

3

Indigenous Ways of Knowing

Learning Objectives

- To understand of the philosophical underpinnings of knowledge.
- To be able to compare the axioms/postulates for both Western and Indigenous ways of knowing.
- To gain a basic understanding of the Indigenous paradigm for knowing and its relation to Western ways of knowing.
- To be able to identify implications for parties trying to communicate who have different languages, assumptions, and values.
- To learn some points of overlap between the two paradigms.

Introduction

A general definition of Indigenous knowledge, presented by Battiste (2002), is that it consists of those beliefs, assumptions, and understandings of non-Western people developed through long-term association with a specific place. Or, as noted by Alfred (2009), it is the vibrant relationship between the people, their environment, and other living things and spirits that share their land. Alfred argues that it is knowledge contingent on the social, physical, and spiritual (not religious) understandings that have contributed to Native peoples' sense of being in the world and to their survival. In the past, the term 'Indigenous knowledge' was synonymous with terms such as 'primitive', 'wild', and 'natural'. As such, the entire field of Indigenous knowledge was viewed with skepticism, and scholars and policy-makers saw no need to seek out or explore this knowledge base for the insight it might bring to understanding the social behaviour of individuals and/or groups.

Proponents of Western ways of knowing claim that science is universal and that, in contrast, Indigenous knowledge relates only to particular people and their understanding of the world (www.livingknowledge.anu.edu.au). A full understanding of 'ways of knowing' will reveal that science and Indigenous knowledge reflect two different views of the world—science focuses on the component parts whereas Indigenous knowledge looks at the world from a holistic perspective. While some simply reject its validity, others acknowledge the existence of Indigenous ways of knowing but consider this a 'second tier' of knowledge—below science. They agree that traditional Indigenous

knowledge can be an ‘ethno’ science and can play an informative role in knowledge formation, just as ethnobotany has added to the overall knowledge of botany and medicine. Despite a willingness to accept the value of Indigenous knowledge, there is a steadfast refusal to accept the worthiness of ‘raw’ Indigenous knowledge (Semali and Kincheloe, 1999). From a contemporary Western view, only if the knowledge can be tested and validated through the use of the scientific method can it be considered useful and/or important. On the other hand, Lehner (2007: 23) points out that for millions of Indigenous people, this knowledge reflects how they have come to understand themselves in relation to their social and natural environment. Moreover, this knowledge is ‘intellectually evocative and useful for a variety of purposes throughout their lives’. Indeed, Indigenous scholars find it strange that they have to explain how their ways of knowing are different from science while scientists need no such justification in order to conduct their research (Wilson, 2008).

Today, First Nation communities are crafting research guidelines and protocols for those who wish to engage in research on First Nations people or communities. Rather than simply reject these guidelines and requirements, we need to examine the historic conditions that have led these communities to such action. Increasing self-determination in education as well in other areas of life has enabled these communities to develop strategies that reflect their struggle for power. Until recently, First Nation communities have not had power to define what education is or should be for their children. They have not been allowed to influence or determine the nature of Indigenous knowledge in the contemporary world. As Lomawaima (2004) points out, for the past 100 years church groups, federal and provincial bureaucrats, and state-supported post-secondary educational institutions have determined what knowledge would be available to First Nations people in such areas as curricula, pedagogical practices, teacher training, and language instruction. These external determinations are now being challenged by First Nation communities.

Epistemological Questions, or How We Know What We Know

In addressing the issue of knowledge, the question arises as to how we know things. Any knowledge base is grounded in a set of basic assumptions—fundamental premises considered to be unproven and not provable, called axioms or postulates. Our intent here is to provide a basic understanding of Indigenous ways of knowing and how these relate to Western ways of knowing (Aikenhead and Ogawa, 2007).

To address the question of ‘how do we know what we know’, we need to enter the field of **metaphysics**, which focuses on ideas or posited reality outside of human sensory perception. It addresses the study of what cannot

be achieved through objective studies of material reality. Within the general field of metaphysics, issues of ontology, cosmology, and epistemology are included. Cosmology is the general philosophy of the universe considered as a totality of parts and phenomena subject to laws. **Ontology** deals with the philosophical theory of reality, including consideration of the universe. When we talk about ontology, we are saying ‘What is your belief in the nature of reality?’ Thus, if someone asks you what you believe to be real in the world, the question is asking about your ontology. If you answer that only things that can be empirically demonstrated exist, then that is your belief about the world—your ontology. If you include in your belief structure the existence of spirits, then that is a different ontological paradigm. This can never be resolved through research; in fact, such beliefs are unresearchable and empirically untestable assumptions that you carry around in your head. **Epistemology**, the study of the foundations of knowledge, examines the nature of these premises and how they work. Epistemology is how you think about that reality. It is the question of how do we know that something is true? How do we come to know something? How is knowledge structured and evaluated? In Western ways of thinking, positivism is the dominant epistemological paradigm.

Metaphysical ideas are not based on direct experience with material reality and thus sometimes collide with Western ways of knowing, which are almost entirely based on material reality. We will begin by outlining the basic premises of Western ways of knowing (science) and then consider the assumptions, ontology, and epistemology embodied in Indigenous ways of knowing. ‘Science’, here, is the point of comparison since nearly all non-First Nations people have grown up accepting science as the model to be used in understanding the world and providing explanations of any sort.

Western Ways of Knowing

We begin by looking at the cosmology, ontology, and epistemology that are bound up in science (Western ways of knowing). The origin and evolution of science has led to the creation and acceptance of a set of rules that emerged out of the ancient beliefs of Egypt and Greece. As the ideology of science moved into Europe, it was supported by the Renaissance movement. Hatcher (2007) points out that by the sixteenth and seventeenth centuries a number of ‘natural philosophers’ such as Galileo, Kepler, and Newton sought to establish a knowledge system based on the authority of empirical evidence, as opposed to the previous basis of knowledge, which was religion or the monarchy. Out of this perspective emerged the belief that science could exercise power over nature. And, if humans held the key to science, they would be able to control the forces of nature. This gave partial rise to the Industrial Revolution and it provided a new role for science. However,

the natural philosophers of the time (the first scientists) were unhappy to see their work used for the sole benefit of entrepreneurs and industrialists and so tried to distance their work from the applied technology by insisting that their work was for the benefit of all, removed from the economic goals of entrepreneurs. The scientists argued they were only interested in pursuing 'pure science' that was universal in time and place. By the mid-nineteenth century, the last evolutionary phase of natural philosophy developed when science became a profession (Aikenhead and Ogawa, 2007). It was a label that set them apart from the entrepreneurs, the technologists, and those who embraced religion as the way of knowing.

Science is an organization of knowledge that depends on laws that have been established through the application of the scientific method to phenomena in the world. It typically begins with an observation, followed by a prediction that is then subjected to an empirical test. If your hypothesis is supported by empirical data, then you have the beginning of a 'scientific theory' or 'truth' about the world. However, in science, there are 'postulates' (assumptions) that structure your way of knowing. For example, one postulate is that nature is orderly. This assumes that there is recognizable regularity and order in the natural and social world and that events do not just occur haphazardly. It also encompasses a postulate that if there is change, it is patterned and thus can be understood. As such, the epistemological basis of the scientific revolution created two worlds: the known and the knower (or sometimes called 'matter' and 'mind'). Humans were considered outside the space of the known, the cosmos, and could operate outside of time and space in an objective fashion. Hence, operating in an objective fashion, the knower (what we now call the scientist) sets out on a neutral mission to apply abstract reasoning and an Aristotelian logic to understand the natural environment. Semali and Kincheloe (1999) point out that such a clear separation between the mind and matter establishes a division between the internal world of sensation and the objective world comprised of natural phenomena. And, building on this **Cartesian dualism**, scientists argue that the laws of physical and social systems can be uncovered objectively by scientists operating in isolation from human perception with no connection to the act of perceiving. Anyone who does not subscribe to this view of Cartesian dualism perceives it as destroying their unit of existence (Aikenhead and Ogawa, 2007).

Other premises or beliefs also encapsulate the process and ideology of science. Among the more salient assumptions held by those who ascribe to the science model are (1) the need for data; (2) the necessity of reductionism; (3) the subservience of nature; and (4) a commitment to a realistic or 'objective' quantifying view (Aikenhead and Ogawa, 2007).

Data. One must use 'data', and only sensory data (seeing, feeling, hearing) can be employed to assess the natural environment. These data must be objective and empirically based.

Reductionism. In order to fully understand the operations of the whole, it has to be fragmented by the scientist and reduced to its minimal constituent parts, analyzed, and then pieced back together according to the laws of cause and effect. As Aikenhead and Ogawa (2007) point out, Newton extended this perspective by arguing that space and time were an absolute, regardless of context. Thus, researchers could begin to predict the future—the accuracy would depend on how well one could understand the precise detail of the natural phenomena and the sophistication of instruments of measurement. It is important to remember that the concept of time is a recent phenomenon; previously, time was a personal, subjective concept measured in some macro-cyclical sense—the seasons, the appearance of the different shapes of the moon. For example, the concept of causality can only emerge if time is perceived as flowing in a **linear** fashion so that the *independent* variable (the cause) comes in time before the *dependent* variable (the result, which is being impacted by the independent variable).

The subservience of nature. Nature is assumed to be capable of manipulation by humans. In other words, it is subservient to humans, who are in charge and, at the same time, at the apex of nature and yet beyond nature. To science, on a linear scale, humans are above all other animals, plants, and the rest of nature. This perspective reveals a dichotomy between humans and the rest of nature; not only are humans above all others, but they have the right to control. This **positivism**, which is also part of science, frees the scientist from any world view or ideology. It employs inductive or deductive logic that is applied impartially to observations and to strict empirical methodologies (Aikenhead and Ogawa, 2007). This belief also spawns the belief in quantification and realism.

Realism. Science depersonalizes people, objects, and events. Moreover, these people, objects, and events are quantified, which allows scientific observations, descriptions, and explanations to exist outside the scientist. In other words, if you can measure some thing in a quantitative manner, it exists. Alternatively, if you can't measure it, you cannot establish a truth value about the person, object, or event. In the end, science sees reality as being comprised of objective mathematical relationships.

As noted earlier, the study of knowledge is epistemology. This involves studying the defining features of knowledge, the substantive conditions of knowledge as well as the limits of knowledge. For example, what is the source of knowledge? In Western ways of knowing, it would be either rationalism or empiricism. On the basis of these sources, Western ways of knowing are then said to be 'true' and the truth has some permanence. These postulates or axioms of science are basic assumptions that have no empirical/rational basis but are accepted as fundamental truths. They allowed Western ways of knowing to move forward and become the foundations of the logic and belief system of science. Western ways of knowing are embodied in the

equation: Knowledge = justified, true belief. And, it is assumed, you know that something is justified if it has been obtained through the rigours of the scientific method that includes an 'objective' stance in assessing reality. It turns out that Indigenous ways of knowing are not that different from this equation. Nevertheless, in Western ways of knowing, truth and knowledge are ends in themselves.

While we have simplified the Western approach to knowledge, the above captures the essence of how scientists claim to know what they know. This view provides the researcher with a paradigm by which he/she approaches and perceives an object, person, or event, and spells out how one would go about establishing the 'truth' regarding the object, person, or event.

Indigenous Ways of Knowing

Indigenous knowledge comprises the complex set of technologies developed and sustained by Indigenous peoples (Battiste, 2002). Battiste notes that Indigenous knowledge is generally embedded in the cumulative experiences and teachings of the people. As such, it is a dynamic system based on people's skills and is adaptable to problem-solving strategies that change over time. It is a knowledge system of its own with a unique internal consistency and postulates (Daes, 1995). Daes posits that Indigenous knowledge has its own concepts of epistemology and its own 'scientific and logical validity', but these are not parallel to the concepts and assumptions of science. Moreover, Piquemal (2004) and Battiste (2002) point out that Indigenous knowledge consists of all knowledge pertaining to a specific people and their territory, and the totality of this knowledge has been transmitted from generation to generation. We also will find that Indigenous knowledge is linked to land where proper ceremonies, stories, and medicines are held. Thus, the structure and diversity of Indigenous knowledge reflect the stories of creation, and the psychological connectedness of these stories to the people's cosmology plays a determining role in how individuals vision themselves in relation to each other and to objects and events. Battiste (2002) notes that for those following an Indigenous way of knowing, knowledge is not secular; it is a process derived from creation and, as such, is sacred; it is inherent in and connected to all nature, including humans. Wilson (2008) notes that knowledge itself is held in the relationships and connections formed with the environment that surrounds us.

Thus we find that Indigenous knowledge is more than the binary opposite of Western ways of knowing but something quite different. What we need to know, then, is whether or not there are a distinct ontology and epistemology for Indigenous ways of knowing and, if so, what they are. Battiste (2002) shows that Indigenous epistemology is found in history, philosophy, and ceremonies. Indigenous knowledge is embodied in the songs, ceremonies,

symbols, and art of a people, and there is a belief that all persons must have a healthy sense of spirituality for mental and physical health. As a result, Indigenous knowledge is difficult to distinguish between the empirical content and the moral message. Moreover, Indigenous knowledge is less like positivism and more like critical theory or **constructivism** (Wilson, 2008), which insists on more fluidity to ‘truth’ about reality than positivists admit. For Indigenous thinkers, reality is constructed by our cultural and social values. In the end, there are many realities, not merely one, and these realities are specific to people and the place of those people. In short, reality is what you make it to be; when researchers and subjects come together and create a natural world common to both them, that is reality. However, knowledge in itself is not seen as the ultimate goal. The goal is the change that this knowledge will bring about, and thus research must have some goal to improve the reality of the research subjects (Wilson, 2008).

Knowledge, for Indigenous people, is not a *thing* in the world awaiting discovery, for Indigenous knowledge is shaped and guided by human actions and goals. Knowledge is what we put to use, and it can never be divorced from human action and experience (Daes, 1995). In addition, Indigenous ways of knowing reflect different levels of knowledge. Indigenous scholars argue that in Western thought scientists work on the lower levels most of the time. Burkhart (2004) argues that what constitutes data is different between Indigenous and Western thought. In Western thought, ideas, observations, and experiences are the basis of data—the Cartesian bias—where the mind and body are two separate substances. Indigenous thought posits that all experience, not just that of the scientists, must be taken into account as data. Thus, an individual must take into account the experiences of others, including stories told from generation to generation, in order to fully understand social reality.

Battiste (2002) argues that Indigenous ways of knowing also assume that meaning exists in a specific context—it is not universal. As such, it is difficult to interpret a particular idea from an unknown or different context, and not understanding that context is to engage in misinterpretation. Indigenous knowledge emerges out of one’s experience, and it is this *subjective* experience that forms the basis for an *objective* explanation of the world.

In considering the differences and similarities between Western and Indigenous ways of knowing, we need to acknowledge that translating terms from an Indigenous language to English is sometimes problematic. For example, the English noun ‘knowledge’ does not easily translate into a verb-based Indigenous language. The best we can come up with as a translation is that ‘knowledge’ is similar to ‘ways of living’ or ‘ways of being’. So, we have a problem already. In English, ‘knowledge’ is a noun and something that can be obtained, gained, quantified, stored, and assessed, and the known can be differentiated from the knower. This is not possible in Indigenous

ways of knowing. As Aikenhead and Ogawa (2007) conclude, a translation for 'knowledge' would seem to be 'coming to know'. But 'coming to know' is different from 'knowledge', which, as a noun, establishes a person, place, or thing. On the other hand, 'coming to know' is a journey towards wisdom and a final destination. As you can see, some differences in world view arise from the language itself.

We now turn to see if we can identify the postulates, world views, metaphysics, values, and epistemologies of Indigenous ways of knowing (Indigenous ways of living in nature) and what the counterparts are in Western ways of knowing. Again, drawing from Aikenhead and Ogawa (2007), the salient components have been identified.

Monism. Indigenous ways of knowing do not have a division of mind and matter, so that everything in the universe is alive. Both animate and inanimate objects have a life spirit. The unwillingness to separate the nature of the relationship between the world of matter and the world of spirit is an important attribute in Indigenous ways of knowing. Indigenous knowledge also assumes that every individual element of the world, such as a rock or plant, has its own unique life force. These life forces are an essential element of all forms of harmony and balance—well-being—as well as an expression of interrelationships.

As Aikenhead and Ogawa (2007) note, three overarching ideologies are at the basis of Indigenous knowledge. First, each person has certain skills that allow that person to engage in personal and social interaction. Second, a vision of social change that leads to harmony or balance, rather than control of the social or natural environment, is required for each person. Third, one accepts the spiritual dimension of the environment. In this ideology, knowledge and the knower are intimately interconnected. In the end, the coupling between the knower and the known is strong. As we noted earlier, in science, spirituality was removed from the discourse in order to distance science (and scientists) from religious and royal authorities. Finally, Indigenous knowledge makes a distinction between knowledge and wisdom. Westerners seek knowledge (a commodity) while Indigenous peoples seek wisdom, which is intimately and subjectively related to human behaviour.

Holism. Daes (1995) and Battiste (2002) point out that holism in Indigenous ways of knowing is the opposite of Western reductionism. In Western knowledge we noted there is the process of fragmentation or decontextualizing of knowledge. From an Indigenous perspective, this severing of the cultural connections destroys the meaning of the behaviour or context. Traditionally, scientists have a view of the universe that restricts the capacity to think in terms of holism, although this view is changing. Nevertheless, scientists have separated science from such areas as art, religion, and philosophy, while no such separate categories exist in Indigenous ways of knowing. As a result, both scientists and Indigenous people will know the name of a

song and how and when it is to be sung, but without the proper ceremony and relationships the song will not be understood or achieve its goal. Holism leads us to a discussion of relationships.

Relations. In Indigenous culture, everything is animate; everything has a spirit and knowledge (Battiste, 2002). And if all things have spirit and knowledge then they are all part of the great circle of life. Thus, all things are in relationship. The animal gives itself to the hunter: a spiritual or sacred relationship exists between the two; the shooting of the animal is not simply a sporting or economic enterprise as a result of the hunter's technology and superior knowledge. This ontological belief means that in Indigenous ways of knowing, people travel through life in a relational existence. As such, First Nations people focus on relationships that encompass knowledge, people, and all animate and inanimate objects, participating fully and responsibly in such relationships (Aikenhead and Ogawa, 2007).

Moreover, Indigenous ontology does not allow an individual to own knowledge as in Western ways of knowing because this relationship is shared and mutual. Knowledge is regarded as coming from the Creator and hence it is sacred—although it also has other components, such as physical, mental, and emotional. All human experience and all forms of knowledge contribute to the overall understanding and interpretations of the world. As Wilson (2001) points out, rather than calling something an object or an idea, the important issue is one's relationship to the idea, concept, or object. In summary, relationships are more important than reality. In Western ways of knowing, empirical evidence is the key to knowledge and is superior to any other kind of knowledge. In contrast, the primary characteristic of Indigenous ways of knowing is the focus on relationships—all things are interconnected and therefore relevant (Wilson, 2003). Stewart-Harawira (2005) argues that a central principle of Indigenous ways of knowing has to do with the interconnectedness of all existence. Moreover, this principle governs relationships between all humans and other forms of life. Finally, in Western ways of knowing, knowledge is approached through the use of intellect while for Indigenous ways of knowing, one would approach it through the senses and intuition.

Reciprocity. Reciprocity is another central tenet of the ontology of Indigenous ways of knowing. This concept recognizes the dual nature of every action and reaction. Thus, as Newhouse (2004) points out, when a person comes into a relationship with certain knowledge he or she is not only transformed by it but must assume responsibility for it. Ceremony is one way in which that relationship is carried out with respect. And the proper performance of ceremony allows the learner to gain access to knowledge holders and perhaps allows the knowledge to be transferred from one person to another.

Reciprocity recognizes that nothing occurs without a corresponding

reaction. As such, individuals need to fully appreciate this conceptualization of action and ensure that they remain in 'balance'. One does not, for example, over-hunt but takes only what the hunter and community need. As the anthropologist Harvey Feit (2004: 106) notes of the James Bay Cree: 'Hunting involves a reciprocal obligation for hunters to provide the conditions in which animals can grow and survive on the earth.' Sharing with the community and treating the products of the hunt with respect and even reverence are part of this requirement of and need for reciprocity and balance. It also captures the concept of 'dynamism' (which also is an integral part of Western ways of knowing) in that Indigenous ways of knowing are always aware that changes happen as a result of new evidence, creative insights, and ongoing interactions. Indigenous knowledge is more than repetition passed from one generation to another. Knowledge holders continually make observations and test the reliability of their knowledge as well as exchange information with others (Cajete, 2000; Aikenhead and Ogawa, 2007). Everything is continually being revised as time goes on. In some respects, Indigenous knowledge is just as empirically based as science. Indigenous knowledge holders are astute observers of the natural world, and the particulars are understood in the context of the whole. In the end, to live properly, one must live in harmony and balance with nature for the sake of the community's survival.

Inner/Outer Space As Ermine (1995: 124) points out, Western knowledge is 'seeing knowledge on the physical plane objectively and thus can only find answers through the exploration of the "outer space", solely at the empirical level.' However, he notes that in First Nation epistemology the individual can only understand the reality of being and experience harmony with the environment by turning inward. Indigenous knowledge is thus based on 'inner space', which means that the universe of existence within each person is equal to the spirit of the self. In other words, our existence is based on the belief that all the elements that make up the world are connected and that the individual is interconnected to the whole—bringing about a sense of inclusiveness. Thus, spirits that exist give meaning to existence and establish the starting point for Aboriginal epistemology. This is, as Aikenhead and Ogawa (2007) argue, the mysterious force that connects the totality of existence. While Western knowledge focuses only on the exterior sources for gaining knowledge, Indigenous knowledge focuses on the inner but never forgets the exterior essence of the individual. So, to gain an understanding of one's world, one must explore his/her existence subjectively and place oneself in the 'stream of consciousness'. In brief, you need to tap into your 'life force' in order to understand yourself as a being and understand your relations.

This view, however, goes even further in that other life forms, e.g., plants, animals, and non-life forms—rocks, earth, water—also have life forces that

are connected to the individual. Since all elements on earth are interrelated and connected, this provides a vast scale of energy that one can tap into to understand more fully the universe through understanding oneself. As Ermine (1995: 86) indicates, ‘it is a subjective experience that, for the knower, becomes knowledge in itself and that experience is knowledge.’ This way of knowing is quite different from those who follow Western ways of knowing, and it reflects a gap between the two manners in which knowledge is acquired or known. This focus on inner space, the concern with understanding the inner-world cosmology and with the ‘inwardness’ of knowledge has been evident for many years, through the language of First Nations people, the rituals and ceremonies they carry out, as well as their dreams. The exploration of that inner space continues to be the focus of First Nations people, and their communities are based upon this culture of using the ‘life force’ to better understand the universe. Indigenous people see all human development linked to the natural environment—soil, water, rock, plants, animals, landforms—and thus Indigenous ways of knowing are instilled with a sense of place. And, because Indigenous people’s identities are imbued with a sense of place, place becomes a part of their ‘inner space’ (Ermine, 1995).

Rituals and ceremonies, such as sweat lodges, sun dances, pipe ceremonies, and healing circles, demonstrate that First Nations people continue to seek their inward journeys. Of course, these ceremonies are corporeal sacred acts that allow the individuals to continue their spiritual exploration and to continue to understand their inner space. First Nations communities engage in these ceremonies and thereby enjoy the collective energy of the community to explore their ‘inner-worldness’. For those who continue the practice, these ceremonies serve as pathways into the inner world (Ross, 2008).

Science versus Indigenous Ways of Living in Nature

In Western ways of thinking, there is a belief that knowledge is something to be gained and thus can be owned by either an individual or corporation. In addition, in Western ways of knowing science is separated from art and religion. From an Indigenous perspective, on the other hand, knowledge is relational and is shared with all—with animals, plants, mother earth, even the cosmos (Wilson, 2008). Moreover, in Indigenous knowledge, these areas of knowledge are integrated. As such, the method for constructing knowledge is different because of the different epistemological foundations of Indigenous ways of knowing. Measuring things is not paramount, as it is in Western ways of knowing, but the key to understanding is found in the relations that exist between things, and this does not mean simply cause-and-effect relations. The key is trying to understand the influences upon the system as a whole. Thus, as Newhouse (2004) explains, a First Nations

researcher lives in a world of constantly reforming multi-dimensional interacting cycles where all factors are influencing other elements in the world. In the end, Indigenous knowledge, unlike Western knowledge, is not an attempt to control the world through understanding causal relations but rather seeks to understand a world defined by relationships and forces.

Cajete (1997) suggests that while science has contributed an element of insight, it has substantial limitations in the multi-dimensional, holistic, and relational reality of Indigenous people. In addition, Timpson (2009) points out that if one uses an Indigenous research paradigm situated in tribal knowledge, it will not be **grounded theory** or **participatory action research**. Rather, it will be a research method congruent with tribal epistemologies that reflects the distinctive approach of Indigenous knowledge systems to the generation of new knowledge. This new epistemology will be a more organic, non-institutional approach to knowledge and will involve elements of methodology foreign to Western ways of knowing (Cajete, 1997).

As discussed earlier, Indigenous ways of knowing offer no tidy division between objective reality and spirituality. However, in science, the inclusion of a spiritual element into ways of knowing is eliminated immediately and is not considered part of the paradigm of knowledge. On the other hand, the maintenance of a balance with humans' relationship to nature is the basic paradigm for Indigenous ways of knowing. As Cajete (2004) argues, in Indigenous ways of knowing, the aim is not to explain an 'objectified universe', but rather to learn about and understand responsibilities and relationships. The role of empirical evidence is considered more legitimate than cultural knowledge in Western ways of knowing. As Wilson (2008) explains, from this Western perspective, Indigenous knowledge is denigrated and not seen as extra-intellectual; rather, Indigenous knowledge, such as it is, merely reveals the superiority of written text over oral tradition, and this view contravenes the epistemology of Indigenous scholars. Moreover, in science, the individual is the source and owner of knowledge, which makes the individual or object the essential feature. In Indigenous ways of knowing, by contrast, relationships are the essential feature. Finally, the issue of Western linearity and Indigenous circularity differentiates between the two ways of knowing, although these are not diametrically opposed.

At the same time, there are points of congruence between Indigenous and Western ways of knowing. Empiricism, observation, reliability, and experimentation are solidly embedded in both paradigms. And both have confronted the problems of doing research. For example, Tofoya (1995) has identified the problem of the 'principle of uncertainty' by noting that it is impossible to know both the context and definition of an idea at the same time. The more closely you define or explain an idea, the more it loses its context and vice versa. In science a similar uncertainty principle (Heisenberg principle) refers to the inability to measure speed and place at the same time.

Cosmologies and Chaos Theory

Cosmologies are the stories about ‘humanness’, and each culture seems to have a different cosmology. What the cosmology consists of will be rooted in culture and since Indigenous culture is rooted in place, the nature of place is embedded in their language. Language, then, allows the physical, cognitive, and emotional orientation of a people in providing generation after generation with a ‘map of the world’, i.e., a cosmology. Individuals carry this map in their heads and transfer it from generation to generation as well as use it on a daily basis to stay alive. These cosmologies have important impacts on the world view that people have, and our discussion has clearly noted major differences between Western and Indigenous cosmologies. Indigenous cosmologies are evident in storytelling and songs, which are predominant in their culture compared to the relative lack of storytelling and traditional songs in contemporary Western ways of knowing.

Some Indigenous scholars link chaos theory with Indigenous ways of knowing. Cajete (2000) notes that chaos is the process through which everything in the universe becomes manifest. It is an evolutionary force that describes the way nature makes new forms and structures out of the potential great void. It also represents the unpredictability and relative randomness of the creative process. However, an ordering process results from chaos, which he calls ‘order for free’. Even small things in chaos theory are important and can have subtle influences (‘butterfly effects’) on a larger system over time. Thus, a song or ritual may have a great impact on the larger system. Someone who prays for rain or participates in a rain dance, it is believed, may have an impact on the eventual rain that occurs. Chaos theory demonstrates that everything is related and everything has an effect, and even small things have an influence. As such, a single individual’s vision may transform a society (Cajete, 2004). While chaos theory may be part of Western ways of knowing, it has yet to be systematically integrated into the structure of science. But, as things change, it may well be that science will embrace chaos theory and incorporate the basic tenets into its epistemology.

Indigenous ways of knowing have five components that are linked together. First, there is a belief in unseen powers in the world. Second, there is an acceptance of the fact that all things (animate and inanimate) are linked and dependent on each other. Third, relationships between people are of primary importance. Fourth, all individuals have the responsibility to both teach and behave in a moral and ethical fashion. Finally, Indigenous knowledge is passed on by scholars of the culture, although this knowledge changes as the environment changes.

Conclusion

Every knowledge system is built on a set of axioms or postulates. These are neither true nor false and they are not subject to empirical investigation; they are simply assumed. If we were to change any of these postulates, we would quickly discover that what we know would radically change. As Aikenhead and Ogawa (2007) point out, if we change one axiom in Euclidian geometry, we create a very different system of geometry that would provide a very different view of the world.

Indigenous ways of knowing have different axioms/postulates from those of Western knowledge. Indigenous epistemology is built upon relationships rather than on the things themselves. It is more than merely a way of knowing. It is based on the concept of relational accountability—being accountable to all your relations (Wilson, 2008). Thus, it should not come as a surprise that an Indigenous world view, using different axioms, is different from that of non-First Nations people. Anderson (2009) points this out when he examines the intent of the ‘treaty annuity’ as part of the treaties. He shows that both parties agreed that the annuity payments were to be an integral part of the overall treaty objective of providing livelihood assistance for First Nations and their descendants. However, governments perceived the annuity and other treaty livelihood assistance to be temporary means of support, while First Nations perceived the annuity payment as renewal of a nation-to-nation agreement whereby the terms of the relationship could be reviewed and readjusted as circumstances might warrant.

At the same time, practitioners in each culture have first-hand experience that their way of knowing has served them well and has provided the necessary answers to the questions they have about life. Indigenous people have been using their ‘way of knowing’ for more than 10,000 years and it has served them well, while science as we understand it today has been around for barely 500 years. Also, of course, the two systems in many instances, because of their different starting points, ask different questions.

An understanding of what Indigenous knowledge is all about is important for several reasons. First, by introducing the concept of Indigenous knowledge, people will begin to have an increased awareness and better understanding of First Nations culture. Second, Indigenous knowledge has provided Western ways of knowing with important insights into the workings of the world in a number of areas, such as medicine (Cajete, 2000) and relational or ‘talking’ therapies. McKinley (2007) argues that understanding Indigenous knowledge will result in healing and rebuilding sovereignty within First Nations cultures. Finally, an appreciation of Indigenous knowledge gives us a better understanding of the cultural influences on school achievement by students whose cultures and languages differ from our Eurocentric culture.

We end by noting that we should never lose sight of the fact that the reason for exploring ideas is to expand our understanding of the diversity of human thought and not to expand our own specific ways of thinking so that they encompass all others (Cordova, 2004). Moreover, we need to understand that knowledge of any sort originates in a people's culture, the roots of which rest in their cosmology. The cosmology is the contextual foundation for a philosophy, a grand theory of sorts that, by nature, is speculative. A cosmology seeks to explain the story of the universe, its origins, attributes, and essential nature. It also sets forth the paradigm of thinking that will guide how people search for and accept data as knowledge.

Questions for Critical Thought

1. What are the central differences between a First Nations and Western paradigm?
2. What are the consequences of different groups having different paradigms?
3. Can the paradigms of First Nations people be integrated with the paradigm held by scientists?
4. Does the existence of different paradigms of knowing mean that all knowledge is relative and one is not better than the other?

Suggested Readings

- Aikenhead, G., and M. Ogawa. 2007. 'Indigenous Knowledge and Science Revisited', *Cultural Studies of Science and Education* 2: 539–620. The authors discuss three different paradigms for 'knowing', comparing and contrasting each perspective.
- Battiste, M., and J. Henderson. 2000. *Protecting Indigenous Knowledge and Heritage*. Saskatoon: Purich Publishing. The authors, an educator and a law professor, address the central concepts that make up Indigenous ways of knowing.
- Waters, A., ed. 2004. *American Indian Thought*. Malden, Mass.: Blackwell. The contributors to this edited volume discuss Indigenous ways of knowing from a number of different perspectives, e.g., philosophy, mathematics, education, and logic.

Suggested Websites

Hanksville

www.hanksville.org

This site provides an interesting index of Indigenous knowledge resources on the Internet. Its coverage is wide, including such diverse topics as biodiversity,

supernova petroglyphs in Chaco Canyon, Inuit astronomy, and Native American geometry.

Indigenous Knowledge Websites

www.kivu.com/wbbook/ikwebsites.html

This site presents a listing of some of the most important traditional knowledge websites to be found on the Internet. It is worldwide and covers traditional knowledge websites from various countries and organizations.