

Disrupting Pipeline Ideology by Embracing Hybridity: A Plan for an Out-Of-School Science Program

Heidi Carlone

The University of North Carolina at Greensboro

VEXATION

I adopt multiple narratives to define what has been a fairly consistent program of research. My scholarly narrative reads something like this:

My area of research interest is anthropology of science education, which means, in part, that I study the culturally produced meanings of science and science person in science learning settings and the implications of those meanings for those who have historically been marginalized in/by science.

My personal narrative, especially lately, reads like this:

My research career has consisted of trying to find the most ideal sites of in-school science learning settings—settings that I hope really contest sociohistorical (narrow, elitist, alienating) meanings of science and broaden the celebrated meanings of “science person” (nerdy, white, male, super-intelligent, socially awkward). After extensive searches, I find great science classrooms and (after spending lots of time in the settings) realize that, despite really wonderful teachers who care deeply for children and science, most do not go nearly far enough in contesting deeply entrenched sociohistorical legacies of “school science” and “science person” to be labeled truly “equitable.” So, my research becomes about theorizing why these settings are not as accessible and transformative as educational theory implies they should be.

Do I really expect an institutionalized setting like school to really contest these sociohistorical legacies? Um, yes, I did, but now, I begin to doubt. This cycle—hoping for “the best”, realizing though it may be the “best out there”, it’s not nearly close to the “the best possible” situation I have in my head and having to explain why and how—makes one a bit weary. In my twelve years of research in schools, I am beginning to think school science can only go so far in facilitating identity development for a broad range of students, in creating truly transformative (equitable, socially just) meanings of science and science person. Institutional, political, and historical meanings of science, schooling, and “good student” loom large, pressing down on innovative classrooms and teachers with seemingly increasing strength, leaving little room for true originality and transformation.

I remain optimistic about possibilities for transformation, and hope to do so for my career, since those ideals sustain me. Further, because of my extensive time in great classrooms with energetic, committed, insightful teachers and students, I am smarter about design principles for settings that may truly have transformative potential. It is time that I begin creating spaces that might have the transformative potential I seek.

VENTURE

As I think about the kind of science education I seek (more accessible, socially just, and meaningful for a broad range of students) and the kind of science educator I want to be (a scholar and an activist), my next project will involve designing and studying a science-related program for girls. While I am getting clearer about the design principles of the program on a theoretical level, I am very fuzzy about the actual structures and activities that will comprise the program; hence, I need feedback, advice, suggestions, and prodding from Crossroads participants to help with the next part of the planning. I discuss here some of my theoretical commitments and motivation for developing this program.

Multi-faceted girls; multi-faceted science. My research has enabled me to meet unbelievably talented girls who are fighting to sustain their science identities in school sciences that do not foster such identities, who do not recognize their talents and dispositions as scientific and/or for whom school science is simply squashing a robust love of science and/or scientific thinking right out of them. These are girly-girls, nature girls, sporty girls, ballet girls, bossy girls, quiet girls, music girls, cell-phone-chatting girls, family-oriented girls, adult-pleasing girls, rebellious girls, and boy-crazy girls. They do not fit one mold, nor do they enact one consistent identity in school or in school science. And, they generally do not affiliate with the stereotyped, narrow “science kid” identity (i.e., nerdy, white, super-intelligent, socially awkward kid). Their science identities in practice are also not essentialized or “purely scientific” (i.e., engaging in science for science’s sake). Their most engaged moments in school science are those that allow them to engage in acts of “cultural bricolage” (Roth, 2006), spaces where they can merge or at least successfully manage the boundaries of school, home, and social worlds (Calabrese Barton, Tan, & Rivet, 2008). Their successful and affiliated participation in these science spaces mean that we have not yet lost them from science. They show a lot of interest, talent, and motivation related to (some) in-school and/or out-of-school science, but those science identities fostered in school are ever so fragile. What would an out-of-school program designed to strengthen these girls’ science identities look like?

Disrupting Pipeline Ideology by Embracing Hybridity: A Plan for an Out-Of-School Science Program

Heidi Carlone

The University of North Carolina at Greensboro

Hybridity. Any program I develop will recognize and draw on girls' multiple identities as a resource. This program will not be about "offering girls science power" (as my smart, but misguided, colleague we'll call "John" suggested) because that implies that girls do not currently have science power. It will be about getting them to recognize, seize, and own the science power *they already possess* in contexts and with problems that are meaningful to who they are—their past, present, and imagined futures (Gutierrez, 2008). *The objective of the program* will be to create a set of meaningful out-of-school science experiences for girls (ages 9-12) with budding, but more-or-less fragile, science identities so that girls come to see a place for science in their multi-faceted lives and identities. The experiences will be designed to broaden the definition of "science person," highlighting the ways science can be used as an instrument of social justice and altruism, science can be adventurous, the ways scientific thinking connects to and complements other interests (food, music, sports, imagination, and art), the wide range of science-related career opportunities available and the social and cultural capital available to those with scientific expertise (underlined text represent hyperlinks).

Those who want to maintain science's boundaries may have problems with this intertwining of disciplinary practices, seeing it as a "softened science for girls." However, the fact of the matter is that science is already a hybrid practice (Haraway, 1991), becoming more so every day, with federal funding opportunities abounding for integrative endeavors. The fact that we do not recognize science as a hybridized discipline diminishes its potential for inclusion. Roth (2006) argues that everyone enacts hybrid practices all the time; culture and identity are always hybridized. Indeed, Calabrese Barton and colleagues (2008) point to the potential of engaging urban girls in "practices that may not always be explicitly scientific" but that

carry scientific significance... [because] girls used them in ways that advanced their scientific trajectories. In other words, merging science practices [with social, artistic, and/or home practices] served as gate openers in the sense that they fostered increased participation in the science learning community, making access to traditional practices possible (p. 97).

A major inspiration for my program comes from Adam Johnston's professional development program (e.g., Drits, Johnston, & Palen, 2009). This summer (2009), the program provided K-12 science teachers opportunities to explore "the Utah desert and its many scientific stories, including geology, astronomy, microbiology, meteorology, and even physics" and allowed teachers to learn about and practice various forms of writing. The teachers hiked, camped, star-gazed, read and wrote poetry, and studied the Utah desert. I am intrigued especially by the deliberate hybridity of the program, which opens up spaces for participants to enact multiple, relevant identities and to take risks to "play" more unfamiliar identities. In this program, an elementary teacher can learn how to cook around a campfire with a secondary science teacher—and one's science knowledge does not necessarily take precedence over another's knowledge. Historical hierarchies between knowledge forms and institutional roles are diminished. A college English professor (Adam's co-leader) can learn about the physics of the desert, while Adam (a physics professor) can study Edward Abbey and try his hand at writing poetry. I think this same kind of hybridity could be used as a resource for an effective out-of-school science program.

Connecting girls to networks of power vs. funneling them into a pipeline. This program will disrupt traditional recruitment programs for girls that attempt to funnel girls into the science pipeline via very traditional science experiences (i.e., "Mad Scientist" programs; summer laboratory experiences) that reproduce narrow and/or alienating definitions of science. This will be the anti-lab science program. Instead, I conceptualize this program as an opportunity to engage girls in science experiences that highlight science's connections to their multi-faceted passions, identities, and lifeworlds.

Fostering collective and individual agency. The program will build opportunities for collective action, but will also have components that are tailored to individuals' interests, talents, and pursued identities. For example, I picture a whole-group project threaded throughout the year, with opportunities for girls to participate in science-related activities (camps, internships, mentor/mentee relationships?) that are more individualized to their interests.

Embodied experiences. Girls will participate in meaningful experiences where they use science as a useful tool connected to their interests and passions. Specifically, I picture a whole-group bonding experience (likely in the summer) that pushes girls out of their comfort zones, disrupts power hierarchies between girls, and enables them to view the world differently through science. This could be some kind of retreat or adventure that that centers experiences with science and nature.

I would like feedback from Crossroads participants about:

- *Program focus*. What are possibilities for the unifying focus?
- *Program structures*. How much of the above can be realistically achieved? What are your ideas for actual activities and program structures?
- *Resources*. What programs do you know of that might be a resource for me? What resources do you think I will need to run this program?