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Indigenous Knowledges and the Story of the Bean

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In this article, Bryan McKinley Jones Brayboy and Emma Maughn explore epistemic tensions within an Indigenous teacher preparation program where students question Western systems for creating, producing, reproducing, and valuing knowledge. Grounding their argument in a rich understanding of Indigenous Knowledge Systems, the authors advocate for an approach to training Indigenous teachers that recognizes the power of Indigenous Knowledge Systems, considers diverse knowledge systems equally, and equips teachers to make connections between various schooling practices and knowledge systems. Through the "story of the bean," in which an Indigenous student teacher reconceptualizes a science lesson from a more holistic perspective, the authors illustrate the wealth of understanding and insight that Indigenous teachers bring to the education of Indigenous students, and they depict the possibilities for pre-service teaching programs in which university staff honor the inherent value of Indigenous perspectives.

> You know, this is a funny place. I listen to the teachers as they teach, and it sounds like what happens when you push play and fast-forward on a tape recorder. The teachers, they talk so fast and they use these words that have four syllables when they could use [words] with two. So, there is a teacher that keeps saying "obfuscate" when she could say "hides behind" or something like that. Why the big words and the supersonic pace? We all need dictionaries to sit in on these classes. It's like you all [the faculty members] are trying to show us how smart you are.

We were in another meeting with the students in our Indigenous Teacher Preparation Program (ITPP) after an intense summer for our students, faculty, and staff. The ITPP students had earned eighteen credit hours in two summer sessions, and they were exhausted. The faculty had taught several courses, and

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the three support staff members had coordinated activity after activity and put out too many fires to remember, helping students find places to live, to bank, and to get health care for their children. As the meeting wound down, Henry Sampson,[1] a member of the program's leadership team, had asked the students how they were holding up.

Following the student teacher's comment on this "funny place" and the nods and chuckles in response, Henry asked if anyone else had something to say. This student, however, was not yet finished: "We're going to figure this out, because we have to be able to keep up with the fast talking. We'll get it. But when we do . . . [a long pause] the program is going to get us all our very own Mickey Mouse ears." Students laughed, hooted, squealed. The members of the program staff laughed and grinned. The student went on, "The reason I say this is because when these people [faculty] are talking so fast and being all impressive, they sound like Mickey and Minnie Mouse [another long pause]. I'm going to Disneyland, baby!" With this, the classroom erupted in pandemonium, and the staff could only watch as this group of "silent Indians" gave each other high fives, described how and where they would wear their mouse ears, and speculated on how much it would cost the program to send them to Disneyland.

In this defining moment for the ITPP, one student had clearly articulated what we, the staff and faculty, all knew but had not quite been able to say as clearly and directly as we should: The ways faculty approach issues of knowledge and knowledge production in our predominantly white institution are performative rather than relational and, therefore, very different from the ways of these bright Indigenous pre-service teachers.

This student's observation highlights stylistic issues, by pointing out that the faculty "talk so fast," as well as substantive issues, such as how we as faculty "are trying to show [them] how smart [we] are." She makes clear that teaching itself is a political act by pointing to the importance of word choice, pacing, and the implications of passing or failing a class for the Indigenous pre-service teachers who want to serve Indigenous elementary and secondary students. Teaching's political nature implicates the epistemic clashes inherent in how knowledge is used and how hierarchies of knowledge are produced and reproduced in educational institutions. These clashes raise critical connections between power and the (re)production and transmission of knowledge. In this essay, we make visible the ways in which knowledge clashes between Indigenous and non-Indigenous educators might be transformed from places of destruction to sites of hope and possibility.

As demonstrated in this short vignette, it is apparent that ITPP's challenge was to link knowledge and skill sets from a predominately white institution—in which specific kinds of identity performances and oral skills are valued—with Indigenous Knowledge and its (re)production, which demonstrate different, but equally worthy, values. This was not the only time we heard from students

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about observed differences in the ways that knowledge was created, produced, reproduced, and valued over the course of the program. We often heard comments that university teaching was "linear in a way that doesn't make any sense" or that the non-Indigenous students and faculty were "so focused on themselves, it is a wonder they can see or hear anyone else." The Indigenous students wanted to make connections that were more circular, or holistic,[2] in order to produce knowledge that served others.

In its long history, the schooling process for American Indians has been based on a hierarchy of knowledge wherein Indigenous Knowledges (IK) are framed as deficient (Adams, 1988; Lomawaima & McCarty, 2002, 2006). Here, we will examine what happens when Indigenous pre-service teachers are supported in recognizing the power of their own knowledge systems, when knowledge systems are not framed hierarchically, and when teachers are trained to recognize the connections between conventional Western schooling practices and Indigenous Knowledge Systems. We explore the possibility that Indigenous Knowledge Systems might offer distinct spaces in which educators and their students might be exposed to broader notions of what teaching and learning are and can be.

Indigenous Knowledge Systems: Knowing, Being, Valuing, Doing, Teaching, and Learning

The topic of Indigenous Knowledges has recently entered more mainstream conversation among education researchers (e.g., see Bang, Medin, & Atran, 2007; Battiste, 2008; Cajete, 2008; Pember, 2008; Villegas, Neugebauer, & Venegas, 2008). There have been calls to explore connections between "traditional" schooling and the ways that Indigenous peoples learn in the realm of science (Bang et al., 2007; Brayboy & Castagno, 2008; Cajete, 2000). Others have examined the ways that IK may inform, extend, and complicate how people learn, act, and think (Battiste, 2002, 2008; Villegas et al., 2008). Indigenous communities have long been aware of the ways that they know, come to know, and produce knowledges, because in many instances knowledge is essential for cultural survival and well-being. Indigenous Knowledges are processes and encapsulate a set of relationships rather than a bounded concept, so entire lives represent and embody versions of IK. Because of this, our attempt to offer a concise definition here creates some difficulty. Indigenous Knowledges are rooted in the lived experiences of peoples (Barnhardt & Kawagley, 2005; Battiste, 2002, 2008; Battiste & Henderson, 2000); these experiences highlight the philosophies, beliefs, values, and educational processes of entire communities. Indigenous peoples come to know things by living their lives and adding to a set of cumulative experiences that serve as guideposts for both individuals and communities over time. In other words, individuals live and enact their knowledge and, in the process, engage fur-

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ther in the process of coming to be—of forming a way of engaging others and the world.

As Indigenous student teachers begin the process of becoming licensed educators, they find themselves in an historic site of struggle for Indigenous peoples: teacher training (Smith, 1999; Vandergriff, 2006). In the context of this struggle, the lived implications of conflicting knowledge systems become more obvious. The teacher education program that we worked with, like many programs, could be rigid, narrow, and unforgiving to different ways of engaging the world. Additionally, teachers have historically been frontline actors in attempts to assimilate Indigenous peoples (e.g., see Lomawaima & McCarty, 2006; Adams, 1988).[3] Drawing on the experiences of Indigenous students, teachers, and peoples, we know that Indigenous Knowledge Systems are not vapid; rather, they are lively, fervent, and effectual, and in the search for holistic versions of teaching and learning amid struggle, they may be key sources of strength for Indigenous Peoples.

Within the larger concept of Indigenous Knowledge Systems, epistemologies, ontologies, axiologies, and pedagogies come to the fore. We have, to date, been working intensely with Indigenous epistemologies. We think, however, that we've been misguided in thinking that such work is simply about ways of knowing or coming to know. As lived knowledge, IK is intimately tied to ways of being, or ontologies. Though ontologists typically focus on exploring reality and whether or not beings are sentient, we think of ontologies a little differently than do philosophers interested in the idea of consciousness and whether or not human beings actually exist (e.g., see Heidegger, 1978; Husserl, 1969). We understand ontologies as capturing the process by which individuals—and communities—come to think of themselves, are framed by others, and are integrated into their local communities. Further, inherent in both knowledges and ways of being are value judgments—what does it mean to live a "good" life, to be a "good" person, and what are one's priorities in life? In considering axiologies, we aim to explore what is good, true, right, and beautiful, as we know these values to be deeply rooted in the ways Indigenous peoples view and engage the world.[4] Finally, we are interested in pedagogies because of the ways that Indigenous peoples come to think about, understand, and enact the processes of teaching and learning.

All of these ways of knowing, being, valuing, and doing make up Indigenous Knowledge Systems. As Mi'kmaq[5] scholar Marie Battiste (2002, 2008) notes, IK is systemic and systematic and has an internal consistency. Therefore, to seriously engage in conversations around connections between Indigenous Knowledges and their relationships to knowledge production and reproduction, we have to move beyond simple taxonomic distinctions of Indigenous epistemologies, ontologies, axiologies, and pedagogies to a more nuanced and holistic consideration of Indigenous Knowledges as entire systems.

These conversations of the role of IK in schooling are neither simplistic nor uniform. Importantly, even within a particular community, not every-

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one will operate from the same foundation of knowledges. As Battiste (2002) reminds us,

> Within any Indigenous nation or community, people vary greatly in what they know. There are not only differences between ordinary folks and experts, such as experienced knowledge keepers, healers, hunters, or ceremonialists, there are also major differences of experiences and professional opinion among the knowledge holders and workers, as we should expect of any living, dynamic knowledge system that is continually responding to new phenomena and fresh insights. (p. 12)

This diversity and plurality of knowledges is fundamental to the dynamism of knowledge systems and the survival of communities over time. The interconnectedness of knowledges, sources of knowledge, and experience are critical to understanding how Indigenous peoples have survived more than 500 years of genocide. These are peoples who have adapted and adjusted to their situations and confronted countless threats aimed at their extinction. This survival and commitment to perseverance is directly connected to Indigenous efforts to move outside of traditional categories of engaging the world intellectually and physically toward recognizing the interconnected nature of all things in the world.

We want to emphasize that our objective here is not to set up a dichotomy between Western[6] and Indigenous Knowledges, as this is not a particularly useful endeavor. Setting these knowledges in opposition to one another erases complexity and nuance, closing off spaces of potential and possibility. Battiste (2002) makes this point vividly:

> 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. By animating the voices and experiences of the cognitive "other" and integrating them into educational processes, it *creates a new, balanced centre and a fresh vantage point* from which to analyze Eurocentric education and its pedagogies. (p. 5, emphasis added)

Our goal is to focus on Indigenous Knowledge Systems in order to extend other knowledge systems and to locate "a new center" of teacher training. In this way, then, Western and Indigenous knowledges can be—in fact, must be—configured in a way that is complementary rather than contradictory. While we discuss here differences between knowledge systems, our purpose is not to reify a sense of binaries. We aim instead to examine how Indigenous Knowledges inform the work of Indigenous students and teachers and to consider how predominantly non-Indigenous educational spaces might come to value these knowledges as both worthy and useful.

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Context and Program Background: The Indigenous Teacher Preparation Program

This essay draws from the experiences of Indigenous pre-service teachers over the course of their teacher training. Western University's Indigenous Teacher Preparation Program was created in 2002 with a professional training grant from the U.S. Department of Education's Office of Indian Education. Just shy of $1 million, the grant provides funding to prepare 12 American Indian teachers to teach in schools serving American Indian populations through a three-year training program that includes one year of professional induction. In exchange for a stipend and other financial incentives designed to alleviate as many nonacademic stresses as possible, program participants commit to teaching in Indian-serving schools (as defined by the U.S. Department of Education's Office of Indian Education) for the same number of years that the program offers them educational and financial support.[7] If participants are unable to earn licensure, they must reimburse the federal government for the services received from the university. After the grant award was announced, the grant leadership team was deluged by interested applicants: 132 applications for the 12 coveted spots.

Applicants reported a number of reasons for applying to ITPP. Among these was a commitment to providing Indigenous students with a more culturally responsive education. As one American Indian woman in ITPP described,

> I grew up on the reservation. When I was five, my parents decided that I should go to the boarding school for Indians because they thought I could get a good education there. It was like a military school where the teachers were strict and hit us if we spoke [our tribal language]. I hated it there, but I kept going because I thought education would make a difference. I didn't want the White people in town to call me a "dirty stinkin' Indian" or think they were better than me. . . . I guess I didn't realize that the teachers would also call me a dirty, dumb Indian . . . and the education I got was bad anyway and the White people still told me I was dirty and that I stunk. . . . That school [the Indian boarding school] could have helped me understand what I know today: My language is a good language and I should know it; I can be smart and Indian at the same time, and I'm not dirty, stinky, or dumb. I can do [many things well]. . . . I want to be a teacher so that my students can see that being smart and [Indian] can go hand-in-hand.

This powerful statement highlights the complicated relationships many ITPP students and staff had with formal schooling. This student points to the ways that schooling could be used to destroy the spirit of a young child and the hope and possibility of being "smart and Indian at the same time." ITPP was guided by the idea that Indigenous peoples could engage in self-determination through self-education, an idea that this quote speaks to powerfully.

Participants enter the program as college juniors or college graduates. They are admitted under the regular admissions policies and join the general student body cohort of pre-service educators in the teacher training depart-

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ments. Although ITPP offers an introduction to American Indian studies and Indigenous Knowledges courses, the pre-service teachers are, for all intents and purposes, integrated into the general teacher preparation program.

It became clear to us in such a context that there were epistemological, ontological, axiological, and pedagogical differences between the ways that the American Indian participants and the non-Indigenous students, staff, and faculty were making sense of their experiences at the university. In an attempt to understand these discrepancies and find ways to articulate them to our partners at Western University, we set out to explore how ITPP participants were making sense of their daily experiences. In analyzing these differing and often contradictory knowledge systems as researchers, we found the work of comparing knowledge systems to be an intellectually challenging task, as each of us approached it from very different viewpoints, from divergent ways of knowing, being, valuing, and doing. One of the authors of this article is an Indigenous man who wrote the grant to fund this program, participated as a member of its leadership team, and understands Indigenous Knowledge Systems as a result of living them. The other author is an Anglo woman, a former graduate student, and a former writing instructor in the program. We both had almost daily interactions with the students, although one of us did so as an administrator and the other as a tutor and confidante. Most importantly, what we share is the belief that self-determination of Indigenous communities can be aided by self-education.

Our work in ITPP presented us with unique challenges. Among these was our struggle to support the university faculty members of our student teachers in their understanding of IK. We met with great difficulty in helping them recognize that the Indigenous pre-service teachers brought different epistemologies and ontologies with them to the experience of student teaching and that these needed to be recognized and valued. We also struggled to assist them in understanding that what makes a "good teacher" in a predominately American Indian school may look different than "good teaching" in the mostly white schools of the area surrounding Western University. As it turned out, it was one of our students who best supported the faculty in turning the corner regarding their understanding and valuing of Indigenous Knowledge Systems.

Soil and Sand: The Growth and Stagnation of Growing Minds

In an effort to assist the Indigenous pre-service teachers in recognizing the ways in which our university work translated to their home communities, we institutionalized weekly meetings. These meetings were born out of a number of conversations that a member of the leadership team, whom we call Henry, had with tribal leaders about their conceptions of what teachers working in their communities needed in order to be effective. Almost every elder and leader told him that the teachers needed to be able to connect with their children linguistically and culturally. These individuals also mentioned that teachers needed to show schoolchildren the ways in which their learning helps the

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entire community and how the curriculum relates to their everyday lives. In an effort to make the wishes of these tribal leaders a reality, we instituted the weekly meetings. At one of these meetings, the following scenario unfolded.[8]

It had been a difficult week for some of the student teachers. Their site teacher educators (STEs) questioned their readiness to take over the classes they would inherit in just a few weeks as student teachers. Implicit in this commentary was the way that the STEs might grade the student teachers. The university provides a rubric to STEs who evaluate their student teachers on a scale from one to five, with one being unacceptable and five being extraordinary. If student teachers receive anything below a three on any measure, they are not recommended for licensure, effectively denying them any opportunity to become licensed through "traditional" means. The student teachers were not aware of these conversations, but the faculty and program staff—heeding these informal evaluations by the STEs—were leaning toward removing the students from their placement sites.

We met at the school where the Indigenous pre-service teachers conducted their student teaching. The program had arranged to provide lunch, and we ordered pizza and drinks. We began the conversation by reviewing the week and discussing what was happening in classrooms. In the fourth-grade classroom, students were conducting experiments in which they attempted to grow bean plants in different kinds of soil (one in dirt, another in sand) with different amounts of water (one got more, another less). There were multiple and interdisciplinary objectives for the lesson: (1) a scientific experiment designed to find out what happens when certain seeds are planted in particular soils and watered with measured amounts of water; (2) an empirical component tied to mathematics, where students measured the growth of the plant as well as the daily amount of water provided to the plants; and (3) a written journal assignment where students recorded their measurements and described what they saw happening. The idea was to use this as a way to further examine the role of photosynthesis and to integrate reading and writing skills across subject areas. The assignment was prescribed to occur in a particular way; the conditions were intended to closely mimic work in a science lab with the idea that students would gather some additional knowledge of how scientists work.

After we had discussed the ways that students conducted the experiment and hypothesized about where the assignment might go, Henry asked one of the student teachers how she might teach this in her own community. She said,

> Well, first off, I wouldn't do it this way. I'd have to start at the beginning. . . . I would get a bunch of seeds that we plant over the course of a year and lay them out on a table and show them what the differences are . . . so, you know, a bean seed is different than a corn kernel and is different than a seed for pumpkins and other melons we might grow. They [the students] have to know what is what before they go planting these things. . . . Then I would talk about what each of the seeds did.

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The conversation continued with her outlining what each of the seeds she described to us would "do." Henry asked why she would tell the students what the "seeds did." She responded,

> Well, they are going to plant them, right? So, you don't just plant any seed at any time. You need to know what you're planting, because you don't want to waste seeds, but you also don't want to plant something [if] you don't know what it will be. In my culture, we are very careful to make sure that every decision we make is thought about before we act. You don't plant some seed just because. It has a purpose and carries more stuff with it.

She informed us that in the process of planting, there were both metaphysical factors to consider as well as the spiritual nature of the planting process (which she described to one of the STEs as being "impossible to separate from everyday living"):

> Once I described the seeds and what they did, I would then ask [the students] to come in one night to school. We would probably do this a few times a year. Then we would look at the sky and the patterns of the stars. The constellations tell us when to plant certain things. So, I would tell them that when [a constellation] reaches the most eastern part of the sky, it is time to plant the corn, and that when [another constellation] reaches the apex of the sky, it is time to plant pumpkins. We can't do it earlier or nothing will grow, or it won't grow right. We have to do it that way . . . it's the way we do things. . . . These students have to know the right way to do it, and they can't plant these seeds at any time. . . . After the first frost, I'd tell them some stories to understand the importance of these things, so that they know.

After the student teacher discussed her own thoughts about this in more detail, Henry asked her about measuring the growth of plants and writing the measurements down and if she would do the assignment this way. In response, she said,

> Well, this is a little trickier. I'd not normally have them do it this way. You can look at it and know if it is growing; you don't need a ruler for that. And we wouldn't plant it in sand anyway; things don't grow well in sand, and everyone knows that. We'd plant the bean where we always do and have fieldtrips to make sure it's growing. I'd check in between to make sure it was okay, and if I had to do something to the plant, I'd take the class and show them, but they'd know how to do this by watching their parents or aunties and uncles, you know. . . . But with No Child Left Behind, and the other testing, I'd have to do this anyway, or at least I'd teach them how to read a ruler and to be ready for the test. They'd write other things down. I think our students have to be able to write and keep journals, and know why they do that.

She concluded by drawing our attention to the importance of bringing together forms of learning and knowing for the benefit of students and communities: "Our tribe is for education, and we know that we have to do better,

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but sometimes this does not make any sense. We have other ways of doing this, but I understand this much better now and think that I've learned a lot here . . . but me and [another student teacher] have something to teach you all, too."

During this conversation, the other student teacher nodded. At various points in the conversation, others would make comments such as, "Well, in [my reservation] we'd do it this way," in order to illustrate the related, but different, ways that other Indigenous peoples might think about the lesson. It was an important moment because it highlighted the nuanced ways in which these student teachers approached the tasks set before them. Henry was the only person asking questions of clarification, hoping to provide a fuller explanation for the university supervisor and STEs. He had asked the STEs to listen to what they heard and save their questions until after the student teachers had described what they would take away from the exercises.

As soon as the student teacher finished talking about the process, the conversation became excited. The STEs had many questions. One of the students, well versed in the cosmology of the tribal nation, explained the significance of a series of constellations and discussed the importance of understanding the metaphysical components of the planting process as it tied into her tribal culture. The student teachers were careful not to tell the STEs things that were inappropriate or that may otherwise violate the trust of their tribal nations. In the process, the pre-service teachers offered new possibilities for the STEs to consider, possibilities that include different ways of approaching assignments, contextualizing a topic area, and integrating student experiences directly into the lesson.

The Value of Student Teachers' Indigenous Knowledges

There are several critical points to be learned from the way that the Indigenous student teacher made sense of the lesson. Importantly, she began by making clear that she "wouldn't do it this way." From her perspective, the lesson itself was somewhat foreign and lacked a particular context. Importantly, Indigenous Knowledge Systems value contextualized knowledge that is local and particular to the setting. In her analysis of the exercise itself, this student teacher pointed to the fact that all knowledge cannot necessarily be universal in its application because of the importance of place, space, and context. Battiste (2002) is also clear on this point when she notes that "Indigenous Knowledge is also inherently tied to land, not to land in general but to particular landscapes, landforms, and biomes where ceremonies are properly held, stories properly recited, medicines properly gathered, and transfers of knowledge properly authenticated" (p. 13).

The student teacher made an axiological claim; that is, she appeared to be making a value judgment about the "best way" to conduct and engage in the lesson. Consider what Inupiat scholar Leona Okakok (1989) says about this when she writes, "To me, educating a child means equipping him or her with

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the capability to succeed in the world he or she will live in" (p. 253). She continues by making a powerful (and political) statement that "education is more than book learning, it is also value-learning" (p. 254). It was an interesting and logical move when the student teacher turned to her own ways of knowing and being as a source of guidance, much as Okakok encourages. The student teacher used her own ways of knowing to extend and complicate other ways of knowing and being, thereby locating a "new center."

The student teacher continued by arguing that she "would start at the beginning" and offered a way to contextualize the lesson itself. The process of contextualizing what is being learned and tying it to the actual lives of the children is an important part of Indigenous Knowledge Systems. It is not just a way of teaching but, rather, is tied into a particular pedagogy that more fully nuances the use of knowledge and ways of being. Indeed, she worked to contextualize knowledge for her students. Consider the important scholarship of Dakota and mixed-heritage scholar Mary Hermes (2005), who focuses on the importance of context in the language learning of Ojibwe students in schools. One of the elders/teachers in Hermes's (2005) study notes: "I asked them [the elders], 'Is a *ma'iingan* in a zoo a *ma'iingan*?' They said, 'No, it is a wolf.' Because *ma'iingan* requires a context. I can't take it out of context without changing the meaning. Everything in English is taken out of context. *Everything taught about Indians taken out of context is really in English—or in that way of thought*" (p. 50).

The student teacher, then, points to the fact that she is doing more than a science experiment. By "starting at the beginning," she contextualized the act of growing something, transforming it from a science experiment to a way of thinking about and engaging the world in which her students live everyday. It is neither sterile nor objective in the ways that many laboratories insist on treating the study of science. As Brayboy and Castagno (2008) assert, "Many Indigenous people [might] argue that their laboratory is the world and that their survival rested on puzzling over observations and phenomena and coming to make sense of them in ways that allowed them to survive" (p. 733). Indigenous science, then, is guided by a conscious move outside of laboratories into the world in which people live (e.g., Aikenhead, 2001; Kawagley, 2006). Thus, "starting at the beginning" signals a different "way of thought" and its concomitant behaviors. Evident here is a different knowledge system at work.

This emphasis on starting at the beginning is also connected to another fundamental difference between many Western and Indigenous Knowledge Systems. Within the Western tradition, the knowledge sought is propositional in nature (Burkhart, 2004). Individuals concerned with knowledge in this traditional Western sense focus on the search for eternal truths, laws, and principles that may be proven through the posing of hypotheses, test construction, and "scientific" experimentation. Indigenous Knowledges, however, are contextual and contextualized; they are lived and are an integral part of survival.

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Truth and knowledge cannot be ends in and of themselves. Battiste (2002) cogently addresses this when she writes, "Knowledge is not what some possess and others do not; it is a resourceful capacity of being that creates the context and texture of life. Thus, knowledge is not a commodity that can be possessed or controlled by educational institutions, but is a living process to be absorbed and understood" (p. 15). Again, we are struck by the fact that knowledge must be lived and is a verb. For many in Western knowledge systems, knowledge is a noun—rooted in things on the pages of a book or possessions. It is often stagnant, maybe something so abstract as to not even be tangible. Knowledge from an Indigenous perspective is active. For those who have knowledge, they must be vigorous in their acquisition and use of it. Okakok (1989) notes, "Though most of the education in our [Inupiat] traditional society was not formal, it was serious business. For us, education meant equipping the child with the wherewithal to survive in our world" (p. 256).

By utilizing the differences between seeds, the student teacher resisted a scripted approach to teaching just measurement and science; instead, she relied on the categorization inherent to knowing what seed grows into what plant: "They have to know what is what before they go planting things." Much of what she highlights here is rooted in notions of Indigenous Knowledges. It points to the practical nature of knowledge and moves away from the abstraction of planting something just to watch it grow and be able to measure it. The plant itself potentially represents more than just a learning tool and medium through which to engage in "scientific practices"; it is something that must itself first be known. There is sanctity in the knowledge and its use here that is an inherent part of Indigenous Knowledges. Doing things simply to do them—perhaps in the pursuit of knowledge for knowledge's sake—is not typically recognized as a part of Indigenous Knowledge Systems.

The student teacher highlighted the importance of contextualizing knowledge when she said, "Then I would talk about what each seed did." The active nature of this sentence points to the seed as alive and having purpose; it is not simply a "thing" to be viewed but an active and living object that "does" things. Framing the seed as something that "does" is a categorical shift in the ways that students in mainstream schools are asked to think about the subject matter and materials. Many Indigenous scholars and leaders indicate that Indigenous people are often concerned with the applicability and practical nature of the tools with which they are learning (Deloria & Wildcat, 2001; Marker, 2003). Respect for and responsibility over knowledge is also important because it demonstrates how knowledge is used and to what end. Indigenous Knowledges require responsible behavior, and this is often achieved by considering the ramifications of actions before they are taken.

The importance of purposeful action is central to this discussion because it is rooted in the beliefs of communities of people and points to the nature of responsible use of knowledge. Because all things are interrelated and connected, planting something that serves no purpose beyond learning is not log-

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ical when, from an Indigenous perspective, a plant can be grown both for the purpose of learning and for the purpose of feeding people.

In his book *The American Indian Mind in a Linear World,* Shawnee, Sac and Fox, Muscogee Creek, and Seminole scholar Donald Fixico (2003) writes:

> "Indian Thinking" is "seeing" things from a perspective emphasizing that circles and cycles are central to the world and that all things are related within the universe. For Indian people who are close to their tribal traditions and native values, they think within a native reality consisting of a physical and metaphysical world . . . people raised in the traditional ways of their peoples see things in this combined manner. (pp. 1–2)

A circular worldview that connects everything and everyone in the world to everything and everyone else, where there is no distinction between the physical and metaphysical and where ancestral knowledge guides contemporary practices and future possibilities, is the premise of many Indigenous Knowledge Systems. This fundamental holistic perspective shapes all other understandings of the world (Fixico, 2003; Marker, 2004; Stoffle, Zedeño, & Halmo, 2001). More specifically, holistic or circular understandings do not draw separations between the body and mind, between humans and other earthly inhabitants, and among generations. Instead, connections (like those between artificially separated disciplines) are central for knowledge production and the responsible uses of knowledge. These connections are also central to how many Indigenous people view their own places within the larger cosmos of all living things. When everything and everyone is connected, a person has a responsibility to act according to her surroundings. Thus, responsibility becomes a logical outgrowth of Indigenous philosophical understanding. A person understands that her actions affect everything else, and she is invested in maintaining necessary balance. According to Arapaho scholar Michael Marker (2003),

> This emphasis on relationships puts animals, plants, and landscapes in the active role of *teacher* and therefore results in a more holistic and integrated understanding of phenomena. This kind of holism resists constrictive and contrived taxonomies as well as disciplinary boundaries. It also produces a state of consciousness in the Aboriginal intellectual that makes no separation between scientific and moral understandings. (pp. 105–106)

When relationships are seen as pervasive and profound, they require attention. Proper attention to relationships requires efforts toward their maintenance, and it requires reciprocity.

In that session, the student teacher continued to emphasize the Indigenous Knowledge-based ways of recognizing the potential purpose and role of teaching the plant lesson. She immediately recognized the fact that students are going to do more than measure the plants; they must plant them first. Importantly, students must be aware of what they are planting before engaging in

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the process. For some Indigenous people, knowledge is the basis of power because it must be used toward a greater aim and goal. To plant something that is unknown potentially creates problems that could have been avoided: "In my culture, we are very careful to make sure that every decision we make is thought about before we act." In this statement she highlights the notion that knowledge and power must be handled with care and deliberation.

All decisions and actions carry ramifications, and the deliberateness of actions is intended to ensure that care is taken with all things. The deliberate nature may also be indicative of the seriousness with which learning occurs. Importantly, the student teacher elaborated by pointing to the fact that the planting of a seed "has a purpose and carries more stuff with it." She also implicitly chastised the teachers and the lesson by pointing out that, "We wouldn't plant it in sand anyway; things don't grow well in sand, and everyone knows that." The process of planting anything that is alive with the intention of nourishing it implies a responsibility to the plant and its care. In this particular tribal culture, the "more stuff" she referred to points to the spiritual and metaphysical acts that are tied to the nourishment of life. Also caught up in this is the critique of not planting the plants in sand: If it will not "grow well in sand," it makes little sense to do it; the plant suffers and the activity serves little purpose except to become "information." From an Indigenous perspective, planting a seed is more than just an experiment; it is a process of nurturing a living creature that bears fruit for life's sustenance.

In many ways, the student teacher appears to be asserting that students must learn more than what is found in books. This resonates with the late Lakota scholar Vine Deloria Jr. (1992), who argued that space must be made for students' moral development because the current educational system, as it stands, only produces professionals who know how to behave "properly" and does not develop whole persons who have a sense of their personal selves, because "professionalism overrules the concern for persons" (p. 46). In other words, according to Deloria, professionalism is the standard way to assess a person's goodness, and it is this oversimplified version of reality that creates blind spots in people's minds that lead to confusion and unrealistic interpretations of the world.

Importantly, the idea of the "more stuff" involved in planting these seeds also corresponds directly to the spiritual aspects of planting something for its nourishment and the nourishment of others. Some Indigenous notions of spirituality require that the metaphysical nature of things be considered in the daily lives of students and teachers. Curriculum and subject matter must be tied directly to the lives of students and their Indigenous teachers. Separating the two makes them arbitrary and fails to recognize the knowledge system that is rooted in the ways of the community. These materials become more than a simple individual exercise. Burkhart (2004) emphasizes the active nature of knowledge:

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> Knowledge is what we put to use. Knowledge can never be divorced from human action and experience. . . . American Indian philosophers see the act of displacing oneself from the world in order to do philosophy not only as unnecessary but as highly problematic, since in doing so one is only guessing whether what one is striving after is really knowledge at all and whether the questions one has formulated are even really questions. (p. 21)

We can see what one knows by what one does; or, what one does, or puts to use, demonstrates the knowledge that individual has.

The student teacher continued with the connections between the curriculum and her own sense of native religion, suggesting that she would have the students "come in one night to school" where she would discuss the community's cosmology and make direct links to the seeds and when they get planted. In this way, few tasks at school are simple or unrelated to the everyday lives and spirituality of the students. When the student teacher said, "It is the way we do things," she points to the ontological and axiological basis that connects the everyday with the sacred—there is little disconnect, and she takes seriously her role to provide students with the larger reasons for engaging in school. School activities are mediated by the community norms and the way things are done. She elaborated on this when she argued that "these students have to know the right way to do it" and pointed to the fact that seeds and planting occur at particular times in particular places with the appropriate use of time and space. This description is culturally based teaching at its best and highlights the potential fluidity between the home and school.

Indeed, notions of the "right way to do it" go beyond notions of who does what better. From an IK framework, survival of a community is at the core of the matter. We simply cannot understand ways of knowing and being without a deep and abiding understanding of what community means and how, for many Indigenous peoples, community is at the core of our existence. Individuals, through self-discovery and selflessness, become whole, thereby insuring community survival. Interdependence of individual and community is essential. Lomawaima and McCarty (2006) write, "The ultimate test of each human educational system is a people's survival" (p. 30), a sentiment that is captured in Diné scholar Brian Yazzie Burkhart's (2004) insightful reworking of the Cartesian Principle. We know that Descartes based his own philosophies of knowledge and being on the principle "I think, therefore I am." Burkhart reconceptualizes an Indigenous version of this principle as "We are, therefore I am." At their core, then, the knowledge systems, ways of being, and teaching philosophies, for many Indigenous peoples, are focused on community and survival.

A healthy community is both the purpose and litmus test of knowledge. It is not dependent only on food and water for sustenance; creating and maintaining community health requires enrichment, aesthetics, emotional and spiritual expression, and the celebration of Indigenous/human creativity and

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intellectualism.[9] According to Deloria (1992), the freedom to think and act in ways governed by individual will promoted in some other knowledge systems can be detrimental, for it allows an individual to conceive of reality in whatever way she finds beneficial, which encourages her to disregard others and be blind to the repercussions of her thoughts and actions on those around her. Community-based knowledges require individuals to be concerned for the welfare of not just themselves but others as well.

Finally, the student teacher highlighted some of the conflicts between a way of teaching informed by IK and community practices and the standards and testing that currently drive curriculum and teaching. In her words, "This is a little trickier." She keenly noted that because of legislation like No Child Left Behind, she must assist her students in meeting the demands of myriad assessments. Ultimately, this student teacher makes what may be the most profound statement of all when she says that her "tribe is for education . . . but sometimes it doesn't make sense." In this statement, she is not arguing that education does not make sense; rather, she critiques a form of education that assumes that one size fits all and that achievement is rooted in individualism. This is a form of education that may not be valued in Indigenous communities, and her voice is a powerful critique of a system that claims to leave no one behind. Importantly, she pointed to the fact that as a future teacher, she has learned something from the university's program and will integrate it into her knowledge. She pushed the issue by letting us all know that while she is learning, the university and the teacher preparation program have something to learn from her. She is, of course, right. In a prescient moment, she foreshadows the effects of her comments on the educators with whom she works.

From Seed to Plant: Transformation, Transition, and Becoming Teachers

The student teacher's discussion of the lesson through an Indigenous lens changed the tenor of the meeting and quashed any concerns over the students' abilities to learn, teach, and think through problems in the classroom. The university faculty and staff had been having difficult conversations with the STEs and with Henry about whether or not these student teachers were going to be able to complete their student teaching assignments. Both of the STEs had privately questioned their student teachers' abilities to take over their classes, and one was adamant that the student teacher she was supervising was "not ready to do this work. She doesn't even have an understanding of the basics, let alone how to teach a child." The student teacher she discussed with such derision is the same student teacher who outlined the ways that she would teach the lesson of the bean.

The change in body language from this STE toward her student teacher was profound. She went from leaning away from the student teacher as she spoke to leaning in, engrossed by her version of the modifications she would make to the lesson. This STE was animated when she said, "Those are really good points. . . . I mean, of course we know that things grow in particular ways, and

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we can just tell our students this. . . . I also like the idea of us growing things in our classroom that the students can then take home and either eat or give away as gifts. . . . That's really good." Her analysis of what the student teacher described moved from "she doesn't even have an understanding of the basics" to "those are really good points." Buried in this transformation is the effect of actually watching the student teacher translate her knowledge into action. Demonstrating knowledge is an important key to the programmatic issues of the teacher-training program, and the student teacher demonstrated how she would rethink an entire lesson and actually put it to practical and informative use. In this example, there is evidence of the ways that differing knowledge systems can come together to create a unified vision of what makes sense. In this case, the sense making coalesces around the lessons of growing a bean plant.

This vignette and the connections it makes between knowledge and its production and transmission recall the comment by the Indigenous woman about her experiences in a boarding school and highlight the faulty logic that has been apparent in the education of Indigenous students for centuries. The school and its teachers framed her as a "dirty, dumb Indian." In response, she asserted the fact that she can be "smart and an Indian at the same time." She also noted that her teachers would have been more effective "if they only understood how good [her] ways are too." The bean lesson demonstrates precisely how "good [these] ways" are and shows how an Indigenous teacher can demonstrate that her "students can see that being smart and [Indian] can go hand-in-hand." Ultimately, we see, in this reframing of a lesson to be more in line with her students' cultural moorings, that "knowing what [her students'] lives are like and understanding what it means to be an Indian, [she] can be a better teacher" for her Indigenous students. Similarly, our hope in creating ITPP was to establish a way of reframing the educational experiences that many Indigenous peoples had with schooling. These pre-service teachers highlight one of the ways that Indigenous peoples might march toward self-determination through self-education.

Conclusions

The story of the bean highlights a number of issues for us. First, Indigenous knowledge systems are in danger of becoming something few Indigenous students are explicitly aware of in their daily lives. The need to understand this danger is imperative so that Indigenous students can make sense of their own experiences and their placement in institutions of higher education and K–12 schooling. Importantly, many individuals may be unaware of the rootedness of their own knowledge systems. For Indigenous students in higher education, being historically aware of the different ways that their own knowledge systems are marginalized or ignored allows them to better situate faculty feedback on their work and the ways that courses are run. This awareness allows for strategic accommodations in order to frame themselves as both "smart" in

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the context of the university and to maintain a sense of themselves as Indigenous people.

Second, these knowledge systems highlight the ingenuity of Indigenous peoples as members of functioning societies, as inventors, and as systematic, analytical thinkers. In the story we share here, student teachers began to transform the ways in which other teachers and their supervisors fundamentally understood teaching and learning. Recognizing this ingenuity is essential for Indigenous educators; they must have multiple sources of strength to draw on in their work with students in order to disrupt the ongoing damaging impacts of deficit thinking and colonization. Finally, it is imperative that all educators serving Indigenous peoples, whether they themselves are Indigenous or not, develop an awareness of the bases for Indigenous Knowledge Systems and production so they can support student learning in meaningful ways.

All knowledge systems are lived. Here we have examined one particular instantiation that has implications for the work we do. At the heart of much of what is called "cultural difference" is a set of deeper theoretical issues involving Indigenous Knowledges. The ways in which knowledge systems govern our lives—from how we value particular relationships to how we conceive of and deliver instruction on plant growth—may be difficult to see, especially if we are not familiar with knowledge systems other than our own. However, these misunderstandings are often at the crux of conflict and key sites of struggle, including Indigenous teacher education. Through the IK research of a large number of Indigenous scholars and the theorizing and action of students in the Indigenous Teacher Preparation Program, we have come to see more fully just how extensive the implications of Indigenous Knowledges are and how these knowledge systems are challenged and unrecognized by many of us in academia. We would be wise to follow the astute observations of Inupiat scholar Leona Okakok (1989), who noted, "We all know that we can go through life convinced that our view of the world is the only valid one. If we are interested in new perceptions, however, we need to catch a glimpse of the world through other eyes. We need to be aware of our own thoughts, as well as the way life is viewed by other people" (p. 248). In many ways, the Indigenous pre-service teachers' experiences and perspectives pushed the institution and the site teacher educators to consider "new perceptions," leading to a simple science lesson that opens up new possibilities.

In the bean lesson example, we are struck by the fact that Indigenous Knowledges are used to extend and create space to think more broadly about what teaching and learning is and what it might look like. In the process, the Indigenous pre-service teachers had an opportunity to demonstrate that they and their ancestors were, and are, brilliant in their ways of engaging the world. Rather than being closed down because of these clashes around different knowledge systems, the pre-service teachers opened up a wide range of possibilities for how to engage learning, contextualize assignments, and integrate differing knowledge systems during a classroom moment. This example high-

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lights an axiological clash about what "good teaching" looks like; more importantly, it also demonstrates that openness to new ways of engaging teaching topics and areas can be sources of strength for both teachers and learners.

It is not enough for teacher education programs to simply claim commitment to the training of Indigenous educators. They must also be able to see that the construction of knowledge is socially mediated and that Indigenous students may bring other conceptions of what knowledge is and how it is produced with them to their teaching. As Battiste (2002) reminds us, "The immediate challenge is how to balance colonial legitimacy, authority, and disciplinary capacity with Indigenous Knowledge and pedagogies" (p. 7). Our hope is that by making explicit some fundamental aspects of Indigenous Knowledge Systems and how they are played out in the lives and teaching of our students, we contribute to a conversation that urges educators—specifically educators of American Indian teachers and students—to recognize these knowledge systems in their power, effectualness, and ontological manifestations.

Perhaps the best way to end this essay is by seeking the wisdom that comes from Indigenous Knowledge Systems. According to Chickasaw scholar and former president of Saskatchewan Indian Federated College Eber Hampton,

> The Europeans took our land, our lives, and our children like the winter snow takes the grass. The loss is painful but the seed lives in spite of the snow. In the fall of the year, the grass dies and drops its seed to lie hidden under the snow. Perhaps the snow thinks the seed has vanished, but it lives hidden, or blowing in the wind, or clinging to the plant's leg of progress. How does the acorn unfold into the oak? Deep inside itself it knows—and we are not different. We know deep inside ourselves the pattern of life. (cited in Battiste, 2002, pp. 28–29)

The pre-service teacher, in taking up Indigenous Knowledges to address a classroom lesson, demonstrated the power of the seed. Her reframing of the lesson highlighted "the pattern of life" and pointed us to a future full of hope and possibilities.

Notes

1. Throughout this article, we use pseudonyms for individuals and institutions and we obscure some details as a way to maintain some sense of anonymity. In the essay, "we" refers to ourselves as authors and as members of the program staff.
2. We use the term "holistic" with the full understanding that it appears to have become a bit of a catchphrase in discussing issues related to Indigenous peoples. While we recognize the problems inherent in its use, we also know that this is the way that the students themselves talked about their own knowledge systems.
3. Lomawaima and McCarty's (2006) outstanding book, *"To Remain an Indian": Lessons in Democracy from a Century of Native American Education*, also points to the ways that frontline teachers rejected calls for assimilation and worked from a model of engaging Indigenous students in ways that led to choice and power.
4. There is a deeply moral and ethical component of Indigenous Knowledge Systems that scholars acknowledge (e.g., see Battiste, 2002; Deloria, 1969/1988; Okakok, 1989; Burkhart, 2004). In this way, IK encompasses a fourth dimension that includes the

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whole person and notions of the spiritual and metaphysical. There are deeply embedded components of values in these knowledge systems.

5. There are variations on this spelling for Indigenous peoples from both Canada and the U.S.
6. We understand that, like IK, Western knowledge systems are not monolithic. In many ways these Western ways of knowing are characterized by what many people think of as what occurs in formal schooling. We also believe, however, that many larger societal norms are connected to Western ways of knowing as well; these include an overemphasis on the individual, heavy competition, and the "right" way of doing everything from how to hold silverware, how to engage with teachers and in the intellectual process, and how to "do school." None of these things is apolitical, and it is the "Western" ways that are often seen as those that have become normalized over time.
7. The opinions and analyses offered in this article are the authors' only and not necessarily those of the funding agency.
8. In order to protect the identities of the individuals involved in the following story, we use pseudonyms. Also, we have altered some nonessential details in order to make it more difficult to identify the individuals speaking. Our intention in this essay is not to paint any person or program in a negative light; rather, it is to use the vignette to point to places of possibility and transformation. Indeed, we eventually developed very good working relationships with faculty and program staff in these departments.
9. We acknowledge Terri McCarty's assistance in pointing out this nuance.

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