Learn Where You Live, Teach From a Distance: Choosing the Best Technology for Distributed Nursing Education

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Abstract

Rural and remote communities within the Circumpolar World have been challenged to provide on-site opportunities for post-secondary education due to geographical barriers and a lack of available resources. Distributed learning is defined as the separation of time and/or space in teaching and learning and therefore offers possibilities that can be tailored for programs, faculty, and individual students. Distributed learning not only mitigates geographical and resource challenges but, most importantly, it provides learning experiences that are context relevant. The intent of this report is to illustrate how one western Canadian nursing education program has moved beyond traditional methods of educational distance delivery to include a more learner-centred approach. The "learn where you live" program was developed to provide accessible, quality undergraduate nursing education to northern rural and remote communities. This novel educational approach supports the educator to be in two places at one time in a synchronous, face-to-face delivery in which students are taught from a distance rather than having to relocate. This approach to nursing education is based on the premise that it is the educator and not the student who is remotely situated. The authors advise that there is no normative preference for a particular type of technology. Best practices are evolving through circumpolar collaborative partnerships in northern nursing education. This report is part of a special collection from members of the University of the Arctic Thematic Network on Northern Nursing Education. The collection explores models of decentralized and distributed university-level nursing education across the Circumpolar North.

Keywords: Indigenous; northern; remote presence; robotics; capacity building; distributed education; nursing

Northern Saskatchewan is a large region making up approximately half of the province of Saskatchewan. There are about 36,000 people residing in seventy communities in Northern Saskatchewan, and the population is cared for under the auspices of three health regions—the Keewatin Yatthé Regional Health Authority, Mamawetan Churchill River Health Region, and the Athabasca Health Authority (Irvine, Quinn, & Stockdale, 2011). Approximately 85% of the population self-identify as Indigenous—with 62% being Cree and Dene and 22% Métis (Irvine, Quinn, & Stockdale, 2011). Indigenous peoples represent 73% of the northern workforce (College of Nursing, 2015). However, in the health professions, this representation drops to 35% (Laurence Thompson Consulting, 2012). For example, of the 12,162 registered nurses (RNs) licensed to practise in Saskatchewan, only 6.1% are Indigenous (Statistics Canada, 2011). Social Workers and RNs constitute the greatest gaps in health human-resource planning in Northern Saskatchewan. Retention is challenging with high turnover and vacancy rates for RNs. While high turnover and vacancy rates are largely responsible for the continued shortage of health professionals in northern communities (Northern Labour Market Committee, 2012), the requirement of a practising RN to have an undergraduate nursing degree (Saskatchewan Registered Nurses' Association, 2014) compounds this problem, and it is apparent that accessibility to nursing education is the major barrier (College of Nursing, 2015).

Given that the highest proportion of the Indigenous population in Northern Saskatchewan is under age fifteen (Irvine, Quinn, & Stockdale, 2011), the time is right for universities to be innovative and creative in providing access to education. This is particularly relevant in the health sciences. Currently, there are 277 self-identified Indigenous students enrolled in the health sciences at the University of Saskatchewan. A total of 165 of those are in nursing, which constitutes 17.3 % of the students enrolled in the nursing program. This is followed by the College of Dentistry with eleven Indigenous students or 9.6% of that college's total enrolment. Since The College of Nursing began the "learn where you live" program in 2011, the percentage of Indigenous students has increased from 9.2% to 17.3%. The overall student enrolment within the university has seen more moderate change since 2012. The Indigenous student population has increased from 7.7% in 2012 to 11.8% currently, thus supporting the evidence that providing accessibility has had an impact on enrolment in nursing education (College of Nursing, 2015).

A Call to Action

The final report of the Truth and Reconciliation Commission of Canada documented the events and abuses in Canada's Indian residential schools, and identified ninety-four recommendations to mitigate and redress the legacy of the residential schools (TRC, 2015). This report challenged Canadians to consider the recommendations as opportunities to change behaviours that have contributed to the present social determinants of health confronting Aboriginal people (TRC, 2015). The commission's message was not about Indigenous people, specifically, but rather about addressing a societal need to find common ground, build relationships, and invest in human capital in order to change the existing disparities. At the core of this recommended change is education. Universities are well positioned to influence teaching by redirecting the focus on "policy to practice" approaches that are both purposeful and actionable. Additionally, shifting capacity building from an individual student level to stronger, healthier communities in support of youth who are seeking post-secondary education, is a sustainable investment (University of Saskatchewan, 2015).

While the TRC of Canada (2015) advocated for accessibility to equitable education, the College of Nursing had already developed and enacted the "learn where you live" program in 2012, positioning the University of Saskatchewan as a leading post-secondary educational institution by investing in northern communities to support the development of a new workforce. By using the definition of distributed learning as the separation of time and/or space in teaching and learning, the College of Nursing embarked on a community-centric approach to nursing education. The goal was to introduce the program to the community with a reciprocal goal of learning Indigenous ways of knowing and understandings of health within the local context for inclusion in the nursing curriculum (Berry, Butler, & Wright, 2014).

Learn Where You Live

In 2012, community leaders in Northern Saskatchewan requested assistance from the College of Nursing to address a prolonged nursing shortage. In response, the college developed the "learn where you live" program and designated two inaugural sites in the communities of La Ronge and Île-à-la-Crosse. Key to this approach has been a unique use of distributed learning including treating our various sites not as "off-campus" or peripheral locations in a "hub and spoke" model, but as equal and distinctive constituents (College of Nursing, 2015).

The goals of the "learn where you live" approach were to ensure students would not be disadvantaged by geography, to build on existing strengths and resources in communities, to provide students with choices for post-secondary education, and to reflect the emerging demographics of the province's Indigenous people. To meet these goals in the delivery of student-centered education, learning was considered local, and the educational provider was considered remote. Therefore, the caption, "learn where you live, teach from a distance" became relevant and unique when compared to traditional strategies including video conferencing, telephone, and online methods in which the student was considered to be remote (O'Conner & Andrews, 2015; Sampsel, Bharwani, Mehing, & Smith, 2011). This unique approach required a change in thinking about the traditional strategies used for the delivery of distance education. Now, rather than students learning from a distance, the teaching was done from a distance. The literature describes experiences with distance delivery methods for nursing education programs with no face-to-face teaching (Newton, 2007; O'Conner & Andrews, 2015; Sampsel, Bharwani, Mehing, & Smith, 2011). However, while this new distributed method includes face-to-face contact, it is not necessarily physical in nature. Synchronous teaching and learning became known as face to face, while asynchronous teaching and learning was considered individual learning without contact (Patterson, Krouse, & Roy, 2012). It was difficult to use best practice approaches to distributed learning because there was no documented normative preference for any particular communication tool in the literature. Therefore, the approach used was to consider all available resources, within a particular context, as being equally valid.

Barriers Imposed by Technology

Implementing a distributed program acknowledges the spectrum of barriers imposed by the various delivery methods including face-to-face classrooms, hard copy materials via correspondence/postal service, web-based content posted online, audio conferencing, video conferencing, and remote presence robotics (Sowan & Jenkins, 2013). A meta-analysis of 103 articles describing undergraduate student experiences with an instructor at a distance revealed five generations of delivery methods, evolving from instructor-driven to student engagement singularly or in groups (Lou, Bernard, & Abrami, 2006). During the 1990s, first generation print-based correspondence evolved to second generation inclusion of audio and video using television, which further advanced to the third generation use of hypertext and teleconferencing. Taylor (2001) described more advanced

methods of fourth and fifth generations of flexible learning from using the Internet to using more interactive multimedia approaches. The meta-analysis revealed no difference in student learning or achievement with synchronous instructor-directed methods between host and distance sites. Students engaged in an asynchronous, independent learning environment were found to outperform those in traditional classrooms. Improvement in performance was noted when multimedia was used to enhance online discussions and computer-based instruction (for example, tutorials and simulations). Additionally, it was noted that providing students with details about the course in advance, as well as allowing them to participate in student-instructor discussions for feedback and coaching, allowed them to perform better. The overall conclusion suggested that while the inclusion of multimedia and interactive technologies were found to enhance student learning, the key to incorporating these resources was the pedagogical approach that focused on the student and not the content (Lou, Bernard, & Abrami, 2006).

Remote Presence Technology

To remain true to the expectations that rural and remote communities have for high-quality education that is comparable to the on-campus experience (Norbye & Wolff Skaalvik, 2013), it was incumbent upon the University of Saskatchewan College of Nursing to find ways to virtually bring remote faculty to the learners in the rural community of La Ronge and the remote community of Île-à-la-Crosse. Video conferencing, as a well-established and successful method for distance delivery (Sampsel, Bharwani, Mehing, & Smith, 2011; Wolff, Skaalvik, Gaski, & Norbye, 2014), was used to deliver theory-based courses. While the province of Saskatchewan had experience in telehealth for the delivery of medical services, this approach was not as well-established in providing health education in the region. The challenge was to find ways in which to teach nursing skills while supporting laboratory practices to ensure competency in performance. It was important that while students could learn where they lived, they were linked to the same professors as other students on the main campus to ensure that all nursing students received the same learning opportunities. An innovative information communications technology (ICT) system, referred to as remote presence (RP) robotics, was implemented as a means to deliver distance education.

Remote presence robotics have been used predominantly in the assessment and treatment of acute stroke (Sampsel, Bharwani, Mehing, & Smith, 2011). However, the successful application of this technology

in a clinical environment is transferable to the classroom and laboratory setting in support of student–faculty engagement for skill development and evaluation (Sampsel, Bharwani, Mehing, & Smith, 2011). In 2012, when the College of Nursing initially launched the "learn where you live" program in northern Saskatchewan, a blended approach of video conferencing and RP technology allowed for a dynamic and immersive experience for students to achieve learning objectives within the nursing curriculum.

Specifically, the RP system is a mobile, robotic communications platform that enables local access to remote health and educational professionals at facilities where it is deployed (InTouch, 2015). The network platform is comprised of software, control stations, and hardware end points in the form of mobile robots. The Control Station and RP end points are connected through the Internet over a securely encrypted network that is HIPAA compliant (i.e., the United States Health Insurance Portability and Accountability Act, which protects the privacy of health information).

The RP platform provides the opportunity for remote faculty to link with students located in the rural and remote centres for one-to-one and small class teaching (Lou, Bernard, & Abrami, 2006). As faculty and students in the College of Nursing have become more familiar with the features and capabilities of RP systems, innovative opportunities to extend the use of these tools have been explored. For example, when combined with video conferencing, RP has allowed faculty to connect with students in two different communities at the same time. Nursing students remain connected to each other through the video conferencing unit, while the faculty member "teleports" between the two northern sites located at La Ronge and Île-à-la-Crosse. Although the faculty member is not physically present with either group of students, the virtual presence of RP provides an immersive and transparent learning experience with students in their own unique environments. Faculty can switch sites in an instant while the video conference continuously links the two geographically separate student spaces, allowing the creation of interactive groups with equal exposure to the instructor. This type of synchronous interaction, which allows for a three-way learning opportunity across hundreds of kilometres, would not be possible using traditional tools and distance education approaches. Additionally, due to the mobile nature of the robot, bedside instruction, demonstration of skills, and student evaluation can be accomplished. For example, through the use of a variety of peripheral attachments including a stethoscope, otoscope, ophthalmoscope, and oral health camera, the faculty member at the remote site can listen, visualize,

and communicate in real time as the student participates in the learning experience.

Creating Pathways for Success with Communities

Northern health regions have limited experience with nursing students working and learning within their communities (Irvine, Quinn, & Stockdale, 2011). The College of Nursing at the University of Saskatchewan is one of two main providers of nursing education in the province. The College of Nursing viewed the "learn where you live" program as an opportunity for registered nurses employed in the northern communities of La Ronge and Île-à-la-Crosse to become involved in educating the next generation of nurses while supporting the college to become more relevant in incorporating northern nursing approaches and practices within the curriculum. Similar to the faculty, nurses practising in La Ronge and Île-à-la-Crosse were uncertain of expectations and how to support students in meeting clinical learning intents. Notably, the health regions viewed the opportunity to work with students as a strong endorsement for recruitment and retention strategies related to continuous learning. Moreover, the graduates of the program are well-versed in the application and opportunities of RP with an expectation that access to service delivery will no longer be a barrier to care. Families receive a wide range of specialist care without leaving their communities. To demonstrate the investment in the community, a "name the robot" contest was held locally, and an award was given for the winning name. This contest was widely broadcast and popular, and also provided the community with knowledge about the RP and its potential use including nursing education, health screening, acute care consults, and the delivery of education by other disciplines.

Building capacity was not only about human resource planning but also about opportunities to invest in the needs of communities, as identified by their members. To support the College of Nursing's approach of community-driven expectations, two comprehensive meetings with community stakeholders were held in June and November of 2015. The purpose of the meetings was twofold. The first objective was to establish, maintain, and enhance relationships amongst Indigenous communities, the College of Nursing, rural and remote nursing students, the Government of Saskatchewan, health regions, registered nurses, and other key stakeholders. The second objective was to consider the future of the nursing profession in these rural and remote communities, with the goal of developing a better understanding of stakeholder needs and how those needs could be better met. These needs included, but were not

limited to, education, skills, diversity, communication, and community needs. The discussions focused on questions such as "how can the community have voice?"; "how can we better educate nurses to succeed in different geographical and cultural settings?"; and, "what demographic information do we need to always be aware of?" The outcome of these comprehensive meetings included the creation of a strong community foundation and, ultimately, a stakeholder-based governance approach. As the relationship with the communities of La Ronge and Île-à-la-Crosse continue to develop, the College of Nursing will facilitate the advancement of the nursing profession. The College of Nursing's "learn where you live" program demonstrates innovation in education, research, and stakeholder engagement.

Taking Local to Global and Global to Local

While faculty had to learn to use technology for program delivery, they also had to learn how to be context relevant. For most faculty, their frame of reference and tacit knowledge did not include Indigenous ways of knowing. Students and community members engaged in the shared responsibility of helping faculty learn about the northern and Indigenous ways of being. Furthermore, the College of Nursing at the University of Saskatchewan sought help from other institutions within the Circumpolar World where Indigenous populations, social determinants of health, chronic disease management, and accessibility to nursing education demonstrated similar experiences to northern Saskatchewan. As a result, extensive sharing opportunities for both teaching and research have emerged with North-Eastern Federal University in Yakutsk, Siberia and with UiT the Arctic University of Norway in Tromsø, Norway.

Next Steps

The assumption that remote presence technology may serve to reduce health costs is well documented in the literature (Gandass, Parekh, Bleech, & Tong, 2007; Latifi, Hadeed, Rhee, O'Keeffe, Friese, Wynne, Ziemba, & Judkins, 2009; Sampsel, Vermeersch, & Doane, 2014). In terms of health education delivery, it is imperative to establish whether or not the innovative use of remote presence in the distributed nursing program in Saskatchewan is a more cost-effective and sustainable approach for northern nursing programs, and whether or not the quality of education is comparable to local, urban-based programming on campus. The outcome of these measures may inform the effectiveness of distributed nursing

education and the potential to transform health care itself. While data are limited due to the short time frame the program has been offered, the trend is toward the conclusion that remote presence is effective (see Table 1).

All students from the 2015 graduating class have successfully passed the National Council Licensure Examination for Registered Nurses (NCLEX–RN). For the 2016 graduating class, 100% success was achieved upon completion of the first writing of the examination.

Traditionally, stand-alone and modified versions of urban institutions have been created to deliver nursing education in northern regions, often at significant cost. Adapting and expanding state-of-the-art technology into nursing education delivery may help to offset these costs and may promote accessibility and quality of education in traditionally underserved rural and remote areas.

Table 1. Student progress in the northern program

Total number of students admitted to the nursing p0rogram	
2012 = 14 2014 = 6 2016 = 19* 2013 = 8 2015 = 16	63
Total number of graduates	
2015= 9 2016 = 4	13
Total number of students retained in nursing program in 2015 cohort	98%
Total Indigenous student enrolment in northern program*	93%

*as of September 22, 2016.

Source: College of Nursing, University of Saskatchewan

Modern technology approaches provide rural and remote students with an opportunity to truly learn where they live by eliminating geography as a disadvantage. Nursing students can participate in a post-secondary program delivered by remotely located faculty using a variety of complementary technologies to create learning experiences on par with the urban experiences. These opportunities were not possible in previous generations before the implementation of distributed learning. "Teleporting" faculty into the learning environment via a system that allows them physical independence and audio/visual immersion, and that is available on demand from anywhere in the world (with a network connection), may well be the dawn of the sixth generation of distributed learning.

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