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Community – University Institute for Social Research

**The Brightwater Environmental
and Science Project:
Respecting Traditional Ecological
Knowledge—The Soul
of a Tribal People**

May, 2003



Building Healthy Sustainable Communities

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and Science Project:
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ABSTRACT

Brightwater is an out-of-school environmental education program that is attempting to incorporate Aboriginal knowledges into existing curriculum. To assist this, I was hired as a CUISR intern to complete an overview of Traditional Ecological Knowledge (TEK) for the purpose of investigating the use of the term and to collect information to inform educators about the process. My job was to make recommendations based on research findings and to further collaborate with the staff to begin preparation of curriculum materials. My work began in June 2001, as teachers were preparing for their summer holiday. The plan was to get a head start on research that could help launch a new position where someone would be hired in September to begin actual curriculum work. Throughout this phase, much has been learned about the process of incorporating Aboriginal knowledge into Western curriculum, and it has become evident that this is a course of action that cannot be rushed.

INTRODUCTION

The world can tell us everything we want to know. The only problem for the world is that it doesn't have a voice. But the world's indicators are there. They are always talking to us. (Quitsak Tarkiasuk Ivujivik in McDonald, M., Arragutainaq, L. & Novalinga, Z., 1997)

These words succinctly describe an intimate relationship, an ecological connection intrinsically woven into all aspects of a traditional Aboriginal person's existence. Industrial expansion and naturally occurring environmental change has affected Indigenous peoples around the world in diverse ways. To cope, they have developed a sense of the environment that nurtures both body and spirit. For many generations, they have accumulated and passed on, through the oral tradition, a collective body of knowledge based on observation of the environment and experience of living on the land. The oral tradition goes well beyond simply narrating events. It represents a deep understanding of the complex relationships in the natural environment that influence animals' behaviour and how people respond. This type of Aboriginal knowledge, often called Traditional Ecological Knowledge (TEK), is conceptualized and associated with long-term occupancy of a certain place, making it highly localized and socialized. Fundamental to their sur-

vival, Aboriginal people collected knowledge of seasonal cycles and foods, forests, rivers, currents, plants, sea ice, animal behaviour, the food web, and other essential elements of an ecosystem that has sustained the traditional lifestyle since time immemorial. Founded on a deep respect for the environment and its often unpredictable occurrences, the principles of sustainability and obligation of respect are core to their intimate ecological relationship. This holistic knowledge refers to traditional norms and social values, as well as intellectual and spiritual constructs that guide, organize and regulate a people's ways of living, knowing, and making sense of their world. It is the sum of generations of a given social group's observations, experiences, and resulting knowledge that forms the basis of decision-making in the face of familiar and unfamiliar challenges in an ever-changing environment. This body of knowledge is as complex as it is diverse, given the histories, cultures, and lived realities of indigenous peoples.

A growing ecological movement concerned with what is called "an environmental crisis" coupled with political concerns to recognize Aboriginal rights has increased interest in Aboriginal peoples' knowledges. Aboriginal and non-Aboriginal academics, scientists, politicians and educators have raised many questions. How can TEK be used? Who will it benefit? How is it acquired? Who controls it? Where has it been used? While some of these questions are beyond this paper's boundaries, they demonstrate that several controversial and unresolved issues surround Aboriginal knowledges's use for non-Aboriginal purposes. Understanding TEK as Aboriginal knowledge and considering its respectful place with people who possess it is a good place to begin. First and foremost, TEK is a learned behaviour, one that requires a lifetime apprenticeship with an elder generation immersed in an Indigenous language. It is holistic, a human interaction that transcends physical senses to the natural, social, and spiritual worlds (Battiste & Henderson, 2000; Cajete, 2000; Kawagley & Barnhardt, 1999; Simpson, 2000a). "TEK," Petch (2000) has written, "can be viewed as gestalt, the core of a philosophy for living" (p.139). Because this explanation of TEK departs from Western scientific thought, many scientists find TEK difficult to grasp. From this apparent contradiction, the two understandings of ecological knowledge appear to be at opposite ends of the intellectual spectrum: "whatever TEK is, western scientific ecological knowledge is not" (Petch, 2000, p. 138).

This report's purpose is to sketch out TEK's principles as a preliminary phase in informing those involved with the Brightwater Environmental and Science Program at the Saskatoon Public School Board. My aim is to articulate from an Aboriginal perspective the importance of understanding and respecting that Aboriginal knowledges and heritages are firmly rooted to a peoples' relationships with their ecologies, that they cannot be taken out of the context of the worldviews transmitted and translated through their native languages. Further, this paper presents a discourse that surrounds TEK, including important subtopics such as power relations and ethical issues. Following this, I briefly outline some recommendations for Brightwater.

EXAMINING THE ORIGINS OF TRADITIONAL ECOLOGICAL KNOWLEDGE

The word “traditional” presents a misconception because it often implies a sense of being fixed in time (Petch, 2000). More accurately, tradition is a word that stands for a culture’s historical aspect (Bowers, 1999). It is argued that the ambiguity of the term traditional and its misinterpretation undermines the complexities of Aboriginal peoples’ continually evolving traditions (Berke, 1999; Bowers, 2000; Simpson, 2000a; Petch, 2000). Aboriginal knowledge systems do not lack awareness or understanding of the present. TEK is not static or a functioning of the past. It is dynamic, forever changing with our environments’ demands. Furthermore, Berkes (1993) points out that the term “ecological knowledge” itself poses problems. If ecology is defined as a subsection of biology within Western science, then, strictly speaking, there can be no TEK because most traditional peoples are not Western scientists. “[N]ative peoples often refer to their knowledge of the land rather than to ecological knowledge. Land, however, is more than the physical landscape; it includes the living environment” (Berkes, 1993, p.3).

ABORIGINAL WORLDVIEWS

Traditional ecological knowledge has its roots embedded in a rich heritage of learned Aboriginal worldviews, languages, and local ecosystems. An Aboriginal worldview differs in its physical, emotional, social, and spiritual dimensions from that of a Western worldview in which scientific ecological knowledge has been compartmentalized. An Aboriginal worldview is based on an unassuming human relationship of interdependence and sustainability with the land. Cajete (1994) terms this “a spiritual ecology” that explains how sacred knowledges have evolved for thousands of years. No simple explanation of the “Great Soul” can be “explained or understood with the intellect, but can be perceived only by the spirit of each person” (p. 44). Nature is sacred, and it is only through a celebration of living that knowledges are preserved (Cajete, 2000). Dr. Fikret Berkes’ (1999) extensive research with the James Bay Cree uncovered their phrase, “a community of beings,” to convey how they describe their holistic relationship with local ecology. It is a generalized reverence for life.

Conflicting with this is a Western worldview that bases itself on a scientific ecology of human curiosity, control, and exploitation. At the heart of this relationship is “the notion of man’s dominion over nature” (Berkes, 1999). The challenge to integrate these two knowledge systems is to cultivate a kind of ecology that rejects the objective, rational, and mechanistic Western tradition and accept without bias the diverse Indigenous worldviews that commonly view an ecosystem as pulsating with life and spirit—one that incorporates the people who belong to a land and who have a healthy relationship and sacred connection of peaceful coexistence with other beings. (See **Appendix A** for a worldview comparative chart.)

Central to all Aboriginal worldviews is knowing one's purpose and identity by experiencing a local ecosystem. A worldview is a tribal philosophy of one's life, a cultural lens from which Kawagley (1995) sees the Native person's self as the central drawing force in the circle of life's center. He and Barnhardt (1999) explain that, "The self is grounded in a profound silence of the universe—its sustenance is spiritual, it is love, it is a sense of belonging to a tribe, belonging to the universe, belonging to something greater than one's self" (p. 124). Willie Ermine (1995) expresses Aboriginal epistemology as being "grounded in the self, the spirit, the unknown." He continues: "[U]nderstanding of the universe must be grounded in the spirit. Knowledge must be sought through the stream of the inner space in unison with all instruments of knowing and conditions that make individuals receptive to knowing" (p. 108). Mysteries of ecologies speak to that "inner space" of which Ermine writes—the mystery of a higher power and an intuitive, yet humble, connection with both the natural and spirit worlds. Living in an ecological space for millennia has taught Aboriginal people about their dependence upon all other forces for their survival. Their existence does not allow for separation of its parts because each part must be understood in its relationship to the whole. Aboriginal peoples' worldviews teach obligations of respect and processes of humility about their existence along side all other living forces (Henderson, 2000; Cajete, 2000). It is characterized as a complexity of knowledge, practice and belief.

Along with complexity comes a caution of over-generalizing. We are warned by Aboriginal thinkers (Battiste & Henderson, 2000; Cajete, 2000; Kawagley & Barnhardt, 1999; Simpson, 2000b) to recognize that, although there is considerable commonality among Aboriginal nations who express beliefs about their traditional position in the natural world, we must not overlook the tremendous diversity of ecologies that have necessarily created diverse worldviews, languages, and knowledge systems. After decades of scientific research and immersion into Aboriginal territories, Berkes (1999) confirms that, for him, "Perhaps the most fundamental lesson of traditional ecological knowledge is that worldviews and language do matter" (p. 182). It only makes sense that, "A body of knowledge differs when it is viewed from different perspectives" (Battiste & Henderson, 2000, p. 134). This becomes crucial when presenting TEK in an educational setting, as interpretations of Aboriginal knowledge can easily be altered depending on a teacher's perspective—his/her attitudes, capabilities, experiences, and prior understandings of Aboriginal worldviews.

ABORIGINAL LANGUAGES

If ecology defines Aboriginal consciousness and Aboriginal worldviews are revealed by an elaborate and sophisticated knowledge of natural and spiritual forces' interrelatedness, then Aboriginal languages become the channel of expression of these relationships. As with all worldviews, sacred knowledges that have been sustained over generations become cemented into a personal way of thinking and knowing. For

Aboriginal people, their languages hold this common humanity. Celebrations, ceremony, prayer, song, art and folklore are symbolic literacies that continue to unite the mysteries of ecologies (Battiste & Henderson, 2000). Valuable teachings are provided through oral traditions, stories, and legends. The creation story, for example, teaches how to communicate and coexist with other life forms, how to hunt and fish, how to respect nature, how to be humble, and how to harvest what is taken from the earth. Through language, prayer, and a commitment to ritual, an intimate way of knowing ecologies is learned. It is through Indigenous languages that worldviews and knowledges exist.

Mi'kmaw scholar Dr. Marie Battiste, who serves the United Nations as a technical expert on guidelines for protecting Indigenous heritage, has written extensively about Indigenous languages' importance. Together with her Chickasaw husband, Dr. James [Sa'ke'j] Youngblood Henderson, they maintain that, without an awareness of an Indigenous language, a truthful understanding of an Indigenous worldview and its resulting knowledge system cannot be perceived. Through intellectual discourse, they adamantly warn outsiders that, "To insist on analyzing Indigenous thought from a Eurocentric point of view is cultural racism and cognitive imperialism" (Battiste & Henderson, 2000, p. 74).

Some properly question how many school teachers know an Aboriginal language? How many students know an Aboriginal language? If we want to share different perspectives of ecological knowledge, perhaps teachers must first admit, and allow students to realize, that they can only have an incomplete understanding of Aboriginal knowledge. They should acknowledge that different cultural groups have valid epistemological and knowledge systems different from that of Western cultures, and share this understanding with students, allowing Aboriginal students to learn that their own knowledges are culturally constructed and are neither inferior nor superior to others' knowledges. In demonstrating to students that it is highly unlikely that they could completely comprehend another cultural group's knowledges, teachers confirm Aboriginal knowledges and heritage to be diverse, complex, and, in fact, indefinable (Battiste, 2000). We must respect the essential cultural soul of a people—their cosmology and fundamental beliefs about themselves in the world. Their knowledge is relatively inaccessible to outsiders.

DISCOURSE SURROUNDING TRADITIONAL ECOLOGICAL KNOWLEDGE

TEK has its own language, set of assumptions, dialogue, and repetition of ideas that are presented in academic literature. Efforts to combine both Aboriginal scientific knowledge with Western scientific knowledge are underway, groomed by anthropologists, philosophers, environmentalists, educators, and academics. Although they do not call it TEK, Knudtson & Suzuki (1993) trace Aboriginal scientific knowledge back to the work of French anthropologist Claude Levi-Strauss (1966), who called it "science du concret," a native knowledge of the natural milieu. He suggested simply that Native

worldviews need to be accorded a basic and deserved respect. Native worldviews exist; they do not need the nodding approval of Western societies or well-intentioned Western scientists to somehow “confirm” their truth and relevance.

There is a measure of consensus about ecological themes and modes of transmission from those who write about Aboriginal knowledge in the contemporary Canadian context. Aboriginal knowledge is generally characterized as personal, oral, experiential, and holistic, and conveyed in narrative or metaphorical language. A brief elaboration is useful:

- The personal nature of Aboriginal knowledge lays no claim to universality. The honesty, reliability, and perceptiveness of a traditional teacher determines the level of trust. Personal knowledge is based on observation and experience, and is completely unique. Quantity and quality of knowledge depends upon gender, age, social status, intellectual capacity, and profession/vocation varying between community members (Battiste & Henderson, 2000; Castellano, 2000).
- Oral transmission of knowledge is considered crucial for a truthful understanding. It is regarded as more trustworthy than recorded knowledge. Oral teachings are passed on in the context of a personal relationship, an apprenticeship that promotes listening, watching, and socializing. Teachings encompass not only intellectual content but powerful, emotional, sacred, and often very personal knowledge (Castellano, 2000; Simpson, 2000b).
- Experiential knowledge’s subjective and qualitative character comes from learning by doing. It is a holistic approach that unites the intellect, spirit, emotions, and physical being, creating awareness of one’s reality in communion with other living beings. To reach beyond the physical plane, what Ermine calls “outer space,” one must turn inward to experience totality, the wholeness of the life force—the harmony and insight that only the “Old Ones” can teach. Dreams, visions, and ceremonial practice provide valid experience when interpreted by a cultural Elder (Castellano, 2000; Ermine, 1995; Simpson, 2000b).
- Aboriginal knowledge’s holistic quality involves trying to make sense of ecological mysteries by seeing seemingly isolated pieces as interconnected. Seeking life and becoming complete comes with continuous analysis of all elements of experience and observation, balanced with synthesis in the context of all its relations. Knowledge transformation is dependent on a continual impact of pieces on the whole (Henderson, 2000; Cajete, 1994; Castellano, 2000b).
- Traditional stories that inform and entertain also provide a lens to see the past and supply a traditional context to guide moral behaviors. These are the primary media for conveying Aboriginal knowledge’s legacy and innate learning potential. Communication and learning from narratives is one of the most basic means that

the human brain structures and relates experience. From the very heart of the human psyche, stories reflect lived and remembered truth. The meaning of human existence is understood, remembered, and enacted through song, dance, art, and stories conveyed in ritual (Cajete, 1994; Castellano, 2000; Simpson, 2000b).

Whether non-Aboriginal allies write to advocate for Aboriginal people, or Aboriginal people write to inform Western peoples about their culture's intricacies, both see a need for greater understanding and respect of Aboriginal knowledge. The potential for losing ancient philosophies is great, and a school science program like Brightwater that ventures to understand Aboriginal knowledge is to be valued. Teachers are in a powerful position to communicate to their students that differences exist, and that human reality is legitimately interpreted by a complex knowledge base. Teachers can validate Aboriginal peoples' ways of knowing by exploring their knowledges' existence. The old ways have already proven their worth through our people's survival.

THE POLITICS OF POWER RELATIONS

Standing in the way of this, however, is a growing and complicated political struggle. Because ecology's Western construct was created outside of Aboriginal communities, and TEK's basic foundation is to define and capture something inherently Aboriginal (a local people's original knowledge) there are growing numbers of political issues to be addressed. Who has the authority to represent Aboriginal knowledge? Can authentic traditional knowledge survive outside an Aboriginal community? With growing dependence on Western technologies, how will young people maintain daily access to experiential learning on the land? Will decreased fluency levels in Aboriginal languages cut off communication with Elders? With an already overloaded curriculum, how can a teacher reasonably be expected to take on communicating unfamiliar knowledge?

TEK has largely become the model for addressing environmental, resource management and land claims problems, and has grown to be considered the best model for research, despite concerns of exploitation of Aboriginal knowledge in the name of "progress." Nadasdy (1999) analyzes TEK from a political stance, questioning basic assumptions underlying the concept of traditional knowledge. By using several personal anecdotes, he illustrates how the word traditional "can be used by non-natives to deny the adaptability and dynamism of aboriginal culture" and to judge "First Nations' ability to adapt to new circumstances without abandoning their culture altogether" (pp. 4-5). He argues that knowledge, in the Western sense, conflicts with how Aboriginal people define their way of life. Nadasdy (1999) has observed how researchers effectively discard anything that does not fit into their Western definition of knowledge. Due to Aboriginal knowledge's holistic nature and the lengthy time it takes to acquire teachings, most resource management projects end only with token acknowledgement. Nadasdy explains how much of what was gathered was later disregarded and deemed useless information. Because of a current political climate that demands Aboriginal

perspectives be considered, Nadasdy (1999) and McGregor (2000) fear that Westerners will misrepresent Aboriginal knowledge by compartmentalizing and distorting its sacred beliefs, values, and experiences. Traditional knowledge has been reduced to simple forms of “data” assimilated into existing bureaucracies to be controlled and manipulated by Western scientists to serve their own purposes. Power relations also exist in what Nadasdy (1999) has identified as the “hidden discourse” that exists off the written page whenever TEK is discussed: a Eurocentric bias and often racist assumption that Natives do not even have any traditional knowledge, or that Aboriginal people themselves cannot accurately define it for Westerners. Perhaps this is why TEK is charged as being a new perpetuation of colonial history.

This same theme is described by Semali and Kincheloe (1999) in a classroom context. Power is exerted over Aboriginal students through scientific colonialism. A “Western epistemological tyranny” has helped determine the social, political, and economic conditions of our contemporary world, for it “produces universal histories, defines civilizations, and determines reality” (p. 29). This is a common platform from which Western science teachers have been trained to teach their students—the authority, prestige, power, and privilege of Western science is exceptional and cannot be denied (Aikenhead, 1997). This same centrality has empowered the dominant Western group to create their own artificial reality (Henderson, 2000) that has held the belief in their cultural supremacy sacred while determining Aboriginal peoples’ knowledges to be inferior, and the people themselves to be wild, primitive, and destined for extinction.

Indigenous scholars have harsh words for those who research Aboriginal knowledge. Rains (1999) is concerned about appropriation by modern day explorers and their “intellectual apartheid” approach. This is echoed by Battiste’s (2000) accusation of “predatory mentality” at those unethical researchers “who would gather it [knowledge] up, strip away its honoured meanings, convert it to a product, and sell it” (p. 11). Whether against TEK or a variety of new and improved labels, a growing number of Aboriginal scholars (Battiste & Henderson, 2000; McGregor, 2000; Rains, 1999; Simpson, 2000a) have made efforts to defend and protect their peoples’ knowledge. Some non-Aboriginal scholars (Berkes, 1999; Nadasdy, 1999) similarly feel moved to advocate for a people by whom they have been taught. Both groups recognize ethical issues that must be addressed lest original knowledges lose their soul and purpose.

ETHICAL ISSUES

Linda Smith, a Maori scholar, provides an important reminder to some, and a warning to others, that “the term ‘research’ is inextricably linked to European imperialism and colonialism. The word itself, ‘research’, is probably one of the dirtiest words in the indigenous world’s vocabulary” (1999, p. 1). There is no evidence to suggest that more Western TEK researchers are required, but, rather, that there is a desperate need for TEK researchers to unlearn their own biases, to admit their limitations of understand-

ing, to acknowledge the complexities of Indigenous knowledges, and to respect Indigenous knowledges' diversities and validity as existing intellectual property (Battiste & Henderson, 2000; Simpson, 2000).

Maintaining and nourishing an Aboriginal worldview that protects sacred knowledge of ecologies has not been easy. Aboriginal knowledges unintentionally facilitated colonialism's early stages, where nutrition, food preparation, hunting and fishing technologies, travel routes, cloth-making, shelter-making, recreation, medicines, and health care were all essential survival gifts that European newcomers received from Natives (Weatherford, 1988). Once settlers' lives were stable and the knowledge source forgotten, assimilation policies followed, leaving a legacy of colonialism. It has been called "a national crime"—a deliberate and systematic genocide that denied Canada's First Peoples almost every human dignity. They were segregated to reserves, sometimes separated from family, left to feel daily shame, isolation, alienation, and humiliation (Milloy, 1999).

Eurocentrism's domination, belief in its own superiority, and claim of universality has manifested itself in mainstream scientific analyses. For Aboriginal peoples, the Eurocentric discipline of anthropology has imposed inaccurate, unfair and often racist boundaries around Aboriginal knowledges and worldviews. By determining and classifying a people's "culture," Eurocentric thinkers effectively lumped "Indigenous people as members of harmonious, internally homogeneous, unchanging cultures" (Battiste & Henderson, 2000, p.31). By categorizing Aboriginal peoples as illiterate, primitive, and static creatures, European scholars demonstrated that their own culture was the only one progressing. Battiste and Henderson (2000) further reveal anthropology as "a history of European colonial thought" through its intended focus on the powerless and reluctance to examine colonialism's effects on those same cultures. It is no wonder that Aboriginal people today are apprehensive and distrusting of those who now want to examine their TEK.

We must remember that Aboriginal people continue to suffer the consequences of domination, for they have been the targets of flagrant injustice. As Lise Noël explains in her 1994 book *Intolerance*, "Experience has taught the oppressed that there is no final destination, and that the struggle against oppression is never really over" (p. 211). Sensitized to and knowledgeable about the human dynamics of the theory of intolerance, researchers need to be understanding and unassuming of a potential colonized victim's alienation from his/her cultural identity. Alienation "estranges people from themselves." It means "being dispossessed of one's self" (Noël, 1994, p. 79).

Another critical ethical issue is ensuring that an Aboriginal community member is involved in the research process. This is already in place with the Brightwater project, so their next step is to empower their own school board liaison person to make decisions about the research process. This includes carefully considering what circumstances best

suit the reserve, when is the best time to meet, where meetings will take place, and how the exchange of knowledge will unfold, including appropriate gift-giving. To act otherwise is to perpetuate the already familiar colonial “discovery” attitude. Collaboration and negotiation with people who want to share is key. If Aboriginal community members are not interested, their right to say no must be respected (Battiste & Henderson, 2000). To this end, Dr. Glen Aikenhead and his research partners, who developed *Rekindling Traditions*, have reflected on their experiences and developed valuable information and advice for those beginning a relationship with an Aboriginal community.

Similar to the “hidden discourse” to which Nadasdy refers, there is a different type of underground discourse that exists away from formal settings, behind closed doors, in and out of intellectual settings. It is important to expose this discourse because it speaks to the very heart of projects like Brightwater regarding who should be involved, an Aboriginal or non-Aboriginal person. The concern is political in nature and requires careful consideration. Many Aboriginal people have voiced this same concern. We have all been taught, at critical times in our education, by non-Aboriginal people. Our history, culture, traditions, and identity have often been transmitted to us in textbooks or by privileged non-Aboriginal professors. I do not doubt their intelligence, sensitivity, compassion, or validity within the walls of their institutions, but nevertheless they remain outsiders. They have not felt the shame, experienced the consequential discrimination and oppression, or been subjected to painful scarring stereotypes. They have been spectators and observers, always able to abandon the hurtful and sensitive parts. It has been embarrassing, uncomfortable, and sometimes completely humiliating to admit personal ignorances about a past that has been guarded and even mentally erased by family members who suffered unimaginable grief at the hands of dominating social and political structures (e.g., residential schools and welfare policies). One person who has taught me so much maintains that “challenging the assumptions of modern society... [including] language revival, maintenance, and development remain ..challenging tasks for Aboriginal peoples to undertake in their quest for decolonisation and self-determination” (Battiste, 2000). Battiste’s words resonate with other Aboriginal scholars who call for proactive Aboriginal work. They do not call for more non-Aboriginal people to represent us, speak on our behalf or decipher our needs. In choosing their Public School Board teacher, Brightwater will have to determine who will best be entrusted to properly meet with Aboriginal community members, appropriately exchange gifts, ethically conduct research, and then respectfully convey knowledge to other staff. Careful consideration and sensitivity to this cross-cultural issue is very important. (See, for example, the Natural Sciences and Engineering Research Council of Canada’s policy regarding research involving aboriginal people at <http://www.nserc.ca/programs/ethics/english/sec06.htm>).

RECOMMENDATIONS FOR BRIGHTWATER

The Brightwater program is in a unique situation, for they have openly identified a deficit in their programming, that being the incorporation of Aboriginal knowledges, and seek to remedy that lack.

- My first instinct tells me to avoid calling it TEK. I say this because integration of traditional ecological knowledge with Western ecological knowledge appears impossible, or at least the debate should be left to resource management scientists. If Brightwater's purpose is to incorporate Aboriginal knowledges, let it happen. Call it Aboriginal knowledges or Aboriginal scientific knowledge and demonstrate it to be an evolving and legitimate system. However, the first step is awareness training for teachers. There are relevant University of Saskatchewan courses or Saskatchewan Education information packages that can meet these needs.
- Dr. Glen Aikenhead (1997) shares insights about teachers becoming cultural brokers, in taking on the role of "tour guides" for their student "tourists" to make Western science more accessible to Aboriginal students. In validating Aboriginal knowledges, students' motivation and capabilities help support success. *Rekindling Traditions* is an excellent beginning resource for incorporating Aboriginal knowledge into existing curriculum. The challenge is to change the dominant culture's perspective and allow Aboriginal knowledge to be understood as a living, dynamic concept. (See also, Eber Hampton, "12 Standards of Education for Aboriginal Students" at http://capes.usask.ca/ccstu/guiding_documents/12_standards_of_ed.html, and Guidelines for Representing Aboriginal Knowledge in Cross-Cultural Science & Technology Units at http://capes.usask.ca/ccstu/guiding_documents/guidelines_for_representing_kn.html).
- That the standard of truth in Aboriginal knowledge systems is personal experience needs to be conveyed. Failure to allow differences in worldviews is considered domination. We are all considered "outsiders" to a given community's knowledge regardless of whether we are Aboriginal or non-Aboriginal. Do not fall victim to indiscriminate discarding of knowledges that do not fit into our own worldview. To this end, a useful exercise is to consciously examine one's own worldview. It is only after understanding our own worldview that we can open our minds to those of others. Brightwater, understanding those differences, needs to engage the Whitecap people in meaningful dialogue to discuss how they will proceed.
- For Aboriginal peoples, spirituality is intrinsically connected to a sense of place. Brightwater needs to understand ethics protocols to guard against fragmenting and misrepresenting the holistic nature of Aboriginal knowledges. Teachers must not confuse Aboriginal knowledges as being something that can be packaged and transferred to other people (as school materials are for Western knowledge). It is

not to be appropriated and disguised as an extension of Western scientific knowledge. Aboriginal knowledges are intellectual property. Using them in the classroom, or at an outdoor setting like Brightwater, will not be an easy endeavour. However, allowing Aboriginal students an opportunity to take pride in the knowledges and wisdom of their ancestors and to demonstrate to non-Aboriginal students that other ways of knowing exist breaks down racial barriers.

- Not all Aboriginal knowledges differ from Western scientific knowledge. Demonstrating comparisons may be a place to begin. “[T]he overall aim of the science teacher should be to lay down similarities and differences between the two systems” (George, 1999, p. 88).
- An Aboriginal person should be hired to properly meet with Aboriginal community members, appropriately exchange gifts, ethically conduct research, and then respectfully convey knowledge to other staff.

CONCLUSION

Indeed, it seems like a mammoth task and responsibility to somehow wade through the wide-ranging complexities of incorporating Aboriginal knowledges into existing curriculum. While difficult, this is a direction that can only benefit all Canadians. While it is necessary to respect Western education’s power and necessity, validating Aboriginal knowledges within European institutions enhances our understanding of each other. By sharing and celebrating cultural difference, we can work toward a postcolonial model of science education. Giving both Aboriginal and non-Aboriginal students the tools to communicate cross-culturally helps to promote transformative learning where we strive to learn the meaning of our experiences. The process of effecting change begins with critical reflection and conscious self-questioning. Eber Hampton (1995) expresses the value that can come from such transformation: “it is the difference in our knowledge and language that makes the conversation difficult and worthwhile. It is this common earth that we stand on that makes communication possible. Standing on the earth with the smell of spring in the air, may we accept each other’s right to live, to define, to think, and to speak” (p. 42).

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Appendix A. Differences Between Aboriginal and Western Worldviews

Aboriginal	Western
Spirituality is embedded in all elements of the cosmos	Spirituality is centered in a single Supreme Being
Humans have responsibility for maintaining a harmonious relationship with the natural world	Humans exercise dominion over nature to use it for personal and economic gain
Need for reciprocity between human and natural worlds – resources are viewed as gifts	Natural resources are available for unilateral human exploitation
Nature is honoured routinely through daily spiritual practice	Spiritual practices are intermittent and set apart from daily life
Humans have responsibility for maintaining a harmonious relationship with the natural world	Humans exercise dominion over nature to use it for personal and economic gain
Need for reciprocity between human and natural worlds – resources are viewed as gifts	Natural resources are available for unilateral human exploitation
Nature is honoured routinely through daily spiritual practice	Spiritual practices are intermittent and set apart from daily life
Wisdom and ethics are derived from direct experience with the natural world	Human reason transcends the natural world and can produce insights independently
Universe is made up of dynamic, ever-changing natural forces	Universe is compartmentalized in dualistic forms and reduced to progressively smaller conceptual parts
Time is circular with natural cycles that sustain all life	Time is a linear chronology of “human progress”
Nature will always possess unfathomable mysteries	Nature is completely decipherable to the rational human mind
Human thought, feelings, and words are inextricably bound to all other aspects of the universe	Human thought, feelings, and words are formed apart from the surrounding world
Human role is to participate in the orderly designs of nature	Human role is to dissect, analyze, and manipulate nature for own ends
Respect for elders is based on their compassion and reconciliation of outer- and inner-directed knowledge	Respect for others is based on material achievement and chronological old age
Sense of empathy and kinship with other forms of life	Respect for others is based on material achievement and chronological old age
View proper human relationship with nature as a continuous two-way, transactional dialogue	View relationship of humans to nature as a one-way, hierarchical imperative

The specialization, standardization, compartmentalization, and systematicity that are inherent features of Western bureaucratic forms of organization are often in direct conflict with social structures and practices in Aboriginal societies, which tend toward collective decision making, extended kinship structure, ascribed authority vested in elders, flexible notions of time, and traditions of informality in everyday affairs (Kawagley & Barnhardt, 1999, pp. 120-121).

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