-help quizzes that reinforce the lesson material. Programmed learning has several advantages for students. They progress at their own pace, they practice the skills they are learning, and they receive rapid feedback on their progress through the use of helpful quizzes. Although self-learning by doing is effective, it does have limitations: for some students working their way through small steps in the learning process may be tedious, and as the programs are often designed to be completed on an individual basis, there may be issues about the lack of social interaction. Much of current web-based training material fits within the programmed learning framework.

Cooperative learning involves heterogeneous teams working together to tackle assigned problems or cases. This approach supports active learning in which the participants are responsible for defining the issue and coming to a mutually acceptable solution. This approach has been reflected in the later series of UNCTAD's Improving Port Performance modules in which groups of students work together in dealing with the many "real life" issues facing the hypothetical port of "Paguera."[8]

Developing case work for on-line delivery for students at a distance is problematic but not impossible. At the University of New Brunswick, a successful, innovative on-line case program was initiated in 2001-02. The "e-TME" program was a joint venture of UNB's Dr. J. Herbert Smith Centre for Technology Management and Entrepreneurship, UNB's College of Extended Learning, and Aliant Inc (the provincial telecommunications company). The class of 30 students (20 professionals from the telephone company coupled with senior undergraduate and graduate students) worked together on a series of projects, discussion groups and seminars for one week at the beginning of the program and a further week at the end. This approach is known as a "book end" model. In the intervening six month period, the students participated in on-line

course provision and a weekly on-line, interactive video discussion of the week's case material. The e-TME included the equivalent of five university credit courses and led to a University diploma for successful completion.[9] The use of chat groups and on-line discussions contributes to group work dynamics and team building. But as shown above in the e-TME program, an initial residential period where students get to know one another assists on-line dialogues during cooperative exercises. Students need to have opportunities to communicate with each other during the course - such communication can assist them in better understanding the learning material.

Distance Education

Distance education has evolved through three distinct phases. The first phase was paper based correspondence courses. In this case, students received text material by postal mail, read the material, analysed problems, prepared papers or solutions and returned them to instructors for grading. In some cases, attempts were made to augment the textual material by providing tutorials by gathering students together for a discussion with a designated facilitator (such as the approach used by the Open University in Britain). In other cases, in early use of electronic communications media, students were grouped by teleconference with an instructor to discuss the written materials and exercises.[10]

The second phase of distance education was the provision of course material through one-way media such as television broadcasts. Several Canadian universities continue to broadcast courses on local television to students at a distance. Several years ago, UNB was asked to participate in providing course content for a television cable system. However the lack of interactivity between the potential students and the instructors caused us to abandon this initiative.

The third phase is the development of two-way electronic communications such as interactive video through networked computers - as discussed above in the e-TME model. Today, on-line distance education is often referred to as "computer-mediated distance education."[11]

Computer-mediated Courses:

Web-based materials and other on-line courseware are being developed and used to either replace or supplement traditional face-to-face instruction. However, on-line courses need to be specifically tailored for the computer-mediated environment. Traditional classroom material does not necessarily translate well in the on-line format. Similarly, effective classroom instructors are not always suitable for on-line situations.[12] Developing effective on-line course materials requires a return to basic principles of curriculum design. The focus needs to be on good

instructional techniques, simplifying the learning elements, and using software, not because its available, but because it adds to the student's learning process. Developing on-line courseware should be undertaken by a multi-disciplinary team including the instructors (for content provision), curriculum designers, editors, technical support and so forth.[13]

A successful approach to on-line instruction is the book-end model, discussed above in the e-TME case. This approach brings students and instructor together for face-to-face discussion and interaction before and following the on-line component of the course. This approach creates an effective bond among the students and instructor and provides a familiarisation amongst all participants. The result is that they will not be corresponding electronically with faceless peers in the on-line interactive component (chat group, email, interactive video, and so forth).

Considerable benefits can be derived from peer-to-peer communication during the course, as students share experiences with each other. Typically web-based courses encourage student interaction by providing cases or problems requiring group interaction and solutions. In the ports training area, such cases could encourage students to share their port's with other participants and all can learn by sharing their experiences. Student communication can be undertaken either in a synchronous mode (live interactivity through chat rooms) or as an asynchronous approach (e-mail, bulletins posted and so forth). The latter allows students to participate in the ongoing class discussion when their personal time and schedule permits.[14] Successful on-line courses involve substantial interactivity (to reduce the obvious isolation of distant learners). For example, Saskatchewan Telecommunications (Sasktel) has ensured e-learning is pervasive throughout their organization. Computer-mediated courses are carefully designed to ensure that learning occurs from more than turning pages by clicking a mouse. "E-learning at Sasktel engages the employee through higher inter-activity and simulation, collaboration and mentoring, on-line instructors, and self-assessment tools."[15]

The success of a "virtual classroom" depends on several inter-related factors including students, instructors, and course material.

Students must be motivated to take the computer-mediated course. Such courses are not as easy as sitting in the traditional classroom receiving a lecture. Students in computer mediated courses must be capable of participating by having the technical ability to effectively use their computer. As pointed out by Hara and Kling, one of their students in an on-line course commented:

> ... it is time consuming, but it is a part of at a distance. I think if you are doing that, you have to be aware that you're gonna be spending more time with computer problems, not getting online, software freaking out, crashing, whatever, its gonna happen, it takes you a lot longer, waiting in line at a lab. There are so many things that make it kind of difficult to do."[16]

The computer-mediated course instructor must understand the nature of on-line learning and the need to change to a non-linear format to ensure effective learning occurs. Due to the lack of face-to-face contact and the resultant absence of non-verbal cues in the communication process, instructors must ensure they provide rapid and clear communications with their students. Hara and Kling indicate the lack of prompt feedback is a primary source of student frustration with computer-mediated courses. As one of their students put it:

> I haven't gotten any feedback about my contribution. I cannot tell from e-mail. You can tell in the classroom what the professor thinks about you from the body language and the way they talk. So I'm not feeling that I am getting enough assessment.[17]

Given the difficulties of effective communication at a distance and the importance of rapid feedback, it is essential that the course material itself be clear and unambiguous. Being unable to readily ask questions of the instructor when undertaking a project at a distance, students are often left to cope on their own. To ensure they are able to do so, the language of the lesson and project instructions must be clear, simple and logical. A frustrated student in Hara and Kling's study argued:

> Though I understand each sentence and word in the e-mail that the instructor sent us, I don't know how to use the instructions to compose the programming. Because in her instructions, I sometimes can follow steps 1 and 2, and then I can't follow from steps 2 to 3. So I go back to the beginning and start over. The instruction is all in text, no graphics because she sends it to us through e-mail.[18]

Another frustrated student in this course indicated the most frustrating thing was "lack of teacher's support and teacher's clarification of her instruction. Usually I e-mail her if I have any questions and her answer is very ambiguous too. So, I won't ask a second time."[19] Hence, considerably more care is needed in designing and developing a computer-mediated course than in a traditional face-to-face mode. In the latter situation, the instructor can readily sense the message is ambiguous and is not getting through and try again in a different way. In an on-line course, instructors have no immediate non-verbal cues that their students are not getting the full message. In this case, students have to e-mail the instructor to voice their concerns and time is spent trying to resolve the ambiguities.

Students in computer-mediated courses can become frustrated from the overload of information available (all being downloaded at once), delayed responses from the instructor (awaiting e-mail replies), and technophobia (where they are unsure how to use the computing technology available).[20] To try to offset the technophobia some students face, the University of

New Brunswick developed a self-learning on-line program to assist students, staff and faculty gain "Fluency in Information Technology" (FITness). This material is provided to senior high school students and newly accepted first year students (along with current UNB students, staff and faculty) to encourage them to become fluent before attending classes. Professors expect their students to be able to communicate electronically and handle computing basics such as spreadsheets, databases, Internet access, and PowerPoint presentations. UNB's College of Extended Learning offers the FITness program to others (www.fitness.unb.ca).[21]

Instructors find computer-mediated courses more intense and difficult to handle. Their academic workload is likely to increase due to the need to nurture individual students at a distance - a few words face-to-face are far easier than lengthy and complex e-mails seeking to provide answers to complex questions. In addition, developing and maintaining up-to-date web-based material and links to other sites is challenging and time consuming. Distance students will demand more interaction. UNB's College of Extended Learning requires instructors to provide 24 hour turn-around for e-mail responses to their students. Distance students will not likely have the same resources available as on-campus students (libraries, technical support, peer support groups) leading to increased one-on-one communication requirements. Administering a computer-mediated course often requires the provision of full time administrative support.[22] Thus, developing and offering a computer-mediated program is a step that should not be taken lightly.

In the non-linear learning process typically found in computer-mediated courses, instructors must learn to give up their control over lesson sequencing, pace and timing. Rather than being a "talking head", the instructor's role is transformed into being a guide or a mentor, providing advice and assistance to students in their quest for knowledge as required. On-line instructors must learn to accommodate different learning styles and understand the technology limitations that some of their students may be facing. Non-linear, on-line learning is not easy. Experience has shown that electronic distance learning increases workload for instructors by a factor of three to four times, as they deal with many e-mails and other one-to-one interactions with their students. In a distance delivery, on-line instructors become the primary point of contact for the students.[23]

All of these difficulties in designing and developing on-line courses makes the whole enterprise an expensive proposition. At UNB, we have found in developing computer-mediated courses that considerable time, effort and expense is required from faculty members and the College of Extended Learning's support team. To make the process worthwhile, there is a need to identify a significant market of students willing to pay of the courses to offset the higher development costs involved. Moving towards a computer-mediated education system with inherent concerns about the cost of production and delivery has led some critics to argue against the "commodification" of the learning process.[24]

The bottom line in moving to computer-mediated course development and delivery for

either in the classroom or at a distance must be about how well the educational technology to be used enhances the teaching and learning process.

International Distance Education

Contemplating the delivery of standardized training packages for port workers and managers at a distance on a global scale through computer-mediated courses adds a significant increase in the many difficulties in using this media. As discussed above, face-to-face classroom interaction enables a good instructor to avoid the pitfalls of cultural and language mis-communication that haunts many faculty members. In face-to-face communication, there are often many pitfalls in dialoguing and interacting among people from different cultures. These pitfalls are aggravated by a faceless computer-mediated educational process.

We are all products of our unique experiences and environment that have shaped our general beliefs, values and underlying assumptions. As a society we form a collection of similar individuals who share a common culture. But our culture will obviously be different than those who come from other parts of the world. If we exhibit an "ethnocentric" bias in the classroom (a belief that nothing good can come from anywhere other than one's home country), this will quickly become evident to our students. In turn, they may become uncomfortable with the instructor and withdraw from active participation.

In a shipping economics class, a group of foreign graduate students had an "ethnocentric" professor, they met informally after class to discuss the lecture material in terms of the global context rather than the relatively narrow perspective offered by the instructor. In the end, the students had a richer experience because they shared their unique cultural perspectives with each other; something that would not have happened in a formal classroom lecture.

Particular care must be taken to ensure the material being provided on-line does not insult the recipient. This is very difficult in offering computer-mediated courses on a global scale. One of the predominant concerns in this process is the pervading belief in the superiority of western North American and European society. This "superiority" can be reflected in many subtle ways in the on-line material. Very careful edits and pre-screening are essential to avoid major inter-cultural pitfalls.

As an example, several years ago, Rik Hall at UNB established a list server for instructors interested in developing web-based courses.[25] On-line participation grew rapidly as more and more academics world-wide joined the group. One day, a faculty member from a U.S. mid-west university wrote in to say she was pleased the group had been formed as she would like to transform her courses to a web-based format, and she wondered if anyone could help clarify a couple of items for her. She asked for a definition of http and html. Within hours, an e-mail from another participant arrived clarifying the terms but questioning quite bluntly why anyone who didn't know these simple web terms would want to waste everyone's time by joining this

list server for web course developers! This e-mail led to a flurry of respondents arguing that surely one didn't have to send a "flame" to respond to an innocent question and that more care should be taken in responding. The following day, a more astute member of the group pointed out that the "offending" e-mail had come from the Hague, and surely everyone knew the Dutch were known to be plain speakers without meaning to offend. He went further to suggest that we all needed to better understand cultural differences and to realize that western sensitivities were not reflective of perspectives elsewhere. The respondent went further to suggest that we need a global web etiquette to handle international cultural and social differences.

Various societies around the world have different ways of dealing with the learning process. Time, space, focus can all vary for the recipients of a distance-based learning process. As an example, in Canada's north, school children often miss their examinations in school as they may be scheduled by southern school administrators at the same time as the elk herd migrates nearby and hunting becomes paramount. This means these children miss their examinations and continue to be further behind in their studies. On-line instructors must be highly sensitive and respectful of the differing time needs and other social and cultural concerns of their students.

Essentially, care must be taken to ensure the on-line course is tailored for the needs of the community in which it is to be delivered. There may well be differing levels of education and experience amongst the participating students in an international context, hence the material must be designed to meet their specific needs - a process designed to avoid "talking over their heads." In other words, the one-size fits all approach common in the provision of on-line courses may not be suitable for the ports training, where varying needs must be addressed. Earlier programs provided by UNCTAD such as the Improving Port Performance series and TRAINMAR lesson modules sought to ensure there was a local interpretation and face-to-face provision of the teaching material. ILO's recently developed Portworker Development Program (PDP), goes a step further in this direction by providing the lesson material in a set of small increments, allowing local instructors to use to meet the local needs of their participants.

Cultural sensitivity is the key to the development of acceptable and appropriate port training material to be provided on-line to international students. This means the use of neutral wording, carefully selected examples and images, and sensitive use of humour (what is considered funny in one culture may be insulting in another).[26] The difficulties of trying to express humour on-line can be summarized by the following student's frustration:

> You sit in a classroom with somebody and you analyse who they are and what they are like. But you cannot analyse them because you've never seen them. So you are only guessing at what the teacher really wants. You don't know how to interpret what they say because you don't know their personality. Like one time, the teacher was making a joke and I took her seriously and it really hurt.[27]

As this student effectively points out, effective communication involves much more than mere written words or even on-line images. We all unconsciously use non-verbal clues to determine how our message is being received [28] This cannot easily be done in a computer-mediated course format. Hence sensitive communication in this medium is essential.

Despite the difficulties involved in offering computer-mediated port training courses to an international community, there are significant benefits. First there is the ability to provide course material that port students would not normally have access to due to the prohibitive costs of travelling to and paying for centrally delivered instruction. Second, despite the necessary higher costs of developing on-line material (as discussed above), the unit cost per student may be lowered due to the possible wider participation possible. Geography is no longer a limiting factor. Third, in the process of actively participating in an international computer-mediated course, students broaden their cultural exposure. They are involved in learning new ideas and ways of doing things. Sharing port experiences may lead to continued improvements and efficiencies in their home port as they try new approaches from elsewhere. International learning encourages students to become more aware and tolerant of other ideas, beliefs and cultures. Interactive computer-mediated programs assists both the instructors and the students to better understand other cultures and to contest meanings, beliefs and practices as part of the learning experience.[29]

Technological Constraints

There is still a significant digital divide between the developed and under-developed world due to an unbalanced distribution of telecommunications infrastructure. Current satellite technology may offer a solution to providing global band-width in an inexpensive manner to enable users world-wide to readily access the Internet.[30]

In an earlier paper on the subject of web-based port training, four years ago, the author suggested that offering on-line courses for ports on a global scale would be pre-mature at that time owing to the lack of high band-width connectivity in many nations.[31] To a great extent the digital divide continues to constrain the widespread development of on-line courses that use the sophisticated computer-mediated systems available today. Lack of suitable band-width will limit video-streaming, inter-active video and other high-level approaches. However, the spread of the Internet is pervasive and provided the course material is text-based and kept as simple as possible, it should be accessible in most ports around the world.

A more important consideration is the skill level of potential port participants and the availability of computers for their use in pursuing on-line courses. As highlighted by other students who have participated in computer-mediated courses, there is a need for them to have basic skills in handling the technical problems that will inevitably emerge as they participate in the course. There is also a need to have basic typing skills to support on-line interaction through

e-mail or chat groups. As pointed out by one frustrated student:

> I have to say I don't really like turning on the computer and finding I have eleven messages on my e-mail. It's a pain. I mean to answer these things, just talking in conversation would be so much easier, rather than replying and doing all the stuff you have to do.[32]

Designing and developing computer-mediated port courses requires an understanding of the technical capabilities of the participating students.

Conclusion - Developing Computer-Mediated Port Courses

Based on the discussion above, it is apparent that developing port courses for on-line delivery either in the classroom for enhancing face-to-face discussion or at a distance, requires considerable care. For distance delivery on an international scale the design needs to be simple (not intensively graphic) so that it can be readily accessed with a low end computer (using a telephone wire rather than higher bandwidth optical fibre cable). Video and graphics can be provided on paper, on a video tape or a CD-ROM to supplement the on-line textual material.

Developing on-line courses, like all other instructional material, needs to be carefully designed. For example, consideration must be given to what are the desired learning outcomes of the course? How are these learning outcomes going to be measured and evaluated? What is the best way to provide the material to the students - face-to-face, CD-ROM, or web-based?[33] To aid in the development of on-line port courses, a review of available web-sites may offer helpful hints. For example, in the Canadian context, computer-mediated learning opportunities can be found on a site specializing in on-line learning (http://courses.telecampus.edu), the Canadian Virtual University (www.cvu-uvc.ca), (http://www.distancestudies.com), as well as UNB's web-based course designer's site (http://www.unb.ca/wwwdev).

Endnotes

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