

A cultural-historical reading of “Culturally Sensitive Schooling”: thinking beyond a constructivist view of science learning

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Abstract “Culturally-Sensitive Schooling” as proposed by Brayboy and Castagno offers an important way of thinking about the relations between formal and informal science learning and between Western and Indigenous science. The constructivist framework adopted by Brayboy and Castagno in their discussions is consistent with the theoretical approach traditionally used by many researchers and scholars interested in science learning. In this article I explore the basic concepts introduced in their paper, but use a different theoretical lens for explicating concept formation. Through a cultural-historical reading of “Culturally Sensitive Schooling,” different insights can be gained about the relations between everyday informal learning and schooled learning in science. I argue that dialectical logic is more productive for re-theorising science teaching and learning in culturally diverse communities.

Keywords Cultural-historical · Sociocultural · Constructivism · Culturally-Sensitive Schooling · Scientific concepts · Culture

Brayboy and Castagno (2008) in their article on how Native science might inform informal science learning, argue strongly against a binary structure for casting Native science against Western science and informal learning against formal learning. They argue for a relational view of knowledges as steeped in community practices, noting convergences, and foregrounding the equal valuing of knowledge systems. What appears to be missing from this informative and considered article is a more expansive form of the theoretical frameworks that have been used for informing their argued position.

The relativist perspective being put forward by Brayboy and Castagno, rightly claims that Indigenous knowledges cannot be essentialised, as many different forms of knowledge exist both within and across Indigenous communities (see Gutierrez et al. 1997). Similarly, postmodern theorist have critiqued binary structures for framing thinking and shown how one binary is always positioned as superior to its counterpart (Harding 2003). They argue for the equal valuing of knowledges, and for the discrediting of claims for finding “truth”

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and “certainty.” This relativist perspective is used by Brayboy and Castagno for supporting their position for Culturally Sensitive Schooling for Indigenous youth. It also underpins their belief that knowledge construction is diverse and not universal, and that different worldviews rather than simply different ideas in science (Native and Western), should be the focus of attention in school curriculum and pedagogy. Postmodern perspectives would see “the individual as capable of freely negotiating subject positions and theoretical paradigms from among the myriad of narratives made available in a modern society” (Blunden 2007, pp. 253–245). In line with their relativist perspective, Brayboy and Castagno put forward different curricula approaches and examples found across the international Indigenous communities. Their review of the existing literature is purposeful, informative and demonstrates the main research findings and thinking in relation to education and Indigenous science knowledges. There are no surprises in terms of the researchers cited, reflecting the thoroughness and informed base from which the authors are working. The bringing together of this literature in the context of valuing and respecting knowledge systems, supports their position that Indigenous sciences should be foregrounded within curricula design and implementation.

Although the reader is continually reminded to think beyond dualistic structures and essentialist views, the discussion appears to be embedded within constructivist thinking. That is, the definition and value of science learning—both Western and Native/Indigenous—are located within the head of the individual and how the individual is making sense of their world—either Western science or Indigenous science—or border crossing (when citing Aikenhead). As Latour (2003) has argued, constructivism has its roots in Kantian logic. He states that “the mind (still in a vat) extracts *from itself* everything it needs to form shapes and stories. Kant’s a priori started this extravagant form of constructivism which neither Descartes with his detour through God, nor Hume, with his shortcut to associated stimuli, would ever have dreamed of” (p. 128). In this article, Brayboy and Castagno position the individual as the carrier of the dominant cultural values and ideology. A constructivist view of learning culture and science prevail in this article, thus working against the binary logic they are trying to transcend.

Blunden (2007) in referring to Holland et al. (2001) has noted a contradiction between “culturalism” and “constructivism.” He rightly points out that we must think about how society and culture are being conceptualised. Many assume the view of culture as a static entity and have neglected to recognise the dynamic and evolving nature of how people shape and are shaped by their cultural communities, which in turn also changes. Cole and Gajdamaschko (2007) in detailing how culture has been historically conceptualised have noted the many ways in which authors construct ‘culture’ and how ‘culture’ as a construct has been used. Their analysis of contemporary views foreground the dialectical relations between the ‘phylogenetic’ and ‘the creation of language and tools’ in ways which continue to ‘re-mediate their relations to the natural world’ (p. 202). The dynamics of this dialectical perspective on thinking about culture would allow for a stronger theoretical framework for Brayboy and Castagno arguments. By default, Brayboy and Castagno unwittingly put forward an essentialist view of “culture and society.”

The constructivist view predominantly used by the authors sits oddly against the references made to sociocultural theory. Blunden (2007) argues that when considering a Hegelian philosophy (in the context of sociocultural or cultural-historical activity theory), in relation to culture “the mass of objects—artefacts that are inherited from the past and only sprint into life when they are used by individuals—buildings, languages, crops, laws, libraries, technology, and so on” (pp. 256–257) provide for a self-conscious system of activity. He suggests that what is invariably left out is the mediational role of materials and people. As Latour (2003) suggests:

Only a mind put in the strangest position, looking at a world *from the inside out* and linked to the outside by nothing but the tenuous connection of the *gaze*, will throb in the constant fear of losing reality; only such a bodiless observer will desperately look for some absolute life-supporting survival kit (p. 128).

Mediation as discussed by Vygotsky (1987), is framed from a dialectical perspective and offers an important way of transcending the mind-body split that is foregrounded in constructivism. Although Brayboy and Castagno (2008) make reference to sociocultural theory, a more expansive view for informing the discussions within their article would more readily allow for the development of new insights in relation to how Native science might inform “Informal science learning”. For example, some studies of child rearing practices with their focus on how learning is mediated within and across particular communities and over time, provide insights into not just what is valued (content) but the how learning is framed—that is, the mediating role and dynamic interactional patterns that exist within and across communities (see Rogoff 2003).

Sociocultural theory, or cultural-historical activity theory (CHAT) as is more broadly named (see Chaiklin 2001) can be defined as “the study of the development of psychological functions through social participation in societally-organised practices” (p. 21). This theoretical perspective foregrounds the significance of informal contexts for learning but as dialectically related to formal learning. For instance, Minick (1987) in the prologue to Volume 1 of *Vygotsky’s Collected Works*, states that “Vygotsky and his intellectual descendants in the Soviet Union have developed a conceptual framework that overcomes many limitations of other attempts to represent the relationship between the social and the individual in psychological development” (pp. 33–34). In particular, Vygotsky’s (1987) theoretical problem of “instruction” and “development” is most pertinent to Brayboy and Castagno’s discussions and critique of formal and informal science learning. Vygotsky (1987) argues that “a comparative analysis of the development of scientific and everyday concepts provides an empirical foundation for addressing the more general problem of the relationship between instruction and development” (p. 194). Vygotsky suggested that children through their social interactions in everyday situations build everyday concepts. For example, children learn to put a jumper on when they feel cold, and use this knowledge in their everyday practice. Vygotsky suggested that these everyday life events and everyday concepts were important because they laid conceptual pathways for “instruction.” Vygotsky believed that everyday concepts and scientific concepts were dialectically related. For example, a child with the motive to keep warm in the water when surfing (where a jumper would not be helpful), will be socially primed to pay attention when introduced to the concept of insulation (i.e. wet suit). That is, everyday practices and concepts lay foundations for the learning of scientific concepts, and learning in schools also lays important conceptual pathways for raising everyday concepts:

Scientific concepts restructure and raise spontaneous concepts to a higher level, forming their zone of proximal development. What the child is able to do in collaboration today, he (sic) will be able to do independently tomorrow. (p. 220)

Once again, the mediation role of adults is foregrounded when considering the development of mature concept formation, particularly with respect to how pedagogy may be enacted differently across cultural communities. In this regard, we must examine the links between everyday and scientific concepts and pedagogy, and we must consider how concepts are a part of a tradition of practice, and that concepts get their meaning as tools in relation to practice. Brayboy and Castagno’s do specifically explore how concepts within

different cultural practice can be introduced to learners. Their concept of culturally sensitive schooling is closely linked with Vygotsky's proposition for the dialectical relation between everyday concepts and scientific concepts in order to support mature concept formation. This is consistent with Brayboy and Castagno's position, when they state they cannot "separate the informal from the formal, and in the nexus of the two is a productive place from which to explore teach, and pursue science in Indigenous communities." What is significant about Vygotsky's theoretical work for furthering Brayboy and Castagno's discussions of informal science learning, is the conscious realisation of both the "object" and the "concept." Consciousness of both the object and the concept occurs through social mediation—most often through an adult raising a child's awareness:

The birth of the spontaneous concept is usually associated with the child's immediate encounter with things, things that are often explained by adults but are nonetheless real things. Only through a long developmental process does the child attain conscious awareness of the object, of the concept itself, and the capacity to operate abstractly with the concept. (Vygotsky 1987, p. 219).

Consciousness is in relation to both the object and concept of the object, which is itself infused with social meaning. Meaning is given to objects through local cultural communities, and how and in what form, a concept is generated and used abstractly, is also determined by the particular cultural community. It is now possible to see how everyday objects, events and activities are dialectically related to scientific concepts. The scientific concepts here, do not necessarily relate just to Western science, but rather to any "schoolled" or "academic" concept that a community values and makes explicit to members of its community (including Indigenous "sciences"—as argued in the article). There is an epistemological alignment between the enactment of everyday concepts and the generation of scientific concepts within particular communities. We can now better understand the important claim made by Brayboy and Castagno's when they state that "Simply taking the dominant conceptions of Western science out of the 'formal' classroom and into more 'informal' setting will have little impact on Indigenous students if the same assumptions about the nature of science are maintained." Clearly the nature of knowledge being mediated in everyday settings by significant adults in children's lives must connect with the nature of scientific knowledge generated through science schooling. A dialectical relation between everyday concepts and scientific concepts can only occur when the epistemologies are aligned; when the practice traditions use concepts that were generated within that particular practice. As stated earlier, concepts only acquire meaning in relation to practice.

In considering convergences of knowledge systems, Brayboy and Castagno discuss the generation of new practices. The examples of studying Western science within Indigenous knowledge systems, such as "Snowshoes and trapping units," "Plant classification and their uses through medicine, religion and American Indian language," and "Berry picking" seek to make some form of conceptual alignment, but within particular Indigenous knowledge and activity system (everyday and scientific). Vygotsky (1987) suggests that single concepts cannot be studied in isolation. They are but one thread amongst a whole tapestry of interconnected threads or concepts. What Brayboy and Castagno seek to illustrate through these examples is how isolated Western scientific concepts may be embedded within the dialectical relations of everyday concepts and scientific concepts of particular communities. Given that Western science has been critiqued for being isolationist and disembedded from everyday practice, Brayboy and Castagno's arguments suggest that the pedagogy and curriculum can seek to find meaning for some Western science concepts by using them within Indigenous practice traditions. I can't help

wondering if they would also advocate discussing the practice traditions which brought about Western science to children and youth from Western communities—something which is less commonly done in schools.

Vygotsky’s work offers a useful theorisation of the ideas put forward by Brayboy and Castagno and provides a more expansive view than currently offered in the article. This theorisation also points to what contemporary CHAT scholars have called a “double move” in teaching (see Hedegaard and Chaiklin 2005). Here the teachers must have in mind the everyday practice tradition or concept of the learners, and the Western scientific concept which they wish learners to acquire. Having both in mind (double move) allows teachers to be respectful and mindful of the practice traditions, whilst at the same time seeking pedagogical ways of giving more meaning to Western scientific concepts. Although Brayboy and Castagno strongly argue against the binary of a “formal” and “informal” conceptual framework, in using a relativists perspective, they are forced to use the exact constructs that they are actively seeking to discredit. Had they used dialectical logic, they would not have had to continually remind the reader that they were not trying to set up binary structures in relation to knowledges, as is epitomised in Table 1 shown in the article by Brayboy and Castagno (2008).

Overall, the article makes an important contribution to understanding and equally valuing the multiple potential relations between Western schooling and Indigenous knowledges in science. My commentary only seeks to re-theorise their conceptualisations through dialectical logic rather than through a postmodern lens, and as a result give support to and affirm the pedagogical and curriculum directions put forward in the article.

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