Objectivity – the Opiate of the Academic?

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Indigenous knowledge in science education, the theme of this special issue, has evoked numerous articulate discussions in our science education literature over the past 20 years. In this special issue, discussions range from the philosophical (e.g., epistemology, ontology, and axiology) to the practical (e.g., what happens in a classroom, in communities, in a government curriculum development department, and in an undergraduate science program).

In academe, we give particular emphasis to crafting theoretical frameworks with which to examine Indigenous knowledge (IK) and its place in science education; theoretical frameworks that are replete, self-consistent, and sophisticated. One of the forum participants, Dawn Sutherland, observed, "There is a time when you need to stop philosophizing and try implementing an aspect of IK … just do it … the dialogue that will be most valuable in the development and implementation of local IK … will be the dialogue that takes place at the level of the Indigenous community." Her prescient comment reminds us that there are ways of addressing this special issue's theme that go beyond the conventions of objectivity in science education research; ways that find a home in *Cultural Studies of Science Education*.

Commenting on academic conventions of science education research, Myron Atkin (2007) noted Aristotle's dichotomous distinction between "thought directed toward *understanding* how the world works and thought directed toward *taking action* in the world" (p. 68, emphasis in original). The respective Greek terms are *episteme* and *phronesis*. In the realm of phronesis, thought and action are somewhat dialogically related: "Not only is action sometimes derived from thought, but practical thought is generated *through* action" (p. 69, emphasis in original). Practical thought generated through action echoes Dawn's admonition: Just do it and generate thought as a result, practical (phronesis) or theoretical (episteme) or a hybrid of both.

Briefly I would like to explore phronesis further. First, phronesis is not "practical knowledge," but instead "practical *wisdom*," which is associated with practical reasoning – "what is prudent, what is obligatory, what is moral and what is appropriate for the particular situation" (Atkin, 2007, p. 69).

Second, practical wisdom (phronesis) intriguingly resonates with the phrase *wisdom-in-action*, which indicates a way of knowing the world embraced by most Indigenous peoples (Aikenhead & Ogawa, 2007). Wisdom-in-action represents a fundamental human goal: to become wiser in living properly in the world. The Nehiyawak (Plans Cree nation) of Canada, for instance, would easily translate *phronesis* as *yipwakawatisiwin* ("wisdom in practice;" Beaudet,

1995). Phronesis and yipwakawatisiwin, it would seem, represent common ground between a Greek-based Eurocentric perspective and a Nehiyaw (Plains Cree) perspective. Sharing common ground, however, does not mean the two words are identical. Much will be lost in translation between the two because the cultural metaphysical contexts for each word differ (Aikenhead & Ogawa, 2007).

On the other hand, words such as *knowledge* and *episteme* are not easily translated into Nehiyawewin (the Plans Cree language) or other Indigenous languages. The corresponding Indigenous concept for the word *knowledge* is "ways of living" or "ways of being." Indigenous epistemologies tend to be verb-oriented rather than noun-oriented, and thus, so are their languages (Little Bear, 2000). Moreover, from a Eurocentric perspective, knowledge and episteme can be given, accumulated, banked, and assessed by paper and pencil examinations. This implies that knowledge is an entity separate from the knower, a concept totally foreign to Indigenous perspectives in which the knower is personally and intimately interconnected with one's ways of living (i.e., their "knowledge," in Anglo terms). Therefore, the words *knowledge* and *episteme* are not easily distorted into common ground between a Greek-based Eurocentric perspective and Indigenous perspectives.

Third, the theme of this special issue can now be updated to "Indigenous ways of living in nature in science education." But this phrase creates a challenge: science education conventionally celebrates knowledge of nature associated with episteme, whereas ways of living in nature largely embody phronesis. How can phronesis intermingle with episteme in science education?

This fundamental conundrum has generated several productive research programs concerning various groups of students conventionally marginalized in science education (e.g., Calabrese Barton, 2004; Roth & Lee, 2004; Scantlebury, 1998; Taylor, 2006; Tobin et al., 1999), and has under girded many research projects oriented toward "activity theory" associated with Lave and Wenger (1991) and Wertsch (1991), for instance. Such research programs and projects have pervaded every volume of *Cultural Studies of Science Education*. This special issue is no exception. Its four articles and forums offer insights into this fundamental conundrum for Indigenous students worldwide; specifically Zulu students in South Africa (grades 7-11), Māori students in Aotearoa New Zealand (grades 1-8), Indigenous students in Papua New Guinea, and American Indian undergraduates in a United States university life-science program.

Each article explores the tensions between phronesis and episteme in a different way. Moyra Keane reports on a sustained, four-year, community-based project that sought to enhance a rural Zulu community's wellbeing and to improve its school science. Her research, in part, investigated the phronesis valued by the community and how this phronesis and the curriculum's episteme might coexist within school science in a culturally sensitive way, such that students could gain "deeper and broader understandings through drawing on both an Afrocentric and a Western worldview." Anaru Wood and Brian Lewthwaite identify Māori community stakeholders' aspirations for the development of an appropriate school science, and they look at sources of support for, and constraints against, that development. Their data are interpreted through two different theoretical frameworks, one associated with phronesis (Kaupapa Māori Theory) and the other with episteme (Bronfenbrenner's bio-ecological model). Ann Ryan provides an unusual insider's account of a developing country's science curriculum department where the tensions between phronesis and episteme resulted in a modern-day wave of colonization that Ann calls "neo-colonialism," a phenomenon that landscapes globalized science education and eradicates vestiges of local practical wisdom (phronesis). In these three articles and forums, explications of phronesis in diverse cultures afford the reader a glimpse into Indigenous ways of knowing nature and into the rich common ground they share worldwide. The fourth article, written by Carol Brandt, examines the experiences of four American Indian students as they struggle to develop self-identities within the challenging world of Eurocentric life sciences in an undergraduate program. In her examination, Carol detected a way to address the tensions between phronesis and episteme: set aside this Aristotelian dichotomy by finding an alternative – a "location of possibilities" – in which both phronesis and episteme evolve within the unique identities of each student.

Carol's challenge characterizes an ongoing problem for science educators: to overcome what appears to be incommensurate ways of knowing nature associated with pluralism. One response to the problem is "third space" theory (e.g., Moje et al., 2004; Taylor, 2006; Wallace, 2004). A very different approach was taken by Ken Kawasaki (2007) in his search for a linguistic standpoint that is superordinate to culture-based worldviews about nature, an approach that draws on "an axiomatics model." He suggests that his model could liberate science educators "from their language-culture prejudices" (p. 29). Yet another way to avoid the phronesis/episteme dichotomy is to engage in what Patricia Vickers (2007) calls "camping

spots," where dialogues occur within communities and between communities. Vickers's mutual coming to know the other through dialogue between a science education community and an Indigenous community captures key ideas discussed in this special issue. For instance, it succinctly describes Moyra's project, it resonates with and broadens Carol's "location of possibilities," and it reflects Dawn's conclusion that dialogue between science teachers and Indigenous people in the community is the most valuable asset to including IK in science education. Ray Barnhardt in his forum concurs, "It is possible to bring the study of Euro-scientific knowledge and the traditional knowledge of Indigenous peoples together in a way that deepens our understanding of both, and gives students an opportunity to deepen their own sense of self in the process."

Cliff Malcolm (2007), another forum participant, suggested yet another approach to bypassing the phronesis/episteme dichotomy. He encouraged science educators to adopt an Indigenous perspective that is open to Western, mechanistic, cause-effect relationships, in addition to embracing its own metaphysics. His example was ubuntu, a key Zulu perspective described in Moyra's article as humanity expressed through relationships ("We are, therefore I am;" Malcolm, 2007, p. 62). Cliff envisioned that his approach would dissolve perceived boundaries between different culture-based ways of knowing nature, an idea he expands upon in his forum contribution when he discusses the question, "What would an effective dialogue/conversation between the different systems look like in the curriculum?" Some answers are mentioned just above: third space theory, an axiomatics model, location of possibilities, camping spots, and the adoption of an encompassing Indigenous perspective. More ideas are found in this special issue, ideas about *how* to intermingle phronesis and episteme and/or *how* to nullify their distinction.

No matter how we resolve seemingly incommensurate ways of knowing nature associated with pluralism, we must still make a decision on *what* content will be taught in science education (i.e., What phronesis-episteme synthesis/replacement content will be taught?). The decision is a political one, of course, grounded in a question steeped in power and privilege: Who decides what is worth knowing?

In Cliff's forum contribution, he reminds us, "Aristotelian logic and Enlightenment ideas of objectivity/subjectivity are deeply embedded in our conceptions of science and research and in the language we use to talk about them." Most teachers and researchers have been enculturated

into the language endemic to episteme. However, the domain of science curriculum policy is politically anchored in phronesis, which lies beyond objectivity/subjectivity. Similarly, Indigenous wisdom-in-action is not encumbered by an objectivity/subjectivity dichotomy (Cajete, 2006); indeed, Indigenous metaphysical concepts such as ubuntu (South African Zulu; Malcolm, 2007) or "all my relations" (Canadian Cree; Aikenhead & Ogawa, 2007) move us away from objectivity/subjectivity and away from the privileged discourse of conventional science education. Given the prominence of the objectivity/subjectivity dichotomy in science education and most of its research, many academics must feel comfortable with the dichotomy, so much so that I wonder if objectivity has become the opiate of the academic. Resistance to IK in science education is more complex than levels of comfort and an addiction to episteme, to be sure; but a person's level of comfort is a powerful force in the phronesis of science education, and a person's passionate reliance on a positivist-like view of Eurocentric science is inertia to be reckoned with.

This special issue explores ways of thinking that have been influenced by the recognition and legitimation of Indigenous knowledge in science education, and it reports on ways of acting that produce experiences inviting and respectful to Indigenous students in science education.

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