

Turning the focus from ‘Other’ to science education: exploring the invisibility of Whiteness

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Abstract This paper provides another way to gaze upon Brad’s story as presented by van Eijck and Roth (2010). It raises questions about infrastructural racism in contemporary science education by exploring its association with Whiteness and White privilege. To explore the racial positioning inherent in Western science education specific attention is given to the positions of power that accompany Western ways of knowing the world (i.e., science education) in comparison to Other ways of knowing the world (i.e., First Nations Ways of Knowing). The paper suggests the power relationships inherent within this dualism are asymmetrical due to the implications of Whiteness within colonial societies. Even though power relations were not discussed in Brad’s story, the paper suggests the implications were visible. The paper concludes by advocating for a re-imagining in science education where the traditional ontological and epistemological foundations are deconstructed and spaces are created for enacting practical ways of resisting oppression.

Keywords Structural inequities · Whiteness · Color blindness · Dualism

I would like to offer my own interpretation of how the history, structural inequities, and social practices of contemporary science education have tended to maintain White hegemony and construct the Other (in this case, the First Nations or Aboriginal student) as ultimately deficient. I would like to raise some questions about infrastructural racism in science education, and our reluctance to confront it.¹ I believe, as researchers, we need to critically read the historical and contemporary cultural codes of science education. By adding this voice, I am not saying that the authors of the original paper were specifically

¹ In exploring infrastructural racism I will not be reviewing social class, or gender. This is not a reflection of a level of importance, but rather, what was present in the original paper, and what can be explored within the frame of this paper.

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stating that Brad was deficient. What I am exploring here is an infrastructural critique of science education in a way that acknowledges the often invisible positioning of the Other in deficit terms. I propose that in order to read cultural codes of contemporary science education it is necessary to interrogate the sites of struggle for those who are valued and devalued in science education. It is necessary, therefore to explore Whiteness, as “whiteness signals the production and reproduction of dominance rather than subordination, normativity rather than marginality, and privilege rather than disadvantage” (Frankenberg 1993, p. 236). In coming to understand why some students take up or have little interest in science, it is important to turn our focus to the ontology and epistemology underpinning Western [science] education.

Whiteness

In Canada, the United States and Australia, the dominant group, or group dominating with power and resources, would be identified as White. Whiteness² is “a set of locations that are historically, socially, politically, and culturally produced and, moreover, are intrinsically linked to unfolding relations of dominance” (p. 6). Whiteness/White privilege is part of the legacy of domination where it is taken for granted that White people do not see themselves as having a *color* but can exist blind to their own historical and social racial identity (Howard 1999). Investigating Whiteness involves identifying how this domination operates in normalized, seemingly non-racial, day-to-day ways.

In coming to understand Whiteness one thing is apparent to me, there is no monolithic notion that is all encompassing with/in the discipline of Whiteness studies or critical race theory. Whiteness is symbolic rather than biological and therefore is best understood as a product rather than as a person; it is a discursive practice that sustains Eurocentric worldviews through policies and laws and is held in place by inherited ideologies and infrastructures. Through social infrastructures and ideologies Whiteness has impact on the distribution of power and resources, and the amount of social control that is afforded to people. Ansley (2003) describes it as being

a political, economic and cultural system in which Whites overwhelmingly control power and material resources, conscious and unconscious ideas of White superiority and entitlement are widespread, and relations of White dominance and non-White [sic] subordination are daily re-enacted across a broad array of institutions and social settings (cited in Mills 2003, p. 179).

To understand Whiteness, it is important to make sense of the social control it possesses and how it constructs an inferior *Other* beyond itself through complex infrastructural and ideological systems of oppression. Embedded within Whiteness is the understanding of the Other in terms of deficit thinking. The Other is constructed as lacking due to internal deficiencies (motivational or cognitive) or socio-cultural deficiencies (family dysfunctions) that over time have come to account for their *failure* (Valencia 1997). This *blame the victim* person-centered approach shifts the emphasis away from the economic, political, socio-cultural infrastructures that created the institutionalized injustices, such as inequitable school financing, segregation, and curriculum differentiation (Valencia 1997). Further, it does not explain the normalization of attitudes and practices of those within

² I capitalize the ‘W’ to represent White, Whiteness and White privilege as theoretical framing or positioning.

education and the community to subscribe to deficiency thinking and racist beliefs associated with Whiteness. An example of this normalized belief is the understanding that assimilation into the ideology and practices of the dominant culture is the solution to the student's deficiency (Gale and Densmore 2000). From this perspective, all students, no matter of their race, class or gender, should have the same basic education. If the *basic* model of education is framed within the dominant White ideology, then the deficient Other will always need extra help to meet these determined needs. The Other will continually be at a disadvantage within this system, and it will be understood by all, including the Other, that the problem is *theirs*. Equity, in this capacity, will only give rise to sameness within the dominant White ideological frame.

Contemporary political, social, and economic infrastructures (Whiteness) function due to the status quo that both the Other and the dominant group adheres to this interpellation. This system is ingrained both culturally and individually (via our subjective positionalities). To be alert to this interpellation Webster Brandon (2003) offers a warning to continually investigate our social construction of Whiteness and deficiency thinking, especially with those who seek to do anti-oppressive work for "deficit thinking ...is the deep structure that shapes classroom life, ...even when we think we are doing equity pedagogy" (p. 35). In this way, Whiteness insidiously seeks to maintain the status quo. Whiteness, as such, is not about varying levels of skin pigmentation that a person possesses, but rather a structural and ideological phenomenon. Whiteness is also context specific because privilege and subjugation based upon race, class and gender intersect to provide unique narrations for each body. People who identify as white and/or are identified as White will experience different levels of social control depending on class, gender, sexual orientation, religion, age, ideology etc. As such, people live and view Whiteness differently.

Science, science education, and Whiteness

A racist society will give you a racist science (Young 1987, p. 30).

Positivistic science has developed into one of the most powerful intellectual traditions in contemporary Western society and although rarely acknowledged, science and Whiteness are historically friends, one might even go as far as saying they are mutually constitutive. With colonialism came the scientific rationalization and justification for such endeavours. Even with revisions to science education, the major premise that scientific facts are based upon scientific theories which are free of personal, social, economic, and political bias, and can be reduced to knowable information, still serves as a major tenet in science pedagogy (Harding 1991). So too is the tenet that science and science education holds a position of authority within society, or that there is an objective distancing between the scientist/science teacher and the science. Far from being neutral, science is a socially constructed discipline that is temporarily situated and funded by those who have the resources; and it is this science that over time developed the *theory of race* (McKinley 2005). Theories such as these evoke Fox Keller's (1985) warning that "it is not taming nature that is sought but the taming of hegemony. To know the history of science is to recognize the mortality of any claim to universal truth" (pp 178–179). Based upon the scientific theory of race, hierarchies ensued and genetic profiling and social estimations continue to emerge. Scientifically, hence, socially constructed, theories of *race* have multiple meanings and relationships to structures of power, but are commonly used to

justify political, economic, and social inequity (Stovall 2006). Science provided the legitimatization for Whiteness to take root.

Through the legacy of Whiteness, racism is deeply woven into the tapestry of the social construction of science education. The threads and knots of historical and infrastructural racial marginalization and exclusions tend to be concealed when observing the *larger picture* of science education that has deceptively become normalized as neutral and natural (Sammel 2006). Dominant science education reflects a particular paradigm founded upon a political, economic, and classist colonial legacy. This legacy of colonialism can be seen through the research questions science education prioritizes, and how the process and outcomes have served certain peoples to the detriment or exclusion of others (Sammel 2009). The economic or political interests of what is investigated in the name of science education, and what is ignored, are seldom discussed in science education. Further, science education has tended to ignore classism, racism, sexism, heterosexism, ageism, and speciesism, and has consciously or unconsciously promoted the agendas of Whiteness.

By not looking at the historical complexities of power, the traditional framing of science education and science education research has protected it from being understood within broader hierarchical social arrangements. This has allowed science educators and researchers to operate from positions of ignorance or denial around their discipline's role in creating and maintaining injustices and oppression. However, there is a growing movement towards an anti-racist and anti-oppressive re-imagining in science education.³ Tuhiwai Smith (2006) reminds us, there is no *post* to colonialism yet, there is just an emergent growing body of knowledge in this late colonial era. I believe that as science teacher educators, we have a responsibility to reflect on this knowledge and develop a form of praxis that includes a recognition and understanding of the racialized world in which we teach and live. It is to this end that I offer another lens to view Brad's story.

Power evasiveness: color-blindness in science education

In colonized Eurocentric countries the colonial powers established systems of rule, ways of knowing, and forms of social relations that governed interactions with the Indigenous people. Located within colonial ontological and epistemological frames, these rules handed down through generations, were gendered and hierarchical and based on the premise that Indigenous peoples were primitive, or not fully human (Tuhiwai Smith 2002). This premise was based on the idea that Indigenous people could not use their minds or intellects because they had not created institutions, histories, invented devices in the ways the colonizers had. Rendered inferior in comparison to European standards, the dominant colonial forces disqualified them as civilized humans. As Tuhiwai Smith (2002) states, "by lacking such virtues we disqualified ourselves, not just from civilization but from humanity itself" (p. 2). These hierarchical forms of social relations and power bases can still be seen in the teaching of 'how the world works' in colonial Eurocentric societies. The legitimatization of Western science as a way of knowing the world has become so normalized in contemporary societies that its location within the complex web of colonial regimes and power bases is not often included in analytic tools. More often the ontology of Western science is assumed as *correct* and *having no color* (i.e., not connected to Whiteness) and what gets to be discussed is the positioning and workings of this ontology: real or artificial,

³ See for example the work of Calabrese Barton; Fausto-Sterling; Gill and Levidow; McKinley, Lim; Harding.

science-as-practice, science from nowhere, science from somewhere. Even though these are all vital discussions in the teaching and learning of science, they do not investigate how dominant Western science education ontology produces, reproduces, inscribes, and reinscribes racism.

Given the pervasiveness of assimilationism in Western science education (assimilation of all students, including the Other, into the dominant ontology, and epistemology), it is not surprising that most science education articles include the mandate of *improving scientific literacy* and then proceed to define it, or refer to it by way of usual contemporary science education definition. The same can also be said for authentic science education. Its aim is to contribute to students' science experiences so they are more likely to enter careers in science. The larger political, economic driver is for the school system to produce more students opting for scientific careers. Again, the system is pushing for assimilation of students into Western science ontology. As a science teacher and researcher, I understand this pressure, but I am now also cognizant of how Whiteness is inscribed in different interpretations of science education. I appreciate now there are multiple ways of working with students to begin a journey of speaking back to Whiteness within science education and ways of unpacking our own racialized subjective positions. But, I wonder if there is a science curricula that does not indoctrinate. I wonder if there is really an authentic "decolonizing science practice." From the evidence present in the original article, I am still not convinced. I did not find any evidence of how Whiteness, the continuing legacy of colonialization, was disrupted, or even addressed in the original article.

What concerns me is that science education may be celebrating a move towards a form of multiculturalism where ethnic differences are maintained, supported, and welcomed within the rhetoric, but in reality the infrastructural and ideological reasons for exclusion remain unchallenged and unchanged. Here the individual aspects of racism are focused on and the infrastructural and ideological aspects remain neglected, hidden, or ignored. The structural inequities are given little attention while the mantra of *we all have a chance to succeed in science* reigns supreme. The focus of this form of multiculturalism then settles on the 'Other,' and their stories, and aspects of Whiteness within science education are not called into question. Brad's story was an example of this framing. There was no deconstructing of infrastructural Whiteness or an acknowledgement of the vastly different power bases that First Nations Ways of Knowing occupy in comparison to Western science within colonial societies. As such, the educational space for exploring such struggles was muted. The research that I advocate for implies thinking risky thoughts by using analytic frames that explore power bases. It seeks to engage in projects of hope, to find horizons of the not yet (Giroux 1992).

Risky thoughts

In Brad's story, even though the power differential between the political, economic and social capitals of Western science and First Nations Ways of Knowing were not discussed or deconstructed, the implications of asymmetrical power relations were inherent throughout the story. Power can be understood as something that exists in relations. In this understanding, power does not belong to an individual, but is present in human relationships. Foucault (1997/1984) explains,

power relations are mobile, they can be modified, they are not fixed once and for all...in order for power relations to come into play, there must be at least a certain degree of freedom on both sides....In a great many cases, power relations are fixed in

such a way that they are perpetually asymmetrical and allow an extremely limited margin of freedom (p. 292).

Within Canadian societies, where we are told Brad's story unfolds, the dominant way of understanding the world is through Western science. Hence, the power relations support the ontology of dominant Western science and the education that maintains it. Unless we unpack Whiteness and the implications of colonization on science education with our students there will be little mobility in the asymmetry of power relations for First Nations peoples.

Reflecting on the asymmetry of power relations in Brad's case, led me to these risky thoughts: why was Brad so surprised/happy when his knowledge was used at Ocean Health? Why were the authors? If we look at it through the lens of unequal power relations, then we might see that the voice of the marginalized, whose knowledge has been de-legitimized within this space for so long, has finally been heard. Then I ask: should we be solely focusing on celebrating this? Could we also be looking to the underlying problem of this marginalization? What knowledge reciprocity between these two cultures has previously been undertaken? Whose knowledge base dominates here and whose knowledge base is marginalized? The fact that Brad's voice was heard, or positioned as hearable, was a good thing, but when he leaves, what then? (Is he a tokenistic voice as compared to a coparticipant in a change process that seeks to address the symbolic violence of the dominant system?) What of real reciprocity? Did they hire someone from the First Nations community to work as a colleague to conduct professional development with them? Was science or science education open to learning? What of science education's own growth, humility, praxis and reflection in relation towards learning within a late colonial era? In the original article, how was infrastructural racism within traditional science education addressed?

My work with Whiteness and science education has shown me that raising risky questions in collaboration with my student takes all of us into uncomfortable places. However, this discomfort is a vital part of the learning journey (Sammel and Pete 2009). As Aveling (2002) says,

defensiveness raises its head at the moment when students (or indeed any of us) were confronted with 'seeing race' and the ways in which some racialised positions are privileged over others; when it was no longer possible for them to pretend that 'race does not matter' (p. 126).

Turning the focus to science

The Master's tools will never dismantle the Master's house. They may allow us temporarily to beat him at his own game, but they will never enable us to bring about genuine change (Lorde 1983, p. 27).

From the snippets of Brad's voice presented in the original paper, we know that Brad has learnt valuable lessons about power, for as he was reported to have said "I feel educated" and "we should learn how to talk science." These are powerful statements for an adult, with 26 years of life experiences, to make. After his 3 days, he appreciates more fully the power of science as a negotiation strategy, win or lose. He may now know more fully how to use the Master's tools to *play the game* as a native activist. It is an unfortunate reality that as long as people subscribe to the dominant interpellation of Western science education, the legacy of Whiteness will continue to exist. Power relations will continue to be asymmetrical

in such a way that the Other will be positioned as inferior. However, if people choose to acknowledge, and find ways to speak back to this dominant ontological and epistemological interpellation of science education, then there is a possibility for change.

When people acknowledge Western interpellations of science education these spaces become sites of change where a different ontology can be created, where another way of teaching science can be re-imagined. In these re-imagined science classes, instead of focusing on the Other, I believe we need to recognize, deconstruct and resist the inherent racism in Western Science, and Western Science education, so we can work individually and collectively with our students, to negotiate the effects of colonization and Whiteness on all facets of the teaching and learning of science. We need to work with our students to interrogate our assumptions and racialised subjective positions in relation to our understandings of doing science. We need to ask ourselves what and who is currently being privileged in science education. Kincheloe et al. (2006) further calls for teachers and students to clarify the purpose of their science educational activities.

For my own pedagogy, there is a dualistic purpose to science education. One aspect is to help my students become learners and teachers of science; and the other is to re-imagine and explore this science with them. We place tradition science content and process within a critical landscape in order to continually seek to identify the multiplicities of oppressions that are inherent in science education. Together, with varying levels of success, we aim to develop practical applications that may only begin the long journey of addressing inequities.

Continuing the dialogue

The aim of this paper was to raise questions about infrastructural racism in contemporary science education and our general reluctance to face it. To explore the racial positioning inherent in Western science education I explored the legacy of Whiteness and then provided an overview of its impacts in contemporary science education. Specifically, I drew attention to the vast power discrepancies that accompany First Nations Ways of Knowing in comparison to the social capital given to Western science education. I suggest the power relationship is asymmetrical within colonial societies. Even though this was not discussed in Brad's story, I suggested the implications were visible. I concluded by advocating for a re-imagining in science education where the traditional ontological and epistemological foundations are jointly deconstructed with our students and spaces are created for engaging in practical ways of resisting oppression.

This discussion about rethinking the epistemology of science education adds to the continuing dialogue that deconstructs and resists oppression within education. It is my continued hope that these discussions may resonate outwards towards helpful conversations with other science educators leading to changes in the ideological foundations, pedagogic implementations, curriculum development and assessment strategies of traditional science pedagogy. As an academic I hold this goal because Whiteness is not a relic of the past but is alive and well within the fabric of science education.

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