INCREASING ACCESS TO NORTHWEST COMMUNITY COLLEGE'S

COMPUTER TECHNOLOGY PROGRAM THROUGH DISTANCE EDUCATION

by

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Survey Results (Spring, 1998), and consultation with NWCC Information Systems department and management staff at NWCC.

Characteristics of distance education as well as factors unique to NWCC and the Computer Technology program are addressed in my planning process. These factors are the Computer Technology curriculum (course content), NWCC's technological infrastructure, NWCC's student success and student support network. The paper will begin by describing the characteristics of distance education, NWCC and the Computer Technology certificate program. Implementation of the first phase of distance education courses is then described considering the following areas: funding, enrollment and registration, target students, student support and success, and the potential problems that may be encountered.

Characteristics of distance education

Distance education is a situation in which the learner and instructor are separated in time and space. The term "distance technology" refers to the tools that create and mediate the communication between the student and the instructor, student peers or between the student and content. Distance technology is necessary to support the two-way communication inherent to distance education.

There does not appear to be a debate in the literature about the ability of distance education to provide access and opportunity for the remote or disadvantaged learner. Through distance education students are not constrained to the "space and time" requirements of a conventional classroom. However, distance education is not the panacea to all of education's problems. Student completion rates via distance delivery, for example, are not as high as traditional classroom delivery (Crawford, 1999).

Distance education allows access to education from geographically isolated or sparsely populated areas. Distance education can make education more accessible to adults responsible for childcare, disabled people, indigenous people, rural residents, and others who cannot participate in conventional educational programs (Dunning,1993; Reddy, 1993; Perraton, 1993; Inquai, 1993; Bates, 1998, May).

Distance education can also enable continuous enrollment for students. A student would be able to enroll at any time throughout the year instead of specified intakes during the traditional academic year. Continuous enrollment allows students to begin and complete courses at their convenience.

Distance education is seen is a cost-effective mode of delivery to reach large numbers of people as compared to traditional face-to-face delivery. Reddy (1993) states that distance education is being used in developing countries where there is a need to meet the shortages of technical manpower that existing conventional universities are unable to meet. For instance, in China there are over a million students in their state-run distance education system. The infrastructure, financial and human capital required for one million students would be prohibitive through a conventional residential school system. "Access to such large numbers is made possible mainly because of the distance education system" (Reddy, p. 244).

Dunning (1993) mentions that adoption of education technology can be motivated by its cost-effectiveness. Dunning says that adopters of education technology have a "desire to enforce co-ordination; to act on the need for educational equity; respond to economic needs state wide, to bring efficiency and economy to education and to exploit the potential opportunity to share educational resources" (p. 215). Efficiency and

economy are attractive in these times of fiscal austerity but these reasons should not take the place of pedagogical efficacy. However the financial implications of course delivery must be considered.

Three generations of the use of media in distance education

Sauve (1993) reviewed the evolution of media in distance education and delineates three generations of media in distance education. The first was the development of printing techniques along with the postal service correspondence teaching. This was followed by the multimedia distance teaching concept in the 1960's that used such technologies as radio, television, audiocassette, and telephone. The current third generation is using the new digital information and communication technologies. Sauve (1993) notes that new methods of distance course design are appearing which use third generation technologies to provide "true interactivity" within the course (p. 308). This true interactivity was lacking in the first and second generation but is now available and efficient in the third generation technologies. Bates (1984) suggests that the new technology promises "a wider range of teaching functions and a higher quality of learning; lower costs; greater student control; [and] more interaction and feedback for students."

The advances in digital technology or third generation education technology allow multimedia presentation of course content. Course designers can then focus on the medium that is more efficient at communicating the course content. What students gain is a higher probability that the intended message will be understood which translates to a higher quality educational experience. Both Sauve (1993) and Bates (1984) are saying that third generation technology is enabling distance education to deliver a more

meaningful educational experience as compared to first and second generation technologies.

Liberation of the learner

Distance education can liberate the learner by being able to provide improved access, reduced cost, improved quality and increased opportunity of educational experiences. By "studying in this way, the student is no longer forced to follow the lead of a teacher and is no longer subjected to the conformity pressure of the learning or peer group" (Peters, 1993, p. 15). The learners are also not fettered to a time and place.

Students are liberated through distance education but the price they pay is a higher chance of failure to complete the course. Distance education institutes such as Athabasca University and Open Learning (BC) have significantly low completion rates as compared to traditional institutes (Crawford, 1999). Students who have support from the education provider will have a greater chance of success in the course. Also, the "provision of student support services distinguishes distance education institutions from publishing houses and other producers of learning materials" (Keegan, 1996, p. 156). The design of the distance course should consider the instructional component and provide student support.

NWCC

NWCC is a two-year college recognized and funded by the British Columbia Ministry of Education. NWCC serves the vast and sparsely populated Pacific Northwest region of British Columbia. The NWCC 1998/99 calendar describes the college region as follows.

The College is comprised of four geographical regions: the Eastern Region, which serves Smithers, Hazeltons, and Houston; the Southern Region, serving the communities of Kitimat, Kemano and Kitimaat; the Central Region, serving the communities of the Terrace/ Thornhill area, the Nass Valley and Stewart; the Western Region, serving the communities of Prince Rupert, along the North Coast and the Queen Charlotte islands/ Haida Gwaii. The entire region is 80,450 square kilometers, with a combined population of approximately 80,000. (NWCC, 1998, p. 7)

The area that NWCC serves is approximately equal to fourteen times the area of Prince Edward Island. The population of the area is similar to a small Canadian city such as Red Deer, Alberta or Prince George, British Columbia.

When we compare NWCC to other post secondary institutes in the lower mainland (BC) we note a fundamental difference. There isn't a large readily accessible pool of potential students to draw from and the students are widely distributed. For example, the College of New Caledonia (Prince George, BC) has the same population to draw from within 15 kilometers from its campus as NWCC does from its entire region. The students at NWCC are geographically isolated in small towns and villages. The small communities prohibit the full offering of the NWCC programs onsite due to low student numbers.

The regional economy is primarily based on resource extraction. Fishing, mining and logging are the primary industries followed by the service and tourism. Prolonged low commodity prices have caused a severe economic slowdown in the Pacific northwest. Historically the performance of the economy and the enrollment at NWCC has

been inversely related. (When the economy is poor more people enroll in NWCC programs.) However this has not been the case in the recent past. Enrollments have been steady or declining in the past few years which are attributed to the reduction in provincial and federal retraining programs (Patrick Rife, Vice President Administration, NWCC, personal communication, June 11, 1999).

Campus numbers.

Table 1 shows a headcount of the student numbers at the various campuses from September 1998. (A headcount is a snapshot of enrollment a particular time.) The numbers would vary throughout the year depending upon courses in session but it gives us an accurate idea of the distribution of students at NWCC.

Table 1

Numbers of Full time and Part time students at NWCC Campuses (Headcount September 1998)

Campus	Full time	Part time	Total (Full +Part)	Percent
Terrace	501	230	731	49
Prince Rupert	224	155	379	25
Hazelton	17	20	37	2
Smithers	45	70	115	8
Kitimat	73	89	162	11
Houston	16	40	56	4
Nass	14	0	14	1
Stewart	0	0	0	0
Queen Charlottes	0	2	2	<1
Total College	890	606	1496	100

Note that Terrace has approximately half (49%) of the 1496 full and part time students at NWCC. The small numbers of students in the other centers is also of note.

NWCC has an inherent physical accessibility problem for students due to the local geography. The Pacific Northwest is predominantly rugged and mountainous. Travel is expensive due to the great distances involved and safety is a concern October through April when the roads are icy.

NWCC is committed to providing equitable access to students in the northwest Pacific region of British Columbia. This vision of NWCC is echoed in its mission statement. "We are a community college committed to respecting and meeting the educational needs of the communities we serve. Our mission is to provide and enable equitable access to quality lifelong learning throughout our college region" (NWCC, 1998, p. 6). Developing a distance education solution to inherent problems of geographical isolation (access) is in accord with the mission statement and vision of NWCC.

Union environment

Union and management must negotiate new working conditions that may effect existing employment at NWCC. Distance education and distributed education initiatives may affect course offerings and therefore the workload of employees. There are two instructor unions, BCGEU (British Columbia Government Employees Union) instructors and CUPE (Canada Union of Public Employees) as well as a BCGEU support staff union.

The two instructor unions do not have identical collective agreements. As a result, there is a duplication of collective bargaining, union administration and an inequity in instructor remuneration and benefits. This dual union environment is not unique as five other post secondary institutes in BC have a similar situation.

Existing technology infrastructure at NWCC

NWCC's computer infrastructure is advanced as compared to other post secondary institutes in BC. An information technology survey done in January 1999 of the 22 members of CCCC (College and Institutes Computer Users Group) showed that

NWCC ranked at the top of the 17 post-secondary institutes that responded. NWCC

ranked first in Pentium computers per student at 5.8 (respondent average 12.1) and

ranked second in total number of workstations per student 5.7 (respondent average 8.6)

(J. Deausy, personal communication, March 11, 1999).

NWCC has a Wide Area Network (WAN) connecting most of its campuses. At

the moment the Nass, Stewart and Queen Charlottes campuses are not connected to the

WAN (frame relay). Hazelton is connected to the computer system but not the phone

system. The frame relay has its hub in Terrace and allows voice-over data desk-to-desk

calling. There are no long distance charges when calling from campus to campus.

Terrace also acts as the gateway to the Internet. Internet access from the other

centers is via 56KB fixed line to Terrace and then T1 from Terrace. A T1 connection has

a baud rate of approximately 1.5 Megabytes per second (Long and Long, 1999, p. C201).

There are plans for the Provincial Learning Network (PLNet) to be operational in

the Pacific Northwest within in next calendar year. The mission of the Provincial

Learning Network (PLNet) is to

> Provide telecommunications services throughout British Columbia to enhance
>
> learning opportunities, communications capabilities and information exchange in
>
> educational and cultural organizations, and to stimulate economic and cultural
>
> development in the communities it serves.
>
> To realize these goals, PLNet will provide cost-effective, reliable, well
>
> supported client responsive, access to Internet, video transmission, secure data
>
> transfer, audio and video conferencing, and other advanced telecommunications
>
> services. (Center for Curriculum Transfer & Technology, 1999)

PLNet will greatly improve the bandwidth and the connectivity of the NWCC campuses, thereby improving Internet access.

The PLNet is a large intranet for K-12 and post secondary institutes which will even out the data communication costs throughout BC. Terrace will be a regional network center for entire Northwest of BC on therefore will be on the "backbone" of the PLNet. When the PLNet arrives there will be more bandwidth available at a cheaper cost to the college. Theoretically all computers in the NWCC will be able to access the servers in other campuses. This will permit effective Computer Mediated Communication (CMC) and file sharing between the campuses.

Table 2 shows the number of workstations with Internet access in each of the campuses. The existing bandwidth is given along with the expected bandwidth after the implementation of PLNet. The campuses that are indicated in Table 2 as having "no NWCC computers (local ISP)" are co-located with other services such as secondary schools and community skill centers. Though there are no computers owned outright by NWCC in these locations potential students may have shared access to computer equipment with Internet access.

Table 2

Numbers of Computer Workstations at NWCC and Internet Bandwidth (January 1999)

Campus	Number of Workstations	Internet Bandwidth Present	PLN (expected)
Terrace	90	T1	T1
Prince Rupert	40	56MB to Terrace	T1
Hazelton	20	56MB to Terrace	128 KB
Smithers	60	56MB to Terrace	T1
Kitimat	35	56MB to Terrace	T1
Houston	25	56MB to Terrace	128 KB
Nass		no NWCC computers (local ISP)	112KB
Stewart		no NWCC computers (local ISP)	112KB
Queen Charlottes		no NWCC computers (local ISP)	112KB

note. ISP refers to Internet Service Provider.

The total number of workstations in the college is 270. The common configuration of the workstations is a 200 MHz processor with 32 MB of RAM and a one-Gigabyte hard drive.

NWCC's previous experience in distance education

NWCC unique characteristics of geographical isolation and low population density attracted previous innovations employing education technology. Teleconferencing of university credit courses (CUPE instructors) was done in the early

80's to try to remove the expense and inconvenience of instructor travel. I gathered information on this teleconferencing initiative through a consultative process with staff and management who were involved. Appendix E lists the people who were consulted.

The CUPE faculty offered Psychology, English, French, and Biology via teleconference. There was some contractual language developed in the CUPE collective agreement regarding as to how teleconferencing classes should be counted in the instructor's workload. The teleconferencing was dropped shortly after implementation. A combination of reasons was discussed as being responsible: poor technology (voice quality), level of technology support, level of instructor's ability to use the technology effectively, factors relating to instructor training both pedagogical and technical, high preparation time for lessons, instructor and class dynamics (a different method of class control was required as compared to face to face instruction), and poor feedback from students on the teleconference learning experience.

The Early Childhood Education (ECE) department in Terrace continues to offer teleconferenced courses. This program is offered throughout the college regions and has had consistently high enrollments.

Computer Technology Certificate Program

Northwest Community College in Terrace has been offering a one-year certificate in Applied Computer Technology since the fall of 1996. In the past three years there have been strong enrolments, growing capital infrastructure and growing instructional expertise. The certificate gives the computer skills and training that enable the student to be employable or complements existing and future job skills. Students can transfer their work at NWCC towards a diploma or degree in computing science at other institutions.

The maximum enrollment in the program is 18. Enrollment is limited to the number of work stations in computer lab on the Terrace campus. The average enrollment in the program is 15 and evenly split in gender though a larger number of females have registered in the recent past. The median age has been in the low thirties. Mature students appear to be enrolling in the program to change their career from resource extraction to computing. The program enrollment for the 1999/2000 academic year is full with a wait list as of July 20, 1999.

The admission into the program is on a course-by-course basis. There is no distinction between full time and part time students at the moment of registration. Students are admitted into the program and can take courses that suit their educational goals. In the past, over three-quarters of the graduates from the certificate program have carried on their computer studies into other post secondary institutes or have found employment locally.

Labour Market Demand/ Needs assessment

In the spring of 1998, NWCC circulated a survey to the potential employers of graduates of Computer Technology program in Northwest BC. The survey was a method to determine the needs for computer training within the NWCC region. The skill requirements expressed in the survey act as a formative evaluation of the certificate program and externally steer the design of the Computer Technology diploma program. This survey identified skills that potential employers consider to be important in graduates of a two-year technical computing program. The survey also identified current and future employment possibilities for graduates.

There were 70 responses to the survey out of the 213 delivered in the NWCC region (30.2% response rate). The respondents identified 12 current full-time vacancies and another 36.5 full-time vacancies were expected within the next two years. Eighty percent (80%) of the respondents also noted that they had a current need for computer training for their existing employees. In short, the survey identified the need for types of computer training in north-western BC (Bialobzyski, 1998).

Due to the popularity of this program and the demand for more in-depth computer training both regionally and nationally, the Computer Technology program is planning to offer a second year of study to enable students to earn a diploma in Computer Technology. NWCC feels that this second year is required to produce employable graduates for the Northwest of BC.

Computer Technology curriculum

The general theme of the existing Computer Technology program is to provide computer skills with certification and potential to ladder to a higher credential. The curriculum is organized into courses that deal with the following content: computer hardware, networking, office applications (productivity tools), programming, Internet (web page creation, maintenance and web commerce), databases, Computer Aided Design (CAD), Geographical Information Systems (GIS), English, Math, and keyboarding.

The classroom sessions for the students in the certificate program begin in September and end in April, followed by a 120 hour practicum in the month of May. Full time students take 25 or 26 credits in the fall and 26.5 or 27.5 credits in the winter.

Appendix A lists the courses in the program along with the credit value of each course in each semester.

The credentials obtained after the certificate year are: NWCC Certificate in Computer Technology, NWCC Internet Proficiency certificate. Students also receive preparation to write Microsoft (MS) proficiency and expert exams in MS Office programs (Word, Excel and Access). This is done through the Microsoft Office User Specialist (MOUS) program. NWCC is a certified MOUS testing center.

Operational issues

Operational issues that effect the implementation of the strategic plan to offer courses via distance delivery are funding, enrollment and registration, target students, student support and success, and evaluation.

Funding.

The first phase of the implementation will work within the existing Computer Technology budget for the 1999-2000 fiscal year. Additional funding would be required for future expansion of distance education offerings. The first phase involves placing one course on the WWW for distance delivery.

Planning and first phase course development is being done through this M.Ed. graduate project, as approved by NWCC. This initiative, therefore, involves no financial risk. This first phase will not require a budget analysis; however expansion in future years will require committed funds.

Instructor travel to other campuses is a potential cost. Instructor travel will not be assumed but will be limited based on the current budget. The 1999-2000 budget allows for two hundred dollars of instructional travel. Based on NWCC travel expense

schedules, this would allow for two or three trips to outlying campuses. Additional funds may be required for instructor travel to support students who are at risk. (The instructor could travel meet with them to resolve their problems face to face.)

Other potential and unplanned costs are additions to course materials, mail (Canada Post), photocopying, computer lab costs (i.e. paper and toner), and the cost of support staff to supervise exams. Registration fees of the student could be divided between the host program (Computer Technology) and the local campus to subsidize support staff and computer lab expenses. The Computer Technology department could use its portion of registration as a discretionary budget line for travel to support students.

Internet access and telephone calls to the instructor from the other campuses are free to registered NWCC students. Email accounts could be obtained through free email providers on the Internet such as Hot Mail. Much of the communication and delivery of assignments to the instructor can be accomplished through email accounts. Students can also deliver completed assignments at no charge through interdepartmental mail system between the campuses.

Enrollment and registration.

The enrollment for face to face classes is limited in Terrace due to the number workstations in the computer lab (18). Enrollment may be increased in accordance with the BCGEU collective agreement. The current collective agreement BCGEU limits class size to 40 students. However, provincial bargaining is ongoing regarding is issue of instructor workload influenced by education technology and distributed learning. It is uncertain at this time how the maximum number of students would be affected.

Students would enroll through the existing enrollment infrastructure at NWCC as a part-time student in the Computer Technology program. Distance students would be advised to contact the course instructor before actual registration in the course. The instructor will interview the student to ensure that s/he has the required prerequisite skills for the course.

Distance students, though they might meet the course prerequisites for a face-to-face delivered course, might not have specific communication skills and self discipline necessary for distance study. Students would have more of a chance of being successful in the course if they have completed prior post secondary courses. At a minimum students should be familiar with the medium of communication used in the course, for example, the World Wide Web (WWW), email and File Transfer protocol (FTP).

Students would register for the section of the course being offered in Terrace. Each class will have seats allocated for both for face to face and distance students. There will be a maximum number of face-to-face students set at 18. Additional students may register for the course as a distance student even if they are on the Terrace campus. Distance students will pay the same registration fees as a face-to-face student. There will be no distinction made between the distance and face to face students in the official transcripts or in student evaluation.

The learning outcomes and performance objectives are the same for the face-to-face students and the distance students. However, there are differences in instruction. Face-to-face students have the advantage of instructor led demonstrations in regular class times. While distance students have the onus placed on them to approach the instructor if any difficulty arises with the material. Though the distance student does not have the

opportunity for spontaneous contact with the instructor, the distance student has an opportunity to access the course which he/she otherwise does not have.

Target students.

The program is generally targeted at adults who are wishing to upgrade or acquire new computer skills. Historically, mature learners retraining from the resource extraction industries have enrolled in this program. We can expect that target students will be similar to the "typical" distance student as described by Keegan (1996): "mature, employed, less prior education than a conventional student and far from the host institution" (p. 149).

These distance education offerings would provide opportunity for education to new student types and reach non-traditional markets. In addition students historically enrolled in the Computer Technology program, there is potential to attract students from outside the college region. As well, those students that have been unable to attend face-to-face courses due to work or other commitments would be able to take credit courses in the program. According to Bates (1998, May) we should acknowledge that "workers are distance learners" even though they may be in close proximity. Therefore, the distance education offerings would increase the pool of potential students for the Computer Technology program.

Student support and success.

As mentioned earlier, students who have support from the education provider will have a greater chance of success in the course. In general, those students who have been successful taking other post secondary courses and are computer literate will have a higher probability of success. Those students who are highly motivated and have learned

how to learn, and can get support from friends and family will be successful (Perraton, 1993, p. 252).

The modes of student support through the NWCC local centers are educational advising prior to and during the course, career resources, personal counseling, student success specialists (assist with "at risk" students), disability support services, and financial aid. Local centers are responsible for maintenance and support for their computer labs.

Regular communication with the instructor is essential to make sure that the students are not having any problems with the material as well as provide an opportunity for informal evaluation of the student. Regular communication also reduces barriers to communication which can be present due to unfamiliarity with the conversational partner. Students will have access to the instructor through email (and other Internet mediated communications), free telephone and interdepartmental mail.

Evaluation.

Reddy (1993) suggests that informal and formal continuous evaluation be done "since distance education is still suspect in the eyes of many, high standards in the assessment of students become all the more imperative" (p.245). As mentioned earlier, both the face-to-face and distance students have the same learning outcomes and performance objectives. The course should also go through an evaluation process to improve the quality of the learning experiences for both face-to-face and distance students.

Feedback from the students is important in the evaluation process to improve the learning experience of students. The expected enrollment for each course is not expected

to be over thirty students. Therefore it would be possible to get informal formative evaluation from the student through the day-to-day interaction with the instructor. Anonymous formal evaluation questionnaires can be distributed to each student and collected at the local center through interdepartmental mail. Attention should be paid to the formative feedback of students to adjust course delivery and correct any outstanding problems.

Student success could be determined by performance of the distance students in tests and assignments as compared to the face to face students for the same section. Another indicator of success after the first year can be determined through the enrollments of the next course offering. Word of mouth from previous students would influence enrollment in the next offering.

Potential problems

NWCC can anticipate potential problems in the following areas: problems arising from previous attempts at distance education, management leadership, duplication of courses, union collective bargaining, and advertising.

NWCC may anticipate and compensate for potential problems by examining its previous attempts at distance education. Recall that management cited several reasons why teleconferencing was abandoned. They included poor technology and technology support, instructor training both pedagogical and technical and poor feedback from public on the teleconference learning experience.

The technology infrastructure and technical support have been improved since that time. NWCC computer infrastructure is one of the best in BC. Instructor training and the use of the technology are not a concern in this first phase. In the first phase of the plan

only one course will be offered via distance delivery. Well-designed course materials and student support can overcome the poor feedback. However, student feedback must be seriously considered and continuously monitored to correct any problems with the course.

The program requires vision and direction from management, a commitment from above which translates into instructor and program financial support. Geoghegan (1998, May), Market Manager for Instructional Technologies at IBM, states that in new course and technology developments there may be unforeseen expenses. Therefore the early adopters need money and encouragement from management. Bates (1998, May) also warns that early adopter's work is often not finished due to lack of support and encouragement from management.

Other programs at the local NWCC campuses may see the distance education courses as an invasion of their campus. For instance, course content in office applications courses (word processing and spreadsheets) is included in other program areas such as Office Technology, which are offered throughout the college region. Management will have to provide direction so that duplication of courses is avoided and so that an online course offering is not perceived as an attempt to remove or centralize resources.

Technology is sometimes seen as a threat to instructor job security (Bates, 1993). Instructors must feel supported in developing courses for distance delivery and secure in the knowledge that in doing so, they are not making their own jobs redundant. There is a potential problem that the instructor unions could grieve the implementation of distance education if no agreement is reached in collective bargaining.

The past year (1998) the two instructor unions (CUPE, BCGEU) underwent collective bargaining on a provincial scale with the employer. Discussion took place in

several areas including copyright, distributed learning and technology in education. Some

of the issues relating to these topics are: job security, quality of education (meaningful

pedagogy), standards for implementation of distributed learning, government support and

institutional funding. No agreement was reached but the discussion was sent to a

subcommittee. The negotiation is ongoing and a report on these issues is expected no

later than April 1, 2000 (Collective Agreement, 1998, p. 44).

Advertising is essential to let potential students know about the opportunity for

distance education courses. At the moment NWCC does not have a person responsible for

college-wide advertising. Coordination and management support will be required to

inform student advisors and potential students in the college region.

There is increased competition from private "for profit " distance education

providers. NWCC has a competitive edge due to its proximity to the students, its

computer and telecommunications infrastructure and student support. NWCC must

emphasize these factors over its competition.

This combination of potential concerns requires a solution that is unique to

NWCC. The appropriate solution to these problems will only be found by learning from

the experience of providing distance education courses.

Summary of part 1: Strategic plan

NWCC is characterized by accessibility problems that can be solved by distance

education. NWCC has the computer and human resources to in place to offer courses

through remote delivery. It is the intention of the Computer Technology department in

Terrace to begin phasing in distance education course offerings. The first phase will

begin in the fall of 1999 by offering one of the core courses in the certificate program.

Subsequent phases will include the expansion of course offerings with attention paid to the lessons learned from the first phase. Development of these subsequent phases will be done in consultation with NWCC management and instructional staff, the Computer Technology Advisory Committee and the formative and summative evaluation from the distance course offered from the first phase.

A plan can never take into account all factors that will influence its execution. NWCC must set out and develop solution to its unique problems. NWCC must learn by doing. The Computer Technology program will be an early adopter of distance education through the existing computer infrastructure. In order for this plan to be successful it must have the support of management.

<div align="center">Part 2: Selection of courses and course design</div>

The second part of the project will discuss the issues surrounding the course development process and include supplementary course materials for the course. Supplementary course materials include web site, course outline, course schedule and course evaluation forms.

Issues surrounding the course development process

No particular medium has been found to be didactically superior to the others (Keegan, 1996, p. 213). The first phase courses will use a combination of media that will include print, web site, and Internet communications (conferencing and email). Course materials will include course texts, WWW web site, course manual, course outline, course evaluation form and course schedule. Both face-to-face and distance students will be expected to adhere to the course schedule.

Regular communication with the instructor through Computer Mediated Communications (CMC) will be emphasized and required. Future phases may consider production of videotapes to demonstrate complicated computer procedures. Instructor feedback through the timely return of marked tests and assignments is fundamental to student success (Stevenson, Sander, and Naylor, 1996).

The type of media chosen in subsequent phases of development will depend upon the amount of funding. NWCC will have to be selective in the media they choose due to the development costs. Cates (1994) found that Computer Based Instruction (CBI) production ratio of hours of development per hour of delivery can vary from 25:1 to 400:1 depending upon nature of content, amount of feedback expected and branching. Using Computer Based Instruction (CBI) would be prohibitively expensive from NWCC. A 45 hour course even at the lowest estimate would take a years worth of work from a full time instructor. (p. 39) When choosing types of media and the amount of interaction expected we should, as Bates (1998, May) instructs, "don't focus on media but focus on the message."

Design considerations

Keegan (1996) notes that distance education materials "have to be of higher quality than F2F [face to face]" and that drop out rates can be attenuated by the planning of quality learning materials but above all the provision of adequate student support sevices" (p 151). Keegan also states that success in distance education "is linked to the preparatory phase in a way that is different from conventional teaching" (p. 81). Therefore the development and design of the materials would require more time to complete than materials for face to face delivery.

Keegan (1996) suggests that the design of materials be clear, somewhat colloquial in nature, and explicit with advice and directions. Materials should involve the student emotionally, use a personal style, and provide a demarcation of changes and themes. The course must be something different than a textbook with questions (p. 96).

A course design team is usually formed to develop materials for distance education. Shaw and Taylor (1984) consider the course team as the most important vehicle for the production of effective study materials (p. 281). For subsequent phases in the development of NWCC Computer Technology distance course offerings committed funds should be considered to acquire release time for a dedicated design team that includes a technology specialist.

Henri and Kaye (1993) state that the major challenge to distance education is to reproduce "the dialogue that enables students to be critical and personal in their learning" (p. 28). The educational relationship should be dynamic and include the communication of knowledge, personal development, emotional and social relationships, awareness, and the arousal of curiosity (p.28-29). Effective course design is not restricted to the simple transmission of knowledge.

A distance education course is not a textbook with questions. Student support and high quality course materials are required to be successful. NWCC must continuously monitor the student feedback on the course materials and act upon it in a timely manner.

Institutional pacing

Institutional pacing has a positive effect on student completion rates but students are attracted to the flexibility of continuous enrollment. When institutions determine the pace and schedule of courses, some students simply do not enroll because they cannot

accommodate the prescribed schedules (Crawford, 1999). However continuous enrollment can create logistical problems for the institution.

Athabasca University has continuous enrollment for their undergraduate courses. In "every survey that have [they] have conducted, students tell us that the flexibility in enrollment and accessibility is the most important characteristic of AU" (Crawford, 1999, p. 63). Students find that continuous intake gives them the flexibility to time their learning without being forced to conform to traditional intakes at the beginning of semesters. Shaw and Taylor (1984) note that this flexibility has pedagogical advantages for adults, "in particular, adults learn more effectively when they can select the content, process, and timing of learning, within the guidelines provided by the objectives of the course study" (p. 277). At NWCC, we will consider the issue of continuous enrollment as we work towards subsequent phases of our distance course offerings.

ACTIONS model

Bates' ACTIONS model as presented in Moore (1998, p. 20) is an aid to selection of a delivery method. The acronym is taken from the first letter from the following words: Access, Costs, Teaching & learning, Interactivity & user friendliness, Organizational issues, Novelty, and Speed. To decide the media to be selected for course delivery, decision-makers answer the questions posed in each of these acronym's areas. Answers to the questions will reveal the best delivery method for the particular situation. Table 3 lists the questions associated with each area of the ACTIONS model.

Table 3

ACTIONS Model Questions

Area	Questions
Access	How accessible is a particular method for learners, instructors, and developers, and how easy is it to learn? Instructors and students must have access to the course materials. Ideally the "time expended and the actual dollar costs should be as low as possible" (Moore, 1998, p. 20).
Costs	What are the short and long term costs of the method being considered? "The costs of delivery depend upon the resources used and the desired results." (Moore, 1998, p. 21).
Teaching & learning	What kinds of teaching and learning are needed for the intended learners? What type of teaching and learning does this method of delivery support? Does the method facilitate the movement of information in the most effective way?
Interactivity & user friendliness	What types and amount of interaction are possible with the method? How easy is this method to use? (Is the method user friendly?)
Organizational issues	What organizational issues must be considered and what, if any, barriers have to be overcome before this method can be used effectively?

Novelty	How new is the method and what effect will that have on the teaching and learning?
Speed	How quickly can courses or programs be adapted for this method of delivery? How quickly can the method adapt to changing conditions?

I have used the questions in the ACTIONS model to compare delivery via print and WWW. Offering distance education courses through WWW delivery has significantly more benefits than a print-based course in all of the ACTIONS areas. In the speed area, for example, editing a course web site is much quicker and cost effective than providing editions to print materials. This analysis assumed that the target students have access to computers with WWW and are computer literate. A hybrid delivery method incorporating print augmented by the WWW and reinforced by regular telephone contact is an ideal delivery method for NWCC because of its technology infrastructure, student support infrastructure and development costs.

<u>Selection of first phase course</u>

Based upon my experience as an instructor and the coordinator of the Computer Technology program I developed a list of criteria to be kept in mind when selecting the first phase course to develop. The criteria to be kept in mind is as follows:

1. Select courses with the highest potential enrollment.

2. Ensure technical requirements are met throughout NWCC.

3. Consider the learning domain of the course. Is the course content cognitive or are more psychomotor skills required? Do not implement a course that has a required

lab component in the first phase (i.e. such as hardware and networking courses where students have to disassemble and assemble computers).

4. Choose courses with require little or no prerequisite computer knowledge.

5. Ensure the software used in the course is available at the local NWCC center.

6. Consider the availability of support staff at the local campus. Choose courses that have course content that is may be familiar to support staff. Support staff may be used to direct the student in communications with the instructor if they are having problems.

7. Choose courses that will have low development time. This will allow the curriculum designer to produce high quality materials.

Three courses in the certificate year that best fit these criteria are: CPTE 132-3 Introduction to Structured Programming using QBASIC, CPTE 141-4 Office Applications I and CPTE 142 -4 Office Applications II.

I have been tasked with developing and instructing these three courses. I chose CPTE 132 as the target for this project because it occurs in the Fall term and involves course content that does not require as much computer laboratory demonstration as compared to content in CPTE 141 and CPTE 142. In my experience the Office Application courses are effectively taught by instructor-led demonstration. Both CPTE 141 and CPTE 142 prepare students for Microsoft Office User Specialist (MOUS) certification exams in Microsoft applications. The Applied Computer Technology Skill survey (1998) identified a need for such office application and productivity tool training in the NWCC region. Therefore, these courses may be targeted for future development as WWW courses, or as hybrid courses that combine the WWW with other delivery

methods. If we proceed in this direction it will be important to develop alternatives that are as effective as the present instructor-led demonstration method. (Please see Appendix B Calendar Descriptions for the complete NWCC Calendar descriptions of these courses.)

<div align="center">Supplementary course materials</div>

As part of this project, supplementary course materials were developed for CPTE 132 Introduction to Structured Programming Using QBasic course. These supplementary course materials include, course outline, course schedule, course evaluation form, student manual and web site. Each of these will be discussed below.

Course outline

The course outline is included in Appendix C as well as on the web site at http://andreae.unbc.ca/engl692/philb/cpte132/crs132.htm. (A copy of the web site is also included on the diskette included with this project. The home page is crs132.htm.) The outline gives fundamental information for students in topics as class times, evaluation, texts and other required materials. The learning outcomes for the course are also stated in the outline to give the student an expectation of what will be covered in the course and can be used by other institutions for articulation purposes.

Course schedule

The course schedule is not included in this paper due to its length. It can be found on the course web site at http://andreae.unbc.ca/engl692/philb/cpte132/crs132.htm and the diskette included with this project. (A first draft is included in the student manual.)

The schedule provides information on assignment submission, additional information for distance students (encouraging regular instructor contact), obtaining

assignment and test marks. The main part of the course schedule is a breakdown of the CPTE 132 course week by week. Each week has the topic, readings, assignments and the assignment due dates for each of the fifteen weeks of the course.

Since this is the first time the CPTE 132 course is being offered it would be naïve to think that this course schedule will be followed exactly as it is written prior to the course being offered. I have introduced the course schedule on the web site as a place of contact for current information and have allowed myself the flexibility to edit the assignments and readings. During the course I shall add instructor notes to the weekly course schedule to reinforce concepts, provide commentary and give general announcements.

Course evaluation form

Students will be asked for formative and summative feedback on the CPTE 132 course in week 7 and at the end of the course. A course evaluation form will be distributed to the students to acquire their feedback on aspects of instruction and course materials. A copy of the course evaluation form is included in Appendix D Course evaluation form. The evaluation form is also on the web site. Students can print off a copy and follow the instructions for submission.

The results of the evaluation form will be used as a tool to evaluate the course materials and my instructional methods for CPTE 132. Students are assured that all of their responses will be kept confidential.

The evaluation form is composed of six close-ended questions with ordered choices (five responses from agree to disagree), a dimension question, and three open-ended questions. The six close-ended questions get feedback from the student on the

clarity of the instructor's expectations, usefulness of the student manual, clarity of the web site, amount of instructor notes on the web site, number of examples given in classroom sessions (face to face students), and ease of contacting the instructor for help. The dimension question asks the student to rate the on line course materials according to the dimensions of effectiveness, clarity, and helpfulness. Open-ended questions allow the student to inform the instructor about what they like or don't like about the course and any provide an opportunity to voice problems not covered in the other questions.

Student manual

The student manual is a forty page spiral-bound document which elaborates on topics in the learning outcomes that are not covered in the text book. The student manual includes assignments and readings found in the course schedule. The student manual is not a requirement for this project; however a copy of the student manual is submitted with the project for the sake of completeness.

Web site

The web site is found at the following address:

http://andreae.unbc.ca/engl692/philb/cpte132/crs132.htm and on the diskette included with this project. The web site is meant to augment the printed materials for the course and provide a place of contact for distance students using Computer Mediated Communication (CMC). The design of the site is not cluttered with unnecessary pictures and icons. The text is one color and is at a font size of 12 points to facilitate reading from the computer screen.

Table 4 describes the hyperlinks found on the CPTE 132 home page.

Table 4

CPTE Home Page Hyperlinks

Hyperlink	Description
Check your marks	Registered students are given a a username and ID number to access their marks from the WWW. The student in consultation with the instructor may choose the username and ID number. (The Perl script will not work off of the diskette included with the project but will work from the WWW address given earlier.) The Perl script performs the following steps.

1. User inputs name and ID in password field and POSTS the form.

2. User input is checked. If valid the studs.txt file is opened and each line interrogated for the strings of username and ID number.

3. Studs.txt (input file) format is read to find a match between the student name and ID number. The format of the studs.txt file corresponds to a copy and paste operation from an Excel file to a notepad file. (When an Excel table is pasted it inserts tabs between the cell contents.) The script assigns

individual line entries into an array based on the tab character (i.e. PERL SPLIT function).

4. The copying and paste operation from an EXCEL is more secure than having the instructor update a master file online. (There is less chance of a cracker breaking into the instructor account.) It also means that the instructor has to enter the data only once. The instructor can copy the cells containing the student name and ID number and assignment marks to Notepad, paste, save as studs.txt then FTP to the server. An EXCEL template is available that will ensure the input format is correct. The program is not limited to the number of assignments and tests.

5. Weighting factors and assignment names are passed to the script through a separate file called assign.txt. Once again tabs separate the data.

6. The output table is formatted with assignment weights and assignment names from the assign.txt and Studs.txt files.

Course outline	A copy of the course outline is included on the web site.
Course schedule	A copy of the course schedule is included on the web site.
Students	Students are invited to submit links to their home pages. The purpose of this page is to be a reference for contacting

other students in the course. (The content of the student page will be password protected.) Students who are interested in placing a link on the page are asked to contact the instructor.

QBasic drills   The purpose of QBasic drill bank is to give the student practice in understanding the three control structures (sequence, selection and repetition) and their QBasic syntax. Each question has a short segment of QBASIC code. Students are asked to predict the output by placing their answer in the text box. This page uses frames and Javascript to give the student an on-line interaction with the course material.

Registration information   Registration information is given to the prospective student in a familiar tone. An invitation is given top the student to contact the instructor if there are any questions or problems encountered in the admission and registration process.

Instructor   This link allows the students to view the instructor's home page. A picture of the instructor introduces personal element for the distance students.

NWCC   A link to Northwest Community College home page. The NWCC home page has a current copy of the NWCC calendar on line.

| Computer Tech | Links to the program and course descriptions of the Computer Technology program at NWCC. (CPTE 132 is a core course of the certificate program.) |

Summary of supplementary materials

A common feature of all of the supplementary materials for the course is an invitation to contact the instructor if any problems or questions arise. I have tried to be less formal in the web site in order to reduce possible barriers to communication by being too formal.

As with any course curriculum it is in a continuous process of revising updating and trying new methods of presentation. The materials developed for this project will undoubtedly change during the life of the course.

Conclusion

In this project I drafted a plan to improve student access to the NWCC Computer Technology certificate program through distance education. NWCC is characterized by accessibility problems that can be solved by distance education. NWCC has the computer and human resources to in place to offer courses through remote delivery.

The intention of the Computer Technology department in Terrace is to begin phasing in core courses available through distance delivery. Subsequent phases will include the expansion of course offerings with attention paid to the lessons learned from the first phase. A plan can never take into account all factors that will influence its execution. NWCC must set out and develop solution to its unique problems. NWCC must learn by doing.

The first phase of the plan was implemented by developing a distance education course offering (CPTE 132 Introduction to structured programming using QBasic) whose delivery is augmented by the WWW. The course materials developed for this project includes a web site, course outline, course schedule, course evaluation form, and student manual.

The proposed model expects that the face-to-face students and the distance students meet the same learning outcomes and performance objectives for the course. This project did not examine the pedagogical efficacy of adult learning via distance versus face-to-face but I believe that the face-to-face student has an advantage over the distance students by having instructor led demonstrations in regular class times and a readily accessible peer support and collaborative network. Distance students do not have these spontaneous opportunities for instructor and peer interaction. However, distance courses provide the student who is unable to attend face-to-face classes with an opportunity to access the course. This opportunity would not exist if there were not a distance course offering.

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Appendix A. Courses in the Computer Technology certificate program

(course identifier - number of credits course title)

Fall Term (September - December)	
CPTE 100 - 4	Introduction to Operating Systems
CPTE 101 - 4	Introduction to Computer Hardware
CPTE 141 -4	Office Applications I
CPSC 121 - 3 *	Programming in C
Or	
CPTE 132 - 3 *	Introduction to Structured Programming using QBASIC
CPTE 151 - 1.5	Internet Fundamentals
CPTE 152 - 1.5	Web Page Fundamentals
CPTE 153 - 1.5	Advanced Web Page Design
CPTE 154 - 1	Web Commerce
CPTE 155 - 1	Advanced Web Project
MATH 150 - 3	Business Math
	Or
MATH 161 - 4	Applied Math
	Or **Elective if students have Math 12
OADM 200 - .5	Keyboarding I
OADM 205 - .5	Keyboarding II

Total credits:25 or 26

Winter Term (January - April)

CPTE 111 - 4	Introduction to GIS
CPTE 121 - 4	Networking
CPTE 133 - 4	Introduction to Visual Basic
ENGL 151 - 3	Technical Writing
CPTE 161 - 3	Data Bases I
CPTE 170 - 4	Introduction to CAD

CPSC 122 - 3	Data Structures and Algorithms
	OR
CPTE 142 - 4	Office Applications II

CPTE 198 - 1   Job Search Skills

Total credits 26.5 or 27.5

Practicum (May)

CPTE 199 - 3   Student Practicum

Appendix B. Calendar Descriptions

CPTE 132 - 3 Introduction to Structured Programming using QBASIC (45 hrs)

The Introduction to Structured Programming module introduces structured programming using QBASIC. Programming assignments will require the use of the three control structures and various modes of programming input and output (keyboard, file, monitor). Students will apply arrays, functions, procedures and subroutines to programming assignments.

Prerequisite or corequisite: CPTE 100, or CPSC 111 or BCPT 150 or CPST 040

CPTE 141-4 Office Applications I (60 hrs)

This is a first course in office applications within the Windows environment. Students will develop an above average ability in the use of word processing, spreadsheet and presentation graphics applications.

In the 1999/00 academic year MS Office 97 will be used. This course will prepare the students for the proficiency level of the Microsoft Office User Specialist exams in MS Word and MS Excel. (See http://www.mous.net/ for details.)

PREREQUISITE :   Working knowledge of Windows or CPTE 100 as co-requisite.

CPTE 142 -4 Office Applications II (60 hrs)

This course will build on the skills acquired from CPTE 141. Students will develop expertise in the use of the word processor and spreadsheet as well as be introduced to personal management and project management software. Students will also be required to create an automated presentation incorporating sound and video.

In the 1999/00 academic year MS Office 97 will be used. This course will prepare the students for the expert level of the Microsoft Office User Specialist exams in MS Word and MS Excel. (See http://www.mous.net/ for details.)

PREREQUISITE : CPTE 141 or CPSC 111 or BCPT 150 or CPST 040.

Appendix C. CPTE 132 Course Outline

Term: Fall 1999

Instructor: Phil Bialobzyski

Time: Tuesdays 1300-1600   Room 109 (Administration Building)

Distance Students:

This class is also available through distance delivery. Distance students are not
required to attend classes but must adhere to the course schedule for all assignments and
tests. Tests are arranged in consultation with the local NWCC centre or through an
approved test supervisor if students are not near a NWCC centre.

Distance students must possess basic computer and Internet skills (file management,
email and basic WWW skills). Students must have access to the WWW and the ability to
receive and send email with attachments. Regular contact with the instructor is required
for all distance students.

Students wishing to enrol as a distance student must contact the instructor prior to the
commencement of classes.

Description:

The Introduction to Structured Programming course introduces structured
programming using QBASIC. Programming assignments will require the use of the three
control structures and various modes of programming input and output (keyboard, file,
and monitor). Students will apply arrays, functions, procedures and subroutines to
programming assignments.

Prerequisites: (or corequisite):

CPSC 111 or BCPT 150 or CPTE 100 or CPST 040

(45 hours - 3 Credits. 3 lecture/ lab hours per week)

Required Texts:

Schneider, D. I. (1994). A brief course in Qbasic with an introduction to visual basic

(2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Bialobzyski, P. J. (1999). Student manual: CPTE 132 An Introduction to Structured

Programming. Northwest Community College, Terrace, British Columbia.

Other Materials:

Students should have at least two 3.5" floppy disks.

Student should have access to the Internet through NWCC computer labs or via their own

computer.

Course Web Site: http://andreae.unbc.ca/engl692/philb/cpte132/crs132.htm

Learning Outcomes

Upon completion of the CPTE 132 the student will be able to do the following:

1. explain and illustrate the operation of the three control structures involved in

structured programming: sequence, conditional and iterative.

2. describe the 5 steps involved in program design

3. identify the difference between high level and low level languages

4. discuss the programming languages commonly used today

5. discuss object oriented programming

6. write programs in QBASIC which use the three control structures

7. write programs which use different modes of input and output (keyboard, file,

monitor)

8. demonstrate the use of multidimensional arrays in a program

9. Write user defined functions

10. Apply procedures and subroutines to QBASIC programs

11. Discuss the application of QBASIC to Office Applications and the Windows

operating system

12. Demonstrate the graphical output capability of QBASIC

Evaluation:

Exams	40%	(midterm 15% & final 25%)
Project	15%	
Assignments & Labs	45%	
Total	100%	

Note: There will be a mid-term exam worth 15% and a final worth 25% of the final mark.

The final marks will be assigned as follows

A+ 96-100	A 91-95	A- 86-90
B+ 81-85	B 76-80	B- 71-75
C+ 66-70	C 61-65	C- 56-60
P 50-55	F 0-49	

Academic Honesty: See NWCC calendar. (I take this seriously so you should too.)

Prior Learning

At the beginning of CPTE 132 your instructor will interview you to assess your previous computer experience and programming knowledge.

If you have had a previous programming course you may work ahead of the class. The web site, text and manual can be used as a guide to the course. The extra time that you have can be devoted to the course project. The project must be discussed with the instructor prior to commencing your work on it. The onus is on you to notify the instructor if you are not finding the material challenging enough.

It is difficult to know where to start a computer course because so many students have varied backgrounds and experience. Lectures will begin at the lowest common denominator of knowledge and skill.
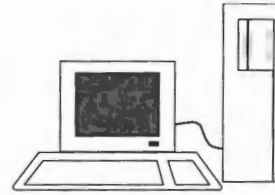
Assignment/ Lab Schedule:

Please see the Student Manual or follow the course schedule hyperlink at the course web site.

Appendix D Course evaluation form

CPTE 132 Introduction to
Structured Programming
Using QBasic

Course Evaluation

Instructor: Phil Bialobzyski   Fall 1999

You will be asked for your feedback in Week 7 and at the end of the course. The results of this questionnaire will be used as a tool to evaluate my instruction methods and the course materials.

You do not have to put your name on this form. Please be candid and be assured that all of your responses will be kept confidential. You may submit this questionnaire in the assignment cabinet near my office or through interdepartmental mail. Distance students may mail the completed survey to NWCC Trades Reception Attn: CPTE 132 Evaluation (see address at "Instructor" link/Course Home page). The receptionist will open the letter and put this questionnaire in the assignment cabinet.

Phil Bialobzyski

Please respond to the following statements by checking the appropriate circle

1. I know exactly what is expected of me in the course.

O   O   O   O   O
Agree somewhat agree   undecided   somewhat disagree   disagree

2. The Student Manual is useful.

O   O   O   O   O
Agree somewhat agree   undecided   somewhat disagree   disagree

3. The web site is a valuable asset to the course.

O   O   O   O   O
Agree somewhat agree   undecided   somewhat disagree   disagree

4. The instructor should provide more Instructor Notes on the web site.

O   O   O   O   O
Agree somewhat agree   undecided   somewhat disagree   disagree

5. The instructor should provide more examples in the classroom sessions.
(Distance students mark the undecided circle.)

O   O   O   O   O
Agree somewhat agree   undecided   somewhat disagree   disagree

6. The instructor is easy to contact for help.

○   ○   ○   ○   ○

Agree   somewhat agree   undecided   somewhat disagree   disagree

Please rate the effectiveness of the on line course materials according to the following dimensions
(Check the appropriate space.)

The web site (i.e. QBasic drills, weekly course schedule) for CPTE 132 is:

Effective   __:__:__:__:__:__   Ineffective

Easy to Understand   __:__:__:__:__:__   Difficult to Understand

Helpful   __:__:__:__:__:__   Not Helpful

What do you like about this course? (Please be specific.)

What do you not like about this course? (Please be specific.)

Please feel free to add any additional comments.

Thank You

Appendix E. People consulted regarding NWCC's teleconferencing initiative.

The following are the people consulted regarding NWCC's teleconferencing initiative in the early 80's: Liz Ball, past president of C.U.P.E.; Brian Loptson, Interim President of NWCC; Rosemarie Goodwin, Coordinator and Instructor in the Early Childhood Education program, NWCC; and Larisa Tarwick, Senior Management, NWCC.