GET City! At the Boys and Girls Club of Lansing

Overview of Findings

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Table of Contents

GET City
Michigan State University and the Boys and Girls Club of Lansing
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Part I: MSU led research on GET City

In Part I of this report we discuss interim findings based on year 1 and 2 data. Our research focuses on conducting research into student growth as technology empowered scientists/ engineers, and includes the following research objectives:

- What forms of knowledge formation, identity formation, discourse, and empowerment accompany youth's growth as technology empowered scientists and engineers?
- How do youth identify as and with scientists and engineers over their two year participation in GET City?
- What other forms of deep engagement with science/engineering and IT do students exhibit over their two year experience?

A. Participation

Demographics and Attendance Rates

Cohort 1

- 33 students
- 23 girls, 11 boys
- 30 African America
- 2 Hispanic
- 1 White
- Cohort 1 completed 264 hours during their experience.

Cohort 2

- 30 students
- 18 girls, 12 boys
- 28 African America/biracial
- 1 Hispanic
- 1 White
- Cohort 2, as of August 09, has received 129 hours of instruction during the school year and an additional 50 hours during the summer.

B. Reasons for participation

Many youth noted that they valued GET City for the skills they learned, for the opportunity to have "real voice" in the community, and for its social and fun value. Student web pages, accessed through the GET City website, support content covered. Students noted exposure to several GET City topics on their individual web pages.

Since the summer of 2007 we have seen two important shifts in why students participate in GET City. This shift is evident in both the "oldtimers" (i.e., youth who have been in GET City for 2 years) and "newcomers" (i.e., you who are just joining for the first time). In Spring 2009, the reasons why oldtimers (Cohort 1) participated in GET City were to learn about the environment (80.0%[1] of students), heard it was fun (73.3%) and to use computers (53.3%) where as parental requirement to join (33%) and to be near friends (46.7%). However, in 2007, the reasons Cohort 1 joined GET City as newcomers included primarily access to computers (75%) and friends (66.7%). In Spring 2009, the reasons why newcomers join GET City reflected more of the same reasons are the oldtimers, with learning about the environment ranking highest (100% of respondants), computers (60%), Parental requirement (40%) and Friends (40%), reflecting a possible shift in how the program is perceived by outsiders.

In interviews in Spring '09 Cohort 1 students explained GET City participation through a combination of access to technology, learning in authentic ways, and having fun:

"Get City, A Place to be. I like Get City because it is fun and you learn a lot of staff about saving energy. It is a place to meet your friends, you go for field trips. Field trips get you out of school for fun. To those kids not in Get City, please pay attention and join Get City. This is a place to be for all kids. You learn and have fun."

"Get City is one of the programs at the Boys and Girls Club of Lansing that shows kids about Green Energy Technology. We have used iMovie HD to make movies such as Public Service Announcements (PSAs). They also teach us about global warming. Global warming is the increase in air temperature due to large amounts of CO2. CO2 traps heat energy in the atmosphere and causes global warming. It is dangerous too, if we keep on polluting our earth. It can get too hot like in pictures below."

During year 1, 78% attended Get City once a week and another 22% report attending twice a week. On average 33 students attended and each student averaged about 23 days in attendance.

During year 2, 80% (24) attended GET City consistently once a week, with another 40% (12) attending GET City consistently twice a week (the second session each week is "open computer time). When sports schedules are factored into the attendance, then rates increase. We have 6 students actively involved in one or more sports taking them out of GET City for approximately 6 week periods.

Students reported varying levels of participation during the focus group conversation focused on participation levels. Some students indicated that they did not miss a day of GET City. Others reported that they missed several due to conflicting schedules with sports. Many students were afraid of the program continuing through the summer

[1] Students could select all reasons that apply so percentages are calculated per total number of students.

because they would not be able to attend given that they had to work full-time over the summer. During the focus groups with Cohort 1 students, they mentioned that the $100 was less of an incentive to participate than it had been in previous years.

B. Knowledge and Skill Development

The **IT Tools** specifically taught and used to enhance deep understanding of science and engineering in GET City include: (a) *Data gathering and analysis tools* and (b) *Communication Tools.* When these tools were used in the curriculum are outlined in Tables 1a-f in the Activities section. What we present below, is how these IT tools played prominent roles in the products created and disseminated by the youth in the program. Some of these sample products can be found on the students' website (in reduced resolution to allow for faster viewing).

The table below presents the major products produced by GET City youth and what IT skills were involved.

TABLE 1: IT SKILL DEVELOPMENT

IT Skills	UHI and Carbon Footprint Documentaries	PSAs	Website	Go Green Survey	Earth Day Exhibits	Green energy & economy	Hybrid Power Plant	Green Roofs
Data gathering and analysis tools:								
○ MS Excel	■	■		■			■	■
○ Digital Probes and related digital equipment	■						■	■
○ GIS software	■						■	■
○ On-line survey design and data acquisition (survey monkey)				■	■	■	■	■
○ Digital Photography and editing	■	■	■		■	■	■	■
○ Video recording and editing	■	■					■	■
○ Electronic concept mapping		■					■	
○ Google and other internet searching	■	■	■			■	■	■
○ Accessing and making sense of national data bases	■				■	■	■	

IT Skills	UHI and Carbon Footprint Documentaries	PSAs	Website	Go Green Survey	Earth Day Exhibits	Green energy & economy	Hybrid Power Plant	Green Roofs
Communication Tools								
○ Power point	■			■		■	■	■
○ Web design			■				■	■
○ i-movie	■	■				■	■	■
○ Pod casting		■				■	■	■
○ Blogging				■	■	■	■	■
○ MS Word				■	■	■	■	■

As is evidenced by the Brown External Evaluation, significant gains in the technology skills were made by the GET City youth during year 2. From the report:

"Data collected from student survey responses were analyzed for changes in technology skills and use from Time one to Time two in both year one and two. As noted in the methods section, in year two a measure of students' beliefs around the value of technology in their community was added. Table 4 displays the statistical change in average student responses on these variables (note that Perceived Technology Value was not measured in year one). Year one did not produce any statistically significant changes in students' technology skills or use pre to post program participation. **Year two, however, produced statistically significant changes in student responses on all three variables; technology skills, use, and value. Given the high reliability of these variables and the strong statistical significance, results suggest that through participation in GET City students significantly increased their technology skills, use, and value beliefs**." (pp. 16-17).

Table 4. Mean Change in Student Technology Skills, Use, and Value

	Year One		Year Two	
Variable	Time One	Time Two	Time One	Time Two
	Mean	Mean	Mean	Mean
Perceived Technology Skills	2.41	2.67	2.11	3.41**
Perceived Technology Use	3.26	3.12	2.62	3.73**
Perceived Technology Value	n/a+	n/a+	2.62	2.94**

However, here at MSU, we wanted to gain a more accurate record of which of these skills students developed and to what level of proficiency. Thus, during Year 2 we designed a self- tracker that required students to mark the date they learned the skill (with signatures by GET City staff) and to assign at both the beginning and the end of the program a self-assessment on level of proficiency of that skill (1: don't have that skill to 4: I'm an expert and can teach others). Students were required to turn in their "skills-tracker" (which we termed "the motivational chart") at the end of the year making them eligible for end of year stipend and 2GB jump drive. These data were helpful for two reasons. First, we found that the process of continual self-assessment with the "skills-tracker" shifted student discourse. They began to "name" their technology skills more formally, and this was not the case in year 1. For example, students could be heard saying things like "I know how to make a bar graph in excel" rather than "I can make a graph in that program." Such use of more formal language we think will support the youth in navigating more formal science and IT environments. Second, we found that many of the students were motivated to score a "4" and so they created opportunities to "teach others" so that they could self assign a level 4 on their skill development.

At the end of the summer program we also asked the youth to look at the pre-assessment scores and to decide "now that they know what they know would they still assess themselves at having started at that level". What is interesting is that we started this form of self-reflection because at the end of year 1 we noted a ceiling effect on the pretest for many technology skills. Yet, our experiences teaching the youth were that they were not the experts they thought themselves to be. This self-reflection proved to provide very

helpful information in terms of how students described their progress in IT. For example, many of the students said things like Chandler did: " Well, I thought I was an expert at i-movie at the beginning of the year because we did it last year. But when I made my movie on the green roofs I realized I had a lot more to learn to be really expert." Another student {hyllis, made similar comments, "I put down "knows a lot" for Making Graphs in Excel because I knew how to make them. But this summer you had me making a lot of graphs with the roof data. I was sick of it. But ya know I saw that not all graphs are the same. That was new to me. Im still a "3" but I know a lot more."

Our analysis yielded four important findings

1. Sometimes the number the youth selected remained the same even though they improved their skills. This typically happened on more difficult tasks in which case the youth realized the complexity of the program and knew that they sometimes needed help still. There was more to master.

Examples:

> Stephen – Use web software to create a web page. He explained that he had gotten better. He barely knew it when he began this summer and now felt that he could do many things like get pictures and make hyperlinks. He had learned about how to make web pages in his computer literacy class, but had never made one of his own. He wrote 2 each time. He started to give himself a 3, but as he was talking aloud, he said he really couldn't do everything by himself (3).
>
> Brenna – Use video editing software such as i-movie to edit videos. Brenna gave herself a 2 on both 6/22 and 7/14, but in our discussion stated that she got better. She discussed learning how to make a clip and change titles.

2. Sometimes the number youth selected improved to a 4 because they did not have a more in-depth understanding of what the program was capable of and felt they could teach others what they knew.

Example: Using GIS Software, such as Google Earth to gather information.

> Stephen gave himself a 3 on the 6/22 survey because he felt that he could use Google earth to locate places. During the one session that we used Google Earth this summer, Stephen learned how to use Street View (which he was very excited about). He felt that he could teach others how to use Street View, so he gave himself a 4 on the 7/14 survey.
>
> Camryn – Use video editing software such as i-movie to edit videos.
>
> Camyrn gave herself a 1 on 6/22/09 because she had never used the program before. She created an i-movie during the summer and gave herself a 4 because she felt she could teach others what she had learned and she stated that she "didn't know if she needed to learn anything else."

3. Sometimes youth didn't distinguish between 3 and 4. If they learned how to do something and could do it by themselves, then they viewed themselves as being about to teach others. This often happened on skills that were easy to master such as "Use digital camera to get pictures into a computer."

> Example: Buddy – Use digital camera to get pictures onto a computer. Buddy initially gave himself a 2, but after he learned how to do it without help, he felt that he could show someone else how to do it also.

4. Youth sometimes initially gave themselves too low of a rating because they didn't know what the question was talking about.

> Example: Use video editing software, such as I-movie, to edit videos.
>
> Kaylin initially gave herself a 2 on the 6/22 survey, but when we went over the 7/14 survey and I told her what the question was referring to, she changed her initial response on 6/22 to a 4 (reflecting her expertise) and also gave herself a 4 on 7/14/09.
>
> Brenna gave herself a 2 on 6/22 for "Use spreadsheet such as MS excel to create graphs." She changed her 6/22 response to a 1 on 7/14 because she "didn't know what it was talking about. She also changed her 6/22 response for "Use a database such as MS excel to enter information." From a 3 to a 1 on 7/14, stating that she "thought it meant something else.

5. Youth sometimes gave themselves too high of a rating on 6/22, but then realized that they did not have the expertise they thought they had.

> Example: Use a spreadsheet such as MS Excel to create graphs.
>
> Kaylin gave herself a 4 on 6/22, but revised her response to a 2 on 7/14 because "She realized she was not "an expert and sometimes I need help." Kaylin was absent the day Becky Jo spent time on this during the summer.

6. Youth sometimes didn't distinguish between questions when they seemed the same.

> Example: The first question on the survey was "Use database such as MS Excel to enter information. The second question on the survey was "Use a spreadsheet such as MS excel to calculate numbers.
>
> Stephen's and Kaylin's initial responses on 6/22/09 were a 2, but when questioned about this on 7/14/09, they made both responses into 1s since they realized they had never done this before.

C. Studies in Science Learning and Participation in Community Contexts

Study #1: "The Coal Plant Could Give People Jobs, But at the Same Time, It Could Pollute the Air": How Youth Reconciling Competing Discourses for Environmental Justice

Environmental education has focused on the "content" of environmental science without considering its social and political locations (Bowers, 2002). Even when schools consider the action-oriented goals of environmental education, they tend neglect how or why youth might engage such problems (Stevenson, 2008). Despite recent calls to engage youth in socio-environmental decision-making (Covitt et al, 2009), even domains like critical pedagogy have neglected environmental science as an important area in which to frame their work (Bowers, 2002). Moreover, historically, environmental discourses have often existed in tension with the economic concerns of low-income families (Jones, 2008). Consequently, we know very little about how or why youth might position themselves as important members of the "complex ecology of our changing world." We are particularly concerned about this issue from the perspective of low-income urban youth who are often positioned outside "power" discourses of their schools and their communities.

The research questions include:

- What salient Discourses and funds of knowledge frame how youth define an environmental problem, seek to acquire new information and take a stand in their community?
- How does explicitly incorporating the primary and secondary Discourses and funds of knowledge of urban youth into the environmental decision-making process affect how youth engage environmental justice?

Our study merges two theoretical traditions – sociocultural perspectives on learning (i.e, Lave & Wenger, 1991) and critically oriented and place-based environmental science (i.e., Covitt et al, 2009; Stevenson, 2009) to better understand the Discourses, funds of knowledge, and hybrid practices (Gutierrez, 2008) that youth draw upon as they make sense of complex scientific content rooted in local controversy.

We draw upon embedded case study to make sense of how individual students take up and enact different discourses while engaging in a 4-month investigation into whether their city should build a hybrid power plant, a highly contentious issue. Data include weekly field notes, interviews, e-mail exchanges, survey responses, student-generated artifacts, and transcriptions of sessions.

Although environmental stewardship discourses framed youth's decision-making process, concerns about the need for jobs, the rising cost of fossil fuels, and our reliance on electricity to provide refrigerated food, framed the questions youth asked and the information they sought to acquire as they struggled to decide what was best for their community. The value of scientific information took on significance as youth attempted to figure out how they might reconcile these sometimes competing and conflicting Discourses. Youth engaged at least three reconciling "hybrid" discourses (Green Jobs,

Save our Mountain Tops, and Earth and Jobs in the Balance), which span a trajectory for how science, community and environmental justice were positioned with respect to each other and their role in that reconciliation. By explicitly positioning youth Discourses within the power plant debate, youth challenged the either/or questions that framed the debate and expanded the role of environmental justice debates in the process.

Study # 2: "Step in the OK Direction": Youth Negotiating Justice as Fairness

This study investigates the "fairness discourses" that youth engaged within a community-based science program focused on environmental justice. Of particular interest is how youth positioned themselves during a four-month investigation into their city's efforts to build a coal-biomass power plant. The research questions include:

- What discourses about fairness do youth engage while talking about the content and structure of the Program?
- How do these discourses inform the stances of youth during investigation of the power plant?

GET City is grounded in an effort to teach and learn science for social justice. When Program youth talk about justice, however, they do so in a fairness "Discourse," which is comprised of different fairness "discourses" (Gee, 1990). Paley (2007) has demonstrated that fairness is an important and engaging topic for young children, and this attachment to fairness remains clear in the lives and experiences of Program youth while they negotiate growingly-complex webs of family, school, and community. Although justice and fairness are not necessarily the same conceptions, Rawls' theory of justice –justice as fairness (1971, 2001) – provides a useful frame for understanding the different discourses about fairness that youth engaged.

GET City is housed at a "Club" for youth in a midsized city. Although they attend schools across the city, the youth who make up the Program come from low-income backgrounds and are primarily African American. The data largely come from twelve "Wednesday Conversations" held with five Program youth, which were audio-recorded. We wrote field notes to contextualize each conversation and to capture immediate reactions. We also collected artifacts from the conversations (e.g. newspaper clippings that were discussed). Additional data include recordings, field notes, youth-generated artifacts from regular Program sessions. All data were analyzed using multiple coding stages based on Strauss & Corbin's (1998) open coding and constant comparison procedures.

Three discourses about fairness – merit fairness, equality fairness, and needs fairness – were evident in the conversations. Program youth engaged these discourses about fairness in and across various contexts, although each "fairness situation" became increasingly difficult for the youth to negotiate as more group scrutiny was given to competing perspectives of persons within the "fairness situation." While investigating the proposed power plant, youth engaged all three discourses but "needs fairness" emerged as the prominent discourse about fairness. When drawing upon each discourse in the context of the power plant, all three discourses positioned scientific knowledge an important element in determining justice, however the predominant discourse – fairness –

required the youth to evaluate the "value" of the scientific knowledge vis-a-vis the complex set of concerns community members brought to the question of building a power plant. Merit and equality discourses tended to position science as a metric of truth and access.

Faber and McCarthy (2001) detail the need for environmentalism to address justice issues; *real* environmentalism is not disconnected from social justice. This paper highlights the importance of theorizing how youth understand and negotiate discourses about fairness, especially in relation to environmental justice.

Study #3: Hybridity and Science Learning in an IT-Rich Environment

Subscribing to a socio-cultural perspective of learning, we believe that learning is situated and inherently linked to the "cultural resources" and practices in a certain environment. We use the concept of "legitimate peripheral participation as a theoretical lens to investigate learning in a club of small urban Midwestern City. Fifteen club member (11 to 12 years of age) participated in GET (Green Energy and Technology) City program that capitalized on participants concrete experience in addition to technological and human resources to discuss food and carbon footprint of club's lunch and canteen.

Our research question is: How has participation in the GET City unit focused on the 100 mile diet capitalized on students' discourses in order to move them from a peripheral position to a central position when discussing the issues at hand? In order to address this question we first describe the social setting and our goals program goals after which we analyze the participants' experiences. We adopted an ethnographic research method in order to code and analyze video tapes, interviews and movie products at the end of the five weeks. Additionally, we drew from ethnography of communication traditions (i.e., discourse analysis) to support our efforts to understand how meanings are negotiated among teachers and students (Cazden, 2001). For example, we examined how teachers and students talked to each other, and how that talk changed over time, noting how the language students used positioned themselves and others with particular roles and expertise.

Our finding lead us into two main claims with how and why hybrid spaces seemed to matter: First, the youth sought to create and enact a hybridized discourse that called attention to and elevated the value of their scientific findings. Second, the youth drew on aspects as hybridization as central to their role as legitimate participants in their GET City community. In other words, hybridity became a defining and necessary feature for valued participation as defined and enacted by the youth.

4. Studies in Identity Development and Agency

Lave and Wenger (1991) propose legitimate peripheral participation as a tool for understanding learning. They argue that learning in schools is often the kind of learning that is "about" practice, rather than learning practice itself. Schools usually treat students as "objects" of the process, rather than participants of it. A legitimate peripheral participation suggests a different perspective: "That perspective meant that there is no activity that is not situated. It implied emphasis on comprehensive understanding involving the whole person rather than receiving a body of factual knowledge about the world; on activity in and with the world; and on the view that agent, activity, and the world mutually constitute each other." (p. 33). Learning, therefore, is not an isolated process but is embedded within the social milieu that may lend itself to various contradictions such as empowering agents (e.g. allowing the legitimate participant to try out a new situation) and disempowering agents (e.g. denying the newcomer from certain crucial decisions).

We are mindful that learning to participate within a community is about developing identities and discourses that are accepted within the practice community. This process is often fraught with issues of power, for the cultural practices one learns to engage do not always validate the cultural resources that learners bring to the process (Moje, et al, 2004). Gutierrez and Rogoff (2003) further remind us of this point when they warn us against the possibility of being able to "nail down" the stable characteristics or regularities of certain cultural groups especially non-dominant ones which in turn leads to "prescriptive" teaching methods. Rather it is important to conceive of a "repertoire for participating in practice" that could identify the artifacts, context and background the individuals carry with them. For example, understanding the dynamic intricacies of the "repertoires" individuals or groups bring with them to the table is the first step towards thinking of how individuals learn. They argue that "rather than pigeonholing individuals into categories and teaching to the students "traits" or attempting to replace those traits, the emphasis would be placed on helping students develop dexterity in using both familiar and new approaches" (p. 5). We therefore think that opening the floor for a "hybrid discourse" when dealing with "non-traditional" science topic in a "non-traditional" educational setting (club rather school), we attempted to help youth participating in the program engage in a legitimate participation of those issues.

It is from this conceptual stance that we present three studies, each of which emerges from the key idea of what it means to become a "community science expert."

Study #1: Developing as Community Science Experts: Mechanisms and Outcomes

Focusing in on *how* youth participated in the GET City program as well as what they learned from participation, in this section I report on how the youth asserted themselves as Community Science Experts in ways that took up and broke down the contradictory roles of being a producer and a critic of science/education. Part of this finding is that youth actively appropriate project tasks in order to challenge the types of roles and student voice traditionally available to students in the classroom.

An analysis of our data reveals that while youth used a variety of means to assert their knowledge in science, we can categorize at least two patterns that reflect particularly powerful mechanisms by which students exert themselves as Community Science Experts [CSEs] through appropriating the ideas, discourses and practices of science:

- Authoring an investigation, and
- Taking up an expert stance.

These mechanisms for asserting CSE status are powerful because they at once show that as community science experts the youth are knowledgeable about science, and that they consistently blend what they know and can do with who they are and desire to be, tenants central to developing agency in science.

Authoring an investigation

The youth in GET City asserted themselves as CSEs through authoring their investigations (i.e., Is Lansing an urban heat island?) in three pivotal ways: (a) Insisting on a real life, community-centered investigation, (b) Framing the energy-related challenges by highlighting personal accounts, and (c) Positioning oneself as an agent. For example, in the students' investigations of whether Lansing exhibited the urban heat island effect, the students generated scientific documentaries of whether Lansing is an urban heat island. In these documentaries, the text in the movies were presented in an active voice with an explicit agent. This is in contrast to traditional science discourse, which favors a passive and more impersonal voice. Students also *blended* personal and emotion-invoking accounts that deeply situated the experience with more formal presentations of what urban heat islands are – presentations that include the use of real world data, scientific representations, and scientific terminology.

Taking up an expert stance- Engaging in the Practices of an Expert

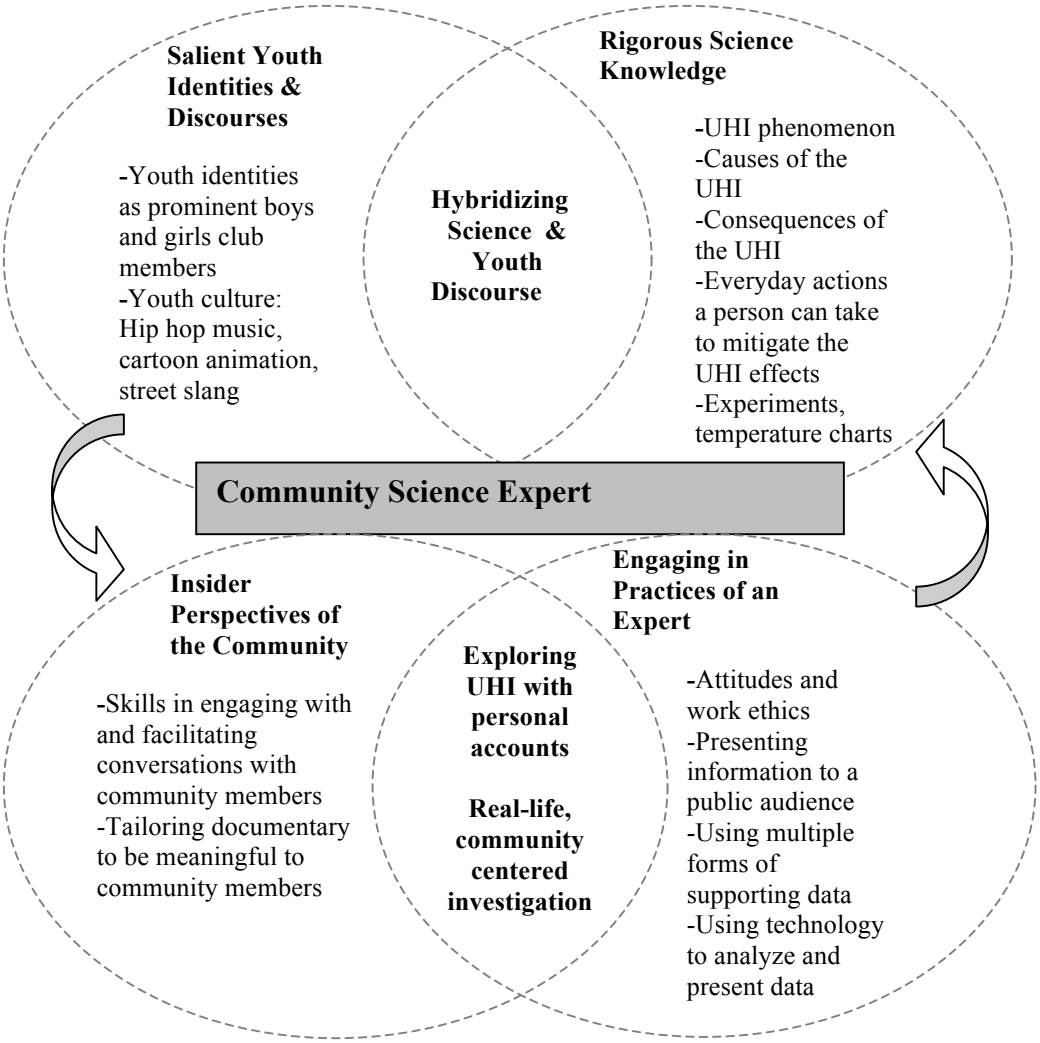
Evident in our description authoring an investigation is the idea that the youth had developing understandings of the UHI phenomenon such that they could share these understandings with others in ways that were accurate, supported with evidence, locally and personally relevant, and demanding of attention and action. In this section we examine more closely the ways in which youth took up an expert stance in asserting themselves as community science experts. In particular, the youth engaged in practices of an expert by

- Providing a detailed, scientific explanation of UHIs using hybrid discourse
- Supporting their stance on UHI with multiple forms of data, some analyzed by themselves using technology
- Displaying the attitudes of an expert with their work ethic
- Presenting their documentaries to an authentic audience with a Q&A session

For example, being a Community Science Expert also cuts against the stereotype of low-income urban youth as lazy and uninformed. Again in the urban heat island investigation, the documentaries show an active curiosity about the urban heat island phenomenon and a desire to help others learn about its causes and effects. Powerfully, when the youth discussed their products in an interview five months after the experience, the very first words they use to describe them is how the movie made them feel important and

powerful, and not lazy, in direct contrast the memes which frame urban youth in popular culture. By authoring the identity of a CSE, the youth displayed the attitudes and work ethic of experts in being strategic, persistent and meticulous over the production of their mini-documentaries.

FIGURE 1 SHOWS WHAT A CSE ENCOMPASSES:



Study #2: Becoming an expert: Transgressing boundaries for identities in science

This study advances the previous study and looks across year 1 and year 2 data to probe more deeply into how and why low-income urban youth asserted themselves as science experts in a science program located at community clubhouse. We focus on the mechanisms by which such youth forged non-traditional hybrid "science expert"

identities by co-opting what it means to be a "club" youth and turning these into assets when enacting scientific expertise. The research questions include:

- What forms of scientific expertise do youth enact in a community-based green energy technologies program? How are these rooted in cultural and scientific practices?
- How do the mechanisms for authoring scientific expertise transgress normative assumptions about being good students, scientists and urban youth?

We investigated the experiences of 12 youth over two years in two contexts: 1.) A youth-initiated investigation into a local "urban greening" policy that prior to their investigation had received scant public notice; and 2.) an adult-initiated investigation into a highly contentious city decision on whether to build a new hybrid power plant.

We draw from critical sociocultural perspectives that highlight the cultural practices and hybrid spaces that frame identity as a process of "becoming" (Lave & Wenger, 1991). Given our work with youth in low-income urban communities, we are concerned with how youth are positioned within and against the communities of practices that make up science and civic participation. Framing our work therefore is the stance that the acts of creating hybrid spaces, discourses and identities are always political and of the highest risk for those whose knowledge, discourse, and identities are positioned as lesser (Moje et al, 2004).

Through a longitudinal ethnographic embedded case study, we studied the design, implementation and impact of a year-round, community-based green energy technologies program. We drew upon a broader study while using the embedded cases of a subset of 12 two-year program participants. Data include fieldnotes, footage of activities, interviews, and artifacts; and, analysis involved multiple coding stages based on Strauss & Corbin's (1998) open coding and constant comparison procedures.

Youth in this project faced the stigma of being "club kids," which, in their community, is code for "poor and black." By enacting science expertise that draws upon hip-hop, youth-speak, loudness, art and creativity alongside traditional scientific practices, they co-opted undesirable 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. Legitimized by peers *and* authority figures (e.g., the mayor's office), such maneuvering inscribed urban youth culture into doing science with a flare. Simultaneously, it justified their growing power and leverage as green energy experts. Such an identity emphasizes (rather than ***deflects***) how race/culture *and* science merge to transform being a "club kid" something into desirable: becoming a science expert to the local and global communities. This study showcases youth engaging in relevant science discourse in novel ways which re-inscribe their identities in their communities, while engaging authentically in science in their local communities.

<u>Study #3: How Youth Leverage on Identities for Strategic Participation in a Community-based Science Program.</u>

This study also further pushes on year 1 findings to investigate how youth leverage on

identities to frame their participation in a two-year community-based environmental science program and its relationship to engagement with environmental justice. In particular we examine how the identity of Community Science Expert transformed over time, and its iterative and generative development alongside content and IT expertise and expanding notions of environmental justice. The research questions are:

- What identities have youth authored in a community-based energy/environment program, and what resources do they draw upon to do so?
- What is the relationship between identity development and youth's growing expertise in science and environmental justice?

We draw from critical sociocultural perspectives that highlight the cultural practices and hybrid spaces that frame identity as a process of "becoming" (Lave & Wenger, 1991). These identities are fluid and contingent on contextual factors inherent to that community-of-practice (Holland et al, 2001). For example, when students join new communities of practice, such as an community-based science program, they do so with a range of salient identities linked to their membership in other figured worlds and that are germane to their sense of self. These identities – and their attendant resources – are central to how students position themselves in authoring a new hybrid identities in science.

Using longitudinal ethnographic embedded case study we examine how a group of low-income, urban youth participate in the different phases of an "energy and the environment" community-based program, and how they position themselves with regards to the program, their peers, and science. Youth are traced through two years of participation including investigations into whether their city was an urban heat island, energy supply and demand and its impact on their city, conservation and green energy design, and the mayor's energy policy initiative. Data include fieldnotes, footage of activities, interviews, and artifacts. Analysis involved multiple coding stages based on Strauss & Corbin's (1998) open coding and constant comparison procedures.

Our study reveals two findings. First, we describe how youth constructed an identity of "Community Science Expert" [CSE] early on in the two-year investigation through the development of "energy artifacts" that were both autobiographic and intended for audiences larger than themselves, such as public service announcements for distribution via television and the internet, and creating forums that required cross-cutting community participation (i.e., youth, community members, policy makers).

Second, we trace how the youths' CSE identity transformed over place and time, constantly positioning the youth to create new ways of and practices for what it means to be powerful and knowledgeable participants in the discourse of environmental justice while also remaining "faithful" to their peer communities. Enacting the identity of CSE over time enabled youth to re-inscribe symbols of youth culture (verve, playfulness, boisterous, etc.) as necessary elements of scientific expertise as well as to re-inscribe science as a valuable commodity within urban youth culture. The practices of a CSE were enacted within specific historical, cultural, and political contexts and they drew upon

their science artifacts as tools and icons to sustain the their agency and a sense of environmental justice across differing communities of practice.

II. Part II: External Evaluation (Education Alliance, Brown University)

A. **Executive Summary**

Michigan State University's (MSU) Colleges of Education and Engineering GET City program was awarded a National Science Foundation (NSF) Information Technology Experiences for Students and Teachers (ITEST) grant in 2007. The GET City program has contracted The Education Alliance at Brown University to evaluate the implementation and impact of the program for the three years of implementation and this report reflects the first and second years of implementation.

The purpose of The Education Alliance's evaluation design included both components to examine the impact of the program and to provide formative feedback on program development and implementation. Implementation procedures included interviews and focus groups with program staff, participating students, and implementation partners. The impact evaluation component included a pre- and post-survey instrument to access participating students' knowledge of technology use, frequency of use, and beliefs of the values of technology in their community. Additionally, student career and post-secondary educational interests were also measured. Alliance evaluators synthesized survey and qualitative focus group and interview data to provide meaningful program findings based on evaluation questions. The data sources were examined across the two years of GET City program implementation to demonstrate the program's growth. In brief, evaluation findings are summarized below.

Overall, implementation occurred as planned with substantial commitment from GET City program staff and partner organizations. Time, staffing, space, and communication were identified as manageable program implementation barriers. When stakeholders were asked to expand on experienced barriers, in all cases an implementation adaptation occurred to successfully overcome challenges. While the partners appeared to take the place of GET City energy mentors, the partner organizations provided a connection to community as well as content expertise.

Student survey data suggested that participating students significantly increased their technology skills, use, and value over the course of GET City program participation. Although students consistently reported high levels of technology skills, use, and value both prior to and after participation in the program, these levels increased after year two participation. These results are limited in interpretation given that student responses prior to participation could not be matched with responses after participation. Rather, results were derived from student averages during a pre-post-survey administration. Results suggested that the significant increases in the student technology variables were reflective of program participation across two implementation years.

No significant changes were found in GET City students' interests to pursue careers related to science, technology, engineering, or math; however, on average, students reported moderate interest in these careers. While student career interests could

not be linked directly to GET City program participation, students' interests remained moderate.

Data measuring GET City students' post-secondary educational aspirations and expectations suggested that, after participating in the program, students' expectations for post-secondary education elevated to match their aspirations. This finding, in conjunction with previous research, suggests that the GET City program is positively impacting urban students by decreasing the gap among low-income and high-income students' educational expectations.

Student interviews and focus groups revealed the value of a culminating project artifact (i.e., iMovie documentary, PowerPoint presentation, etc.). Students reported leveraging both content knowledge and technology skills to complete an artifact. The technology skills were described by students as being teamwork driven and useful in a future job interview; however, students described the content as not related to content learned during the school day in either math or science. In follow up questions regarding content knowledge gained in the GET City program, students provided understanding of topics, yet more in-depth understanding of the technology processes in finalizing a project artifact.

The Education Alliance provides GET City program staff with recommendations based on evaluation findings. Recommendations are meant to serve as a discussion point for continued, improved implementation and impact. Program recommendations include; continued curriculum emphasis on student technology skills and use, revisiting program intensity level and incentives, structured communication with partners, parent involvement, and connection to the school day.

For the complete external evaluation interim year 2 report, please contact the PI, Angela Calabrese Barton.

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