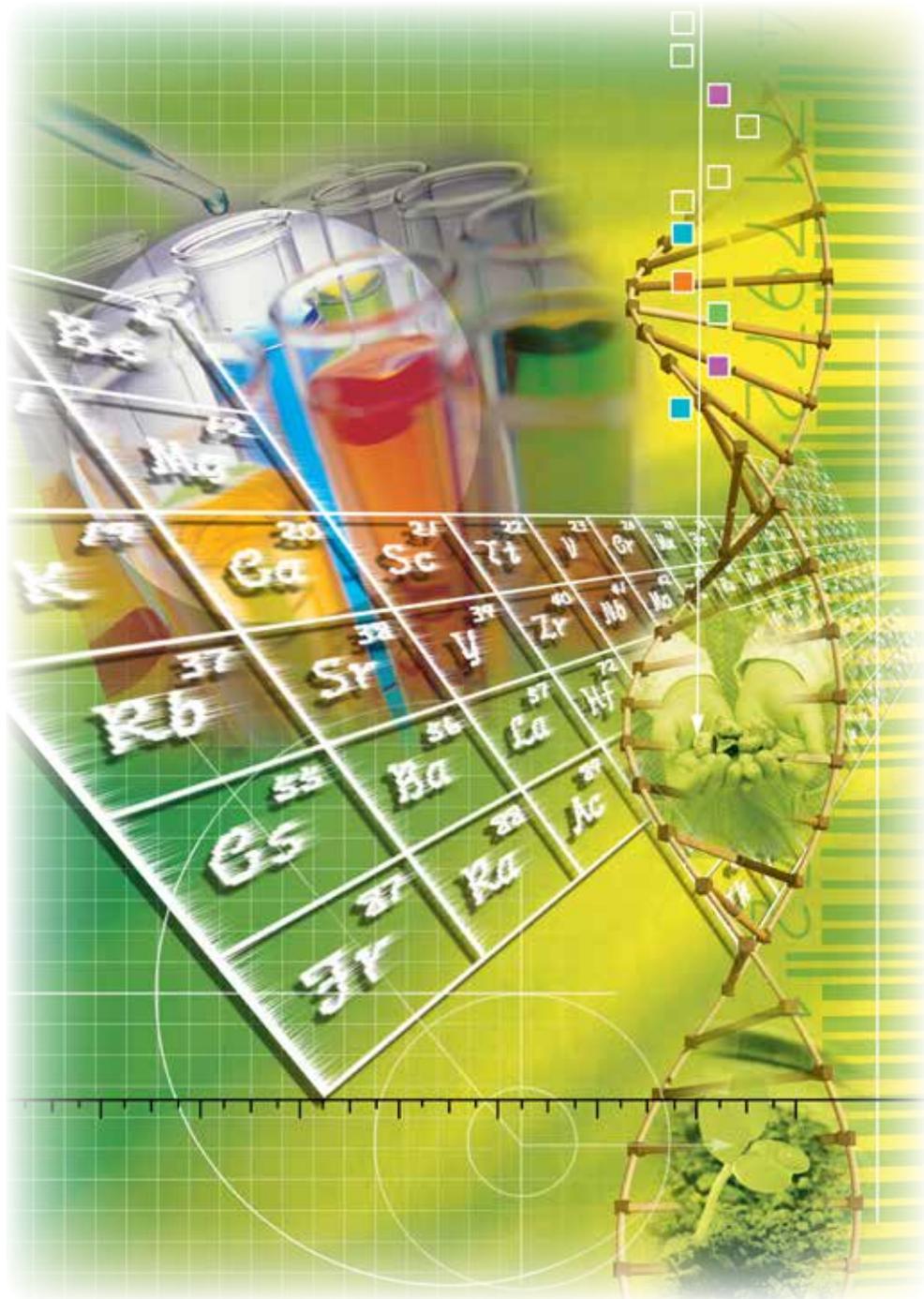
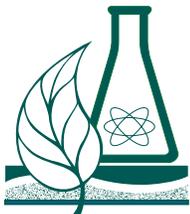


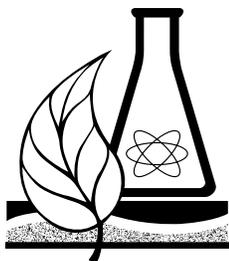
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Three-Eyed Seeing? Considering Indigenous Ecological Knowledge in Culturally Complex Pedagogical Settings

Greg Lowan-Trudeau

Background

Canada is a culturally complex country composed of Indigenous peoples and settler populations from Europe and, increasingly, other parts of the world. In general, but with some important exceptions, the first waves of Canadian colonizers and settlers were from Europe, bringing with them predominantly Western perspectives on science, ecology and land use (Saul 2008). For the first few centuries of postcontact Canadian history, these Western perspectives interacted and often clashed with Indigenous understandings of the natural world, which were based on thousands of years of geographically rooted experience (Cajete 1994). More recently, immigration from other parts of the world has increased (Malenfant, Lebel and Martel 2010). People arriving from non-European cultures might have an understanding of Western science and philosophy, but they also often carry rich ecological understandings linked to their home nations. Statistics Canada projects that immigration from non-European countries will continue at a high rate over the next several decades (Malenfant, Lebel and Martel 2010).

Simultaneously, Indigenous history, perspectives and contemporary issues are increasingly emphasized in many provinces and territories as priority areas in education for all students. For example, as Elliot (2011) notes, the inclusion and consideration of Indigenous perspectives is now part of Alberta science curricula. Such trends have created and revealed rich and wonderful pedagogical complexity for Canadian educators and students alike. As a Métis science and environmental educator born and raised in a relatively diverse urban centre, I am particularly interested in the relationships

between different culturally based ecological knowledge systems.

Hence, this article reports on a recent pilot study conducted in response to calls from participants in a past study (Lowan-Trudeau 2012, 2014) for further exploration of the complex experiences of newcomers to Canada with learning about Indigenous ecological knowledge in predominantly Western educational contexts. In the first study, I interviewed Indigenous and non-Indigenous Canadian science and environmental educators who were working to find common ground between Western and Indigenous knowledge and philosophies of nature. One of the challenges identified by several participants was the difficulty of reconciling two or more cultural viewpoints in the complex settings common to many Canadian communities today. For example, many participants emphasized the challenge of considering the cultures and experiences of students who have recently arrived in Canada, while at the same time honouring local Indigenous knowledge and wisdom and continuing to engage with Western science perspectives. Several participants suggested that it would be valuable to explore the experiences of students new to Canada in order to better understand their perspectives.

While there is extensive literature available pertaining to multicultural science and environmental education (eg, Agyeman 2003; Blanchet-Cohen and Reilly 2013; Roth 2008) and a growing body of work on Indigenous science and environmental education (eg, Aikenhead and Michell 2011; Lowan-Trudeau 2012, 2014; Cajete 1994; Elliot 2011; Hogue 2012; Snively and Corsiglia 2000; Swayze 2009), research that examines the complex interaction of these two areas is limited. Terms such as *two-* or *multiple-eyed seeing*

(Hatcher, Bartlett, Marshall and Marshall 2009; Institute for Integrative Science and Health 2012) have been introduced to describe these complex contexts, but they have not yet been explored in great detail together in the Canadian context.

Toward Three-Eyed Seeing?

The concept of *two-eyed seeing* is now well established in science education circles. Developed by a team of Mi'kmaq elders and science education researchers at Cape Breton University, two-eyed seeing involves viewing the world simultaneously through one Western and one Indigenous eye to form a balanced and unified whole (Hatcher, Bartlett, Marshall and Marshall 2009). This concept has proved very useful and is adaptable to a variety of cultural and geographical contexts engaging Western and Indigenous ecological knowledge.

The developers of two-eyed seeing allude to the possibility of other culturally rooted perspectives being considered in addition to Western and Indigenous knowledge (Institute for Integrative Science and Health 2012); however, no empirical research to date has explored the potential of three-, four- or five-eyed seeing in earnest.

The purpose of this study was to explore the formal and informal educational experiences of first-generation immigrants to Canada with Indigenous ecological knowledge and philosophy. Specifically, I was guided by the following questions:

- How do newcomers to Canada perceive Indigenous ecological knowledge and philosophy?
- How might formal and informal science and environmental educators better respond to such culturally complex educational contexts?
- What are the broader societal implications of these kinds of questions?

Methodological Métissage

This study was further informed by methodological métissage (Lowan-Trudeau 2012), a calculated mix of interpretive, narrative and Indigenous research approaches. Three pilot interviews employing a semi-structured format were conducted with first-generation adults who had experienced schooling in Canada. Sample size was intentionally kept very small in order to allow for in-depth consideration, interpretation and presentation of participants' narratives.

Participants and Recruitment

Despite broad circulation of a call for participants to appropriate community and professional networks, I did encounter initial difficulty with recruitment. During reflection and discussion with participants and colleagues, it was proposed that this may have been due to the relative paucity of adult individuals new to Canada who have also had the opportunity to engage with Indigenous ecological knowledge in meaningful formal or informal educational contexts. In fact, this foreshadowed one of the key findings of this study, explained in further detail below.

Another surprising methodological development was that, despite the recent increase of immigration from non-European countries (Malenfant, Lebel and Martel 2010), there were, of course, individuals from European nations who were interested in participating in this study. This was an important reminder. As presented below, this resulted in a participant group that arguably mirrors historical Canadian immigration trends.

In order to provide further insight into the participants and their perspectives, brief biographies, in chronological interview order, are presented below.

- **Kathy** was born in Oxford, England. Early in childhood, her family left England by ocean liner for Canada, eventually, in 1967, settling in Ottawa, where she still lives today. Kathy noted that, as a British immigrant, she found it fairly easy to transition into life and school in Canada. In her current position, she manages an Aboriginal youth role mentorship program that brings Aboriginal role models into communities to facilitate sport, leadership, health and development initiatives.
- **Sophia** (pseudonym) is currently a postdoctoral researcher in the natural sciences. She was born in central Europe and, similar to Kathy, came to Canada by ocean liner in early childhood. Sophia's family initially settled in Ottawa, but soon relocated to a small lakeside community in central Ontario. Sophia revealed that, overall, she had a comfortable childhood in a predominantly Anglo-Canadian community; however, she did experience some prejudice and feelings of exclusion related to her family's central European cultural and linguistic roots.
- **Takwana** is currently a graduate student in Ontario, studying Indigenous knowledge in schools. She came with her family from Zimbabwe to Toronto in her mid-teens, a difficult time for such a transition.

Despite experiencing significant prejudice and culture shock, Takwana successfully completed high school and undergraduate studies in southern Ontario. She was also employed for several summers as a literacy and community development worker in several Aboriginal communities across northern Ontario. This experience led Takwana to relocate to a university in northern Ontario to complete her graduate studies.

Interpretation

Interviews were transcribed, restoried (Creswell 2002) and individually and collectively coded for themes (Lichtman 2012). Each interview was also examined for epiphanic (Denzin 1989), illuminating or “aha!” moments in which participants and/or the researcher experienced exceptional clarity or understanding.

In the spirit of reciprocity common to Indigenous research methodologies (Kovach 2010), three in-depth and individually intact narrative portraits (Lawrence-Lightfoot 2005) were subsequently produced and presented to each participant.

In recognition of individual and community accountability (Kovach 2010), I am still in regular contact with the participants and seek their approval and insight regarding any publicly presented or published materials.

Key Findings

These three conversations produced an incredible depth and diversity of insights, experiences and perspectives that are difficult to capture in a single journal article. However, as the researcher, I recognize that it is my responsibility to share my own impressions and insights along with those of the participants in the hope that others will find resonance and connection with their own experiences and inquiries (Kovach 2010). This is a pilot study, and therefore just the beginning of a much deeper line of inquiry.

Notable findings from this study include the common lack of meaningful exposure to Indigenous knowledge and philosophy of any kind through formal schooling, the importance of critical and experiential approaches, and the potential for reimagining cultural complexity as a strength rather than deficit for collaboratively addressing contemporary socioecological issues through formal and informal education.

Limited Exposure to Indigenous Knowledge

All three participants emphatically stated that they had very little exposure to Indigenous ecological knowledge and philosophy in their formal K–12 education in Canada. However, Takwana reflected upon her earlier experiences with school in Zimbabwe where English and Shona (a local indigenous culture) language and cultures were naturally integrated into school curricula and the day-to-day functioning of the school and community. For example, she shared memories reminiscent of two-eyed seeing (Hatcher, Bartlett, Marshall and Marshall 2009) when she noted that

In elementary school [in Zimbabwe], we [had] a garden ... and sometimes we'd do class projects where we'd be growing things ... We learned English and Shona ... and ... we would read Shakespeare, and Nigerian authors like Chinua Achebe... I also remember ... when we were learning animals, the class would be learning [about local] Shona [and European] animals ... It wasn't that people were trying, that's just how life was ... Having a grandmother come in and tell stories to the class first thing in the morning ... that was just something that was done.

Due to her early years surrounded by Shona culture and language, Takwana reflected a three-eyed seeing perspective when she suggested that “it might be easier for me to accept” traditional ecological knowledge in Canada. However, perhaps not surprisingly, upon arriving in Canada, Takwana did not experience such a two-eyed seeing approach at all. She expressed frustration with this and talked about searching well into her undergraduate and early graduate studies for mentors and opportunities to express, explore and relate her own Shona culture to Indigenous peoples in Canada.

Toward Sociocritical Experiential Approaches

Takwana's emphasis on experiential, community-based pedagogies in Zimbabwe aligns well with Indigenous perspectives here in Canada (Elliot 2011; Lowan 2009; Lowan-Trudeau 2014; Simpson 2002). All three participants spoke of formative opportunities to spend extended time in Indigenous communities in Canada for work or postsecondary study.

For example, both Takwana and Kathy discussed their overwhelming positive experiences working and spending time on the land and in several Indigenous communities for extended periods of time. Sophia shared similar sentiments when she reflected upon her experiences as a student researcher in the Canadian North:

I went up north for my first field season and I had a really, really profound time ... I stayed on an island with two families. I was the only white person ... it was my first chance to really ... spend time with Indigenous people ... It was really amazing to be ... immersed in this different culture ... My eyes were just wide open and I was quite quiet and really just observing everything.

All three participants also agreed that it was crucially important for non-Indigenous learners of all ages engaging with Indigenous knowledge and peoples to have strong mentors who are able to facilitate respectful and critical intercultural exchange and dialogue.

Identity Transformation

The participants also spoke about how these experiences transformed their own identities. For example, Kathy revealed that she now sometimes finds it hard to relate to her British relatives' perceptions of Indigenous peoples in Canada. Sophia also described shifts in her identity as she moved from respecting, but not fully accepting, Indigenous knowledge during her undergraduate studies, to over-adopting Inuit perspectives after her initial experiences in the North, to finally finding a point of balance where Western and Indigenous knowledge and philosophies comfortably coexist. Sophia reflected

Learning to respect these different ways of knowing is really important and ... quite powerful. I can't speak for Inuit ... I can only try and understand what's been explained and what I've read ... It can be really awkward because then I've interpreted what I've been told and ... I'm trying to somehow not play the devil's advocate, but ... be sensitive to different ways of knowing. I get kind of lost in all of that and ... that's part of ... my identity. It makes me kind of a messy person! Trying to navigate who I am and where I come from and what I know from a very scientific perspective, but then [I'm also] really informed by everything that I hear and learn ... Every time I go up north ... things make more sense.

Takwana also described an epiphanic (Denzin 1989) or aha! moment when she realized that her work as a literacy and learning instructor in northern Indigenous communities was perpetuating colonial processes similar to those effected upon her own people in Zimbabwe:

I realized that it is ... a handout type of development, it's not really from within. So I stopped doing those things ... It stopped being about Zimbabwean experiences and Canadian experiences. It's the same. When I try to reconcile everything, I look at the experiences in my country where I know how to grow [and cultivate] crops ... because we learned those things in geography [and at home] ... Everybody knows those things, everybody farms. And so, I know how to take care of the land, but it's very political too because now we are forced to plant all of these ... genetically modified crops that come in as aid and that don't do well over time. We don't know how to farm those things and then when [we] reject [then it creates major international tension] ... You're trying to be self-determining and our politicians who reject this harmful "aid" are framed as monsters depriving their people of food—when you're just trying to feed yourself in a sustainable way.

Takwana's comments are reminiscent of Maori scholar Graham Smith's (1997) discussions of internally driven socioeconomic development as a key principle of Kaupapa Maori, an influential Indigenous-centred pedagogical and community development theory. Takwana's insights also allude to one of the primary societal implications of this study that is discussed below, the consideration of "wicked problems" that require interdisciplinary and intercultural collaboration.

Educational Implications

I believe that the primary implication of this pilot study for educators is to reimagine cultural and pedagogical complexity as a possibility and strength, rather than a challenge or deficit. While some science educators may remain reluctant to foster sociocritical and interdisciplinary dialogue (Steele 2011; Chambers 2011) or perhaps feel that they do not have the curricular or logistical space to do so, there is increasing curricular and administrative support for such approaches (Elliot 2011). Indeed, in other provinces such as Ontario, interdisciplinary high school programs that bring together the arts, humanities and sciences have

flourished (Henderson 2011). However, as Elliot notes, educators teaching discrete courses can still do much to foster effective learning through experiential, community-connected, and sociocritical discussions and experiences.

As all of the participants in this study emphasized, facilitating sociocritical discussions and real-life experiences is a key element for successfully introducing students of all backgrounds to Indigenous knowledge and traditions in Western science settings (Lowan-Trudeau 2014; Simpson 2002; Elliot 2011). As Takwana indicated, learners new to Canada and their peers will benefit even more when provided with the opportunity to reflect upon and contribute their own culturally based understandings to critical discussions of Western, Indigenous and other knowledge systems. In this manner, we may well move from collectively using only one or two eyes, to a dynamic three- or multiple-eyed seeing model.

Societal Implications

Several societal implications of this study warrant consideration. The primary implication involves the exploration of contemporary “wicked problems”—socioecological challenges, such as climate change, that defy unidisciplinary solutions (Vink, Dewulf and Termeer 2013). Using three-eyed seeing as a model for the consideration of wicked problems holds great promise because it allows for the contributions of multiple stakeholders drawing on Western and Indigenous understandings from around the globe.

As Kassam (2014) has noted, such an approach can also facilitate inter-Indigenous exchange wherein Indigenous peoples from similar geographical and ecological areas share insights and experiences with each other.

Another broad implication of this study is the importance of building strong intercultural alliances that acknowledge and incorporate multiple cultural perspectives in authentic ways. All of the participants supported such an approach in order to honour the individual and contextual perspectives of both Indigenous peoples and newcomers to Canada in the spirit of living well together on this land (Haluza-Delay, DeMoore and Peet 2013). As Kathy suggested,

We are extremely fortunate to be living in a country with such resources ... [So] how do we take care of that, how do we nurture that ... so that we've left something for the next generation?

Future Possibilities

Findings from this study will guide the development of future research (Steele 2011) with community- and school-based science and environmental education programs that emphasize and integrate Indigenous ecological knowledge and philosophy in culturally diverse contexts. Further inquiry into the experiences of youth and adult learners and educators engaging with these complex situations will most certainly prove insightful and further the conceptual development and application of a three-eyed seeing model.

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