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# Indigenous Knowledge Systems and Alaska Native Ways of Knowing

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*Drawing on experiences across Fourth World contexts, with an emphasis on the Alaska context, this article seeks to extend our understandings of the learning processes within and at the intersection of diverse worldviews and knowledge systems. We outline the rationale for a comprehensive program of educational initiatives closely articulated with the emergence of a new generation of Indigenous scholars who seek to move the role of Indigenous knowledge and learning from the margins to the center of educational research, thereby confronting some of the most intractable and salient educational issues of our times. [Indigenous knowledge, Indigenous epistemologies, Alaska Native education, Native science]*

A few years ago, a group of Alaska Native elders and educators were assembled to identify ways to more effectively utilize traditional knowledge systems and ways of knowing embedded in Native communities as a means of enriching the school curriculum and enlivening learning experiences of students. After two days of lengthy discussions on Indigenous worldviews, Native ways of knowing, cultural and intellectual property rights, and traditional ecological knowledge, an Inupiaq elder stood up and explained through an interpreter that he was going to describe how he and his brother were taught to hunt caribou by their father before guns were commonplace in the upper Kobuk River area of northern Alaska.

The elder described how his father had been a highly respected hunter who always brought food home when he went out on hunting trips and shared it with others in the village. One day, at the time when he and his brother were coming of age, their father told them to prepare to go with him to check out a herd of caribou migrating through a valley a few miles distant. The brothers eagerly assembled their clothing and equipment and joined their father for their first caribou hunt. When they reached a ridge overlooking the nearby valley, they could see a large herd grazing and moving slowly across a grassy plain below. The father told his sons to lie quietly on the ridge and watch as he went down with his bow and arrows to intercept the caribou.

The boys watched as their father proceeded to walk directly toward the caribou herd, which as he approached began to move away from him in a file behind the lead bulls. Yet the father kept walking openly toward the herd. This had the two brothers scratching their heads wondering why their father was chasing the caribou away from him. Once the father reached the area where the caribou had been grazing, he stopped and laid his bow and arrows on the ground. As the elder told the story, he demonstrated how his father then got into a crouching position and slowly began to move his arms up and down, slapping them against his legs as though he were mimicking a giant bird about to take off in flight. The brothers watched intently as the lead bulls in the caribou herd stopped and looked back curiously at their father's movements. Slowly at first, the caribou began to circle back in a wide arc watching the figure flapping its wings out on the tundra, and then they began running, encircling their father in a closing spiral until eventually they were close enough that he reached down, picked up his bow and arrows and

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methodically culled out the choice caribou one at a time until he had what he needed. He then motioned for his sons to come down and help prepare the meat to be taken back to the village.

As the elder completed the story of how he and his brother were taught the accrued knowledge associated with hunting caribou, he explained that in those days the relationship between the hunter and the hunted was much more intimate than it is now. With the intervention of modern technology, the knowledge associated with that symbiotic relationship is slowly being eroded. For the elder, however, the lessons he and his brother learned from their father on the tundra that day were as vivid when he shared them with us as they had been the day he learned them; he would have little difficulty passing a graduation exam on the subject 70 years later. The knowledge, skills, and standards of attainment required to be a successful hunter were self-evident, and what a young hunter needed to know and be able to do were both implicit and explicit in the father's lesson.

The insights conveyed by the Inupiaq elder, drawing on his childhood experience, have relevance to educators today as we seek to make education meaningful in the 21st century. The remainder of this article will be directed to explicating such relevance through a close examination of common features that Indigenous knowledge systems share around the world, followed by a closer look at initiatives contributing to the resurgence of Alaska Native knowledge systems and ways of knowing as a catalyst for educational renewal.

Indigenous peoples throughout the world have sustained their unique worldviews and associated knowledge systems for millennia, even while undergoing major social upheavals as a result of transformative forces beyond their control. Many of the core values, beliefs, and practices associated with those worldviews have survived and are beginning to be recognized as being just as valid for today's generations as they were for generations past. The depth of Indigenous knowledge rooted in the long inhabitation of a particular place offers lessons that can benefit everyone, from educator to scientist, as we search for a more satisfying and sustainable way to live on this planet.

Actions currently being taken by Indigenous people in communities throughout the world clearly demonstrate that a significant "paradigm shift" is under way in which Indigenous knowledge and ways of knowing are recognized as complex knowledge systems with an adaptive integrity of their own (see, e.g., the Winter 2004 special issue of *Cultural Survival Quarterly* on Indigenous education). As this shift evolves, Indigenous people are not the only beneficiaries; the issues are of equal significance in non-Indigenous contexts (Nader 1996). Many problems manifested within conditions of marginalization have gravitated from the periphery to the center of industrial societies, so that new (but old) insights emerging from Indigenous societies are of equal benefit to the broader educational community.

The tendency in the earlier literature on Indigenous education, most of which was written from a non-Indigenous perspective, was on how to get Native people to acquire the appurtenances of a Western scientific worldview (Darnell 1972; Orvik and Barnhardt 1974). Until recently, there was very little literature that addressed how to get Western scientists and educators to understand Native worldviews and ways of knowing as constituting knowledge systems in their own right, and even less on what it means for participants when such divergent systems coexist in the same person, organization, or community. It is imperative, therefore, that we address these issues as a two-way transaction. Native people may need to understand Western society, but not at the expense of what they already know and the way they have come to know it. Non-Native people, too, need to recognize the coexistence of multiple worldviews and knowledge systems, and find ways to understand and relate to the world in its multiple dimensions and varied perspectives.

The intent of this article is to extend our understanding of the learning processes that occur within and at the intersection of diverse worldviews and knowledge systems, drawing on experiences across Fourth World contexts, with an emphasis on the Alaska context. The article outlines the rationale behind a comprehensive

program of educational initiatives closely articulated with a new generation of Indigenous scholars who seek to move the role of Indigenous knowledge and learning from the margins to the center of educational research, and thus take on some of the most intractable and salient issues of our times.

### Indigenous Knowledge Systems

In 2003, the U.S. Commission on Civil Rights issued a comprehensive report titled, *A Quiet Crisis: Federal Funding and Unmet Needs in Indian Country*, in which the following conclusion was drawn with regard to education of Native American students:

As a group, Native American students are not afforded educational opportunities equal to other American students. They routinely face deteriorating school facilities, underpaid teachers, weak curricula, discriminatory treatment, and outdated learning tools. In addition, the cultural histories and practices of Native students are rarely incorporated in the learning environment. As a result, achievement gaps persist with Native American students scoring lower than any other racial/ethnic group in basic levels of reading, math, and history. Native American students are also less likely to graduate from high school and more likely to drop out in earlier grades [U.S. Commission on Civil Rights 2003:xi]

Students in Indigenous societies around the world have, for the most part, demonstrated a distinct lack of enthusiasm for the experience of schooling in its conventional form—an aversion that is most often attributable to an alien institutional culture rather than any lack of innate intelligence, ingenuity, or problem-solving skills on the part of the students (Battiste 2002). The curricula, teaching methodologies, and assessment strategies associated with mainstream schooling are based on a worldview that does not adequately recognize or appreciate Indigenous notions of an interdependent universe and the importance of place in their societies (Kawagley et al. 1998).

Indigenous people have their own ways of looking at and relating to the world, the universe, and each other (Ascher 2002; Eglash 2002). Their traditional education processes were carefully constructed around observing natural processes, adapting modes of survival, obtaining sustenance from the plant and animal world, and using natural materials to make their tools and implements. All of this was made understandable through demonstration and observation accompanied by thoughtful stories in which the lessons were embedded (Cajete 2000; Kawagley 1995). However, Indigenous views of the world and approaches to education have been jeopardized by the spread of Western social structures and institutionalized forms of cultural transmission (Barnhardt and Kawagley 1999).

Recently, many Indigenous and non-Indigenous people have begun to recognize the limitations of a monocultural education system, and new approaches have begun to emerge that are contributing to our understanding of the relationship between Indigenous ways of knowing and those associated with Western society and formal education. Our challenge now is to devise a system of education for all people that respects the epistemological and pedagogical foundations provided by Indigenous as well as Western cultural traditions. Although the examples used here are drawn primarily from the Alaska Native context, they are intended to be illustrative of the issues that emerge in any Indigenous context where efforts are under way to reconnect education to a sense of place and its attendant cultural practices and manifestations.

### Indigenous Knowledge and Western Science Converge

In this section, we compare Indigenous and Western knowledge systems and worldviews. When engaging in this kind of comparative analysis, generalizations must be recognized as indicative and not definitive, since Indigenous knowledge systems are themselves diverse (as are knowledge and traits ascribed to Western societies); these knowledge systems are constantly adapting and changing in response

to new conditions. The qualities identified for both Indigenous and Western systems represent tendencies rather than fixed traits, and thus must be used cautiously to avoid overgeneralization (Gutiérrez and Rogoff 2003). At the same time, it is the diversity and dynamics of Indigenous societies that enrich our efforts as we seek avenues to integrate Indigenous knowledge systems in a complementary way with the system of education we call schooling.

Although Western science and education tend to emphasize compartmentalized knowledge that is often decontextualized and taught in the detached setting of a classroom or laboratory, Indigenous people have traditionally acquired their knowledge through direct experience in the natural world. For them, the particulars come to be understood in relation to the whole, and the “laws” are continually tested in the context of everyday survival. Western thought also tends to differ from Indigenous thought in its notion of competency. In Western terms, competency is often assessed based on predetermined ideas of what a person should know, which is then measured indirectly through various forms of “objective” tests. Such an approach does not address whether that person is actually capable of putting that knowledge into practice. In the traditional Native sense, competency has an unequivocal relationship to survival or extinction—if one fails as a caribou hunter, the entire family is in jeopardy. One either has or does not have requisite knowledge, and it is tested in a real-world context.

The American Association for the Advancement of Science has begun to recognize the potential contributions that Indigenous people can make to our understanding of the world (Lambert 2003). In addition to sponsoring a day-long symposium on Native science at its 2003 annual meeting in Denver, the AAAS has published a *Handbook on Traditional Knowledge and Intellectual Property* to guide traditional knowledge holders in protecting their intellectual property and maintaining biological diversity (Hansen and VanFleet 2003). In the handbook, the AAAS defines traditional knowledge as

information that people in a given community, based on experience and adaptation to a local culture and environment, have developed over time, and continue to develop. This knowledge is used to sustain the community and its culture and to maintain the genetic resources necessary for the continued survival of the community. [2003:3]

Indigenous people engage in a form of science when they are involved in the annual cycle of subsistence activities. They have studied and know a great deal about the flora and fauna, and they have their own classification systems and versions of meteorology, physics, chemistry, earth science, astronomy, botany, pharmacology, psychology (knowing one’s inner world), and the sacred (Burgess 1999). For a Native student imbued with an Indigenous, experientially grounded, holistic worldview, typical approaches to schooling can present an impediment to learning to the extent that they focus on compartmentalized knowledge with little regard for how academic subjects relate to one another or to the surrounding universe.

Indigenous societies, as a matter of survival, have long sought to understand the regularities in the world around them, recognizing that nature is underlain with many unseen patterns of order. For example, out of necessity, Alaska Native people have made detailed observations of animal behavior (including the inquisitiveness of caribou). They have learned to decipher and adapt to the constantly changing patterns of weather and seasonal cycles. The Native elders have long been able to predict weather based upon observations of subtle signs that presage what subsequent conditions are likely to be. The wind, for example, has irregularities of constantly varying velocity, humidity, temperature, and direction due to topography and other factors. There are nonlinear dimensions to clouds, irregularities of cloud formations, anomalous cloud luminosity, and different forms of precipitation at different elevations. Behind these variables, however, there are patterns, such as prevailing winds or predictable cycles of weather phenomena, that can be discerned through long observation (though climate change has rendered some



of these patterns less predictable). Over time, Native people have observed that the weather's dynamics are not unlike the mathematical characteristics of fractals, where patterns are reproduced within themselves and the parts of a part are part of another part that is a part of still another part, and so on.

For Indigenous people there is a recognition that many unseen forces are at play in the elements of the universe and that very little is naturally linear, or occurs in a two-dimensional grid or a three-dimensional cubic form. Indigenous people are familiar with the notions of energy conservation, irregularities in patterns and anomalies of form and force. Through long observation they have become specialists in understanding the interconnectedness and holism of our place in the universe (Barnhardt and Kawagley 1999; Cajete 2000; Eglash 2002).

The new sciences of chaos and complexity and the study of nonlinear dynamic systems have helped Western scientists also to recognize order in phenomena that were previously considered chaotic and random. These patterns reveal less visible sets of relationships that point to the essential balances and diversity that help nature thrive. Indigenous people have long recognized these interdependencies and have sought to maintain harmony with all of life. Western scientists have constructed the holographic image, which lends itself to the Native concept of everything being connected. Just as the whole contains each part of the image, so too does each part contain the makeup of the whole. The relationship of each part to everything else must be understood to produce the whole image. With fractal geometry, holographic images and the sciences of chaos and complexity, the Western thought-world has begun to focus more attention on relationships, as its proponents recognize the interconnectedness in all elements of the world around us (Capra 1996; Sahtouris 2000). Thus, there is a growing appreciation of the complementarity that exists between what were previously considered two disparate and irreconcilable systems of thought (Barnhardt and Kawagley 2004).

To bring significance to learning in Indigenous settings, the explanations of natural phenomena are best understood by students if they are cast first in Indigenous terms to which they can relate. For example, when choosing an eddy along the river for placing a fishing net, it can be explained initially in the Indigenous way of understanding by pointing out the currents, movement of debris and sediment in the water, the likely path of the fish, the condition of the river bank, upstream conditions affecting water levels, the impact of passing boats, and so on. Once students understand the significance of the knowledge being presented, it can then be explained in Western terms, such as flow, velocity, resistance, turbidity, sonar readings, and tide tables, to illustrate how the modern explanation adds to the traditional understanding (and vice versa). All learning can begin with what the student and community already know and have experienced in everyday life. The Indigenous student (as with most students) will become more motivated to learn when the subject matter is based on something useful to the livelihood of the community and is presented in a way that reflects a familiar worldview (Battiste 2000; Kawagley 1995; Lipka et al. 1998).

Because Western scientific perspectives influence decisions that impact every aspect of Indigenous people's lives—from education to fish and wildlife management—Indigenous people have begun to take an active role in reasserting their traditions of science in various research and policy-making arenas (Arctic Environmental Protection Strategy 1993; Cochran 2004). As a result, there is a growing awareness of the depth and breadth of knowledge extant in many Indigenous societies and its potential value in addressing issues of contemporary significance, including the adaptive processes associated with learning and knowledge construction. The following observation by Bielawski illustrates this point:

Indigenous knowledge is not static, an unchanging artifact of a former lifeway. It has been adapting to the contemporary world since contact with "others" began, and it will continue to change. Western science in the North is also beginning to change in response

to contact with Indigenous knowledge. Change was first seen in the acceptance that Inuit (and other Native northerners) have knowledge, that is “know something.” Then change moved to involving Inuit in the research process as it is defined by western science. Then community-based research began, wherein communities and native organizations identified problems and sought the means to solve them. I believe the next stage will be one in which Inuit and other Indigenous peoples grapple with the nature of what scientists call research. [1990:8]

Such an awareness of the contemporary significance of Indigenous knowledge systems has entered into policy development arenas on an international level, as is evident in the following statement in the Arctic Environmental Protection Strategy:

Resolving the various concerns that Indigenous peoples have about the development of scientific based information must be addressed through both policy and programs. This begins with reformulating the principles and guidelines within which research will be carried out and involves the process of consultation and the development of appropriate techniques for identifying problems that Indigenous peoples wish to see resolved. But the most important step that must be taken is to assure that Indigenous environmental and ecological knowledge becomes an information system that carries its own validity and recognition. A large effort is now underway in certain areas within the circumpolar region, as well as in other parts of the world, to establish these information systems and to set standards for their use. [1993:27]

The complexities that come into play when two fundamentally different worldviews converge present a formidable challenge. The specialization, standardization, compartmentalization, and systematization that are inherent features of most Western bureaucratic forms of organization often are in direct conflict with social structures and practices in Indigenous societies, which tend toward collective decision-making, extended kinship structures, ascribed authority vested in elders, flexible notions of time, and traditions of informality in everyday affairs (Barnhardt 2002). It is little wonder, then, that formal education structures, which often epitomize Western bureaucratic forms, have been found wanting in addressing the educational needs of traditional societies. In the following section, we present one illustration of a program and processes designed to reconcile Western institutional structures and practices with Indigenous cultural forms.

### **Intersecting Worldviews: The Alaska Experience**

The 16 distinct Indigenous knowledge and language systems that continue to survive in villages throughout Alaska have a rich cultural history that governs much of everyday life in those communities. For over six generations, however, Alaska Native people have been experiencing recurring negative feedback in their relationships with the external systems that have been brought to bear on them, the consequences of which have been extensive marginalization of their knowledge systems and continuing erosion of their cultural integrity. Though diminished and often in the background, much of the Native knowledge systems, ways of knowing, and worldviews remains intact and in practice, and there is a growing appreciation of the contributions that Indigenous knowledge can make to our contemporary understanding of medicine, resource management, meteorology, biology, human behavior, and educational practices (James 2001).

Alaska Natives have been at the forefront in bringing Indigenous perspectives into a variety of policy arenas through a wide range of research and development initiatives. In the past two years alone, the National Science Foundation has funded projects incorporating Indigenous knowledge in the study of climate change, the development of Indigenous-based math curriculum, the effects of contaminants on subsistence foods, observations of the aurora, and alternative technology for waste disposal. In addition, Native people have formed new institutions of their own (e.g., the Consortium for Alaska Native Higher Education, the Alaska Native



Figure 1.

Alaska Rural Systemic Initiative: Cultural regions and participating school districts.

Science Commission, and the First Alaskans Institute) to address some of these same issues through an Indigenous lens.

Alaska Native people have taken an active role in promoting the integration of traditional knowledge with Western science traditions, though their reasons for sharing their knowledge with outsiders have been varied, as indicated by Richard Glenn, an Inupiaq who has served on the Arctic Research Consortium and the Alaska Native Science Commission:

Why do Iñupiat share traditional knowledge? Despite the stigma, our community is proud of a long history of productive, cooperative efforts with visiting researchers, hunters, travelers, scientists, map makers and others. We share when we consider others close enough to be part of Iñupiat culture and share when it is in the best interest of a greater cultural struggle. [2000:13]

In an effort to address the issues associated with converging knowledge systems in a more comprehensive way and apply new insights to address long-standing and often intractable problems, in 1995 the University of Alaska Fairbanks, under contract with the Alaska Federation of Natives and with funding from the National Science Foundation, entered into a 10-year educational development endeavor—the Alaska Rural Systemic Initiative (AKRSI). The most critical feature of the context in which this work has been situated is the vast cultural and geographical diversity represented by the 16 distinct Indigenous linguistic and cultural groups distributed across five major geographic regions in Alaska, as Figure 1 illustrates.

Through the AKRSI, a statewide network of 20 partner school districts was formed, involving 176 rural schools serving nearly 20,000 predominately Alaska Native students. The remaining 28 rural school districts in Alaska (103 rural schools serving mostly non-Native communities) have served as a comparison group for assessing the impact of the AKRSI initiatives. Utilizing an educational reform strategy focusing on integrating local knowledge and pedagogical practices into all aspects of the education system, this established network of partner schools serving diverse Indigenous populations has provided a fertile, real-world context in which to address the many issues associated with learning and Indigenous knowledge systems outlined above.



The activities associated with the AKRSI have been aimed at fostering connectivity and complementarity between the Indigenous knowledge systems rooted in the Native cultures that inhabit rural Alaska and the formal education systems imported to serve the educational needs of rural Native communities. The underlying purpose of these efforts has been to implement research-based initiatives to systematically document the Indigenous knowledge systems of Alaska Native people and to develop pedagogical practices and school curricula that appropriately incorporate Indigenous knowledge and ways of knowing into the formal education system. The following initiatives have constituted the major thrusts of the AKRSI applied research and educational development strategy:<sup>1</sup>

- Indigenous science knowledge base/multimedia cultural atlas development
- Native ways of knowing/parent involvement
- Elders and cultural camps/academy of elders
- Village science applications/science camps and fairs
- Alaska Native knowledge network/cultural resources and website
- Alaska standards for culturally responsive schools
- Native educator associations/leadership development

Over a period of 10 years, these initiatives have served to strengthen the quality of educational experiences and consistently improve the academic performance of students in participating schools throughout rural Alaska (AKRSI Annual Report 2003). In the course of implementing the AKRSI initiatives, we have come to recognize that there is much more to be gained from further mining of the fertile ground that exists within Indigenous knowledge systems, as well as at the intersection of converging knowledge systems and worldviews. Figure 2 captures the critical elements that come into play when Indigenous knowledge systems and Western science traditions are placed side-by-side and nudged together in an effort to develop more culturally responsive science curricula (Stephens 2000).

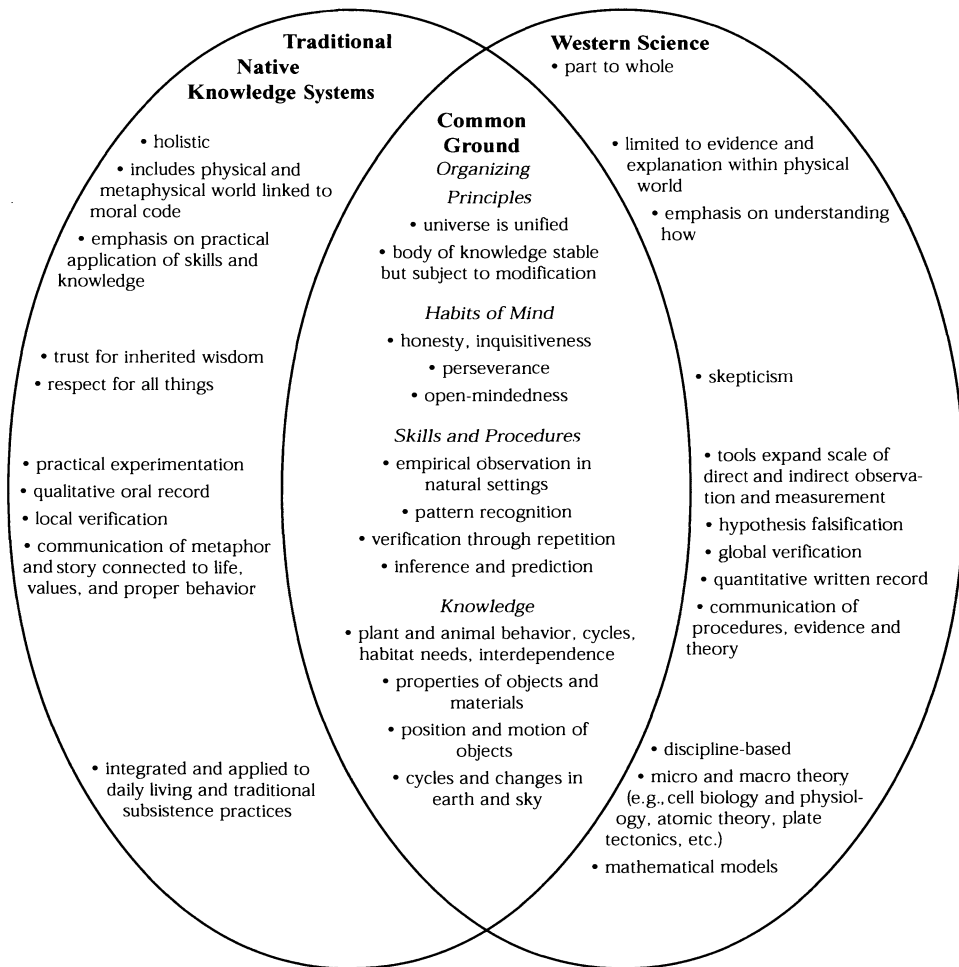
In the *Handbook for Culturally Responsive Science Curriculum*, Sidney Stephens explains the significance of the various components of this diagram as follows:

For many Native educators, culturally responsive science curriculum has to do with their passion for making cultural knowledge, language and values a prominent part of the schooling system. It has to do with presenting science within the whole of cultural knowledge in a way that embodies that culture (the Traditional Native Knowledge circle in the diagram), and with demonstrating that science standards can be met in the process. It also has to do with finding the knowledge, strategies and support needed to carry out this work. For those educators not so linked to the local culture, culturally responsive science curriculum has more to do with connecting what is known about Western science education to what local people know and value (the Western Science circle). [2000:10]

The implications for the learning processes embedded in the three domains of knowledge represented in the overlapping circles in Figure 2 are numerous and of considerable significance. Stephens highlights some of the implications for how we approach education as follows:

Although educators obviously differ in their perspective, there is no doubt that the creation of culturally responsive science curriculum has powerful implications for students for at least three reasons. The first is that a student might conceivably develop all of the common ground skills and understandings while working from and enhancing a traditional knowledge base. The second is that acquisition of the common ground, regardless of route, is a significant accomplishment. And the third is that exploration of a topic through multiple knowledge systems can only enrich perspective and create thoughtful dialog. [2000:10–11]

With these considerations in mind, the AKRSI has sought to serve as a catalyst to promulgate curricular and pedagogical reforms focusing on increasing the level of connectivity and complementarity between formal education systems and



**Figure 2.**  
Qualities associated with traditional (Indigenous) knowledge systems and Western science.

Indigenous knowledge systems in the communities in which schools are situated. In so doing, the AKRSI has attempted to bring the two systems together in a manner that promotes a synergistic relationship such that the two previously disparate systems join to form a more comprehensive holistic system that can better serve all students, while at the same time preserving the essential integrity of each component of the larger overlapping system. The implications of this approach extend far beyond Native communities in Alaska, as indicated by Battiste in her comprehensive literature review on *Indigenous Knowledge and Pedagogy in First Nations Education* (Canada):

Indigenous scholars discovered that Indigenous knowledge is far more than the binary opposite of western knowledge. As a concept, Indigenous knowledge benchmarks the limitations of Eurocentric theory—its methodology, evidence, and conclusions—reconceptualizes the resilience and self-reliance of Indigenous peoples, and underscores the importance of their own philosophies, heritages, and educational processes. Indigenous knowledge fills the ethical and knowledge gaps in Eurocentric education, research, and scholarship. [2002:5]

Examples of what this “fresh vantage point” looks like are provided in recently developed curriculum materials that integrate Western and Indigenous knowledge

in a complementary way (see Adams and Lipka 2003; Aikenhead 2002; Carlson 2003). Indigenous people themselves have begun to rethink their role and seek to blend old and new practices in ways that are more likely to fit contemporary conditions. There are ways to break out of the mindset in which we are oftentimes stuck; although it takes some effort, there are ways to develop linkages that connect different worldviews. The insights that emerge from such efforts often open up as many questions as answers. We have learned a tremendous amount from recent experience, and we find each year that the more we learn the less we know in terms of having penetrated through another layer of understanding of what life in an Indigenous context is all about, only to recognize the existence of many additional layers that lie beyond our current understanding.

One of the major limitations in these endeavors has been the severe lack of Indigenous people with advanced Indigenous expertise and Western research experience to bring balance to the Indigenous knowledge/Western science research enterprise. Thus, one of the long-term goals of the AKRSI has been to develop a sustainable research and development infrastructure that makes effective use of the rich cultural and natural environments of Indigenous peoples to implement an array of intensive and comparative research initiatives, with partnerships and collaborations in Indigenous communities across the United States and around the world. To begin to address this issue, the University of Alaska Fairbanks (UAF) has expanded its program offerings through a series of special seminars, distance education courses, visiting scholars, international exchanges, internships, and Indigenous elder academies. In addition, a new M.A. program with an emphasis on Indigenous knowledge systems has been established, with the following graduate courses now available to students anywhere in the United States or beyond through the Center for Cross-Cultural Studies distance education program:

- CCS 601, Documenting Indigenous Knowledge
- CCS 608, Indigenous Knowledge Systems
- CCS 610, Education and Cultural Processes
- CCS 611, Culture, Cognition and Knowledge Acquisition
- CCS 612, Traditional Ecological Knowledge
- CCS 602, Cultural and Intellectual Property Rights

The initiatives outlined above have brought together the resources of Indigenous-serving institutions and the communities they serve to forge new configurations and collaborations that break through the obfuscations associated with conventional paradigms of research on cultural influences in learning. Along with the other Indigenous cultural regions of the world, Alaska provides a natural laboratory in which Indigenous and non-Indigenous scholars can acquire first-hand experience integrating the study of learning and Indigenous knowledge systems.

There are numerous opportunities to probe more deeply into the basic issues that arise as we explore a terrain that has always been a part of our existence, but is now being seen through a new multidimensional lens that provides greater breadth and depth to our understanding. Given the comprehensive nature of Indigenous knowledge systems, they provide fertile ground for pursuing a broad interdisciplinary research agenda. In the next section we identify some of the most promising research opportunities that have emerged from the intersection of Indigenous knowledge systems and Western educational and scientific endeavors.

### **Emerging Research Associated with Indigenous Knowledge Systems**

The study of Indigenous knowledge systems as they relate to education can be categorized into three broad interrelated research themes: (1) documentation and articulation of Indigenous knowledge systems; (2) delineating epistemological structures and learning/cognitive processes associated with Indigenous ways of knowing; and (3) developing and assessing educational strategies integrating

Indigenous and Western knowledge and ways of knowing. These issues encompass some of the most long-standing cultural, social, and political challenges facing education in Indigenous societies around the world, so it is essential that future research addresses the issues in an integrated, cross-cultural, and cross-disciplinary manner, with strong Indigenous influence. The following subsections provide a brief description of some of the major research themes that have emerged from the study of Indigenous knowledge systems.

### *Native Ways of Knowing: Indigenous Epistemologies*

Indigenous scholars have begun to identify the epistemological underpinnings and learning processes associated with Indigenous knowledge systems (Cajete 2000; Kawagley 1995; Meyer 2001). The Venn diagram in Figure 2 depicting the intersection of traditional Native knowledge and Western science contains numerous topical areas in which comparative research can be undertaken to gain a better understanding of the inner workings of the many and varied Indigenous knowledge systems around the world, as well as a more detailed explication of the elements of common ground that emerge when the diverse knowledge systems interact with one another. Collaboration among scholars across the Indigenous cultural regions will enhance the degree of generalizability that can be achieved as well as facilitate the transfer of knowledge to other related sectors.

### *Culturally Responsive Pedagogy: Contextual Learning*

The development and implementation of the *Alaska Standards for Culturally Responsive Schools* and *Guidelines for Respecting Cultural Knowledge* by the Assembly of Alaska Native Educators (1998) has fostered a great deal of promising innovation in schools seeking to integrate Indigenous knowledge and ways of knowing into their curriculum and pedagogical practices. Although there appears to be a strong positive correlation between the implementation of the cultural standards in the schools and communities and Native student academic performance, the details of those associations have not yet been fully delineated. The research implications and opportunities in this area are of considerable interest and potential consequence with regard to how we approach schooling in general, not only in Indigenous settings. Research initiatives should engage scholars incorporating multiple research traditions and theories associated with cultural and contextual influences on learning, teaching, and cognition. Of particular interest are the implications of current theories associated with various forms of contextually driven teaching and learning (Johnson 2002).

### *Ethnomathematics*

Ethnomathematics has emerged in the last decade as a powerful blending of insights from the mathematical sciences and cross-cultural analysis (Asher 2002; Eglash 2002). The National Council of Teachers of Mathematics recently published a collection of articles under the heading, *Changing the Faces of Mathematics: Perspectives on Indigenous People of North America*, several of which reflected research from Alaska (Hankes and Fast 2002). Alaska has been at the forefront in the development of curriculum materials that utilize Alaska Native constructs such as fish rack construction, egg gathering, salmon harvesting, and star navigation as an avenue for teaching mathematical content that prepares students to meet national and state standards and related assessment mandates (Adams and Lipka 2003). All of these recent breakthroughs in our understanding of how mathematical knowledge is constructed and utilized provide extensive opportunities for research on mathematics learning across cultures that has significant implications for schooling, particularly since mathematics is one of the critical elements in current assessment systems associated with the 2001 federal No Child Left Behind Act.

### *Indigenous Language Learning*

Indigenous languages are an integral part of Indigenous knowledge systems and thus warrant particular attention in our efforts to understand how to better integrate learning in school with the cultural context of home and community in Indigenous societies. Research issues associated with Indigenous languages extend beyond the makeup of the language itself to include the thought processes embedded in the language, as well as how, when, where, and for what purposes the language is used. Only then can we begin to understand what happens to an Indigenous knowledge system when the language associated with that system of thought is usurped by another (G. H. Smith 2002).

### *Cross-Generational Learning and the Role of Elders/Camps*

A dominant theme throughout the *Alaska Standards for Culturally Responsive Schools* (Assembly of Alaska Native Educators 1998) is the importance of drawing Native elders into the educational process and utilizing natural learning environments in which the knowledge that is being passed on to students by elders takes on appropriate meaning and value and is reinforced in the larger community. Although data affirm the broad educational value of cross-generational learning in culturally appropriate contexts (Battiste 2002; Johnson 2002), the dynamics associated with such learning have not yet been well documented and translated into comprehensive pedagogical or curricular strategies.

### *Place-based Education*

The importance of linking education to the physical and cultural environment in which students and schools are situated has special significance in Indigenous settings, where people have acquired a deep and abiding sense of place and relationship to the land in which they have lived for millennia (Barnhardt and Kawagley 1999; McCarty 2002; Semken and Morgan 1997). Place-based educational practices have received widespread national recognition and support as a way to foster civic responsibility while also enriching the educational experiences for all students—rural and urban, Indigenous and non-Indigenous (Gruenewald 2003; G. Smith 2002; Sobel 2004). Indigenous scientific and cultural knowledge associated with local environments is a critical ingredient for developing an interdisciplinary pedagogy of place (Cajete 2000). As such, these systems of knowledge offer many opportunities for comparative research into how traditional Indigenous ways of learning and knowing can be drawn upon to expand our understanding of basic educational processes for all students.

### *Native Science: Sense-Making*

The ways of constructing, organizing, using, and communicating knowledge that have been practiced by Indigenous peoples for centuries have come to be recognized as constituting a form of science with its own integrity and validity, as indicated by a day-long AAAS-sponsored symposium on Native science mentioned earlier (Lambert 2003). Mainstream science also has its distinctive ways of constructing, organizing, using, and communicating knowledge. Both Native and mainstream knowledge systems are largely implicit, however, and while they overlap, they also diverge in ways important to how knowledge is learned and applied. Native scholars have been actively contributing their insights to the growing body of literature around the themes of Native science and sense-making (Cajete 2000; Hankes and Fast 2002; James 2001; Krupnik and Jolly 2001).

### *Cultural Systems, Complexity, and Learning*

An area of special interest in exploring the implications of Indigenous knowledge systems and the structures by which they are perpetuated involves the potential



insights that can be gained from the application of complexity theory to our understanding of the dynamics that occur when diverse knowledge systems collide with one another (Barnhardt and Kawagley 2004; Eglash 2002). Since this is a sufficiently broad (and complex) arena with many convergent, divergent, and emergent properties and possibilities, it has the potential to evolve as a significant research theme that capitalizes on the recent insights gained from the study of complex adaptive systems and through which we can apply those insights to stimulate the development of self-organizing structures that emerge from interactions within and between diverse knowledge systems.

### *Indigenizing Research in Education*

Until recently, research traditions in education have been dominated by Western science methods, models, and practices, including those applied to Indigenous peoples. In 1999, Maori scholar Linda Tuhiwai Smith published *Decolonizing Methodologies: Research and Indigenous Peoples*, which articulated the importance of Indigenous people devising and using their own research methodologies and addressing issues from frames of reference that derive from within their own communities and cultural traditions. Indigenous scholars are in a position to enlarge the scope of research paradigms in ways that will benefit all research traditions.

The research topics outlined above have the potential to advance our understanding of learning as it occurs in diverse cultural contexts by exploring the interface between Indigenous and Western knowledge systems, as well as contributing to the further conceptualization, critique, and development of Indigenous knowledge systems in their own right, drawing on the experiences of Indigenous peoples from around the world. The expansion of the knowledge base associated with learning and Indigenous knowledge systems will extend our understanding of an emerging interdisciplinary body of scholarly work regarding the critical role that the local cultural context can play in fostering academic success in learning, particularly among Indigenous peoples.

### **Conclusion**

An underlying theme of this article has been the need to reconstitute the relationship between Indigenous peoples and the immigrant societies in which they are embedded. By documenting the integrity of locally situated cultural knowledge and skills and critiquing the learning processes by which such knowledge is transmitted, acquired, and utilized, Alaska Native and other Indigenous people engage in a form of self-determination that will not only benefit themselves but will also open opportunities to better understand learning in all its manifestations, thereby informing educational practices for the benefit of all. Traditional processes for learning to hunt caribou by observation and meaningful participation can offer insights into how we create opportunities for students learning to operate a computer. To overcome the long-standing estrangement between Indigenous communities and the external institutions impacting their lives, all parties in this endeavor (community, school, higher education, state and national agencies) will need to form a genuinely multilateral partnership in which mutual respect is accorded to the contributions that each brings to the relationship. The key to overcoming the historical imbalance in that regard is the development of collaborative research endeavors specifically focusing on education and Indigenous knowledge systems, with primary direction coming from Indigenous people so they are able to move from a passive role subject to someone else's agenda, to an active leadership position with explicit authority in the construction and implementation of the research initiatives (Harrison 2001).

In this context, the task of achieving broad-based support hinges on our ability to demonstrate that such an undertaking has relevance and meaning in the local Indigenous contexts with which it is associated, as well as in the broader social,

political, and educational arenas involved. By utilizing research strategies that link the study of learning to the knowledge base and ways of knowing already established in the local community and culture, Indigenous communities are more likely to find value in what emerges and to put new insights into practice as a meaningful exercise in self-determination. In turn, the knowledge gained from these efforts will further our understanding of basic human processes associated with learning and the transmission of knowledge in all forms.

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## Note

1. Details are available at [www.ankn.uaf.edu](http://www.ankn.uaf.edu).

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