NAIT D.A.T.E. (Distance Apprenticeship Training and Education) and Beyond: Effective Approaches to Democratize the Acquisition of Proficiency and Aptitude in Vocational Training

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ABSTRACT

NAIT has been a leader in technical training and applied education for over forty years. Our graduates contribute to the skilled workforce in demand within our province and around the world. NAIT has created innovative ways of providing training to students working or living in remote areas of the province. We have used videoconferencing to teach welding and electrical apprentices; online learning to teach heavy equipment maintenance and repair; and a virtual 3D world (NAIT Virtual Campus) in Second Life - an interactive environment simulating real-life business conditions.

While all projects found enthusiastic participants in the students, the instructors, and employers, each contributed to both sides of the suspicion surrounding the value and success of teaching competency-based skills at a distance.

NAIT D.A.T.E. (**Distance Apprenticeship Training and Education**) - tested the efficacy and potential societal cost savings of using videoconferencing to move beyond the face-to-face training approach by riding a high-speed, broadband Internet in the Province of Alberta, known as SuperNet.

The NAIT D.A.T.E. project allowed students to attend classes (while staying in their own community, continuing to work) via Internet Provider (IP) videoconference then engage with employers to obtain the hands-on skills and competencies in their area of vocational training. Students participated in synchronous presentations with the instructor, then had access to a rich set of internet archived sessions and simulation-based DVD resources. Students were very enthusiastic, with the most common positive response being the ability to take classes without leaving home or family. Another positive response was the ability to save money. A common dislike expressed was the lack of time to spend working with the instructor on practical experiences (labs). Some students felt too rushed to complete the work effectively.

Our experience in each of the alternate delivery methodologies provides an evaluation that links theory and practical skills to effective training.

BACKGROUND

Economic Drivers

In Alberta, our provincial government has developed a 10-Year Strategy that addresses the pressing need for a skilled workforce to help with the shortage of labour across all sectors that has now reached a critical peak. The province has also noted that labour supply shortages are not being adequately supplemented by new technological investments that will increase productivity. (Alberta Human Resources and Employment Report 2006)

In Alberta, as everywhere in the world, skilled, educated, innovative and motivated workers are highly valued. Breaking down the educational profile within our province, in 2006, 22 percent of the adult population had a university degree; 22 percent had a college diploma and 12 percent had a trade's certificate, with 21 percent of the last group qualified in Construction Trades (the highest proportion of all provinces and territories). (Statistics Canada 2006)

Alberta is facing a number of challenges, some of which are: an overall aging population; expected strong economic growth and a tightening labor market; increased urbanization causing regional labor and skill shortages in many rural communities; low graduation and post secondary transition rates and low credentialing rates. Addressing these labour force pressures is a priority of our Provincial Government. (Alberta Human Resources and Employment Report 2006)

To begin to address these challenges over the past eight years, the Alberta Government has been building an infrastructure that will connect Albertans and make possible the delivery of training to rural and remote communities as well as urban centres.

In 2000, the Alberta Government began an investment of $193 million (CAN) in the development of a broadband Internet with approximately 4,200 connections in 430 communities across the province. Alberta 'SuperNet' as it is called, provides the provincial infrastructure to realize alternate delivery of education and training across the province.

Apprenticeship Training in the NAIT Context

NAIT has been a leader in technical training and applied education for over forty years. Our graduates contribute to the skilled workforce in demand within our province and around the world. We confer certificates, diplomas, applied degrees and most recently, baccalaureate degrees. We offer over 240 programs, including 34 apprenticeship offerings and over 1,200 continuing education courses.

NAIT serves approximately 86,500 students per year with a wide range of programming. Over 40 percent of students entering full-time programs at NAIT have previous post-secondary education.

Note: In Alberta, apprentices must be employed in their trade and have the opportunity to attend an Alberta institution that offers training which, depending on the discipline, will be from eight to twelve weeks at a time. Employers must commit to providing the time for the apprentice to engage in training away from work as well as challenge the student at the appropriate level of training with tasks related to their level of ability.

Students attending training are eligible for Employment Insurance coverage during their training. Our Alberta system does not lead to the challenges facing the United Kingdom, where concern that the tradition of paying block grants in advance to providers [of training] encourages a tendency to be averse to spending on off-the-job-training for apprentices, (Mohamud & Jennings et all. 2007). However, we face different issues.

In the current Alberta context, employers are not keen on allowing apprenticeship students the time off to attend school for training. They would rather the employee stay on the job due to worker shortages and workload.

APPROPRIATE TECHNOLOGIES

NAIT currently provides education in technical and trades training face-to-face at the institution. We have partnered with business and industry to build state-of-the-art labs and shops that permit students to learn on the newest and most current technology. In our present economic reality we are finding ourselves at capacity when it comes to enrolling and training more students. We are double and triple shifting our apprenticeship course access in several trades including welding and electrician to meet the demand of employers and government. The organization has reached maximum capacity and we have concerns about our ability to sustain this practice.

To address this pressure NAIT has a strategy and plan to offer flexible learning options to our students and to this end, the organization has invested large amounts of capital dollars to create world-class facilities including the technical infrastructure to support learners across the province and around the world.

NAIT's fully integrated IT system connects to the Alberta SuperNet to deliver courses via videoconferencing. This approach also focuses a robust internal infrastructure to allow the delivery and support of online learning, the use of web conferencing software and the use of a 3D virtual world (NAIT Island) in Second Life where simulations support the practical application of theory and knowledge.

When there is no classroom nearby, NAIT brings the classroom to the student - a 'classroom-on-wheels', two NAIT-In-Motion semi tractor-trailer units. These mobile classrooms provide students in remote aboriginal communities with the equipment they need to practice their skills in trades-related training in millwright, pipefitting, steamfitting, gasfitting, welding, machining, electrical and plumbing.

We have forged solid partnerships with business and industry and participate in consortia opportunities with other colleges across the province to allow our students to gain practical skills while studying at a distance.

INNOVATION IN CURRICULUM DEVELOPMENT AND DELIVERY

Our experience with alternate delivery technologies has provided us with profound knowledge in our quest to understand and support teaching and learning in a variety of modalities. We have found that adaptation and flexibility are key to entering into innovative delivery, experimentation and action research.

We claim support for the learner at a distance is a key to success. Recognizing the need for fully integrated student support services, the Open University of the United Kingdom solved their attrition problems and established their role as a premiere provider of education using alternative methodology (Keegan 2004). This support is provided at our institution through technology by direct interaction of both synchronous and asynchronous connections with instructors and fellow students; appropriate and timely technical support; availability and ease of access to all appropriate resources (such the provision of library materials); and the building of an authentic learning community.

NAIT is experiencing the phenomena and importance of social connection and social context in teaching and learning. Course development that is student or learner-centered is morphing to incorporate a more collaborative group-centered delivery. "Customized settings that mirror the real world - or diverge wildly from it - present the chance to collaborate, explore, role-play and experience other situations in a safe but compelling way. [Three dimensional virtual learning environments] offer opportunities for education that are almost limitless… (Horizon Report 2007).

At the heart of our core business - teaching and learning - NAIT supports a competency-based experiential learning model in the design and development of curriculum. It is our belief that the effective use of the dominant technology in delivering training, a fully integrated collaborative support model, and an acceptance by industry of our instructional design approach (and proven rigor) should, over a period of time, dispel the suspicion that competency-based instruction and practical skills cannot be taught or assessed at a distance.

Building on an applied research project and a subsequent report entitled, "An Evaluation of IP Videoconferencing Courses at the Northern Alberta Institute of Technology" (Montgomerie & King 2006) we have gained a better understanding of how to thread a collaborative and supportive approach to curriculum design and delivery.

The manner of our approach using videoconferencing for trades training at a distance is presented here to illustrate what was learned and how this important work has helped our organization shape and understand the barriers to both the internal uptake and use of technology and to the system-wide acceptance and support of non-traditional training and education.

In fact, our experience in alternate delivery methodologies provides an opportunity to compare and evaluate what links theory and practical skills to effective training at a distance. Through our NAIT D.A.T.E. project we have made positive changes that are reflective of the challenges we faced as well as the negative impacts on both the learner and institution that exemplify the lack of understanding by the industry in the bringing these competency-based courses to the learner and subsequently to the workplace.

The NAIT D.A.T.E. Framework

The 2006 NAIT D.A.T.E. project allowed us to test the hypothesis of providing trades training at a distance with the dominant technology, videoconferencing. We compared and measured its success against the traditional approach to our apprenticeship training model of bringing the student to the institution.

As NAIT D.A.T.E. allowed us to measure our success, other related resource materials were introduced to students to enhance support during the time of training: the development of online learning materials to support synchronous learning sessions for these courses, and the development of specialized DVD resources to support specific trade-related learning (such as welding).

NAIT collected qualitative and quantitative data from a number of stakeholder groups including students, instructors and employers. The study answered key questions, "Do NAIT D.A.T.E. students receive similar achievement scores to students in a comparison group of traditional apprenticeship students?"; "Are there variables that differentiate apprentices who enroll in the NAIT D.A.T.E. programs and those in the traditional on-campus program?"; "Do employers feel that the quality of the NAIT D.A.T.E. program is equivalent to the traditional program?" (Montgomerie & King 2006), NAIT was also able to establish a sustainability plan that will allow community groups outside of our organization to support the delivery of videoconference courses via their operations. In other words this project allowed us to get a sense of the true cost of delivering training in this manner.

During the NAIT D.A.T.E. project there were 65 apprenticeship students who took the opportunity to stay in their community (continue to work) and participate in Welder and Electrician training. Each [student] paid the equivalent to fees paid by traditional students who would come to Edmonton and NAIT for training. (Fricker 2006)

The cost of temporary housing in Edmonton is rising with the economic growth and pressures on the city as the number of people coming into the province grows. NAIT does not have a student residence in the City of Edmonton, and therefore students must find their own living accommodations while attending school.   The basic cost of a one-bedroom apartment in Edmonton in 2006 was approximately $500.00 (CAN) per month. In 2008, the same apartment could cost $1,100 to $1,200 per month.   With the cost of food, transportation and incidentals it is likely to cost students from $3,000 - $6,480 per month to live and attend school. This represents the possible savings to students by providing the training in their community.

Students reported they were better off being able to take their courses under the NAIT D.A.T.E. model rather than under the traditional model where most would have sought Employment Insurance coverage during schooling. (Montgomerie & King 2006)

The distance between Edmonton and the communities where NAIT D.A.T.E. videoconference training was provided ranged from 366 kilometers to 735 kilometers. Providing training in the community saved the students over five to twelve hours of driving (one way) in winter highway driving conditions.

The distance instruction added a few more hours to the time it took to deliver the course compared to face-to-face offerings. NAIT also provided additional hours (and an additional instructor) for remedial math instruction for a number of students struggling with the curriculum. Even so, students felt there were rushed to complete the course and assignments (Montogmerie & King 2006)

CHALLENGES AND LEARNINGS

At the end of the NAIT D.A.T.E. project, 39 students successfully completed and passed their exam, 25 students withdrew and one student wrote and failed the final exam. (Fricker 2006)

Despite the obvious economic savings to students and the considerable additional support to those who were having academic difficulty in completing their program of studies, and the fact the project proved it was possible to achieve success, NAIT D.A.T.E. has not been repeated.

Key factors outlined below that contributed to student's experiences in this project and other factors that impacted NAIT instructors have provided us with knowledge that continues to influence our approach in considering future offerings of trades and technology distance education.

- Overall, the challenge to our organization is to provide training to instructors that will give them a comfort level when engaging in the use of this complex equipment. The instructors involved in the NAIT D.A.T.E project were comfortable extending themselves to use unfamiliar equipment to teach whereas not all our instructional staff feels the same way. This project has allowed us to change our technical support model to one that supports instructors who *want* to engage in alternate delivery rather than providing ongoing training to all staff in the hopes they will engage in the use of the technology.

- From the student perspective, it was clear that they wanted the training, and wanted to take advantage of the course coming into their community. In some remote sites there were three or four students studying together, in others only one student was connected. It became apparent that the sense of community, collaboration and working together were important to successful completion of the training. The curriculum was not originally set up to foster this environment for the distance learners. NAIT D.A.T.E. provided the realization that all curriculum delivered at a distance should be designed to build community and a sense of belonging for our students. While it is understood that students need to be internally motivated, teamwork, projects and group centred interactive opportunities for all remote site students need to be part of the overall learning experience.

- From the employer's perspective, it is imperative they are aware that the course delivered through alternate methods is just as rigorous and perhaps even more time consuming than attending classes in a traditional setting. Often, because of the shortage of workers, the employers were pushing these NAIT D.A.T.E. students to work overtime evenings and weekends. Some students found a conflict in their loyalty to their employer and their need to attend the class or to do their prescribed homework.

- Again from the employer's perspective there is also a need to agree (formally) to provide opportunities for students to practice their hands on skills with the support of a mentor and knowledgeable person in attendance. At the start of the NAIT D.A.T.E program the employers were asked by the students to provide this support and most agreed. However, when the time came to practice, the employers either didn't have time, or were not able to follow through on the commitment. Employers need to understand they have become partners in the learning process.

- From the Government perspective, it is important to understand the increased cost to the organization to provide the flexible alternatives to traditional delivery of this training. Costs are for technical support staff to be available to troubleshoot technology (at both ends) - in the case of NAIT D.A.T.E. at the delivery (Edmonton) site and at the eight receive sites. Additional instructors need to be hired to teach evenings and weekends. Instructional staff who teach during regular hours on site are not willing to teach outside their regular work day. This has posed the most significant barrier to continuing with this training model. An unwillingness or lack of understanding by the provincial government agency overseeing apprenticeship training that the cost of training has shifted from the student (who in the past bore the brunt of the cost to come to the City) to the Institution to provide the technical infrastructure, ongoing instructor training and additional instructional staff has led us to discontinue the effort to provide this alternate method of training even though it has been proven successful.

CONCLUSION

Linking theory and practical skills to effective training at a distance

The NAIT D.A.T.E. project provided the opportunity to stretch our ability to design and deliver a blended approach to trades training and prove it can be successful. A similar project with a multinational oil field service provider allowed us to link practical skills and theory. The courses related to operation and maintenance of oilfield equipment and were delivered online. Practical training occurred on the job site. Difficulty finding instructional staff to teach these courses and the lack of understanding at the international sites by management contributed to not continuing the project.

Potential collaborative learning environments in 3D virtual worlds in Second Life have prompted NAIT to create an Island for delivery of training to students in our Business Administration diploma program. Second Life (SL) is based on the development of massively multiplayer online game (MMOG) design of role-playing. The downloadable client enables the user to create an Avatar resident that can explore, meet other residents and socialize by engaging in group activities including the purchasing and trading of items with one another. (McCarthy 2008).

The ability to create community in this collaborative environment is highly rated in the use of SL. The cost of the NAIT Virtual Island was minimal, and the training provided to instructors and interested staff was relatively minimal to the organization. However, the mass adoption of this technology is highly unlikely for the near future as there are technical requirements barriers.

Competency-based trades and technical training both theoretical and practical, can be delivered successfully through a blend of alternative learning methodology using technology and partnerships with employers. To create a scalable approach to increase the ability for more students to participate in this training, it is important that employers engage and also participate in the learning process and understand the technology being used to provide the training. Government must also undertake a process of learning to be able to fully understand the needs of the organizations providing training in this manner. Finally, the organization must continue to develop training and provide assistance to instructional staff who prefers to teach students at a distance. When these factors are in place, then it will be possible to democratize vocational training for learners around the globe.

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