Understanding Adaptive Orienteering Using Mobile Technologies in First Nations Communities: A Conceptual Framework

Paper by

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INTRODUCTION

This paper emerges from a doctoral research that responds to the question: how do Indigenous adult post-secondary learners use mobile technologies to pay systematic attention to, orient themselves and adapt to learning between multiple world views, particularly Eurocentric and First Nations ones? It is aimed more broadly to investigate cultural issues in the pedagogy of educational technology by exploring the cognitive movements that indigenous peoples such as First Nations peoples take, or are required to take, in order to comprehend lessons delivered in Eurocentric ways.

In this paper, Eurocentric ways of learning is defined in simple terms to mean learning that takes place in a formal structured classroom environment with qualified subject matter experts or instructors responsible for delivering content. In this context, students are required to learn, exhibit knowledge in the lessons taught by taking tests and writing exams, and to systematically proceed through the various learning steps until they graduate. Historically, this form of learning has been successful with some challenges especially with First Nations people where attrition rates continue to rise, enrollment numbers and graduation numbers continue to drop (Harper, 2007; Kirkness & Barnhardt, 2012; Kirkness, 1999; Raham, 2009; Sigurdson, Paulson, Poonwassie, Johnson, & Einarson, 2012).

This research explores a culture-centric approach in the utility of educational technology in an indigenous setting such as Oxford House henceforth referred to by its traditional indigenous name, Bunibonibe Cree Nation (BCN); a Northern reserve located 940 kms north of Winnipeg, Manitoba. Indigenous here refers to First Nations Canadians living on reserve and the research participants are indigenous people who are adult learners enrolled in a University College of the North (UCN) program.
The underlying research assumption here is that adult indigenous learners often make cognitive movements from their indigenous ways to Eurocentric ones in order to make meaning of what is being taught (Atleo, 2006). Such movements come from a “known” place or source domain to an “unkown” place or target domain, and then back to the known place, usually utilizing a mediator. In Atleo’s case of Nu-Chaa-Nulth Elders in British Columbia, she utilizes indigenous “source” metaphors as the mediator for understanding concepts and making meaning in the target domain. This paper utilizes technologies, such as mobile devices, i.e. iPads, iPods, mobile phones, etc. as mediatory devices that helps to facilitate cognitive movements from indigenous learning contexts to and from Eurocentric ones.

The research derives contextual impetus from two very important national and provincial policy and strategy documents: firstly, the University College of the North’s Recommendations and Action Plan (Kirkness, 2003) which mandates the UCN to meet the demands for delivering education to learners in remote Northern communities using technologies (UCN, 2016). Currently, UCN relies on technology and fly-in instructors for learning delivery. Secondly, the research is influenced by the Canada Digital 150 strategy document that promises high speed internet of at least 5Mps to over 356,000 Canadian households to a maximum national household coverage of 98% by 2017 (IC, 2014). Availability of broadband could improve the economic wellbeing and the social capital of Aboriginal people if utilized effectively (Mignone & Henley, 2009). These two documents provide a contextual base that supports education delivery to First Nations communities; even more so, the utility of mobile technologies to deliver learning.

The research is still underway at the point of writing this paper, thus, research findings are presented at a later stage. It is intended that the research participants will produce cultural digital artifacts within a formal class structure consistent with Eurocentric pedagogical practices while
exploring First Nations epistemologies through engaging with their communities to learn and acquire knowledge. This cross-cultural approach would be analyzed through data captured from interviews and reflections generated by the participants. The data will be analyzed to determine cognitive shifts that they may have experienced, using a conceptually developed adaptive orienteering framework.

This paper describes the aspect of the research involving the conceptual framework only. The paper is divided into three sections. The background section provides the rationale for the research and this paper. The literature review section provides a historic view of First Nations Education in Canada, and takes a look at the implementation of educational technologies in First Nations communities. The final section argues in support of a culturally-aware educational technology framework as a tool that could improve learning among indigenous peoples in First Nations communities.

BACKGROUND

In communities geographically removed from mainstream society, the reach of urban education is often minimal and participation in global matters of local importance is challenging (Carr, 2010; Spence, 2011). Students are often disconnected from important learning scenarios and case studies that would, in the least, bring alien concepts closer to them – concepts that may be useful in the future. In the least, learning employability concepts, skills and competencies for future work opportunities may appear to be one of the purposes of education. Even then, geographically dispersed learners are required to cognitively connect to urban examples or educators are required to generate contextually relevant examples that would produce the same sort of outcomes. In this latter case, students and instructors are required to relate their knowledge of culturally relevant
concepts (Ezeife, 2003) with new urban/relevant knowledge through a metaphorical mapping process framed in experiential learning in order to make meaning of them (Atleo, 2006).

One challenge of delivering education in dispersed communities results from the physical constraints associated with teaching there. For one, their locations are dispersed and the cost of transiting teachers for scheduled teaching periods is often prohibitive. First Nations communities such as Bunibonibee Cree Nation (BCN) which is located 940 KMs North of Winnipeg is no exception. To access BCN, teachers and other social workers would have to travel by plane. An alternative access is via seasonal winter roads that are often treacherous and slow. Thus the incentive for an urban teacher to deliver content in these remote communities must supersede the financial benefits associated with the quest. Often, intense connection with the community and passion for delivering knowledge to such communities underscore their motivation for continually engaging in this process.

During the course of gathering data for my doctoral research, I was fortunate to have BCN as my research location, to visit several times, and to engage with the research participants at the University College of the North (UCN) Center. In the process, I gained first hand experience of the challenges of delivering education and content to remote rural communities in Northern Manitoba and to comprehend the enormity of the task that the UCN has. I argue that educational technologies can be significant in addressing some of the concerns in this community. My doctoral research which explores the role that educational technology, especially mobile technologies, can play in educational delivery in rural community, aligns with two policy documents that could help to surmount this incredible task of delivering education to communities in Northern Manitoba and potentially across remote communities in Canada.
The first document is the *Canada Vision 150* document that commits the federal government to ensuring a 98% broadband coverage, of 5Mbps to all homes in Canada. Until April 1, 2016, BCN operated a CDMA wireless network sufficient only for voice communication within the community and no data at all. As a guest to the community, I was unable to access any wireless services for the duration of my trip, usually lasting days. My phone did not roam on the network and the frail Internet link provided by Wi-Fi to a radio link connected by satellite to the UCN center often provided very little reprieve. This infrastructure was incapable of delivering education content such as the use of a learning management system or video conferencing capability. On April 1, 2016, the CDMA network was switched off and a HSPA network was implemented by MTS. This new network infrastructure allowed the entire community to share 1GB of wireless Internet for data access (Conversation with MTS representative, 2016) and for use on social media such as Facebook and Twitter. As of April 1, 2016, my phone can roam in these communities and I am able to stay connected with family and friends whenever I visit the community, albeit with errant connection speeds.

The second document that has a potential for boosting education delivery was developed after series of consultations with community members, Northern elders and various education stakeholders over two decades ago. After several years of dialogue and months of agitation, the *University College of the North Action Plan* document was created in 2003 that tasked the UCN to deliver education to remote Northern communities and to plug educational gaps by delivering learning (Kirkness, 1999, 2003) using information and communication technologies as the “glue that can hold a far-flung operation together” (Kirkness, 2003, p. 17). Today, UCN has two main campuses and 12 regional centers in Northern communities one of which is in BCN, delivering various continuing education, diploma and degree programs to adult learners. The research
participants in this project are adult students who are enrolled in UCN programs and who reside in BCN.

These documents provide the policy bases for my doctoral thesis and the impetus for this research paper because they underscore the importance of educational technology as an integral and successful contributor and a vehicle that can produce social and economic growth and development in Northern communities including BCN.

I came about this research following several years of development work in rural and remote communities in West Africa where I had worked to deliver access to knowledge and educational content; to youths and women often in post-conflict situations. In Guinea Bissau, an agricultural resource-rich but economically poor country in Africa, I worked with several communities to establish and install community radio stations through which members of the society engaged in policy dialogue amongst themselves and subsequently with policy makers and politicians. The radios provided platforms for cognitive engagement, cultural interchange, access to information and knowledge, and advocacy tools on issues that had relevance and benefits to their communities. In Sierra Leone, The Gambia, Liberia and remote Ghanaian communities, I engaged in setting up rural community centers and libraries with computers where single women learned life skills like basket making, hair dressing, and computer/technology skills that enabled them to develop and market their wares within and outside their communities using the internet, thereby enhancing their economic and social capital.

Through these community-based projects, I recognized the importance of information and communication technologies in empowering marginalized indigenous communities in confronting their social and economic challenges through enhanced access to knowledge and information, and through engaging in policy formulations that concern them.
Increasingly, I see the role of information and communication technologies in providing a tremendous opportunity for social and economic development through the delivery of education and content (Carpenter, 2004; Edewor, Imhonopi, & Urim, 2014; Fillion, Limayem, Laferriere, & Mantha, 2009; Leopard, 2012; Pirbhai-Illitch, Turner, & Austin, 2009; Plante, 2005; Utulu & Alonge, 2012). They can foster the creation and delivery of content, collaborative learning, and student-teacher communication. They are also disruptive in that they challenge what we know as the balance of society. For instance, they have shaped the relationship between industries and educational institutions (Cuban, 2003); facilitated global flows of knowledge and movement of students and faculties across borders and boundaries; and, improved intercultural engagement (Appadurai, 1996, 2000; Brydon, 2012). Thus, it is not inconceivable that institutions such as the University College of the North would look to educational technologies to meet its mandate of delivering education to remote communities in Northern Manitoba (Kirkness, 2003).

However, while educational technologies hold tremendous promise, they are not a silver bullet that would address all the challenges of First Nations’ education. A broad base systematic approach is required to confront the various factors that continually challenge education in Northern Manitoba despite various research efforts and government interventions.

While educational technologies, or information and communication technologies hold promise in improving current negative, yet improving statistics of First Nations education (see the literature review section), it remains a double-edged sword (McGrail, 2006) with positives and potentially negative outcomes and unintended consequences (Cuban, 2003). For instance, the implementation of the HSPA network in BCN has resulted in increased access to, and ability to create mobile and Internet content that could have potential economic and social benefits, with a
consequential increase in instances of cyber bullying in the community (confidential statement by community member, May 2016).

Another challenge of implementing technology in remote communities results from lessons learned during the era of ICT4D or information and communication technology for development instituted by most developed communities to deliver technology solutions to developing countries as an answer to poverty. These projects could not meet their purported mandates and millions of dollars were sunk without attaining their “poverty reducing” objectives (Geldof, Grimshaw, Kleine, & Unwin, 2011; Heeks, 2002, 2010). An understanding of the context within which these projects were implemented that could enhance their potential benefits to the communities in a culturally sensitive manner was absent thereby resulting in projects that failed to address their needs.

The purpose of this paper, framed as an outcome of my doctoral research is to avoid such costly mistakes, to minimize the impacts of negative unintended consequences, and to explore a conceptual framework that would enable educational policy makers, administrators and instructional designers, especially those exploring the potential of mobile technology to consider certain factors necessary for successful and sustained implementations in rural remote indigenous communities in Canada such as in BCN. Prior to describing the framework, it is important to review the trajectory of First Nations Education and the role that technology has played in the past few years.

LITERATURE REVIEW

First Nations Education in Canada

The post-secondary system in Canada is a complex arrangement of various stakeholders consisting of public and private colleges and universities, government, and the governance arrangements between them (Smith, p. 48). Post-secondary institutions in Canada are certificate,
Provincial governments are responsible for legislative, administrative and coordinating powers for post-secondary education. Jurisdiction over First Nations education is retained by the Federal government as is oversight of vocational and technical training because of its strong link to national economic priorities aimed at preparing Canada for the global economy. The Human Resources and Skills Development Canada (HSRDC) and the provinces are responsible for community college skills training programs and substantially influence university programs at various levels. The focus of federal and consequently provincial governments has been to increase Canadian competitiveness in the global knowledge economy through providing local skilled labour.

Post-secondary participation rates in Canada are quite high at 55% compared to other OECD countries at 33% for those aged between 25 and 34 (CCL, 2009) but abysmal between internal demographic groups such as low income families and Aboriginal students. Students from families earning less than $75,000 per year are less likely to enroll in universities than in colleges, thus raising a concern about affluence and university access for certain Canadians including First Nation students. Certain funding strategies and programs have been defined to address these concerns, albeit with variable outcomes.

Enrolment numbers into technical and vocational education programs (TVEs) are no different. Established to address concerns related to the length of time required to attend postsecondary education, the need for practical/hands-on technical programs, and the need for Canada to compete with other industrialized groups (Lyons, Randhawa, & Paulson, 1991); TVE advocates ensured that TVEs gained increasing popularity; most especially to prepare a workforce to compete in the global economy (D. Fisher et al., 2006, p. 5).
The depressions of the 1930s began to cripple educational efforts and to question belief in higher education as a liberating force and a catalyst for career success (Lyons et al., 1991, p. 142). Saskatchewan modified its Secondary School Education Act to facilitate vocational education in 1938. By 1960, the Technical and Vocational Training Assistance Act (TVTA) allowed the federal government to directly support TVEs including the training of technical vocational teachers and to provide funding in support of trade education and subsequently “adult occupational training and retraining, and… assistance to universities” (D. Fisher et al., 2006, p. 143; Lyons et al., 1991). Consequently, Aboriginal-controlled community learning centers and non-profit institutions emerged to provide credit- and non-credit vocational training. As demand for highly skilled workers increased, federal and provincial strategies began to change to include the retraining of minorities and women; the establishment of better collaboration and cooperation between government and industries for worker mobility across provinces, the creation of interprovincial certification and recognition; and improved accountability through program evaluations.

The Indian Act of 1939 and the Canadian Constitutive Act of 1982 reiterated the responsibility of the federal government for First Nations education, and the Department of Indian and Northern Affairs Canada (INAC) would oversee the education of Metis and non-status Indians. However, the relationship between the government and churches led to the creation of residential schools that has produced gross mishap and “an integral part of a conscious policy of cultural genocide” (TRC, 2015, pp. 58–59). In the midst of this trajectory, policy makers and educational institutions explored the role that educational technologies would have among First Nations communities, especially in improving the abysmal statistics amongst learners.
Educational Technologies in First Nations Education

Information and communication technologies have had a profound effect on the delivery of content and administrative approaches in most post-secondary education across the globe (Akoh, 2012; Burgstahler, Comden, Lee, Arnold, & Brown, 2011; Kim, Miranda, & Olaciregui, 2008; Looi et al., 2010; Ofotokun et al., 2010; Pegrum, Oakley, & Faulkner, 2013). Email communication (Carpenter, 2004), distance education (Youn, 2001), online learning management systems (Tan, Liu, & Burkle, 2013), open education resources (Siemens, 2008), and learning using mobile devices (Utulu & Alonge, 2012), social media (LeNoue, Hall, & Eighmy, 2011), and new forms of mass content delivery such as Massive Open Online Courses (MOOCs) (Traxler, 2013), permeate the post-secondary landscape essentially eradicating boundaries as whole certificates and credentials become available to students beyond their bounded geographic locations.

It is ironic that ICTs, as a double edged sword (McGrail, 2006) provide broad base access to more students while simultaneously restricting it to those to whom cost makes it prohibitive or for whom internet infrastructure remains a challenge, especially for students from the global south or those in First Nations communities in Northern Manitoba.

Canadian post-secondary institutions including the UCN continue to explore the benefits of educational technologies in the delivery of content and instruction, and to do so while remaining open to new emerging technologies such as mobiles. Historically, a number of considerations guide the decision for educational technology use. Early proponents of distance and online education in Canada for instance, argue beyond the mere implementation of technology; by asserting that leadership style and qualities (Garrison, 2004), quality of instruction and its design (Kaufman & Campbell, 2004), appropriately adjusted policies that reflect technology induced trends in the delivery of online content (Matheos & Curry, 2004), flexibility in implementations, and the
definitions of various evaluative models (Owston, 2004); all contribute more to, and are factors important for the successful implementation of technology in a post-secondary setting.

It is no longer about merely delivering education and content to Canadians including those in remote communities but about exploring the most promise for Northern-based Canadian Post-Secondary institutions in a global context of rapid flows, constantly evolving technologies, cultural influences in content delivery, and quality standards. Educational technology in and of itself does not contribute to cognition, teaching and learning (Clark, 1986), but rather that cognition depends on a number of very significant peripheral factors, such as the aforementioned but also the importance of favourable policy and practices; the recognition of relationships between people – learners, instructors, and school administrators, and partnership structures between them, evaluation strategies that are framed in a culturally sensitive manner and a culture-centric design and delivery of content. While my doctoral research focuses on these aspects, this paper focuses on the recognition and importance of culture in educational delivery using educational technologies.

The framework described in the next section highlights the need to recognize culture as an intrinsically important factor in the successful design and delivery of content to indigenous communities.

**A CONCEPTUAL FRAMEWORK**

**The Utility of a culturally aware technology framework**

I argue through a review of literature that the challenge of delivering education using technologies especially in post-secondary institutions situated in indigenous Canadian communities lie in the fundamental misappropriation of cultural concepts in their design and implementation. Ezeife (2003) argues that a major reason for high dropout rates and poor performances in examinations by students in traditional and cultural backgrounds especially in mathematics and
sciences can be blamed on the “lack of relevance of content to the students’ real life experiences” (2003, p. 234). He traces the history of scientific and technological advancements to cultural and indigenous practices and further argues that success rates can be improved if current teaching and learning practices recognize cultural epistemologies. He postulates the concept of “cultural border crossing and collateral learning” (2003, p. 326) as a means of crossing the chasm between daily indigenous life experiences and the classroom experiences that indigenous learners encounter.

In a review of information and communication technologies in Aboriginal Canadian communities, Mignone, Henley, Brown, O’Neil, & Ross (2008) argue that technology such as broadband could be beneficial and could improve Aboriginal social capital and enhance Aboriginal cultural continuity if it is implemented in the preservation of culture (2008, p. 31). Although they mention less of the connection between recognizing culture and educational technologies, they allude to the relevance of knowing how to use technologies, development of a technology action plan with digital literacies components, and improving the digital literacies of community members as intrinsic to social and economic successes of Aboriginal communities.

Petrina & Dalley's (2003) review of curriculum reform of technology education in British Columbia highlights the bias and inherent favor of reformist agenda towards a different kind of “technical” culture focusing merely on the knowledge of technology/tool skills and their uses, and privileging this over the learning culture of the students that could potentially have personal and societal impacts. They conclude that educational technology reform is out of step with actual reality on the ground and that a “series of stages of concern related to the collection of information and demand” (2003, p. 138) is required, which I would attribute as the understanding of the cultural context for which such educational reform would be applied.
All of the aforementioned researches including those of Aikenhead (1997); McMahon, O’Donnell, Smith, Woodman Simmonds, & Walmark (2010); Pirbhai-Illch et al. (2009); and, Turner (2003) all allude to the connection between a clearer understanding of cultural context and education be it in its implementation, curriculum reform, design or delivery.

As a result, I examine educational delivery from the perspective of cognitive movements between Indigenous cultural epistemologies and Eurocentric demands for educational success in which technology, such as mobile, plays an important role. I argue that what continues to be lacking despite the various researches with references to an understanding of host culture is the absence of a conceptual framework that recognizes inherent values of both Indigenous and Eurocentric worldviews, that recognizes the culture-centric roles of an educational technology such as mobile, and its utility as a mediator for facilitating learning between them.

The Mobile Technology Mediated Adaptive Orienteering Framework

The Technology Mediated Adaptive Orienteering Framework as a useful tool to apply in the design and development of educational technology projects in Indigenous communities. Leveraging from Atleo's (2001) framework of phenomenological field of metaphorical mapping; Bertram, Moskaliuk, & Cress' (2015) framework for evaluation of virtual training, and Edwards & Hardman's (1989) concept of “lostness”, the TMAOF was developed as a model that can help our better understanding of the utility of technology in indigenous education.

I argue that the learning with technologies successfully takes place where the learner has acquired the ability to transition phenomenologically from one cognitive world via technological mediation to another, and back. Thus, for the instructor, facilitator, or course designer, the learner’s success is dependent on their ability to consistently catalyze these shifts. Such transitions or shifts
are necessitated by inherent motivational factors and the perceived value of the adjacent world. TMAOF helps to identify and analyze phenomenological shifts in Indigenous narratives of technological engagement in an indigenous community in Northern Manitoba.

The framework influenced by three concepts: virtual or mediated realities; lostness and cognitive movements.

Mediated realities is as old as mankind (ECREA European Media and Communication Summer School, 2011; Leopard, 2012). The ability to adapt to conditions in which we find ourselves often originate with an internalization of our circumstances, a conceptualization of adaptation strategies, and an externalization of options in a way that helps us to understand ourselves, cope with our environments and to make meaning of new approaches for addressing the present and recurring conditions (Andrews, 2007).

Technology such as mobile, applied to prevailing conditions is one way of adaptation to new communication patterns in society. We have emerged with appropriate forms of technologies such
as clothing, various forms of housing, cutting and hunting implements, and many more coping, behavioral and adaptation strategies in response to shifting advancements in society (Webb, 2001). We have applied age long traditional strategies, knowledge and practices for conceptualizing space, time and distance to reconstruct models of reality and for adapting to environmental stressors (Akoh et al., 2012; Carlson, 2007).

The entertainment industry is not excluded from this growing field of human enterprise in which realities are virtually simulated to create multi-million dollar industries especially in online-gaming, pornography, and many others. The not-so-obvious activities such as fine arts, urban design or archeology are included. By developing models of reality through technology, humans have been able to simulate conditions to see if ideas work, and if they can, by extension, be applied to humans (Bertram et al., 2015; Passig, 2015; Peckmezian & Taylor, 2015; Vignais, Kulpa, Brault, Presse, & Bideau, 2015). As a consequence, humans have been able to visit space, fight wars, navigate undersea terrains, fly like airplanes, and simulate complex health related scenarios; right from the comfort of their home, research labs, couches or cubicles. Virtual reality applications are available on mobile devices and on virtual reality social media sites like Oculus Rift for use in nearly every life situations. They are not as far-fetched as they once were. It is not unusual to find virtual reality headsets in stores today. These devices such as Google Cardboard can be paired with a smart phone to create a complete virtual reality experience.

The use of technologically mediated virtual realities, as training simulation contexts become part of the most sophisticated educational innovations in teaching and learning; and for developing frameworks for more systematic applications. For instance, M. R. Atleo's (2001), in telling her 4500 year old story, describes the body of the dead whaler that provides the questers a model/heuristic
framework that they used as their training stimulus and ritual to simulate the conditions in which the actual activity might occur.

One significant importance of virtual reality frameworks is their potential to offer value and benefits in the corporeal prior to their “real life” application. The importance of perception of relevance and value of content to policing trainees’ knowledge and learning was highlighted based in the utility of virtual reality training content in the research conducted by Bertram, Moskaliuk & Cress (2015). The authors set up three training groups: a control group, a standard group, and a virtual group. They measured trainees’ reactions to virtual reality training of police personnel on complex collaborative tasks (what they termed as the motivational outcomes and perceived value of training); and the level of knowledge transfer. They evaluated: a) acceptance, a positive attitude by the trainee that they will benefit from the experience; b) satisfaction; and, c) relevance, a willingness and consciousness to apply the new skills learned during the simulation to their real life environment.

In the area of perceived value of training, participants must exhibit: a) a subjective impression about having gained knowledge, b) assurance that the lessons from their virtual environment prepares them for real life scenarios; and, c) the degree of perceived realism during the training. The researchers provided descriptive results because of the size of the training groups; only 23 participants were involved and three groups were created: the standard, virtual and control groups, each group consisting of 8 participants except the control, which had 7 participants. Participants were trained for two days and then subjected to two weeks of further training and access to a real operation. Measurements of learning were taken before and after the training; and, knowledge transfer or the reactions to the training were measured after the training and the operation. Their results indicated that the virtual training conditions did not produce motivational
outcomes as high as those of the standard group and that the overall perceived value of the training was higher among the standard group than with the virtual group. The standard training led to better learning and knowledge acquisition outcomes than the virtual training group. However, on the overall, and at the conclusion of the real operation, the virtual team showed better results “in the more complex scenario than the others” (2015, p. 291). They also felt more secure during the operation and were more satisfied with their performance.

The authors argue that the virtual training had better effect than the standard training because it produced more realistic results and a more dynamic training environment than the others, and that virtual reality training leads to more automatic real or actual world performance, and more cognitively astute participants who are better at processing inferential tasks than the other groups. Thus, the concept of virtual reality training seems to hold utility among learners who seek more dynamism in their training environment and more holistic knowledge in the concepts for which they intend to learn.

Another important concept in the framework is this concept of lostness often related to virtual world. The metaphor of “world” in the “World Wide Web” used to describe the Internet is not out of place. It is indeed another world open to submersion. A virtual space contrasted against the “real world”, so often that one has become an extension of the other and vice versa. Where we used to walk to a physical building such as to a bank, school or to socialize, we now fully do so online or blend the online experience with a physical one.

Edward and Hardman’s (1989) experience of navigation within a hypertext environment is perhaps one of the earliest studies depicting the consummative nature of Internet technologies to humans and their experiences. They describe the feeling of “lostness” in hypertext as one in which the user has no clear conception of relationships within the system or a knowledge of their present
location relative to other structures. Today, we experience various forms of lostness as we navigate from one internet page to the other, often chasing a rabbit down a hole; sometimes losing our frame of reference or even where we started from and why we ended where we did.

Specifically, lostness results when the individual does not know where to go next, knows where to go but not how to get there, or does not know their exact location in the overall structure of the virtual world. Having a cognitive spatial map of structures, location and routes may increase an individual’s ability to generate specific navigation routes on existing routes or to traverse new ones. However, it does not necessarily help orientation abilities or the ability to conceptualize “here” in relation to “there” (p. 106). There seems to be a clear correlation between satisfaction in the virtual environment and the feeling of being lost in the way “knowledge of the arrangement of information” relates to the “user’s current positions within it” (p. 122).

A third important factor in the frameworks relates to conceptual or phenomenological adaptations across multiple worldviews. In her research leading to the development of a conceptual framework useful as a social protocol to talk with Aboriginal Elders about cultural understandings of learning, Atleo (2011) presents the phenomenological field of metaphorical mapping framework that allows us to conceptualize moving back and forth between cultural domains (see figure 1).

Atleo’s work “recognizes the adaptive ability to move between phenomenological fields and indeed world views operationalized through a process of mapping salient aspects of metaphors from one conceptual space to another” (Atleo, 2001, p. 455). Using metaphors as the mapping of one idealized cognitive model over another, Atleo further argues:

The idealized cognitive model is perceptually held by an individual based on experience or as an action schema. The model that is held (Source) is superimposed on something similar (Target), and the two are subjectively compared. In this case, the models of learning that the
Elders understood in a Nuu-chah-nulth perspective and from the narratives served as the Source were compared with those Euroheritage models of learning with which they were familiar based on their experience of Euroheritage schooling which was the Target. This was possible because metaphors can be understood as conceptual artifacts of experiences, philosophy in the flesh, where language and experience meet in embodiment. Metaphoric blending and integrative complexity then serve to facilitate ongoing orientation by and for the skillful cultural person in which both affective and cognitive dimensions of experience and action are employed as models mapped from one domain or action context to another. Their similarities and differences become apparent in the process where a transfer of learning or insight occurs (p. 456).

The MTMAOF is a conceptual framework that facilitates cognitive shifts between two domains of learning that leverages these ideas of virtual reality, lostness, and phenomenological movements mediated by technology. Because educational technology implementation produces unintended consequences (Cuban, 2003) which could sometimes be very detrimental; much care is required in their implementation especially in indigenous settings. My experience during the field work for my doctoral research has already indicated that the consequences could be dire, often with irreversible outcomes. Therefore culturally sensitive questions require appropriate responses in the implementation of educational technologies in indigenous settings. For instance: what is the level of acceptance of an educational technology by the community or target audience? Acceptance is a very complex issue which Venkatesh, Thong, & Xu (2012) explore extensively in their *Unified Theory of Acceptance and Use of Technology* model. The model explores performance, effort, and social influence expectations while taking into consideration the underlying conditions, motivations, value and habit surrounding the learner and the learning environment. Framed in simple but culture-
centric terms, how acceptable is this educational technology in the community without disrupting its epistemology? Would the educational technology enhance and not obsolesce tradition?

Similarly, what level of satisfaction would the learners benefit from this educational technology, and how relevant is it to their learning context? In a context where both Eurocentric and indigenous ways of knowing are at play, what motivators compel cognitive movement from one domain to the other? More so, could technology; if it were used as a lens through which one worldview is viewed, act as sufficient incentive that could catalyze repeated cognitive shifts to the other worldview and then back? These issues and concerns are what the framework questions. It requires the program developer, instructional designers, school administrator to ask certain questions that would make them consider culture-centric factors that could be essential to the success of educational technology implementation in First Nations communities.

CONCLUSION

In this paper, I have described a conceptual framework that should guide our implementation of educational technologies especially in indigenous contexts where Eurocentric ways of learning are prevalent. The aim is to recognize that cognitive shifts from indigenous to Eurocentric ways of knowing are an expectation of indigenous learners in First Nations communities. And that educational technologies especially mobile can play a role in this movement. However, some culture-centric considerations must be made in their design and implementation in order to avoid some unintended consequences that may be detrimental to learning and thereby accelerate attrition, drop outs and increased low enrollment of learners in this community.

One positive unintended outcome and a perceived value identified in the community during the implementation of this project is an increase in community engagement and participation with the potential for increased community development. Consequently, research participants and
community members are able to find value in producing more information and knowledge about themselves and their community on online and social media sites. They were able to identify aspects of their culture and history through carefully conducted first-hand research, and by interviewing elders, family members and other willing community members to produce knowledge where otherwise such knowledge was tacit. It is anticipated that they would continue to engage in-community but might also increase their social engagement with a wider community base which may be external, on policy issues that arise relating to community development.
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