Walkerton Clean Water Centre

Distance Education Enterprise

2008 Business Plan

Submitted by: Kenneth Grant Murphy
Learner Number: 2515643
Athabasca University
Masters of Distance Education

Course: MDE 605
Assignment #1
Date: February 16, 2008

The Walkerton Clean Water Centre, an Ontario crown agency, was established in October 2004 to address critical gaps identified by the O'Connor Commission as a result of the tragedy in the Town of Walkerton —its main objectives to:

- Ensure that training courses are accessible and tailored to meet the needs of drinking water operators in small and remote communities
- Ensure the availability of courses on the subjects required to train drinking water operators
- Offer training facilities and curriculum to First Nations water system operators.

As such the Centre is becoming a premiere training facilitator for Ontario's drinking water system operators. This business case proposes a distance education enterprise model that would facilitate proper training and sustained competency for operators, not only in the more densely populated areas of southern Ontario, but also in more remote locations in northern Ontario.

Issues to be reviewed include provincial agency relationships, operator training requirements, the reality of distance education within the drinking water industry, and culminating in the implementation of a proposed distance education enterprise within the Walkerton Clean Water Centre.

Table of Contents

Executive Summary

In May 2000, the world of Ontario's drinking water treatment system operators was literally transformed overnight due to the Walkerton Tragedy which resulted in the deaths of seven people and the illness of thousands of others due to contaminated drinking water. As a result, Justice O'Connor (2002) was commissioned by the Province of Ontario to investigate the tragedy; his report made over 90 recommendations that resulted in new regulations and tougher drinking water standards, additional controls and monitoring; clarification of responsibilities for operators, public health officials, and other drinking water agencies; and higher standards of care for municipal officials who oversee the Ontario's drinking water systems.

Over the past eight (8) years, the Ontario government has enacted several drinking water regulations under the Safe Drinking Water Act (2002). Ontario Regulation (O. Reg.) 128/04 under this Act requires that all persons operating drinking water systems have the necessary skills and knowledge to treat or supply safe drinking water to the public consumer. The regulation requires mandatory licensing of water works operators, with auditable requirements for operator training that include certified training programs with defined learning objectives and measurable results. For a new person in the field—an operator-in-training (OIT) — completion of a formal training course is required, along with on-the-job practical training. For existing operators to maintain their licenses, the regulation requires a minimum number of hours of continuing education and on-the-job practical training, depending on the complexity of the system being operated.

This business plan proposes a distance education enterprise that would facilitate proper training and sustained competency for operators, not only in the more densely populated areas of southern Ontario, but also in more remote locations in northern Ontario. Issues to be reviewed include provincial agency relationships, operator training requirements, the reality of distance education within the drinking water industry, and culminating in the implementation of a proposed distance education enterprise at the Walkerton Clean Water Centre (WCWC).

The distance enterprise would develop the necessary content for the distance education programming and build links to distance education specialists, such as website designers and application specialists. The distance education enterprise would be the incubator for trainers and course content specialists. It would provide an environment within which experienced and knowledgeable operations staff would develop distance education applications with the help of others. This aligns with the mission and mandate of the WCWC, to deliver and coordinate training for drinking water operators across Ontario.

Business Opportunity Analysis

In Ontario, the Ministry of Environment (MOE) is responsible for the enforcement of regulations under the Safe Drinking Water Act (2002), and is ultimately responsible for O. Reg. 128/04 that specifies various operator certification levels. For example, a system that serves less than 500 people and includes a well, pump house, chlorinator, and a small piped system, is less complex than one that serves 100,000 people using a conventional water treatment facility (filtration, coagulation, flocculation, sedimentation, and chlorination) with pumping stations, water storage tanks, and several hundred kilometres of underground watermains.

Since 1994, operator licensing has been administered by the Ontario Environmental Training Consortium (OETC) under contract to the MOE. This licensing program is based on the model provided by the Association of Boards of Certification and 'need-to-know' guides have been developed that describe the necessary drinking water operator competencies. The guides assist trainers, supervisors, and operators in determining what topics to review while studying for operator certification exams. OETC also processes license applications and exam applications, coordinates and marks exams, notifies operators of the need to renew their certificate, and provides designation of continuing education courses as 'Director Approved'. The OETC does not provide training to operators directly, as this is the left in purview of other private and public training organizations. The OETC operates under the umbrella of CON*NECT Strategic Alliances and through OETC/CON*NECT Strategic Alliances clients have access to training network of 25 colleges in 200 communities across Ontario.

The Walkerton Clean Water Centre (WCWC), an Ontario crown agency, was established in October 2004 to address critical gaps identified by the O'Connor Commission (2002)—its main purpose is to lead the implementation of three specific recommendations:

- Ensure that training courses are accessible and tailored to meet the needs of operators in small and remote communities
- Ensure the availability of courses on the subjects required to train operators
- Offer training facilities and curriculum to First Nations water system operators

In addition to the training oriented objectives, WCWC focuses much effort on research and technology transfer, dealing with new drinking water technologies, including optimization approaches.

There are many private for-profit training companies and consultants that have been providing training to the drinking water and wastewater industries prior to the Walkerton tragedy. But with the subsequent regulatory requirements for additional training, there has been a noticeable increase in trainers

providing services. Additionally with the aging workforce in the municipal and utility sector, there are many experienced operators retiring and getting involved in the training, by sharing their wealth of experience and technical know-how. Though ready to provide this knowledge, few have direct adult education certification and even fewer have an understanding of distance education approaches that could be used to reach a broader audience, in a more economical fashion.

Most of the training provided to date (more than 90%) requires utility staff to travel to a centralized location to receive the training, which ultimately costs the municipal tax-payer or the water utility rate payer. Consideration needs to be given to not only the cost of the course but the associated travel and lodging expenses and the opportunity costs associated with an operator being away from the water treatment plant during training. So to address these issues should the WCWC be investing in resources to provide broader access to operators, and thereby reducing overall costs to the public?

The Current Market: Operator Certification and Educational Requirements

Ontario Regulation (O. Reg.) 128/04 under this Act requires that all persons operating drinking water systems have the necessary skills and knowledge to treat or supply safe drinking water to the public consumer. Under O. Reg. 128/04, there are two general areas of focus—(1) training new operators who are entering the industry and (2) sustaining ongoing education of existing operators in order to maintain acceptable level of competency. It requires mandatory licensing of water works operators, with auditable requirements for operator training that include certified training programs with defined learning objectives and measurable results.

Based on inquiries to the MOE, there are approximately 9000 drinking water operators with some License Class which includes operator-in-training (OIT) licenses, based on recent listing from the OETC (February 2008). 350 operators have been ‘grand-parented’ into their certification levels without completing any written no examinations. These numbers do not include operators required for First Nation Communities (governed by federal legislation), or smaller non-municipal systems such as rural community centres on a well system, where only ‘trained persons’ are required. This also may not include operators that are required to operate and maintain wastewater systems, such as sanitary sewers, pumping stations, and primary, secondary and tertiary wastewater treatment plants.

New Operators

For a new person in the field—an operator-in-training (OIT) — completion of a formal training course is required, along with on-the-job practical training. In order for existing operators to maintain their

licenses, the regulation requires a minimum number of hours of continuing education and on-the-job practical training, depending on the complexity of the system being operated.

An operator candidate must successfully complete the Operator-in-Training (OIT) examination, after which they can take an OIT course developed by WCWC. This two week course is divided in two parts—a self-study component, estimated to take 40 hours to complete, followed by five days of classroom training. The prospective OIT completes the initial self-study component at home; following this they register for, and write (in a classroom setting), the test related to the self-study. Once the OIT has passed the self-study test, they register for a classroom training session that also ends with a test. Once the course has been successfully completed, the OIT certificate is issued with a three year renewal date. At this point, the OIT may begin to proceed with writing certification exams for the initial level operator license, as well as higher level system licenses. In combination with work experience, the OIT may eventually be able to reach the highest and most complex Level IV class. The WCWC has made arrangements to hold regular class room sessions that are distributed around Ontario, such as Sault Ste. Marie, Peterborough, Brampton, Windsor, etc.

Existing Operators

Having attained the appropriate class certification level for the license of facility which they are operating, the operator must maintain an acceptable level of knowledge and competency. This level is based on the operator's certification level, with an increasing number of training hours required for more complex facilities.

An operator must renew their license every three years, and demonstrate that they have successfully achieved an adequate level of approved training. Training requirements involve two types of training defined under the regulation—'on-the-job' training and 'director approved' continuing education. 'On-the-job' practical training must have documented learning objectives, be provided by a trainer with expertise in the subject matter, and be directly related to the duties typically performed by an operator; examples include on-site backhoe operations or routine pump maintenance.

Table 1 - Annual Operator Training

System Class	Continuing Education	On-the Job Practical	Total*
Limited System – Ground	7 hours	13 hours	20 hours
Limited System – Surface	7 hours	13 hours	20 hours
Class I	7 hours	23 hours	30 hours
Class II	12 hours	23 hours	35 hours
Class III	14 hours	26 hours	40 hours
Class IV	14 hours	36 hours	50 hours

**The annual hours of training can be averaged over three years, the total number of three years worth of training could be taken in one year if so required.*

'Director approved' continuing education programs are structured courses that involve two-way communication between the learner and the trainer, and are OETC-approved, on behalf of the MOE. The instructor provides feedback in a manner that allows them to monitor the learner's progress. These types of courses have documented learning objectives and specified evaluation techniques and trainers must have background and experience in providing adult education for the drinking water industry; examples include chemical feed dosing and proper traffic control techniques.

In addition the operator must take a MOE approved course, "Preventing Water Borne Illnesses" every three years as a condition of licensing; the course outlines "the critical role that capable, well trained and dedicated operators have in protecting the safety of drinking water" (MOE 2005). The course also explains the importance of applying regulations, standards, and policies dealing with water quality, and discusses the emerging issues facing the water industry.

WCWC Distance Education Enterprise Strategy

This business plan proposes a distance education enterprise that would facilitate proper training and sustained competency for operators, not only in the more densely populated areas of southern Ontario, but also in more remote locations in northern Ontario. Issues to be reviewed include provincial agency relationships, operator training requirements, the reality of distance education within the drinking water industry, and culminating in the implementation of a proposed distance education enterprise at the Walkerton Clean Water Centre (WCWC).

The distance enterprise would develop the necessary content for the distance education programming and build links to distance education specialists, such as website designers and application specialists. The distance education enterprise would act as a distance education incubator for drinking water trainers and course content specialists. It would provide an environment within which experienced and knowledgeable operations staff would develop distance education applications with the help of others. This aligns with the mission and mandate of the WCWC, to deliver and coordinate training for drinking water operators across Ontario.

Though WCWC will enable distance education applications and modes in order to distribute this form of education to the drinking water and wastewater utility sectors across Ontario, it will also work with others beyond Ontario's borders so as to optimize the development of online material or learning objects.

It is not likely that distance education will dominate the drinking water operator's educational landscape, as there will always be a need for "hands-on training. This is noted in the SWOT analysis in several areas. Complimenting existing programming is very important and building linkages is critical to the ultimate success of the WCWC Distance Education Enterprise.

The question that is important to address is whether the WCWC Distance Education Enterprise needs to capture market share or perhaps they should take on the role of an incubator and facilitator instead. Since the WCWC's mandate is to provide operator training and research, it is recommended that a distance education incubator be created within the centre to drive development of distance education programming to fulfill WCWC's objectives and those of Ontario's.

Vision

The Walkerton Clean Water Centre's vision is "to create a world-class institute dedicated to safe and secure drinking water for the people of Ontario".

Mandate

1) To deliver drinking water education and training for owners, operators and operating authorities of drinking water systems.
2) In collaboration with other training organizations, to coordinate the accessibility and availability of education and training for owners and operators.
3) To provide support to owners, operators and operating authorities with a primary focus on small, remote and older systems by providing information and advice .
4) Optimization of existing treatment methods and technologies.
5) To demonstrate leading-edge drinking water treatment technology.
6) To advise the Minister on research and development priorities within the Centre's mandate in order to achieve safe drinking water. The Centre is sponsoring high-priority drinking water research that contributes directly to the Centre's training mandate. The Centre could network with the Advisory Council on Drinking Water Quality and Testing Standards to identify research needs.
7) To provide, both directly and through partnerships with other organizations and in coordination with the Ministry, public outreach and education relating to the Centre's mandate and to make technical, scientific and regulatory information more readily available.
8) To provide other services as described in any policy direction issued by, or set out in any agreement with, the Minister that helps to ensure safe drinking water.

Objectives

The objective of the Centre is to do the following, either alone or in conjunction with other organizations:

1) To coordinate and deliver education and training for owners, operators and operating authorities of drinking water systems.
2) To provide information, education and advice to owners, operators and operating authorities of drinking water systems and to the public about:

    i. the treatment of water necessary to ensure that drinking water is safe,
    ii. the equipment and technology used to ensure that drinking water is safe,
    iii. the operational requirements necessary to ensure that drinking water is safe, and
    iv. other environmental issues relating to drinking water.

3) To sponsor research into any activities related to its objects.
4) To provide advice to the Minister on research and development priorities to achieve and maintain safe drinking water.
5) To conduct such further activities, consistent with its objects, as are described in any policy direction issued by the Minister or as set out in any agreement with the Minister.

To fulfill these objectives, the Centre will continue to develop and deliver an appropriate array of technical training and curriculum; demonstrate the application and use of leading-edge technology to deal with water quality issues and treatment requirements; and sponsor high-priority drinking water research.

We will make sure training and education about drinking water is available and accessible to operators, owners and operating authorities of Ontario's drinking water systems, especially those serving rural and remote areas, as well as First Nations.

The Distance Education Enterprise strategy aligns with Objectives #1 and #6 of the WCWC's Mission Vision-Mandate-Objectives statements and generally follow the theme of provision of accessible and appreciate education and training to operators, in collaborative manner with other like-minded organizations or agencies. This will be the them that this strategy that will be discussed in this business case.

Potential Customer Sensitivities: Perception versus Reality of Distance Education

Conestoga Rovers and Associates (2005) completed a needs assessment on behalf of the WCWC to determine the current state of Ontario's operator training; their assessment included concerns from a variety of public-sector drinking water industry stakeholders. Of significance was the comment that "technology-based training was discussed during the "think tanks" as an alternative which could help to alleviate some of the accessibility issues for small and remote communities. It became apparent that distance education options are limited because operators tend to learn more from collaborative-based training, there is a strong need for hands-on training, some communities have very limited access to the Internet or video-conferencing facilities, and some operators may have computer literacy issues. However, there was extensive discussion, which indicated that technology-based and correspondence courses should be considered to some extent, as one option for alleviating accessibility issues" (p.14).

Not surprisingly, stakeholders see the value of technology in solving the some of the challenges of operator continuing education but, based on their experience, indicate that online computer training cannot provide a collaborative learning environment but that hands-on training does. Garrison (2000) acknowledges this issue, by referring to Peters, "the difficulty of replicating face to face interaction by mediated means" (p. 14). To most lay-persons, their frame of reference is that face-to-face learning is the ultimate manner to learn information, concepts, and procedures. However, as many authors have noted, it is not the medium so much as the manner in which the education program is developed. Garrison (2000) describes Holmberg's concepts of didactic conversation, where "well-developed self-instructional materials resulting in feelings of a personal relationship, intellectual pleasure and study motivation" (p. 15).

Analysis of the Competition

A scan of the competition was completed, by starting with a review of the Ontario Environmental Training Consortium (OETC) website, where it maintains a list of available trainers and associations that provide information about training opportunities. Table 2 shows a sample of 25 organizations that provide some form of training or education to the drinking water and wastewater sectors.

Table 2 - Training Organizations & Modes

Company Name	***Website***	***Organization Type***	***Instructor Delivered Training (FtoF)***	***Correspondence***	***On-line Training Modules***	***Asynchronous Distance Education***
Algonquin College of Applied Arts and Technology	***www.algonquincollege.com***	*Public- not for profit*	*yes*	*no*	*no*	*no*
American Water Works Association (AWWA)	***www.awwa.org***	*Industry Association*	*yes*	*no*	*yes*	*yes*
Approved Environment Inc	***www.approvedce.com***	*Private – for profit*	*yes*	*no*	*yes*	*no*
California State University	***www.owp.csus.edu***	*Public- not for profit*	*no*	*yes*	*yes*	*no*
Cambrian College	***www.cambrianc.on.ca***	*Public- not for profit*	*yes*	*no*	*no*	*no*
Clear Water Legacy	***www.clearwaterlegacy.com***	*Private – for profit*	*yes*	*no*	*no*	*no*
Water Industry - Technical Training International	***www.witticorp.com***	*Private – for profit*	*yes*	*yes*	*yes*	*yes*
Electrical Utilities Safety Association	***www.eusa.on.ca***	*Industry Association*	*yes*	*no*	*no*	*no*
Environmental Training Institute	***www.etivc.org***	*Private – for profit*	*yes*	*no*	*no*	*no*
Henderson, Paddon Environmental Inc.	***www.hp.on.ca/training.htm***	*Private – for profit*	*yes*	*no*	*no*	*no*

Hetek Solutions Inc.	***www.hetek.com***	*Private – for profit*	*yes*	*no*	*no*	*no*
Keewaytinook Centre of Excellence	***www.watertraining.ca***	*Public- not for profit*	*yes*	*no*	*no*	*no*
MacViro Consultants Inc.	***www.owotc.com***	*Private – for profit*	*yes*	*no*	*no*	*no*
Mohawk College	***www.mohawkcollege.ca***	*Public- not for profit*	*yes*	*no*	*no*	*no*
Municipal Engineers Association	***www.municipalengineers.on.ca***	*Industry Association*	*yes*	*no*	*no*	*no*
Ontario Good Roads Association	***www.ogra.org***	*Industry Association*	*yes*	*no*	*no*	*no*
Municipal Health and Safety Association	***www.mhsao.com***	*Industry Association*	*yes*	*no*	*no*	*no*
Northern College of Applied Arts and Technology	***www.northernc.on.ca***	*Public- not for profit*	*yes*	*no*	*no*	*no*
Ontario First Nations Technical Services Corporation	***www.ofntsc.org***	*Public- not for profit*	*yes*	*no*	*no*	*no*
Ontario Water Works Association	***www.owwa.com***	*Industry Association*	*yes*	*no*	*no*	*no*
Tangible Skills Training	***www.tangibleskills.ca***	*Private – for profit*	*yes*	*no*	*no*	*no*
Sault College of Applied Arts and Technology	***www.saultc.on.ca***	*Public- not for profit*	*yes*	*no*	*no*	*no*
Technical Learning Courses	***hometown.aol.ca/Tlearncourses/tlcourse.htm***	*Private – for profit*	*yes*	*no*	*no*	*no*
XCG Training	***www.xcg.com***	*Private – for profit*	*yes*	*no*	*no*	*no*
Water Environment Association of Ontario	***www.weao.org***	*Industry Association*	*yes*	*no*	*no*	*no*

Table 3 provides a summary of those results, with only 16% offering any form of distance education training, including correspondence, online training modules and asynchronous distance education, of which only 8% offer the latter. In this regard the asynchronous distance education amounts to an instructor answering questions from the students about the online material that has been presented, with no conferencing with other students.

Table 3 - Summary of Training Organizations

Organization Type	***Number of Organizations***	***Instructor Delivered Training (FtoF)***	***Correspondence***	***On-line Training Modules***	***Asynchronous Distance Education***
Public- not for profit	8	7	1	1	0
Private – for profit	7	7	0	1	1
Industry Association	10	10	1	2	1
Total	25	24	2	4	2
% organizations delivering mode		**96%**	**8%**	**16%**	**8%**

Scan of Training Costs

Some of the websites provided cost information related to the various training provided. The cost for training ranged widely and an exhaustive analysis was not completed of every course. Based on the experience of the author course one day of instructor delivered training ranges anywhere from $200 to $500 per day per participant dependent on the nature of the course. The vendors that provided on-line training for about $50 to $200 per course.

SWOT Analysis

Strengths

Currently, the Ontario Water Works Association (OWWA) and Water Environment Association of Ontario (WEAO), along with several other volunteer industry associations, are involved with development and review of Ontario water system regulations, guidelines, and procedures. This peer reviewer approach has been effective to date at ensuring that best practices drawn from other jurisdictions are successfully implemented in Ontario.

This proven process would be valuable for review and evaluation of existing course content, development of examinations, and addition of future content. As these peer reviewers may not have the necessary skills to address pedagogical issues in applying distance education, partnerships with agencies such as Contact North or CONNECT would be valuable in ensuring that effective distance education techniques are applied in the drinking water industry.

Weaknesses

The industry is a very technology savvy industry, pumps, electronics, etc. and yet the learning approach is still very focused on non-technological oriented solutions related to educating operators. Coupled with this paradigm, the manner in which the Director approved courses are evaluated is based on face to face learning time with an instructor. So there is an inherent bias built into the type of training that is expected to happen, this is not to say that this could be interpreted differently nor the criteria changed.

From the Conestoga Rovers and Associates (2005) report it was noted that, “northern and remote communities have stated that they have unique issues because of location. Distance and travel costs are prohibitive to operators who have to leave for training. In some cases, communities may be totally isolated and require fly-in transportation. Small communities often must rely on outsiders to supply many things including training” (p. 16). Even if remote communities could afford to send their operator away for training, a lack of staff redundancy poses a major challenge, as a certified operator needs to be available to monitor and operate a water system year round.

From the southern Ontario municipal perspective, systems are larger, have more operators to run them, have greater flexibility when it comes to sending them away on training due to staff redundancy, but face significant training expenditures due to sheer numbers of operators. Both large and small communities across Ontario are facing increased operator training costs, and this pressure will continue to

grow in the next three years as operators and municipalities are faced with meeting regulatory requirements.

As mentioned above, only 16% of training organizations offer any form of distance education training, including correspondence, online training modules and asynchronous distance education, of which only 8% offer the latter. Learners take a more passive stance when faced with a television program, website, or study guide. Currently there very few courses that are being offered that provide an asynchronous conferencing approach, the closest being the courses offered by the Water Industry - Technical Training International. Conferencing technology offers an added dimension for the instructor to help learners 'think out and test content'—this is a critical skill for instructors to develop. Rumble (2001) agreed that teleconferences help learners form ideas, discuss them, develop arguments and build knowledge in layers.

Opportunities

Any initiative should look beyond the provincial boundaries and review what other jurisdictions with similar challenges are doing; examples might include online water and wastewater training courses developed by the American Water Works Association (2005) or the California State University (2005). The courses are computer-based, delivered over the internet, and include lessons, readings, video clips, animated illustrations, student exercises, and online exams. Online training could incorporate threaded discussion groups for students to discuss coursework with their peers and a messaging system for asking course-related questions of an instructor or industry expert. The readings, student exercises, and video clips are contained on a companion CD that integrates with the online materials.

These jurisdictions have varying levels of developed course content and though not specific to the Ontario's regulatory environment, basic learning objects can be shared (with minor modifications to appropriate language and units of measure). Development of online course materials can be constructed as learning objects, site specific learning objects could be swapped out (depending on jurisdiction) with best practices remaining the same. Using these techniques a significant portion of OIT training and operator examinations could be delivered through the use of the internet, or asynchronous conferences. These materials can come in the form of video-conferencing, live webcasts, computer-based learning (CD-ROM, internet and system simulation).

Partnerships with other agencies, centres, and networks offer opportunities to leverage existing knowledge and experiences while minimizing WCWC costs. Through partners such as Contact North, CONNECT the community college network much of the necessary distance education experience and infrastructure could be obtained. Each of these partners offer skills and experience which could prove

invaluable during the initial implementation of the distance education programming and would help to sustain the program over the longer term.

The mandate of Contact North (2005) is to support innovation in education and learning through testing and applied research of new modes of "delivery" using technology and to share information in Northern Ontario. Contact North has valuable experience in delivering innovative, flexible education and training delivery systems, is familiar with the barriers of distance and sparse population, and has 145 distance education and training access centres in over 100 communities across Northern Ontario.

The Keewaytinook Centre of Excellence (2005) offers a special opportunity to work with First Nations communities located in Northern Ontario as it is a pilot program which provides technical and academic training for water plant operators.

Fostering a 'Community of Learners' provides an opportunity for ongoing relationships between participants, with existing industry associations such as the OWWA or WEAO augmenting this community. Web forums for operator discussions could instill a sense of community, provide a connection within the trade, and assist with on-going learning issues. The issue of developing a community of learners is critical to the ultimate success of the learners and as Wegner (2001) noted "a learning community can both support and challenge each other, leading to effective and relevant knowledge construction" (Anderson, 2004, p. 38).

In remote and First Nation communities it is particularly important that the students have an opportunity to meet the instructor as it reinforces the learning relationship. Haughey (1995) reiterates the importance of this relationship; these regional learning hubs can also help to share operator resources between close communities, serve as networking centres to assist in mentoring and encourage recruitment from a larger population base. Trainers or training providers would be located centrally and hubs could assist in coordinating fly-in training or scheduling mobile units.

Consideration should also be given to the Circuit Rider Program developed by the Ministry of Indian and Northern Affairs (via the Ontario First Nations Technical Services Corps). Its purpose is to send qualified operator instructors to remote First Nation communities on a 4 to 6 week cycle, spending about a week with the community's operator to provide training and mentoring. This program would augment the distance education component and help to provide teacher-student interface.

Threats

Not surprisingly, stakeholders see the value of technology in solving the some of the challenges of operator continuing education but, based on their experience, indicate that online education cannot provide a collaborative learning environment but that hands-on training does. Garrison (2000)

acknowledges this issue, by referring to Peters, "the difficulty of replicating face to face interaction by mediated means" (p. 14). To most learners their frame of reference is that of the face-to-face learning experience and that it is the ultimate manner to learn information, concepts, and procedures. However, as many authors have noted, it is not the medium so much as the manner in which the education program is developed.

There is a significant bias in the drinking water industry towards face-to-face training as there has been limited efforts to develop distance education courses. In Ontario, more than 90 percent of operator training, currently provided by private consultants or equipment supply companies, is face-to-face in nature, with the learner either going to a centralized training location and having a technical expert present information or having the expert come on-site and providing hands-on training. In the existing environment there will be many private consultants and other organizations that will raise much "hue and cry" about the perceived limitations of distance education, without acknowledging the limitations of face to face training, such as learner retention, engagement and the associated training costs.

SWOT Analysis Summary

Table 4 - SWOT Summary of Results

Strengths • Peer reviewer approach has been effective to date at ensuring that best practices drawn from other jurisdictions are successfully implemented in Ontario • Partnerships with agencies such as Contact North or CONNECT would be valuable in ensuring that effective distance education techniques are applied in the drinking water industry. • The Keewaytinook Centre of Excellence (2005) offers a special opportunity to work with First Nations communities located in Northern Ontario as it is a pilot program which provides technical and academic training for water plant operators.	Weaknesses • In Ontario, more than 90 percent of operator training, currently provided by private consultants or equipment supply companies, is face-to-face in nature, • Only 16% of training organizations offer any form of distance education training, including correspondence, online training modules and asynchronous distance education, of which only 8% offer the latter • It is important to note that very few trainers have formal adult education certification; their training knowledge is gained by experience • Both large and small communities across Ontario are facing increased operator training costs, and this pressure will continue to grow.
Opportunities • Look beyond provincial boundaries and review what other jurisdictions with similar challenges • Develop online course materials that use learning objects, site specific learning objects could be swapped out (depending on jurisdiction) with best practices remaining the same. • Partnerships with other agencies, centres, and networks offer opportunities to leverage existing knowledge and experiences while minimizing WCWC costs. • Foster a 'Community of Learners' to build relationships between participants, with existing industry associations such as the OWWA or WEAO augmenting this community. • Utilize the Circuit Rider Program (Ontario First Nations Technical Services Corps) to augment the distance education component and help to provide teacher-student interface.	Threats • Significant bias in the drinking water industry towards face-to-face training • Overcoming the perception that distance education cannot provide a collaborative learning environment like face to face education does.

Multi-Year Strategic Goals

SWOT Issue/Risk	Strategic Goal	Resource Estimates
• Very few trainers have formal adult education certification and even fewer still have a distance education bias.	Align with industry organizations that have influence to change the perception with trainers.	Implement a red ribbon panel of distance education experts to raise the profile of distance education in remote areas and work with the AWWA, OWWA and WEAO to promote this. ***Assumption: $50,000 (Yr 1)***
• Only 16% of training organizations offer any form of distance education training, including correspondence, online training modules and only 8% offer asynchronous distance education.	Assess the training and education needs of drinking water operators with a specific bias towards distance education. Look for opportunities to expand this mode within the province. Make the WCWC a distance education specialist… or a change agent.	Complete research on the available training, what is needed and how it could be driven by distance education. Hire distance education specialists to assist on completing the needs assessment. ***Assumption $150,000 (Yr 1, 2)***
• Both large and small communities across Ontario are facing increased operator training costs, and this pressure will continue to grow.	Develop core course material around reaching out to remote communities and help support the necessary infrastructure to overcome technological barriers.	Requires a manager knowledgeable in distance education to provide necessary support for distance education applications. Utilize contracted consultants to design course material. ***Assumption: $400,000 (Yr 2, 3)***
• Overcome perception that distance education cannot provide a collaborative learning environment like face to face education does.	Demonstrate to industry training consultants the potential of distance education modes and pedagogy.	Requires a manager knowledgeable in distance education to provide necessary support for distance education applications. Two additional staff would work with necessary contracted personnel with specific training in the design, instruction, and support of distance education programs. ***Assumption: $450,000 (Yr 3, 4, 5)***
• Significant bias in the drinking water industry towards face-to-face training.	Encourage training companies to develop course material that aligns with the WCWC's distance education objective. These courses would be deemed Director Approved in a similar fashion as face to face course material.	Work with OETC to evaluate distance education course to ensure that courses are Director Approved. ***Assumption: $60,000 (Yr 3,4,5)***

Table 5 - Five (5) Year Cost Analysis

Five Year Costs Analysis	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total Costs**
Red Ribbon Panel	$50,000					**$50,000.00**
R&D of D.E. Applications	$75,000	$75,000				**$150,000.00**
Develop D.E. Core Course Material		$200,000	$200,000			**$400,000.00**
Demo & Market D.E. Courses			$150,000	$150,000	$150,000	**$450,000.00**
Director Approved D.E. Courses			$20,000	$20,000	$20,000	**$60,000.00**
					Total Cost =	**$1,100,000**

Note: revenue analysis was not completed, but it is assumed that it could come from a mix of government support and course sales to utilities and municipalities.

Concluding Remarks

An opportunity exists to develop a distance education enterprise within the newly emerging WCWC to change the manner in which drinking water operator training is delivered in Ontario. With a focus on developing partnerships and sharing ideas with agencies with previous distance education experience, there is the opportunity to make distance education the norm and not the exception in the drinking water industry.

Distance education has merits for discussion, based on the educational content that operators are expected to learn and apply, and particularly related to knowledge and attitude issues. It must be recognized that there is a significant bias in the drinking water industry towards face-to-face training as there has been limited efforts to develop distance education courses. Therefore this poses a significant shift in thinking about how distance education can make a difference in the provision of operator training.

In conclusion, the WCWC needs to continue as a catalyst for change within the drinking water industry, but with a specific focus on the utilization of distance education as the primary mode for delivery of drinking water education and training within the province of Ontario.

References

Anderson (2004). *Toward a theory of online learning.* Theory and Practice of Online Learning. Athabasca University. Canada. Retrieved November 1, 2005 from AU web site: www.athabscau.ca

Conestoga-Rovers and Associates. (2005). *Phase 1 report - Ontario operator training needs assessment for the Walkerton Clean Water Centre*, Walkerton Clean Water Centre, Retrieved November 24, 2005 from WCWC web site: http://www.wcwc.ca/training.htm

Garrison, R.(2000). *Theoretical Challenges for Distance Education in the 21st Century: A shift from structural to transactional issues.* Athabasca University, Canada.

Haughey, M. (1995). *Distinctions in distance: is distance education an obsolete term? Why the information highway?*, Toronto:Trifolium Books Inc.

O'Connor, D. (2002). *Part two report of the Walkerton Commission of Inquiry.* Ontario Ministry of Attorney General. Retrieved November 24, 2005 from MAG web site: http://www.attorneygeneral.jus.gov.on.ca/english/about/pubs/walkerton/part2/

Rumble, G. (2001). *Re-inventing distance education, 1971-2001.* International Journal of Lifelong Education, 20(1/2), 31-34. Taylor and Francis Limited.