

## **“It Changed Our Lives”: Activism, Science, and Greening the Community**

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### **Abstract:**

Drawing upon critically oriented studies of science literacy and environmental justice, we posit a framework for activism in science education. To make our case, we share a set of narratives on how the River City Youth Club acquired a new green roof. Using these narratives we argue that the ways in which youth describe their accomplishments with respect to the roof reflects a range of subject positions that they carve out and take up over time. These subject positions reveal how activism is a generative process linked to “knowing” and “being” in ways that juxtapose everyday practices with those of science.

### Résumé

Fondant notre approche sur des études critiques dans le domaine de l'alphabétisation scientifique et de l'équité environnementale, nous postulons un cadre visant à promouvoir l'activisme en enseignement des sciences. Comme arguments, nous présentons une série de récits qui racontent comment la Maison de jeunes de River City a pu se doter d'un nouveau toit écologique. Ces récits nous permettent de montrer que les façons dont les jeunes décrivent leur rôle dans la réalisation de ce projet reflètent une gamme de positions que les sujets adoptent et modifient au fur et à mesure que progresse la réalisation du toit. Ces différentes positions indiquent que l'activisme est un processus génératif lié à la ‘connaissance’ et au ‘savoir’, processus qui juxtapose les pratiques quotidiennes et celles des sciences.

**Keywords:** education | science literacy | science education | activism | environmental justice | youth activism

## Article:

In the summer of 2009, the River City Youth Club, a neighborhood youth organization, which serves a predominantly lower-income and African American population, had a new green roof installed on its facility. Though the club's facility needed a new roof because the “old one leaked,” club leaders sought out a green roof because it would be energy efficient, reduce their energy bills, and offset their carbon footprint. As Sarah, 1 one of the club leaders, explained:

I had never heard of urban heat islands before. I did not realize that a building's roof could contribute to our own carbon footprint. Actually, I had never really thought about how the club could have its own carbon footprint. When the GET City youth started to raise these ideas, I began to question what approach we were taking to getting a new roof. We had to be more responsible.

When Sarah spoke these words, we were surprised. GET City (Green Energy Technologies in the City) is a year-round program intended to engage youth in authentic investigations into green energy and the environment. As teachers, however, we had not anticipated that the program would have such a substantive impact on local practices—especially those that required substantial financial costs. Though the youth had previously studied the impact that urban design has on climate change, we never took green roofs up specifically as a target of investigation until the club leaders had gone public with a plan to replace their leaky roof with a green roof. We take up two questions in this manuscript:

What are the narratives that youth tell about how the club got its new green roof and their role in the process?

How do the youths' narratives inform activism in science?

## **A CONCEPTUAL FRAMEWORK FOR ACTIVISM IN SCIENCE EDUCATION**

Activism generally implies taking action to bring about change—socially, economically, politically, or environmentally. Often framed by ritualized activity (Robins, 2006), activism is often re-presented as “spectacle” replete with police and protesters clashing in public spaces (Urrieta, 2004). Such re-presentations remove activism from normal daily activity; they situate activism within ideological convictions rather than in the lived experiences of everyday people (Brodkin, 2009). Further, activism has been framed narrowly as action taking, sidestepping the deeper significance of the ways in which such actions are deeply embedded in cultural knowledge and experience. Why and how one critically engages the subject in an effort to transform routine practices is both a reflection of one's subjective locations and one's daily effort to transform those locations. Below, we build a case for activism in science as both an identity and knowledge building project deeply rooted in everyday practice. To do so, we turn to critically oriented studies on science literacy and environmental justice.

## **Environmental Justice**

The dominant discourse of environmental justice of the past three decades has been to highlight who has the power to create and enact environmental policies and practices and their effects on oppressed communities (Hobson, 2006). As the “anti-toxics” movement (Taylor, 2000, p. 504) shows, environmental justice efforts have largely focused on challenging the polity (Teelusksingh, 2002). This focus has been important because it has brought into the public discourse dialogs on injustices—in terms of the right to information, to healthy environs, and to a voice in broader policy and practice. However, such a discourse has left little room for incorporating how youth enact environmental justice (Stephens, 1996). The marginalization of youth in environmental justice discourses is acute because youth do not, generally, possess the rights of “full members” of societies (e.g., neither allowed to vote nor considered experts who can make a change).

However, recent work on environmental justice fronts has paid more attention to the everyday enactment of environmental concerns—or the lived experiences of environmental injustice—among low-income communities and communities of color (Brodkin, 2009). In recent work, environmental justice is located not only in anti-toxic movements but also in how the boundaries of environmental issues are framed across race and class. Studies on access to quality housing (Molina, 2000), venues for participation in urban planning (Teelusksingh, 2002), and the design and dissemination of stoves for heating and cooking (Subramaniam, 2000), for example, all challenge the form and function of environmental justice discourse and activity globally. This reframing expands the discourse from rights-based to the performative, with its attention on the “everyday actions and representations” individuals take up, which often fall “under the radar” of rights-based environmental justice (Hobson, 2006, p. 673).

The move toward the performative is crucial to understanding youth practices with respect to environmental justice, specifically, and activism in science more generally. Performative lenses highlight the agency of individuals and collectives when they take actions to reinscribe everyday spaces and activities with meaning: a process that reformulates environmental justice discourse in terms that acknowledge and value youth participation in local, situated environmental concerns. Such a reformulation may help to advance critically oriented, place-based efforts in environmental education intended to make matter how and why youth are positioned within the environment in the learning of science (Bowers, 2002). This reframing is important because it positions African American and low-income youth as activists even when their actions fall outside what is normally constitutive as activist (Cohen, 2006).

## **Critical Science Literacy**

Activism involves a critical engagement with the subject. Individuals or collectives take action because they believe in something as the good or moral thing to do. Yet, values are not always a recognized part of the discourse or practices of science, at least in schools and other formal

learning environs. 2 The inherent challenge here is that activism in science has been accepted in the discourses of teaching/learning science only insofar as individuals can take action on science-related topics, rather than through their actions transform the daily practice of doing science. 3

The reforms of the past two decades have been premised on functional science literacy. The term functional is meant to imply that individuals gain the knowledge, skills, and habits of mind of science necessary for “personal decision making, participation in civic and cultural affairs, and economic productivity” (National Research Council [NRC], 1996, p. 22; see also Ryder, 2001). However, functional science literacy attends to participation in the world as it is now, without explicit critical attention to how or why scientific ways of knowing or being might bring about a more just world for individuals or communities while being transformed by broader and more diverse participation.

Though such a stance has advanced the debate around why learn science, it also leaves uncontested what it means to function in society. Critical science literacy, though embracing the broader notion that individuals ought to have facility with the big ideas and practices of science, also privileges critical engagement with text, ideas, and ways of knowing and being that frame the discourse and practice of science. Teaching and learning practices often represent science in its final form, yielding descriptions of content that appear complete and stable rather than as knowledge-in-the-making. Critical engagement with the text of science deprivileges the authority of text and teacher, thereby expanding opportunities to more fully define and situate scientific problems, describe methods, and pose limitations to knowledge claims. An important part of this framing is in acknowledging the social networks that facilitate and constrain individuals as they seek to perform the necessary tasks and sociocognitive work of science. “Lone individuals do not solve problems, but rather problem solving is embedded in a social network that collectively performs necessary tasks and cognitive work” (Nasir & Hand, 2008, p. 144). At the same time, such social networks can legitimize or delegitimize the knowledge, experiences, identities, and practices one brings to doing such work.

### **Returning to Activism in Science**

Bringing critically oriented stances on science literacy and environmental justice together provides us with a powerful way of framing activism in science. With attention paid to the role of the everyday in the critical engagement of science, activism in science incorporates knowing and being in science (in terms of understanding and reinterpreting big ideas through local, situated concerns and subjective locations) and taking action. Activism thus privileges two forms of action: the educative, where individuals or collectives seek to use their subject locations to educate others from within, and the transformative, where emphasis is placed on “moment-to-moment” (Urrieta, 2004, p. 6) actions meant to work toward a just world one step at a time (see Figure 1).



FIGURE 1 A Framework for Activism in Science Education

Activism in science is not limited to the environmental realm. However, we find power in drawing extensively from the environmental justice movement. It is in this movement that we witness the fight between ideology and lived experience (Brodin, 2009) as well as the struggle to integrate scientific knowledge and practice, power and positionality, economic and corporate concerns in a racialized, gendered, and classed global society. The stakes are high (from personal health to global sustainability), and there is a global pattern of unjust practices. Reflecting upon how and why knowledge and action come together in ways attentive to these vast tensions can offer a broader model for activism in science.

### **GREEN ENERGY TECHNOLOGIES IN THE CITY: GET CITY**

GET City is a year-round program for youth ages 10–14 in River City, an economically depressed city in one of the most economically depressed states in the United States. Located at a local youth club, GET City began in the summer of 2007 with a cohort of 20 students who investigated whether their city, River City, contributed to the urban heat island phenomenon. The local Boys and Girls club largely serves youth from minority and low-income backgrounds. Many of the youth in GET City had attended the club since 3rd or 4th grade. The club offers leadership building programs, sports, and homework help. Since then, the program expanded to reach about 30 students per year and also to year-round programming. The club has been in existence in River City for over 40 years and is one of the more robust youth centers in the city, serving over 250 children and youth per day.

The original goals of GET City were to offer youth an opportunity to engage with advanced information technology skills while learning about green energy issues. Over the 3 years of GET City we have strived to create authentic investigations rooted in local problems of global importance (e.g., Should River City build a new hybrid power plant?). However, over time, the youth have authored novel pathways for contributing to the local and national discourse and taking action on green energy and the environment (Calabrese Barton & Tan, 2010). What was

new in GET City was the collective authoring of new ways to push toward a deeply meaningful engagement with others on how and why caring for the environment matters in ways that were science rich and authentic to the situated needs of youth, most of whom live in the most economically depressed neighborhoods in the city.

## **CRAFTING NARRATIVES**

Our work in GET City is a part of a broader critical ethnographic and community-based effort to engage low-income youth in green energy technologies. In our work we have field notes, video of weekly sessions, interviews, and a corpus of student work. However, because the new green roof was not an actual target of the GET City program and emerged as an artifact of broader community participation in the youths' work on green energy, we sought additional information. We purposefully set up additional experiences to fully capture different interpretations of "getting a new green roof." First, we asked youth to generate a map that showed the critical events and experiences that led to the new green roof. We conducted individual interviews and asked the participants to tell us their stories of how the club got its new roof. We prompted for what roles they believed GET City played along with their own personal contributions.

A grounded theory approach to data analysis yielded three salient coding trees: (a) what the roof signified; (b) steps, knowledge, and practices that led to the roof; and (c) youth positionings. Cutting across each of these three coding trees were ideas about the science youth drew upon. These coding trees were used to help structure the creation of a set of individual narratives on how the club got its new roof, of which we tell three below. Looking across the narratives we noted similarities in how the youth positioned themselves vis-à-vis science, community, and the roof process, along with what the roof signified for them.

### **Narrative Constructions of the New Green Roof**

We share three narratives of how the club got its new green roof. In telling the narratives we seek to show that the ways in which youth describe these accomplishments and how the relative priorities they ascribe to them work to reify their identities as community science experts "who make a difference."

#### **Jana's Narrative: "It Changes Our Lives"**

Jana is a vivacious sixth grader who attends the local elementary school adjacent to the club (see Figure 2). Though small in stature, she exudes confidence. Jana joined GET City in the Fall 2008, in part because her older sister had participated in GET City the previous year and she was eager to participate in some of the activities and to gain access to the computers while learning more about the environment.



FIGURE 2 Jana Working on a Graph

Jana described the green roof as “a big step ahead.” She was careful to note that “just because you say green doesn't mean you have to change your whole life. You can still be you and still help the earth at the same time.” Yet, Jana also pointed out that the new green roof “changed our lives.” Jana is a matter-of-fact person. She has a deep thirst for knowledge and will often wade into complexity as she seeks a carefully thought-out position (see Kissling, 2010). Not prone to the dramatic, such a statement that the roof “changed our lives” carries weight. Jana was quick to point out that the roof impacted both the individuals who came to the club and the larger community. She explained that the roof's skylights brought much-needed natural lighting in spaces in the club that are windowless. This mattered because “a lot of kids come to the club.” She also noted that as a result of the roof, “our club has more money to run other programs”:

The roof would help them to save a lot of money. Since in the summer a lot of kids come here and so that means a lot of energy and stuff to feed us and have the lights on. And when a lot of people come in one area, it gets hot. So when you have a green roof in the summer time it keeps it cool in the building and outside [on the rooftop] and when its cool like it is now, it keeps it warm and dry and stuff. The green roof is a big change.

Most importantly, Jana suggested that the new roof showed that even in their neighborhood a green roof was possible. That Jana described the new roof as a “big step” and as “real change” seems important given the backdrop of the current political climate where “change” is an important part of the lexicon, but frustration exists among those in her community suffering greatly from the current economic recession.

Jana believed that the youth in GET City “played a big part” in how and why club leaders sought out a green roof. She placed primary emphasis on the role that GET City youth played in educating others on green energy issues and getting others “talking about how to change people's

lives.” In her map of how the club got its new roof, Jana underlined twice the point that the youth “educated” the club leaders and similarly underlined twice the fact that club leaders turned to youth for direction by “asking questions” (see Figure 3). Jana viewed the youth as experts on the topic who carried a heavy responsibility for getting others to reflect and act upon their concerns. In fact, Jana credited their public service campaign, a series of 30- and 60-s digital shorts that the youth created earlier in the Fall 2008 on green energies, as the key event that got the green roof process started because they “got people talking.”

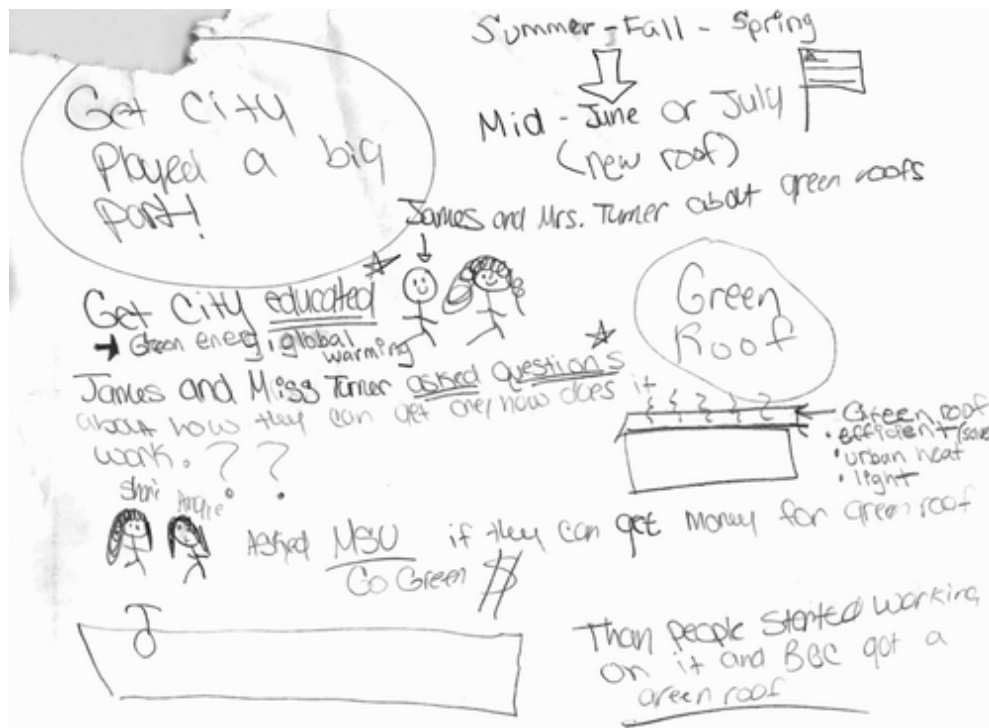


FIGURE 3 Jana's Map of “How the Club Got its New Green Roof”

Jana wove in two related science content lines in describing the value of the new roof. First, she pointed toward the role of cutting-edge technology. She stated that, “Back then there were a lot of ways to be green, but now there are newer ways to be green, and we are more educated and we are hard working kids who care.” She was clear in her narrative that even a few years ago not enough was known about the connection between energy efficiency and global warming such that considering a green roof was a viable idea. Jana is clear that the youth's up-to-date knowledge of alternative energies and urban design directly parlayed into a new roof. Given that the club has one of the few green roofs in the city that contribute to Leadership in Energy and Environmental Design (LEED) certification, her stance is not a surprise.

Second, Jana indicated that a detailed plan with “proof” would be needed to educate others about how to get a roof. The roof “is more efficient” and “you use less energy to heat and cool the building.” The “less energy you use,” the less we “contribute to global warming.” The central concern for Jana was making this point evident to others in a carefully planned way:



What you have to do is to convince people. First of all, you have to have a plan and you have to stick to it and be determined. After you have that figured out, you get the proof, then make a video and then back it up with information, and then show it to the highest people in charge.

What seems especially important here is how being knowledgeable in science can break down power relations in youths' efforts to gain access to resources to acquire something like a roof. Such power relations matter to Jana not only because of how they—as “club kids”—are positioned without resources but also because of their age. As she poignantly stated, “Most people say kids are too young and they can't really do anything. We are in fifth and sixth grade and we got Mr. J. and Ms. T. to get a new roof.”

### **Cathy's Narrative: “They Had No Idea They Were Wasting Energy!”**

Cathy is 13 and an eighth-grade honors student who has participated in GET City weekly for 2.5 years. When we first met her she informed us that science was for “nerds.” The only reason she joined GET City was because her mother made her. Yet, Cathy takes decisive ownership of the new green roof.

Cathy's description of the process of getting a new green roof was rich with references to relevant scientific ideas and with descriptions of the importance of research and evidence. The new roof was most important because it would help to mitigate the urban heat island phenomenon and reduce the club's carbon footprint. To Cathy, green roofs are “energy efficient” and would “reflect rather than absorb the sun's heat.” She also noted that the research helped them to make connections that she was not aware of before, such as “why roofs even matter [in climate change].”

Cathy highlighted four steps that led to the club's green roof: The urban heat island investigation, the youth-produced digital public service announcements and survey work on River City's official energy policies, the carbon footprint investigations, and investigations into green energy (see Figure 4). Cutting across her description of each of these was the importance of doing research and getting evidence. In one 20-minute conversation about her map, Cathy used the word evidence, research, or data 12 times. In reference to green roofs she said, “We had evidence that showed that green roofs were better.”

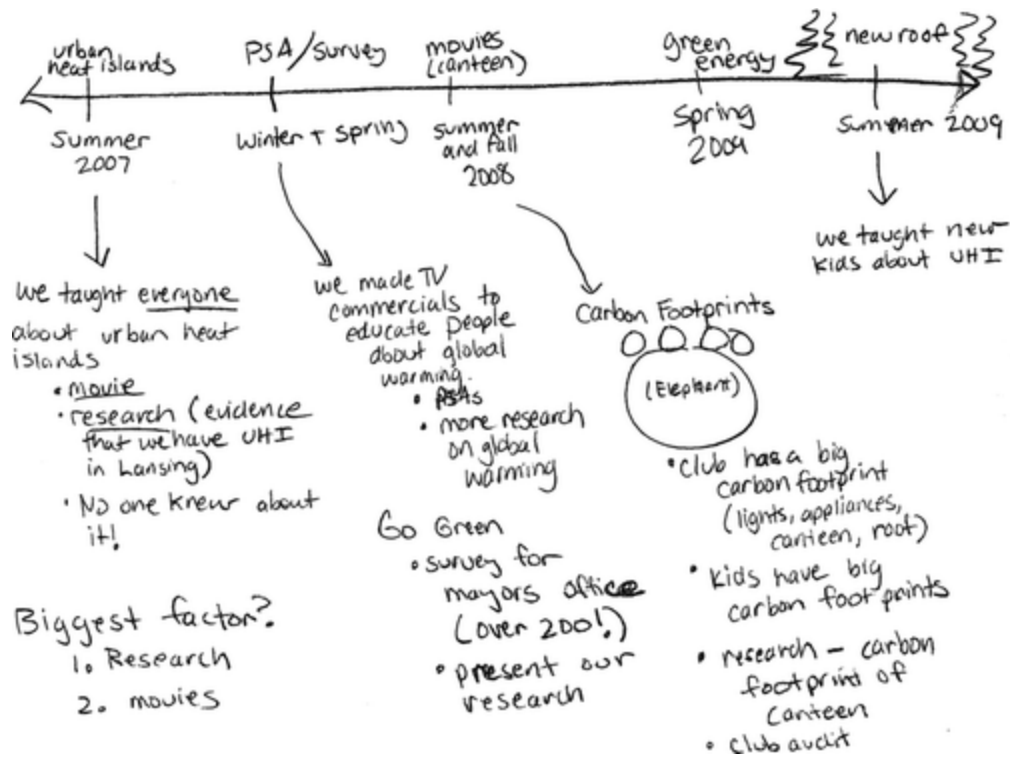


FIGURE 4 Cathy's Map

More importantly, however, is how she used the terms research and evidence to position herself and her peers with powerful knowledge. Cathy pointedly illustrated how research and evidence allow her to convince others in more powerful positions, such as the people with money or the club directors:

I think research is a good thing too because then we can actually show like the board members and people who gave money like the things that GET City is doing.

We figured out how our roof helps make urban heat islands. ... Well we had to like, cause [Sarah, one of the club directors] didn't know what it was either. So we had to tell her what it was. We had to show her all the things that we did and what we know about it and everything.

In fact, when asked what the most important factors in her mind were with respect to the club getting the new roof, she amended her map to include two factors: research and movies. She talked extensively about her movie-making activities as an important component of conducting authentic research. She stated on three separate occasions in her interview that their digital products, such as their scientific documentaries and public service announcements, allowed them to organize and present their evidence in useful and fun ways:

The movies were all about our research and what evidence we gathered. ... You have to show them [club leaders] somehow. Like if we just wrote papers and stuff it would be

just like school and stuff but I think that it was a fun way for [others] to learn so we need to do this for them.

Though science played an important role in Cathy's description of the roof, it is in how her expertise positions her as an educator that seems to matter more in her narrative. Being an expert through her own research and dedication compelled her to take action with her peers because “no one else knew.” In describing her work on carbon footprints she said, “Like we did those surveys about our carbon footprints and it proved that like a lot of us, it proved that a lot of our carbon footprints are big. And adding a green roof would put our carbon footprints low.” She felt that this research had “a big impact cause they didn't know how much energy that they [the club] were wasting.” Cathy was clear that the new roof was not the focus of their research but getting others to understand how their everyday practices contributed to climate change was. Figuring out that a roof could be an important step was part of the education process.

Cathy summed up the roof by saying that “personally I think that it gives me one more thing to say that I did to help the earth, you know?” (see Figure 5). This comment reflects a deeper tension expressed in how Cathy positioned herself as both an expert and an activist. She stressed that African Americans are stereotyped in the media as people who do not care for the Earth and who are not interested in using their knowledge and power to work for environmental causes. As she stated, “There's a stereotype. Because in the media and stuff they only show the negatives about African Americans. They don't show the positive and stuff.” This comment deepens the meaning that the roof carries as a reflection of her seriousness and hard work.



FIGURE 5 Cathy Posing in the GET City Club Room

For Cathy, the roof signified a great deal of seriousness and hard work and many hours of scientific research, ideals that run against the stereotypes held against African American youth. She also believed that because she had expertise that she deemed critical to the Earth's survival,

she was positioned as someone who needed to educate others. The roof signified “one step ahead” for one to build a bigger legacy in the community and for African American youth.

**Janis's Narrative: “The Green Roof Is the Most Important Example of How We Are Make-a-Difference Experts!”**

Janis is a quiet 12-year-old who attends the elementary school next door to the club. A gifted artist, Janis spends nearly all of her free time sketching images from pictures in magazines or photos. She attends GET City because it is “fun” and she can “make a difference” but she is also quick to note that she does not like science—it is for “geeks.” She does, however, “love” GET City because it's a “different kind of science” where you can have fun and use computers (see Figure 6).

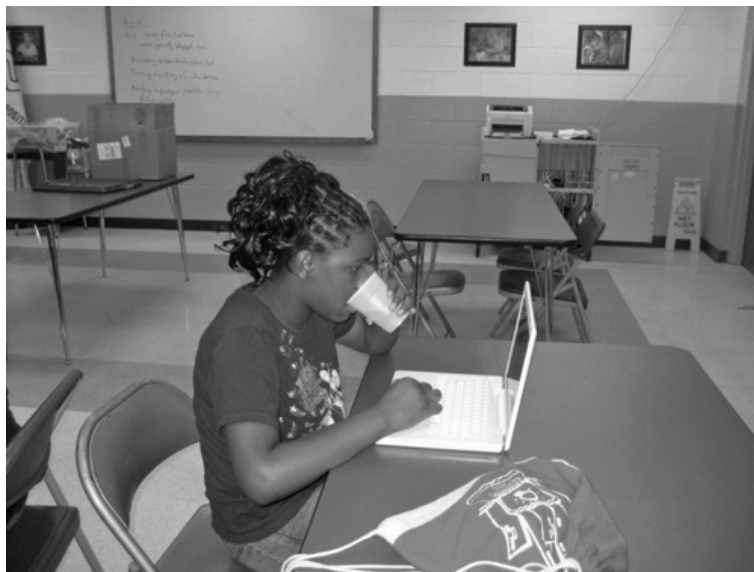


FIGURE 6 Janis Working on her Skylight Report

Like Cathy, Janis also took decisive ownership over the new green roof. In fact, Janis explained that the green roof was “the most important example of how we are make-a-difference experts.” According to Janis, a make-a-difference expert was someone who “knows what they are doing” and “how to make a difference”:

We know what we are doing. We know how to make a difference. [We know] how to save energy and how to convince other people of better ways to do things with electricity. That is one way that we are experts. The roof is probably the best example because we actually helped the club save money. They spent a lot of money getting the roof but now they have probably already saved enough to get that roof again. In the long run it saved money.

The roof was important to Janis because it helped to save the environment and save money at the same time. Janis almost never talked about environmental issues without also mentioning the

financial impact of such issues. Her attention to the socioeconomic positioning of her family and her peers was central to the discourse she brought to the roof. Though it has become acceptable in left-leaning, White middle-class culture for individuals to shoulder the burden of greening our world (i.e., by paying more for green electricity etc.), Janis was adamant that environmental sustainability had to be affordable. In fact, Janis described the green roof as a roof that is “healthier” both financially and environmentally:

It's basically like a roof that is healthier, like for finances and stuff like that. A word to describe it is efficient. It's helping you save the things you need, like money and electricity.

As indicated by the quote above, she suggested that the green roof was the best example of what it meant to be a make-a-difference expert because the youth know what they are doing, they have done all of the hard work, and they helped save the club money. According to Janis, it would be hypocritical for the club not to get a green roof after the youth worked so very hard to learn about green energy.

Janis's narrative focused in part on getting the right story to the right audience. Whereas Cathy (and to a lesser extent Jana) drew upon scientific research to build a coherent and convincing story that provided evidence on the relationship between urban design and climate change, Janis used science to link greening practices with economic and personal concerns. Of the activities that Janis pointed out as the most crucial, she highlighted the two audits that youth did of the club to determine how to save money and to make youth more comfortable. The first audit took place in Fall 2007 and focused on the electrical usage in each room in the club (appliances, wattage, and hours in use). The second audit took place 3 months before the roof installation in Spring 2009 and focused on determining potential locations for skylights (in the new roof).

Janis further stated that both of these activities were important in convincing others that the green roof was important because they showed how much money and electricity was used:

We went around the club and saw how much computers were left on and how many watts that was. How many lights, and what kind of lights. We also calculated how much money the electricity uses, changing watts to dollars. We showed them how much money they would save and how much money each room used, and how many light bulbs in each room that could be changed for natural light. So now there are like three skylights, in the lobby, clubroom, and office. It helps the light because it's natural light. It's better than fluorescent bulbs, but what it means is that we save energy, and so we save money, and that is what we need to do.

Janis was not at all surprised that “the kids were the main reason the club got a new roof.” Agreeing with her peer Kayla, she stated, “I didn't know that the roof cost \$65,000 but I'm not surprised. Our work made the difference because they showed what green roofs were and how they would save money and the environment.”

## DISCUSSION: ACTIVISM AND BECOMING A “MAKE-A-DIFFERENCE EXPERT”

The roof signified scientific, social, and personal accomplishments for the youth in ways that reify what it means to be a make-a-difference expert. The roof reflected the hard work and dedication of the youth to develop understandings of their own roles in global sustainability and in their ability to take this message to those in power in relevant, fun, and justifiable ways. The roof represented “many hours” and “extra days” of researching, getting evidence, and educating others about their own contribution to the larger global carbon footprint. The roof also reflected a “big step” ahead for the youth in GET City, the club and the community—a repositioning not only of the club as a leader within the community but of tacit understandings of who is allowed to participate in the discourses of environmental stewardship. Yet, the differing emphases on the range of social, personal, and scientific accomplishments also suggest that what it means to be a make-a-difference expert is dynamic and that activism is a generative process deeply linked to knowing and being in science (see Figure 7).



FIGURE 7 Activism in Science

The youth took up many subject positions in their stories of the roof, which framed how and what it meant to be a make-a-difference science expert (see Table 1). They reflected a growing self-awareness of how their own practices (and by extension those of the club) contributed to a larger carbon footprint and to wasted money. Citing evidence and proof from audits they conducted, Cathy and Jana traced out carbon cycles and money cycles in relation to the roof. Though the connection between socioeconomic positioning and environmental concerns were strongest with Janis, how and why understanding the carbon cycle mattered was coupled with both environmental concerns and financial well-being for all the youth. Thus, becoming a make-a-difference expert required a localized knowledge of the scientific phenomenon at hand. Carbon cycling is a big idea (and an abstracted idea) in science and, yet, to be a make-a-difference expert meant that the youth could explain its value in terms that made sense scientifically as well as to their neighbors, in both cases with appropriate forms of evidence—as Janis reminded us, by “changing watts to dollars.”

The youth also leveraged their growing expertise to break down power differentials around broader environmental issues in their community and city. Janis repeatedly referenced their “big

break” when they got those in power to listen and how important it was to show others. Though the youth used their expert position to break down power, they did not reposition themselves with power over others. Instead of activististic protesting, they took more of a shared stance with their strong commitment to educate others. Cathy talked a lot about how “others didn't know” and they “had to make movies to show the evidence” and that movies were important because people would not read school-like papers.

What is interesting about taking on the responsibility for educating others and leading change was the merging of what is often viewed as contradictory subject positions in the context of science education, even in informal spaces. That is, by enacting science expertise that reflected both traditional scientific practice while also leveraging hip-hop, youth-speak, art, and creativity the youth coopted (un)desirable meanings of being a “club kid” with an urgency to build a more just world, fashioning a practice that was respected across two different worlds: local peer culture and White corporate/governmental America. Indeed, the youth's actions were legitimized by peers and authority figures (e.g., the roof funders, club leaders, mayor's office), and such maneuvering inscribed urban youth culture into doing science with a purpose. Simultaneously, it justified their growing power and leverage as green energy experts. Such an identity emphasized (rather than averted) how race/culture and science merged to transform being a club kid into something desirable: becoming a science expert to the local and global communities.

This latter point is fairly significant. As Cathy indicated in her interview, the issue of race was central to what it means to be a make-a-difference expert. Painfully aware of how her peer group is portrayed in the media, the roof signified a way to speak back to these deficit images. Both Jana and Janis further recognized how youth voices have been left out of environmental discourses. These youth, and others in GET City, spent hours scouring the Internet looking for images of Black families recycling or engaging in environmentally friendly practices only to be frustrated by their inability to find them. That their work at the club led to the green roof destabilized stereotypical understandings of what it means to be a club kid or an environmental steward.

Finally, the green roof reflected just how much the club itself has been reinscribed with new meaning for youth. It is not just a place for kids to hang out or to engage in after-school programs. The club itself is a leader in a global movement toward sustainability and a local icon for making a difference. More importantly, it is home to youth from lower-income and African American backgrounds who have created the power to enact change in a domain that has largely ignored their voices.

The power here is not in the roof itself but in the everyday actions that made the roof possible. All of the youth pointed toward a “snowballing” effect of their moment-to-moment actions and the deeper understanding on the carbon footprint concept (knowledge-in-the-making) they gained as they explored different aspects of becoming more green in their local environment. Though Cathy seemed most certain of the long-term nature of their efforts, each of the youth

pointed toward critical moments where their work took new form because they reached a new audience, which in all cases was an audience with more power to make decisions and with more money. The youths' critical engagement with the broader ideas of carbon cycling and climate change—and their relationship to broader political and economic themes—along with an examination of their own practices paved the way for the club leadership to imagine replacing their leaking roof with a green roof despite their limited budget. The green roof itself was not initially a target of the youths' efforts. Their investigation of the club's carbon footprint resulted in recommendations made regarding the lunch program, recycling, composting, and energy usage. The youths' abilities to make these ideas a part of the way of thinking at the club opened up the possibility for the club leaders to ask what they could do when it came time to replace their roof.

**TABLE 1 IS OMITTED FROM THIS FORMATTED DOCUMENT**

### **LOOKING AHEAD**

We have posited a framework for activism in science education grounded largely in critical studies of environmental justice and science literacy. The youths' narratives on the new green roof offer a compelling way to make concrete and nuance this framework. Activism requires locally situated ways of knowing the world that juxtapose local culture and values on both how and why one engages in scientific practice. It also suggests that part of “knowing” is in how one takes actions in ways that are educative across a range of communities of practice and transformative to the spaces they claim. In the case of the green roof, such activism was made possible by the youths' recognition as “community science experts” but at the same time their activism shaped that identity in ways that carried a range of meanings across the youth in the program.

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### **Notes**

1. A pseudonym.
2. It is important to note that feminist, multicultural, and queer perspectives on science do take on the relationship between scientific knowledge and practices and values.
3. Weinstein's discussions of street medics and guinea pigs are excellent examples of activism transforming the daily practice of science (see Weinstein, 2006, 2008a). However, he, too, noted that such a stance is divorced from the discourse and practice of school science (see Weinstein, 2008b).



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