Why Do We Need Social Theories: The case for science education research, feminist theories, and social justice

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Just like individuals who are assigned certain identities within society, culture, and institutions (e.g., men, women, teacher, student, English language learner), one can claim that disciplines such as science education have also their own identity (Weedon, 1996). And within those identities and assignments are inscribed practices and regimes of meaning that constitute, “establish, [and extend] the parameters for how people are to inquire, organize, and understand [the] world” (Popkewitz, 2001). Science education as a discipline resides geographically in a peculiar space that constitutes the “domain” of science fields and education field. However when the word theory is mentioned the dominant meaning usually invokes the understanding simply related to educational processes of access, such as teaching and learning. At least in the United States, often in science (and even math) education, the notion of theory is mainstreamed under the umbrella of what is known as theories of teaching and learning (Wilson & Peterson, 2006). The call for the special issue of JASTE on the importance of critical theories, once again invites us to re-think about the critical role of theory in science education. The current editors of JASTE state, “the culture of science education often treats theory like an unwanted guest, resulting in little vision for collective engagement with sociopolitical issues that involve science.” I would argue even further that the science education research often tends to avoid social, critical, and philosophical theories. As Lester (2005) puts, “largely ignored in the discussions of the nature of educational research [is] consideration of the conceptual, structural foundations of our work. To be more specific, the role of theory and the nature of the philosophical underpinnings of our research have been absent” (p. 457). According to Lester the reason for the absence of strong theoretical and philosophical foundations in education studies is “an assumption that the purpose of research is to determine ‘what works’ (p. 457). My own background as a teacher attests to this widespread assumption. For instance, a number of years ago, while still in a graduate school, I read Lyn Carter’s (2010) paper titled The Armchair At the Boarders: The
“Messy” Ideas of Boarders and Boarder Epistemologies within Multicultural Education Scholarship.

Carter started her paper by naming some “intellectually edgy” and somewhat “messy” texts from Noel Gough, Van Eijck & Roth, and William Kyle in science education (p. 429). At the time, the language of the paper appeared very elaborate and yet theoretical frames were seemingly far removed from everyday “realities” of classrooms, and seemed not relevant to the mainstream discourses of science education research and practice. The paper sounded more philosophical than anything “theoretical.” After all, I thought, Carter’s ideas belonged to sociology, philosophy, and/or anthropology, but not necessarily to day-to-day dilemmas of science teaching and learning in formal education. Although Carter’s paper was very seductive in terms of its fresh perspectives about the importance of theory and language in science education, as a former teacher, I was not sure how Carter’s vision could be directly implemented into practices of teaching and/or learning of science. To me the research meant to identify gaps and problems…to find recipes, solutions, and even spells for a perfect classroom, ideal teaching, and successful learning. To put it otherwise and to use the words of former editor of the Journal of Research in Science Teaching, William Kyle Jr. (1994), it never occurred to me how “theoretical frames of reference for doing research in science education…[and] what constitutes knowledge and being within a particular frame” had material bearings on the everyday realities of teaching and learning science (p. 321). Similar to a content and language of science education, processes of teaching and learning, I viewed the knowledge production as an objective and neutral enterprise. I too performed instrumentalist learner discourse, as Deborah Britzman (2009) describes:

> With this new instrumentalism [came] a new definition of the high-speed student, worried about falling behind. Learners must rush, become adept, flexible, and able to judge instant knowledge in terms of its use value, its applicability to real life concerns, and its prestige… But this means that skills supplant ideas, technique is confused with authority and responsibility, and know-how short-circuits the existential question of indeterminacy and incompleteness. (p. 42)

Today, after almost four years, reading the call for the special issue of JASTE dedicated to the Militancy of Theory, I (re)membered the moments when I stumbled upon a “challenge” during my research with science teachers who had enough pedagogical and content
knowledge to teach science, and with Latina women and students who were motivated, smart, and capable. Yet, there was this continuous discourse of what Hughes-Decatur (2011) names as not-enoughness, or what Britzman calls as an indeterminacy and incompleteness brought by instrumentalist approaches to education. And there was a point, when my research informants did not want to talk to me about science, anymore; and my own observations were not enough to account for the intricate ways of power relations and their effect on bodies, languages, and subjectivities (for the details of the study see Kayumova et al, 2014). Back then, I was taking a course on Feminism and Education and reading through a wide range of feminist social theories, and that’s when I realized that I needed what Carter (2010) called “messy texts” to move forward “ethically” by first stopping and thinking “[w]hat are the epistemological and ontological underpinnings associated with science education?” (Kyle, 1994, p. 321). Feminist theories, particularly Donna Haraway’s (1988) conceptions on situated knowledge and her calls for “responsibility and answerability,” allowed me to consider how epistemological and ontological commitments weigh on research, knowledge, and issues of social justice in science education. Moreover, feminist calls for a more “radical intellectual, moral, social, and political” work afforded me the understanding that the social development is not necessarily progressive in its nature, but also radical in terms of thinking (Harding, 1996, p.10). The next section attempts to answer the question how these theories played a central role in my understanding and envisioning of critical, activist, social justice oriented science education.

**Feminist Theory as a Critical Lens**

Feminist theories have played an important role in the history and philosophy of science (Haraway; 1988; Harding, 1988; Knorr-Cetina & Mulkay, 1983). However, many to date have limited feminist theories and their implications to the issues of gender –that it is gender, and particularly women’s issues, that feminists care about (Bordo, 1998). Donna Haraway (1988) argues that feminist epistemology “is not about fixed location in a reified body, female or otherwise, but about nodes in fields, inflections in orientations…[it is] the condition of being heard to make rational knowledge claims” (pp. 587-589). “Conditions of being heard” in education, according to feminist scholars, have always been inextricably imbued with power, which often frames the social and cultural realities (Bell, 1999, p.35). Consequently,
any attempt aimed at examining social, cultural, and institutional structures, unpacking power relations, and challenging oppressive material “realities” is considered to be political in its nature. Since doing research is in a way about reading and telling about “the world [engaging with knowledge in terms of theory and research] also helps to perform that world. This means that in (writing)…reality is being staged. And such a staging ensures that, everything else being equal, what is being performed is thereby rendered more obdurate, more solid, more real than it might otherwise have been” (Law, 2002, p. 6). Joann Scott (1996) describes realities –experiences, and subjectivities – by no means as “neutral,” but as embedded in knowledge systems/claims and enacted in institutional practices. Hence, knowledge claims about social worlds are one of the ways in which power is disseminated and deployed, therefore, feminist intellectuals challenge how so called “rational knowledge claims” are enacted (Haraway, 1988).

Theorizing and working with a range of social, philosophical, and scientific theories has created a productive space for me to think, reflect, and enact diverse views and practice different ways of seeing, knowing, and conceptualizing. To me, in this sense, feminist theory became a practice--what Foucault (1977) calls “the regional system of [the] struggle” with knowledge claims: where does knowledge come from, how do we know, whose purposes does knowledge serve (p. 208)? For instance, Sandra Harding (1986) discusses in her book, titled *The Science Question in Feminism*, that acquiring and disseminating knowledge claims about social aspects of humanity as a science have had repressive outcomes in terms of race, class, sex, and cultural relations. Harding argues that the way research claims to objectively view, portray, and envision teachers and students, teaching and learning, simultaneously ascribes identities to teachers and students, which are materialized in everyday practices of teaching and learning. To take an example of the knowledge claim about the “achievement gap” in education among different groups in the United States, according to Gloria-Ladson Billing (2009), what an abundant literature frames as a “gap” is actually an “educational debt” that is being reproduced by the very standards and measures of current teaching and learning. As Gutiérrez (2013) says,

It used to be common practice that researchers concerned with gender inequities in mathematics education would focus their efforts
on such things as documenting the differences in achievement and learning strategies between boys and girls, exploring the cognitive strategies that helped boys successfully negotiate the math classroom and the mathematical tasks they were presented, and describing the different levels and nature of “confidence” between the genders. Such framings of the “problem” and associated research methodologies produced findings and policies that basically amounted to trying to get girls to become more like boys—something most people could now recognize as far from equity. (p.3)

Feminist philosophers of science have long challenged objective knowledge claims and argued that all knowledge is partial and situated in our experiences, background, and educational training. According to Haraway, acknowledging partiality in knowledge claims allows science to become

not of closure, but of that which is contestable and contested…not of what escapes human agency and responsibility… but, rather, of accountability and responsibility for translations and solidarities linking the cacophonous visions and visionary voices that characterize the knowledges of the subjugated (p. 590).

Haraway argues that all standpoints, epistemological and ontological, are partial and situated somewhere. Thus, rational knowledge claims, as Haraway explains,

…do not pretend to disengagement: to be from everywhere and so nowhere, to be free from interpretation, from being represented, to be fully self-contained or fully formalizable… [It] is a process of ongoing critical interpretation among “fields” of interpreters and decoders…[It] is power-sensitive conversation. (p. 590)

The responsibility of the researcher then is to ask power-sensitive questions, such as whose knowledge? Whose claim? And what purposes does the knowledge serve? How do we get to the knowledge? What modes and modalities do we use? Who/what are included and excluded in the knowledge claims? What is enabled and obstructed as a result?

**Responsibility vs. the View From a Distance**

Haraway (1998) argues that most of the unjust and racialized constitutions of modernity are associated with dominant forms of knowledge production situated in
Eurocentric dualisms that reduce “the bodies” and experiences of people to passive rationalities. Social theorist Pierre Bourdieu (2000) further explicates that modern educational paradigm is heavily based on universalist epistemologies, in which bodies, human and non-human, can be “reduced to a pure gaze” of an observer (p. 22). Based on his readings of Durkheim’s *The Evolution of Educational Thought*, Bourdieu argues that the perspective of seeing the world and reading the world from a distance emerged at the canon of the scholastic vision of the 16th century, when only “sons of aristocrats” were privileged to engage in science, arts, philosophy and overall knowledge production and “for whom the difficulties of serious living did not exist” (Durkheim, 1977, pp. 218-19 as cited in Bourdieu, 2000, p. 20). According to Bourdieu, the universalistic and objectivistic epistemologies position academic scholars as “a motionless spectator installed at the point (of view) – and also [legitimizes] the use of a frame that cuts out, encloses and abstracts…” the events, processes, practices, and complexities of life into distinct scripted performances (p. 22). In his book, titled *Pascalian Meditation*, Bourdieu posits:

> It is significant that, to construct a model of vision, Descartes – who, as is well known, gave a privileged place to intuition understood as *vision* – uses, in his *Dioptrics*, the image of an eye placed ‘in the expressly made aperture of a window’, on the back of which the observer, situated within the *camera obscura*, will see ‘perhaps not without admiration and pleasure, a painting that represent most natural in perspective all the objects that are outside.’ (p. 22)

In this traditional epistemology, researchers and intellectuals are positioned as “the Kantian subject, assured of having the same objective view,” which Bourdieu calls “a single, fixed point of view” (p. 22). Limiting education research to only teaching and learning theories is like reducing educational studies to a single fixed point of view. In this reduction, the larger social issues (such as sexisms, classism, racisms and etc) and institutional practices become locked into established modes and modalities, parameters of vision, through which only certain things can be seen. It does not allow space for thinking and/or re-thinking, and re-produces the same dilemmas. As Simon (2004) says brutally applied views and methods to education research even when done “rigorously and exhaustively [they] unlikely to generate significant contribution to existing knowledge” (p. 161). According to the feminist epistemology of situated knowledge, in the combat of working with theories while engaging
with the “struggle over how to see” the world, the feminist responsibility calls for researchers to attend to “the view from a body…versus the view from above [and] nowhere” (Haraway, 1988, p. 590). It reminds that “[w]hat we do as researchers *intervenes* with the world and creates new possibilities, but also evokes responsibilities” (Hultman & Lenz-Taguchi, 2010, p. 526). The epistemologies of a single view are also linked to ontologies that view and re-produce human bodies, such as teachers, and students, as inert objects. According to feminist theories, “‘being’ is much more problematic and contingent…[while] vision is always a question of the power to see –and perhaps of the violence implicit in our visualizing practices” (Haraway, 1988, p. 585). The question remains, as Spivak (1993) says, how do we “question the authority of the investigating subject without paralyzing him, persistently transforming conditions of impossibility into possibility” (p. 201). This is not to suggest that subjectivities and partialities are limitations that cannot/should not be overcome, rather to acknowledge that science and research is about “find[ing] a larger vision…somewhere in a particular” (p. 590). Thus, according to feminist epistemology, being aware of the limited nature of observations and knowledge allows intellectuals and researchers to be open and answerable to diverse views and ways of knowing, to turn impossibilities into hopes and possibilities.

**Answerability vs. Subjugated Knowledge**

While the issues of gender and women’s marginalization are the central concerns of feminist theory, many contemporary social issues are inextricably entangled along the axes of race, language, culture, and class oppressions, compounded by gender. Feminist philosophers and scientists recognize this entanglement and emphasize the ethical responsibility for attending to “situated and embodied knowledge” within academic and everyday knowledge production (Haraway, 1988). In the first section, I argued that one of the requirements of “science and theory question in feminism” is to recognize that the claims of an objective knowledge are all situated in social, historical, political power relations (Haraway, 1988, p. 554). Another requirement of engaging with feminist theory is to be answerable for the produced knowledge. Because the engagement with theory is “to struggle against the forms of power that transform [us] into its object and instrument in the sphere of "knowledge," "truth," "consciousness," and "discourse"” (Foucault, 1977, p.208). In this regard, feminist
epistemologies call the researchers’ attention to the correlative effects of power on teachers’ subjectivities, the student identities – how different practices position some at an advantage and many at a disadvantage on their educational trajectories (Davies, 1998; Jones, 2013). For instance, when I started my graduate studies, I realized that elementary teachers were not considered math and science teachers. The research I encountered constantly talked about the lack of adequate math and science knowledge in elementary teachers. Although, there is strong research evidence that children’s identities and interests in STEM fields are formed early in their educational experiences, elementary grade level teachers are always positioned inadequate. Since elementary grades are replete with women teachers, these women, often and probably inadvertently, are framed as “a problem.” Many of my own colleagues with PhDs in science and math education often cast deficit views on elementary teachers as math and science teachers, saying that science (or math) at the elementary or middle grades level is not math and science, it is a generalism.

The research and theories that allow us to position elementary science teachers as less than others undermines their intellectual authority. Feminist epistemologies can help researchers to make visible the embodied math and science learning young children bring into formal educational spaces (Davies & Gannon, 2009). Therefore for me, feminist theories have provided a critical lens and a language to speak back to the deficit discourses about teachers and students, and overall subjugated people; it further helped me to dismantle many exclusionary, hierarchical, privileged and power imbued constructions of gendered, raced, and classed bodies of children and teachers. In science education, a small number of scholars have critically engaged with feminist epistemologies and ontologies to analyze how power relations are inscribed in the constitution of race, sexuality, class, language, and gender. Particularly, science education is still one of the prominent fields that heavily relies on empiricism, cognitive sciences, and largely avoids social and philosophical theories. Consistent with feminist theories, knowledge production in science education becomes not only an epistemological endeavor, but also an ethical and deliberate choice that takes into consideration responsibility and accountability towards subjugated groups of people (Grasswick, 2011). Grasswick argues that “our choices of knowledge production [are linked with] who we take ourselves to be accountable to through those choices” (pp. xvii-xix). This notion of ethics, responsibility and accountability in knowledge production is also in line
with what Dewey describes as the purpose of knowledge production in sciences and arts (1998),

> Why employ language, cultivate literature, acquire and develop science sustain industry and submit to the refinement of art? To ask these questions is equivalent to asking: ‘Why live?’ The only questions having sense which can be asked is how we are going to use and be used by these things, not whether we are going to use them. (p. 46)

According to feminist epistemology, subjugated positions and marginalized lives bring along the terrain of views on the issues, the privilege of seeing, reading, and knowing the world from below (Haraway, 1988). Harding (1993) posits:

> Marginalized lives provide the scientific problems and the research agendas—not the solutions…starting off thought from these lives provides fresh and more critical questions about how the social order works than does starting off thought from the unexamined lives of members of dominant groups. (p. 63)

Harding’s remark reminds us of what Foucault (1977), in his interview with Deleuze, describes working with theory as: “an activity conducted alongside those who struggle for power, and not their illumination from a safe distance (p. 208).” Engaging with feminist theories allows researchers to view that the space of the margin could become a space of power -- power that comes from “critical theories of how meanings and bodies get made, not in order to deny meanings and bodies, but in order to build meanings and bodies that have a chance for an [equitable and equal] life” (Haraway, 1988, p. 580).

Recently, feminist scientists have been re-thinking theoretical dimensions of social ontologies, particularly known as new materialisms, to suggest that “the body’s materiality – for example, its anatomy and physiology – and other material forces actively matter to the processes of materialization” (Barad 2003, p. 809). This radical thought heavily challenges the anthropocentric tendencies of social and scientific research, and provides affordances for viewing and/or interpreting the world beyond human vision, values, and experiences (Hultman & Lenz-Taguchi, 2010). The knowledge is not only what we can see, and make interpretations of, but also constituted by the material “reality,” what quantum physicist Karen Barad (2003) calls the “agential realism” that matter, both human and non-human also matters in the practice. Feminist scholars argue to take into consideration objects of

Knowledge not as a static matter, but *matter that matters in mattering* (Barad, 2003). This perspective allows us to recognize that learning is organized not only around teacher and students, but also implicated in the material relations. It is a similar concept to Bruno Latour’s notion of *actant* that all bodies simultaneously are sources of actions for other bodies they encounter. As Haraway (1988) puts it,

> the object of knowledge be pictured as an actor and agent, not as a screen or a ground or a resource, never finally a slave to the master that closes of the dialectic in his unique agency and his authorship of ‘objective’ knowledge. (p. 592)

Employing feminist epistemologies and ontologies allows scholars to “explore how the forces of matter and the processes of organic life contribute to the play of power or provide elements or modes of resistance to it” (Frost, 2011, p. 70). Attending to the body, both human and non-human, allows science education researchers to analyze the conditions of learning made possible when children engage with different material objects, such as hands-on materials, visuals, and technologies. Moreover, the epistemological perspectives in feminist theory will allow researchers to locate the agency not only within human agency, but also in the agency of seemingly inert objects (Hultman & Lenz-Taguchi, 2010). It allows us to be aware how we “produce and [are] produced by texts in the form of data, theory, and analysis that act with a material force” and that we are not the sole agency in the production of knowledge, “nor are they the sole authors of [us]” (Mazzei, 2013, p. 784). Furthermore, in today’s age, when science education is particularly challenged by ever growing diversity and issues related to social justice, to some degree, it becomes the responsibility of a researcher to make sense and make deliberate choices about how, when, and for what reasons knowledge is produced –maybe, as Barad (2007) says, social justice becomes:

> not a state that can be achieved once and for all. There are no solutions: There is only the ongoing practice of being open and alive, each intra-action, so that we might use our ability to respond, our responsibility, to help awaken, to breathe life into ever new possibilities for living justly. (p. x).

Attending these “new” theoretical perspectives is “not in order to discredit scientific knowledge, but rather to check and strengthen it” (Bourdieu, 2002, p. 4). In Haraway’s
terms, it is a “responsibility for difference in materials-semiotic fields of meaning… [in which there is always] room for surprises and ironies at the heart of all knowledge production; we are not in charge of the world” (pp. 587-593). Therefore, social justice in science education requires a struggle with theories, methods, and frames of analysis. As Deleuze (1977) says, in this endeavor, theory becomes “exactly like a box of tools…we do not revise theory but construct new ones…[it] does not totalize; it is an instrument for multiplication and it also multiplies itself.” Now, as I go back to Carter’s (2010) suggestion, particularly in science education, “the best we can do is to be clear sighted about what it is we are trying to achieve and carefully select the language [theories and methods] with which to achieve it” (p. 443). At the same time, it is important to acknowledge that we cannot always have all the answers nor all the instruments; in Foucault’s (1977) words, theory works like “a pair of glasses directed to the outside; if they don't suit you, find another pair; I leave it to you to find your own instrument, which is necessarily an investment for combat” (p. 208).

References


