

TECHNOLOGY & INDIGENOUS EDUCATION

IK / TECHNOLOGY / PEDAGOGY / IN RELATIONSHIP

SUMMARY LITERATURE REVIEW PAPER

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Although the focus of this paper is on Indigenous knowledge and technology in aboriginal online environments I have included 'Technology' and 'Pedagogy' in the title to emphasize the collaborative aspect of this project and the inextricable and interconnecting relationship that Indigenous knowledge purveys across cultures, disciplines and these themes.

This literature review summary paper was requested by the manager of the UBC's External Programs and Learning Technologies (E.P.L.T.) as a supportive resource for developing Aboriginal online courses in rural communities. E.P.L.T. engaged two UBC Ph.D students to collaborate on two literature reviews that would be informed by the topics of Technology and Pedagogy for online learning systems. This collaborative review is rooted in a unique set of trajectories. My colleague brings her experience as a non-aboriginal educator having acquired an extensive learned experience working with aboriginal people in her community and I bring my experience as an Aboriginal educator that embodies extensive and ongoing lived experiences working in remote and rural aboriginal educational institutions as well my personal journey through education.

A significant factor that influences the spirit of my collaborative efforts stems from the realization that my colleague and I both draw inspiration from our journey's through the Simon Fraser Master's of First Nations Curriculum in Education Cohort and from our recent enrollment as UBC Ph.D students coming out of a unique course titled 601B Indigenous Knowledge Seminar offered by Dr. Jo-ann Archibald; furthermore coming out of a unique Pre-Service Workshop on the *First Peoples 12 Literature* course that is being offered provincially for the first time. First Peoples' 12 was developed in a partnership between the BC Ministry of Education and the First Nations Steering Committee and thus follows a completely Aboriginal

literature reading list that is provincially tested and serves as an equivalent English 12. My experiences engaging with aboriginal and non-aboriginal teachers in this pre-service workshop brought valuable insights for my research for E.P. L. T.

For the Indigenous Knowledge course we were asked to create a mobilization project that would be useful for organizations working with aboriginal clients. The mobilization project is called the Indigenous Knowledge and Pedagogy in Online Systems: Emerging Themes for Educators. Within this framework are four emerging themes: Indigenous Knowledge and Technology; Protocols and Protections; Elders and Knowledge Keepers; Relationships and Worldviews. The development of a framework for engaging with Indigenous knowledge became the fundamental link that we needed to meld the topics of technology and pedagogy and hence inform the choices we selected for our resources. Although the majority of the resources for this article are focused on Indigenous or Aboriginal perspectives, I have included some articles by non-aboriginal authors that may broaden the research scope in particular areas. Worth noting is that the terms Native American, First Nations, Native, Indigenous, Aboriginal, are used in the context of their periods and don't necessarily reflect the terms used today by First Nation's people in Canada.

As part of our collaboration my colleague and I decided to employ the four Emerging themes as a bridging element in our literature summaries. Hence this paper on Indigenous knowledge and technology is structured with these four emerging themes that stratify and organize the resources absorbed on a search through local, national and global forums of inquiry. The complexity of Indigenous knowledge is evidenced in the sometimes overlapping of themes however the lingering constant throughout this search was the notion that Indigenous ontologies, epistèmes and pedagogies run simultaneously across each theme in relationship to each other. A

resource that is included across all themes are a number of intermediating key fundamental publications of crucial historical events that link the past, current and developing Aboriginal and Indigenous historical landscapes that can be accessed in a variety of ways including online.

Under the theme of Indigenous knowledge I have created four subheadings to accommodate the larger focus of this paper on Indigenous knowledge and technology. The sub headings are as follows: Indigenous Knowledge and The Dynamics of Media Based Learning Environments; Indigenous Knowledge and The Discourse on Education Technology & Ethics; Indigenous Knowledge and the Contextual Layers in Mobile Learning and Virtual Environments; Indigenous Knowledge and Elements of Culturally Supportive and Flexible Online Environments. Following the first emerging theme IK and Technology and the four subheadings attached to it are the three remaining emerging themes in the following order: IK / Technology / Protocols and Protections in Relation; IK / Technology / Elders and Knowledge Holders, IK / Technology / Relationships and Worldviews.

IK & DYNAMICS OF MEDIA BASED LEARNING ENVIRONMENTS

Discourse on the dynamics of media based on line learning environments is complex and socially impregnated. An aboriginal online environment therefore begins with a grounded set of principles that balance and shape the social dynamics for a diverse network of e-learners, e-teachers. Greg Young Ing (2008) provides two principles that are aptly positioned as a starting point when considering the social dynamics of technologically based aboriginal online environment. The principles that Ing describes below serve as an anecdote to run in constant parallel with all articles in this paper.

“Indigenous cultures have adapted into their unique and distinct contemporary forms by adhering to two important principles: 1) that incorporating new ways of

doing things should be carefully considered in consultation with community and Elders and according to Customary Law; and 2) It if it is determined that a new technology or institution goes against fundamental cultural values and /or might lead to negative cultural impact, or breaches Customary Law, then it should not be adopted.”

(Greg Young Ing, 2008)

The following articles may offer insights that inform online media based education course design with regards to a diverse set of social aspects; Parker (1999) presents a critical view on the meaning of interaction in distance education focusing on the pedagogical process, justification, definition, methodologies, and the role of “provacateur” rather than “academician”. Parker presents a provocative view relating that the interactions among students and between instructors are places where technology must empower students to construct and reconstruct knowledge as a result of the interaction. Parker’s critical view of the balance of self-direction and the integration of the instructor is potent area for discussion that leads into a recent article by Sheryl Ferguson called *Key Elements for a Maori e-Learning framework* that touches on the Maori holistic method for dissemination of knowledge. Ferguson states three constant principles “connectedness”, inclusion and balance” that can be transferred into the e-Learning and e-Teaching environment for pedagogical practices. Foremost Ferguson relates that “Ako” is a reciprocal Maori teaching and learning pedagogy that is practiced in face to face teaching and learning that must be strived for in e-learning and e-teaching environments through Pouako visibility in the e-Learning environment. The balancing of visibility in terms of student acknowledgement and contributions between students and facilitators offer valuable insights with regard to engaging and sustaining online learners by creating inclusive and relevant knowledge.

Further to these principles the following articles point to the importance of problem posing when considering aboriginal online technologies. Friere in *Pedagogy of the Oppressed* stands out

as a hallmark on the issue of problem posing when one considers the cultural and literary divide for Indigenous people. Baudrillard (1997) further punctuates how online media is interpreted, intercepted, perceived through the concepts of fragmentation. Thibault describes Baudrillard's simulacra work and Wilson in *Turtles all the way* draws from Baudrillard's notion of the simulacra. Reidling in the article *Distance Education: The Technology-What you need to know to succeed*, takes up the notion of the blurring boundaries between the traditional classroom and distance-education environments. Taylor's Indigenous representation among the Nordic Sami merits attention in discussing online stereotypes created in cyberspace. The *Friends for life project* mentioned in the 2008 Children and Youth report on mental health adds to this discussion as does Verlinda and Thompson in *Beyond tipis and tomahawks: Using internet images to combat Native American stereotypes*.

Discussions that point toward the challenges and barriers in technologically mediated environments are taken up by Malatest & Associates Ltd (2004) and Gillies (2005). In *Is Aboriginal knowledge science?* Here Lorna Williams relates the need for discussion on the valuing and integration of traditional Indigenous knowledge in BC's science and technology classrooms. Narby in the book *Cosmic Serpent* proposes that Indigenous people have a unique perspective in their relationship with nature that offers a positive lead for the future.

Moreover, Holloway (2002) offers insights on children's identities with regard to how their integrated online and offline social worlds are formed. Skeele in *Blackbox in the Sandbox: annotated bibliography of internet resources for teachers and young children*; opens a discussion on the shaping social and of anti-social learning environments with regard to technology. White in *Technology-enhanced learning support for Aboriginal institutions* provides online resources supplied by the Government of Saskatchewan including an article about how Aboriginal

institutions can apply technology to enhance post-secondary education opportunities.

IK & DISCOURSE ON EDUCATION TECHNOLOGY & ETHICS

Hermes (2000) poses an important question concerning the perceptions people have about academic rigour and culture based education being synonymous. Hermes points out that culture is often seen as secondary to academics. Subramony (2006) in an ethnographic case study explores some key issues in developing culturally appropriate Western information technologies for Inupiat K12 students living in a technologically rich school district quotes Tapscott.

“Equitable technological proficiency is, if anything even more crucial. Tapscott (2000, p127) noted, “The issue is not just access to new technologies, but rather... availability to services, technology fluency, motivation, and opportunities to learn.”

Ehlers in *A New Pathway for e-Learning* offers a critique of e-learning in relation to the development of competence. Furthermore Resta et al (2002) highlights aspects of a six year *Four Directions Project* that aims to develop technologically supported curriculum for culturally responsive teaching by providing a Virtual Museum. Pascual in *Educational techno-ethics: As Means to and End* alludes to the term ‘competence’ by using the terms moral point of view, moral insights and further suggests that what is need is a meta-conversation about the nature and value of technology in various environments. Bryson & de Castello in *Telling tales out of school: Modernist, critical, and postmodern “true stories”* about educational technologies adds depth to the critical discourse on the notions of meta-narratives in technological environments and further opens a conversation about gender relations in technologically mediated classrooms. Crawford & Crawford (1995) examine the role of self-determination of First Peoples and the transformation to the information age.

Kim et al. (2007) examine the question *Can mobile technology become a viable literacy form*

to counter the literary gap between Indigenous students and non Indigenous students? This is a good question in light of our growing globalization and technological environment. The article sheds light on the potentials for development of a mobile learning model stating that learning technologies need to include a political, cultural, and environmental diversity in their design as well as awareness of the effect of technology whether it is intentional or not. Daniels (2008) provides an overview of the factors that affect distance learning in Northern Indigenous communities of the North West Territories including the development of Broadband for Rural and Northern Development Programs that leads to tools for mobilizing education programming such as language acquisition and culturally relevant materials. Conley (2006) provides an external resource list linking to web pages of various science and technology organizations as a support to the initiative to preserve Indigenous traditional knowledge and its application to scientific areas of practice in global networks and interrelated Indigenous communities.

IK & CONTEXTUAL LAYERS IN MOBILE LEARNING & VIRTUAL ENVIRONMENTS

Buker & Zandvliet (2002) created a study that describes important contextual factors that affect good instruction in a computerized classroom setting. Buker and Zandvliet present two tools for good instruction namely the (WIHIC) *What Is Happening in This Classroom instrument* and the (CCEC) a *computerized Classroom Environment Checklist* that includes a psychosocial, physical, and use of information technologies that overlap into an area where one experiences “satisfaction” as a shared outcome. *Voyageur in Ready, Willing, and Able, Prospects for Distant Learning in Canada’s First Nations Communities* furthers the technologically infused classroom design by discussing the distance education and technological accessibility via computers, internet, email, voicemail, computer networking, satellite systems, teleconferencing to enhance

education opportunities in remote First Nations' communities. Rasheed (2007) on the other hand reveals some of the negative factors impeding the implementation of web-based distance learning such as student and faculty barriers and course quality concerns thus revealing the complexity of distance learning environments. *In Testing a New Talking Stick*: Freeman & Moore project a number of questions to compare the perceptions and responses to technology for urban and suburban Native American high school students. The article touches on the inquiry of various technological accessibilities to internet, email, gaming, with a wide focus on learning styles. Zittle et al. in "*Injecting or Integrating Technology in the Classroom*" suggest that teachers' technological expertise increases in a particular field, so will the student performance in that context. The *2008 Child and youth mental health plan for B.C. progress report* also addresses relevant information on the need to improve mental health for aboriginal students by reducing risk, building capacity, improving support and performance.

Rowow in *Equity and Theory are Key*: suggest that equity and theory are important factors in providing empowerment to students' writing, reading assessments thus if student know why and how a system works, they are more likely to value the system for their own use. Therefore equity and theory are key to education technology.

Royal et al in *WINHEC Advancing IT of a New Sort-Indigenous Technology* is an organization worth noting because it offers a global leadership on Indigenous issues. The authors advance a collective spirit of synergy, self and cultural determination with a focus on Indigenous technology and innovative telecommunications. Other resources that provide equitable and global voice on Indigenous issues are the following: United Nations Declarations on the Rights of Indigenous Peoples; Working Group on Indigenous Populations; and the International Indigenous ICT Task Force (2008) further explores issues of global leadership.

IK / CULTURALLY SUPPORTIVE & FLEXIBLE ONLINE ENVIRONMENTS

In order to provide elements of a cutting-edge aboriginal online environment one might consider the diverse ways to include culturally supportive online resources that are extended and continually being informed by Indigenous Knowledge. Battiste in '*The Struggle and Renaissance of IK in Eurocentric Education*', describes:

IK as a distinct knowledge system, with its own concepts of epistemology and scientific and logical validity, within contemporary education systems...Indigenous knowledge is systematic, covering both what can be observed and what can be thought.

(Marie Battiste, 2008)

In view of this one may also consider the utmost importance to acknowledge the diversity of Aboriginal distance learners is key to understanding what constitutes a cultural fit, cultural competence in designing technologically mediated resources. Rogers (2007) proposes an interesting question in asking if online instructional designers are aware of the differences between themselves and the cultural group for whom they are designing instruction. While the verdict is in the affirmative it is with a limited awareness. Campbell poses another provocative question in the article: *Using online technologies: Does culture matter?* This article opens up the topic of support systems while bringing a global integrative component. Campbell relates:

"How students enrolled in an Information Technology course might access a course is less relevant than what they consider important material to support their study."

Campbell, (2008)

These questions may be useful in directing innovative online resource supports and pre-orientation strategies for online programs. Campbell's International student cohort preferred a teacher driven class rather than text based learning in contrast to the local student cohort that

preferred self-directed approach. A case study by Kelly (2008) adds to this discussion when suggesting that Native American students preferred group work because cultural connectedness requires group activity.

The following articles put forth useful insights on notions of shared learning and scaffolding in developing models for technology based online learning systems. Durocher (2002) combined two pre-service education courses that integrated both student and teacher feedback using web-portfolio. The simultaneous running of the courses highlighted the need for more scaffolding to integrate technology. Ruskin (2005) demonstrates the innovative ways that student courses can be enriched by the inclusion of a linked format for digital media. The linked digital aspect allows for quick adaptation and change of resources. Further to this idea Ferguson (2008) presents the Iti Rearea programme of mixed mode delivery. The programme delivers the same content in three places thus offering a flexible and consistent quality of distance education delivery. Karen Kellogg in *Learning Communities* offers a description of the Learning Communities such as the Cluster Model and the Linked Course Models that draw some similarities the Iti Rearea mixed mode model in that students and faculty work across disciplines for a common goal thereby creating empowered learning communities. Kellogg relates:

This model links a cohort of students with two common courses. One course is typically content-based (science, math) and the other is an application course (writing, speech). The faculty of each course may teach independently or together and coordinate syllabi and assignments so that the classes complement each other.

Kellogg concludes that while there are challenges with the timing or preparation for courses the benefits go beyond students to faculty and the whole institution. Kellogg concludes that Learning communities are a practical way to workout complex educational issues. Mary Baxter broadens the conversation of the linked course model in *Re-conceptualizing the linked course*

model. The pilot study offers insights into linked course models that combine a rich media learning environment with courses taken across curriculum. Halverson & Thornburg (2006) generate a similar discussion in describing the distance continuum for the Confederation College in Thunder Bay, Ontario that offers classroom and satellite synchronous classroom services using a learner-centered model. Din & Abdul (2004) proceeding of the World Conference on Educational Media, Hypermedia and Telecommunications aim to democratize education for diverse learners through Hybrid Learning Systems. The systems are based on Vygotsky's social development theory. Sinclair (2003) moreover describes globalization as a driving force in a technological evolution and the potential to provide connectivity as a coping mechanism for Indigenous people by bridging the digital divide using communications to give Aboriginal people a voice in a global society. Further to these resources are the following

IK / TECHNOLOGY / PROTOCOLS AND PROTECTIONS

“Indigenous knowledge is an internally consistent system. It validates itself. It does not need external validation. But you have to understand it's principles through maps that it has created. Finding a balance and attending to one's self and to where one stands are the first steps in our collective journey of rediscovery. We have then to be responsible to our families, our communities, our ancestry and our personal gifts. We have to carry forward the best we have and give it to the next generation.”

(Gregory Cajete, 2000)

Three online resources that stand as guiding posts for transformative self-governance and sustainable Aboriginal Education are: *Royal Commission of Aboriginal Peoples. Perspectives and Realities; the Renewal: A Twenty-Year Commitment*; Assembly of First Nations Education *Action Plan* (2005). Following this are four publications that stand in close periphery to these resources. *Battiste & Henderson in Protecting Indigenous Knowledge and Heritage* offers a global comprehensive linking past and the future directions on Indigenous rights; Smith in

Decolonizing Methodologies, Research and Indigenous Peoples' is a unique book for our times in that it set a precedence for establishing a unique representation for Indigenous critical theory; Dickason in *Canada's First Nations* provides a succinct comprehensive chronology of Canadian National Aboriginal historical events; Smith et al. in *Handbook of Critical and Indigenous Methodologies* is another groundbreaking book in that it is a collaborative that engages in critical theory that is extensive and far reaching. Furthermore standing in close relation to the above mentioned historical events are the following recent developments that evidence a move towards protections and protocols for transformative education. Menzies et al. in *Transformational Sites of Indigenous Education* marks the need for transformative self-governance to meet the need of community; Press Release (2007) First Nations Education received *Royal Assent in BC Legislature* leading to the implementation of the *First Nations Education Act* in 2007 that provides provincial governmental recognition of the jurisdiction of First Nations people over K-12 education on reserves; Vive news report (2008) on the *Joint statement of House of Commons call for Implementation of UN Declaration on the Rights of Indigenous Peoples* also marks a key advancement toward the rights of Indigenous people; *Text of Prime Minister Harper's Apology* (2008) marks a public recognition of the damaging effects of residential schools; *Truth and Reconciliation Commission on Indian Residential Schools Mandate* (2008) is an informational website that provides a space for anyone affected by residential schools to share their experiences; Thompson et al. (2008) report of the *House of Commons calls for Declaration of Human Rights* sheds light on notions of reconciliation for Indigenous peoples'. Standing at the front door of BC's home front is the First Nations Steering Committee in *Building Digital Literacy in First Nations communities* offering a leading innovative pathway to capacity building relations through aboriginal digital literacy and education resources. Converging with these are

the doors created by the Sage Pod (Supporting Graduate Enhancement) and the UBC Aboriginal Strategic Committee running parallel.

In the global arena a number of projects and publications have developed; UBC Dr. Kesler (2008) developer of the IVT application for archiving and digitizing video presents an educational tool that provide cultural safety measures while providing an open source sharing capacity; Smith in *Indigenous Cultures in an Interconnected World* ; Indigenous Peoples *Globalization Program* is a forum for scholars, economists, activists and researchers to analyze the cultural, political and environmental effects of globalization; The Kavanagh et al. (2005) survey aim is to incorporate First Nations language and culture into programs to increase students' security, knowledge of self, community and family involvement; Resta in *Revitalizing Native American Cultures* in a six year project called the *Four Direction* highlights some ways to include locally relevant and shared resources. The project aim was to develop technology-supported curriculum for culturally responsive teaching fueled by the partnership between K-12 Tribal Native America schools, four universities and two museums; A case study by Vigo & Arnold named *Indigenous Inclusion Curriculum: Creating Cultural Opportunities in multimedia learning resources* offers a cogent checklist that describes the practical ways to raise consciousness and make policy recommendation among other consultation factors.

IK / TECHNOLOGY / ELDERS AND KNOWLEDGE HOLDERS

“Today, the role and knowledge of the elders are being preserved and respected to the best of the people. The roles of elders vary from area to area and from family to family. Throughout the Coast area they are recognized as a great resource. Elders often play a role in the political process as well as in the general culture. It is their inherited knowledge, as well as their perspective (derived from experience), which is valued. In the Native way, memory of history is a tribal or

family responsibility and is held and passed on by elders.”

Neel, (1992)

The late elder and author of the book *Spirit of Reason* Dr. Vine Deloria provides reassurance and wisdom on traditional technologies into Indigenous philosophy, reason, spirit. In *Architecture as a Living Process* Douglas Cardinal describes his life as a student and artist in the academic world of science and technology relates how the elders of his community facilitate knowledge in the face of an ever changing information age. Dr. Jo-ann Archibald in the *Canadian Journal of Native Education* extends Cardinal’s theme. Two books by Battiste & Henderson in *Protecting Indigenous Knowledge and Heritage* and Battiste in *Reclaiming Indigenous Voice and Vision* strengthen these concepts of Elders as Knowledge Holders. Duzer (2003) provides insights to online learning in using the term “cultural fit” because the reciprocation of discussions in online environment was more in line with the mentors, elders, traditional co-operation and reflection in meaningful contexts. The *Native Access Engineering Program* website that was implemented by the Faculty of Science at Concordia University offers a mentoring program and offers a guide for teachers and students on curriculum materials.

Donaldson in *Writing the Talking Stick: Alphabet Literacy as Colonial Technology* and Postcolonial Appropriation draws connections to stories to illustrate the affect of European writing modes on oral societies. Thorbes (2005) writes about Dr. Ethel Gardner’s High Tech language revitalization program called the *E-Masters Apprenticeship* Program includes elders as vital resources in the information age. Furthermore additional resources worth noting are: The BC Ministry of Education website offers details outlining the *Aboriginal Enhancement Agreements* between B.C. school districts and BC Net a non-profit organization funded by BC’s universities, colleges, provincial and federal government that aims to encourage research, education and

innovative networking between BC's research and educational institutions. *First Nation's Schoolnet*; the language legacies of *First Voice, Storytelling*; Indian and Northern Affairs (INAC) *Geoportal's* website provides interactive maps are useful for curriculum purposes; Industry Canada and Aboriginal Youth Network project *Aboriginal cultures and traditions storytelling project* links generational aspects of storytelling; Condordia's Society for the Advancement of Excellence in Education, *Moving forward in aboriginal education* offers an example of open door relationship to elders; First Nations Center National Health Organization's *Sacred ways of life* is a useful document that informs educators on Indigenous ways of being;

IK / TECHNOLOGY /RELATIONSHIPS & WORLDVIEWS

Thomas King (1990) highlights an important concept that runs through all aspects of Aboriginal relationships and worldviews.

“‘All my relations’ is at first a reminder of who we are and our relationship with both our family and our relatives. It also reminds us of the extended relationship we share with all human beings. But the relationships that Native people see go further, the web of kinship extending to the animals, to the birds, to the fish, to the plants, to all the animate and inanimate forms that can be seen or imagined. More than that, ‘all my relations’ is an encouragement for us to accept the responsibility we have within this universal family by living our lives in a harmonious and moral manner...”

(Thomas King, 1990)

The Report of the Royal Commission on Aboriginal Peoples (1996) put forth two reports: *Gathering Strength and Looking Forward Looking Back* that have remained key influences in aboriginal education, aboriginal perspectives with regards to the history and future of relationships between Aboriginal People and the Government of Canada. An acknowledging of Canada's history of treaty making, displacement and assimilation, residential school, relocations

of Aboriginal communities, the Indian Act and the Veterans policy, creates a starting point towards a rebuilding of new relationships. Following a partnership momentum Wiseman (1999) first reminds us that Aboriginal communities are ‘developing’ and ‘disparities’ are growing resulting in a deficit in infrastructures, engineering and technical needs. Concordia University aims to offer an innovative interactive blend of curriculum materials that include a visual interface of the WWW linking mentors and teachers responds to this dilemma. Kaukkanen in the book *Reshaping the University, Responsibilities, Indigenous Epistèmes, and the Logic of the Gift* offers an extensive body of Indigenous philosophical literature that reminds us of the need to understand Indigenous worldviews in education environments. Lickers et al. (2007) puts forth a compelling view on the aspects of aboriginal identity, worldview, and mother tongue that conflict with Western science in citing Aikenhead who refers to the Western ways of competitiveness and de-contextualized learning environments for Kickapoo students learning in off-reserve school learning modes. The building of partnerships to share in resources to help government agencies, educators, and the general public gain access to Indigenous knowledge systems is becoming a leading force in how Indigenous knowledge will be understood in the future. Voerman in *Walking together: LAMS, learning experience for indigenous students*, adds to the notions of partnerships in education. Rutledge, Duran and Miranda in *Three years of the New Mexico laptop learning initiative* informs through notions of accessibility of technology.

The *Alaska Native Knowledge Network* ; Peterson & Showalter (2003); *National Indian Telecommunications Institute* (2003) holds a mission to use technology to promote Native communication systems for the advancement of education; Lone Eagle Consulting (2006) Liu & Bin in *Government of Canada Strengthens UBC Wireless research*; Nikolejsin in *Bridging the Digital Divide*, BCNet conference presentation; First Nations Education Steering Committee in

Building Digital Literacy in BC First Nations Communities; Alexander in *Wiring the Nation!* Government initiatives; Sotelo & Berruecos in *Window to My Community* takes up the educational, cultural and economical inequalities that exist as educational challenges to social and developmental policies; Downing in *Bridging Aboriginal Digital and Learning Divides* discusses the need to develop leadership programs for youth and best-practice strategies for developing public policy in government and education. Understanding of the virtual classroom and the social dynamics of culture may also be enlightened by the following: Hewling in *Understanding culture in the Virtual Classroom*; Boyle et al. in *Learning Design for nomadic digital natives*; *Creation Mother-avatar-based indigenous multimedia intergenerational culture communications project*. Zittle et. Al in *The effects of web based multimedia lessons on Native American learning* speaks to the notion of partnerships. The Navajo Education Technology Consortium project statistical data relates that student population, software design, educator role and level of access to technology factors in the effectiveness of education technology.

SUMMARY OF IK & DYNAMICS OF MEDIA BASED LEARNING ENVIRONMENTS

The resources noted below each contribute to the dynamics of media based learning environments by carving principles and trends for examining learning environments. Ing's principles of incorporating new ways of doing things in consultation with Elders and Customary Law thereby avoiding the use of new technology or institutions that repudiate fundamental cultural values is a starting point to examine media based learning environments. Ferguson provides an accompanying starting point by suggesting that the constant Moari principles of "connectedness, inclusion and balance" can be transferred to e-Learning and e-Teaching environment for pedagogical practices.

Provocative and critical views on what it means to interact in distance education are offered

by Parker focusing on the ability to empower students to construct and reconstruct knowledge as a result of the interaction. In addition, Friere focuses on the importance of problem posing in education that may lead to questions that inform why there is a cultural and literary divide for Indigenous people. Baudrillard offers notion of the simulacra parallels Riedling's notion of the blurring boundaries between traditional classroom and distance education environments, while it is a general theme amongst most of these resources that there is a need for discussions around the challenges and barriers in technology mediated environments.

The critical analysis of media based learning has led to insight into the future dynamics of aboriginal online learning. Holloway opens discussion of how modern children's identities are shaped by the inevitable forming of their integrated online and offline social worlds. Williams suggests the need to value and integrate traditional Indigenous knowledge in BC's science and technology classrooms. Narby offers that Indigenous people have a unique connection to nature that can positively impact technology and the environment. Skeele opens discussion space on the shaping of social and anti-social learning environments with regard to technology. White offers a reconciling notion that media based learning environments will only be enhanced as Aboriginal institutions apply technology in appropriate and encouraging ways to enhance educational opportunities. Kape'ahiokalani et al. in *Indigenous Educational Models for Contemporary Practice* widens the lens on Indigenous education models. Hermes and Roach in *Supporting indigenous culture through local creation of multimedia CD ROM curriculum*, illustrates the ways local resources can be utilized and extended to a shared source in education.

SUMMARY OF IK & DISCOURSE ON EDUCATION, TECHNOLOGY & ETHICS

Hermes asks why culture is often viewed as secondary to academics. Subramony's concept of "equitable technological proficiency" relates to Hermes in that Western information

technological learning will only be equal with appropriate availability to services, technological fluency, motivation and opportunities to learn for aboriginal learners.

Ehlers offers a critique of the ability of e-learning to develop competence; whereas, Resta highlights aspects of a technologically supported curriculum developed by a Virtual Museum for culturally responsive teaching. Pascual uses the term “competence” in a moral point of view to suggest that a meta-conversation is required about the nature and value of technology across multiple environments.

Crawford & Crawford examines self-determination efforts of First Peoples in the transformation to the information age. Kim et al. suggests that in order to develop literacy in mobile technology to counteract the literary gap between Indigenous and non-Indigenous students learning technologies need to be designed with political, cultural and environmental diversity. Daniels provides an overview of factors that affect distance learning in Northern remote Indigenous communities in Canada that has led to the development of Broadband for Rural and Northern Development programs to mobilize education programming in language and cultural material. Further, Conley provides links to online science and technology organizations to support the initiative to preserve Indigenous traditional knowledge while applying that knowledge to science and global networks of interrelated Indigenous communities.

SUMMARY OF IK & CONTEXTUAL LAYERS IN MOBILE LEARNING & VIRTUAL ENVIRONMENTS

Buker & Zandvliet developed a checklist of psychosocial, physical and factors that affect good instruction in a computerized classroom setting where the use of information technologies overlaps into an area where one experiences “satisfaction” as a shared outcome. Voyageur supports the use of technological opportunity development to promote education initiatives in

remote First Nations' communities. On the other hand, Rasheed reveals the negative factors to the implementation of web-based distance learning such as unpredictability in student and faculty barriers and course quality. Freeman & Moore developed a survey to compare perceptions and responses to technology of urban and suburban Native American high school students in terms of accessibility and learning styles. Zittle in *Injecting or integrating technology into the classroom* suggests that as teachers' technological expertise will increase in a particular field so will the student performance. Rowow points out that equity comes with the ability to empower students to write, read so that the student knows why and how a system works, in turn creating students that are more likely to use the system. The above sources demonstrate how equity and theory are central considerations in education technology.

SUMMARY OF IK & CULTURALLY SUPPORTIVE & FLEXIBLE ONLINE ENVIRONMENTS

Indigenous knowledge is valued by Battiste as a distinct knowledge system that covers what can be observed and what can be thought in its own concepts of epistemology and scientific logical validity that are used in contemporary non-Indigenous education systems. This view offers consideration of acknowledgement of Indigenous knowledge and Rogers asks whether online instructional designers' are aware of the differences between themselves and the cultural group for whom they are designing instruction and suggests that the awareness is a there but limited. Further, Campbell asks whether culture matters which opens the topic of support systems for students. The questions posed by Rogers and Campbell may direct innovative online resource supports and pre-orientation strategies for online programs. Kelly's case-study supports that direction by correlating the trend for Native American students to prefer group work and the fact that cultural connectedness requires group activity.

Shared learning is encouraged by Durocher with pre-service education courses to integrate students and teacher feedback in a web-based context. Ruskin also encourages shared learning in innovative ways to enrich courses with digital media so there can be quick adaptation and change of resources. Ferguson explores a case example of presenting mixed mode programme delivery so the same content may be accessed in multiple places to allow for flexibility with consistent quality of distance education delivery. Halverson & Thornburg generate similar discussion on satellite synchronous classroom services using learner-centered model in Ontario. Hybrid learning systems are discussed by Din & Abdul in an aim to encourage democratization of education for diverse learners based on the Vygotsky social development theory. Therefore, the technological evolution is described by the above sources as being fuelled by globalization in terms of its ability to provide connectivity as a coping mechanism for Indigenous people to bridge the digital divide and create space for a global Indigenous voice.

SUMMARY OF IK & TECHNOLOGY PROTOCOLS AND PROTECTIONS

Cajete suggests that Indigenous knowledge validates itself without a need for external validation. Ways of being have been created to understand its principles and it requires knowledge of the self in relation to others in a collective journey. Guiding posts linking the past and future for the rediscovery and rebuilding of Indigenous education are three online resources including the Royal Commission of Aboriginal Peoples. Perspectives and Realities; the Renewal: A Twenty-Year Commitment, AFN Education Action Plan and Battiste & Henderson in Protecting Indigenous Knowledge and Heritage. Smith and Dickason move toward discussions of protections and protocols for transformative education; and Menzies suggests self-government initiatives should also be transformative to meet the needs of Indigenous people. Transformative actions include the enactment of the First Nations Education Act in 2007 recognizing the

jurisdiction of First Nations in K to 12 education on reserves, the UN Declaration on the Rights of Indigenous Peoples, Prime Minister Harpers formal apology to residential school survivors and establishment of a Truth and Reconciliation website to provide space for sharing experiences of Indian Residential schools all indicate key advancements.

Currently, in the local arena, projects and publications have emerged that lead to technological advancements that open a wide space for knowledge sharing. For example, UBC Dr. Kesler developed the IVT application for archiving and digitizing video that can be used as an education tool that incorporates open source sharing. On a global level the *Indigenous Peoples Globalization Program* offers a forum for scholars, economists, activists and researchers to analyze cultural, political and environmental effects on globalization is another example among others.

SUMMARY OF IK & TECHNOLOGY ELDER'S AND KNOWLEDGE HOLDERS

Neel captures the importance and respect of the role of elder and inherited knowledge in the Native culture via the discussion of how the preservation of elder knowledge today is occurring. Cardinal describes his life as student and artist in the science and technological academic world in relation to the traditional way of elders in his community facilitating knowledge despite the fast-paced changes in the information age. Battiste & Henderson extend the theme of elders as knowledge holders. Further, Duzer parallels the elder's role as knowledge holder and mentor as similar to the reciprocation of discussions in the online environment. The theme of reciprocal learning has been implemented at the post-secondary level in Concordia University mentoring programs.

SUMMARY OF IK & TECHNOLOGY RELATIONSHIPS & WORLDVIEWS

King highlights the concept of "all my relations" that is carried through all aspects of

Aboriginal relationships and worldviews. It is a concept that evokes the individual's place, learning and responsibilities in harmonious relation to all human beings, animals, birds, fish, plants and animate/inanimate forms whether seen visually or imagined. The Royal Commission emphasizes that acknowledgment of the Government's history in treaty making, displacement and assimilation, residential school, relocations of Aboriginal communities, the Indian Act and the Veterans policy create a starting point for rebuilding of relationships between Indigenous and non-Indigenous peoples. In the context of aboriginal education, Kaukkanen and other sources in this paper remind us that there is a need to understand Indigenous worldviews and perspectives in educational environments in order to discourage the development of disparities between Indigenous and non-Indigenous technological literacy.

OVERVIEW OF IK & TECHNOLOGY CULMUNATING SUMMARIES

Understanding the dynamics of media based learning environments for aboriginal and Indigenous learners begins with a set of principles. The crucial starting point for creating holistic, interconnected, inclusive, innovative, competent, culturally diverse, reciprocally responsive, technologically proficient aboriginal online learning environments begins first by one's reflection and acknowledgment of where one's stands in relation to maps, dreams, visions, past current and developing social historical realities. Reciprocal consultation with community local Elders as knowledge holders informed by IK and Customary law initiates the valuing of Indigenous knowledge and establishes how course interactions can become culturally safe, relevant hence motivating sustainable appropriate online environments and technological advancements that meet the needs of local the community aligned with Indigenous knowledge, local protocols, protections and relationships and worldviews.

Discourse on the mobilization of transformative education to counter the literary gaps

between aboriginal and non-aboriginal digital accessibility, technical supports and quality of life leads to questions about the perceptions pertaining to Indigenous knowledge, equity and theory, technology, ethics in education that include the political cultural and environmental diversification of local and interrelated global networks through partnership and capacity building. Attention to linking the contextual layers with the culturally supportive and flexible learner centered online environments entails a consideration of the psychosocial and physical factors influencing the social integration and technological education in pre-service and pre-orientation initiatives between students' and instructors' virtual and face to face social worlds. Furthermore a continuum of acknowledgment assemblages and institutional visibility may warrant positive participation, performance, academic rigor and economic opportunities born of through the development of community oriented aboriginal online environments.

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