GET CITY - Green Energy Technology at the Boys and Girls Club of Lansing

PI: Angela Calabrese Barton, PhD., Co-PI: Scott Calabrese Barton, PhD.
Co-PI: Carmen Turner, Project Manager: Shari Levine Rose, PhD.

Objectives

GET City provides two cohorts of Lansing youth from minority and low-income backgrounds a year round science and engineering program that focuses on energy production and sustainability, including green energy technologies, through application of advanced IT skills. The program provides:

a. **Experiences with advanced IT tools;**
b. **Opportunities to develop scientific research skills and conceptual understandings** related to energy technologies, production and sustainability;
c. **Job skills** for the IT market and awareness of and commitment to STEM in college/professional life;
d. **Interactions among youth and parents/caregivers** around advanced IT and the relationship between green energy technologies and local environmental health; and
e. A **curriculum** for informal science and IT education that can be adapted in other urban communities.

GET City will study how a university-community-business partnership program:

a. Fosters youth knowledge and skills in the areas of energy production and sustainability in the urban center;
b. Empowers youth in drawing upon IT skills to communicate ideas, to apply understandings to problem solving, and to change personal practices; and
c. Fosters greater community awareness and communication around the energy issues that face cities and around STEM trajectories for youth in IT, engineering, and energy production and sustainability

Community Partners: Lansing Board of Water and Light, Urban Options, Lansing Mayor's Office

Program Design

GET City consists of a set of ***six integrated*** components, which include:

(1) Year-round Program: Year long After School Program and an Intensive Summer Program emphasizing unique energy technology themes. Each cohort receives over 280 hours of program over two years.

Cohort 1

Year 1 (2007-2008): Investigating Current Energy Production, Use, and Implications

Summer: ***How healthy is Lansing?***: Youth investigated and modeled the relationship between energy use and the health of the urban environment through a case study of urban heat islands.
Fall: ***Do we have an energy crisis? What can we do to reduce our carbon footprint? Taking Action!***: Youth investigated where and how Lansing area energy is produced, and the implications of relying primarily on fossil fuels to create electricity. Youth conducted energy audits and used findings to design efficient energy practices. Youth communicated their how to reduce one's carbon footprint in public service announcements that aired on local television.
Spring: ***Go Green Go Lansing: What do Lansing residents know and do about energy efficient practices? Taking Action!***: Youth designed, conducted and analyzed surveys aimed at finding out what Lansing residents knew about the Mayor's Go Green Go Lansing Initiative and used their knowledge and skills as energy experts to offer recommendations.

Year 2 (2008-2009): Investigating Future Energy Production, Use and Implications

Summer: What does the food we eat have to do with energy crisis?: Youth investigated the *carbon footprint* of the Club's lunch program and canteen by analyzing what they ate (processing), where it came from and how it got to the club (transportation) and how it was packaged and served (packaging).
Fall: ***21st century energy and the new green economy***. Youth investigated the need for alternative energy and the replacement of fossil fuels with renewables-wind, solar, hydrogen, and biofuels.
Spring: Should Lansing build a new coal plant or not? Youth explored arguments for and against building a new coal plant, while learning about the science of renewable energy, the feasibility of meeting demand through alternative sources and the role of energy efficiency in reducing demand.

Culminating Event: Presentation and Booth at the Green Today, Jobs Tomorrow Conference, Lansing, MI (May 11, 2009, Invited Presentation)

Cohort 2

Year 1 (2009): Investigating Green Energy Production, Use, and Implications

Spring: Should Lansing build a new coal plant or not? Youth explored arguments for and against building a new coal plant, while learning about the science of renewable energy, the feasibility of meeting demand through alternative sources and the role of energy efficiency in reducing demand.
Summer Part 1: ***Green Roof Project***: Youth will investigate the design and installation of the new "green energy roof" at the Club using the lenses of environmental impact (i.e., mitigation of urban heat islands), energy conservations, and green energy design principles (LEED). Youth will devise a set of performance criteria and procedures to measure performance that they will study during the school year.
Summer Part 2: ***Fuel Cell Engineering***: Youth will learn about fuel cell engineering, and will design and build model fuel cell cars.

Year 2 (2009-2010): The Green Economy: Now to the Future

Fall: ***Understanding Lansing's carbon footprint***: Youth will investigate where and how Lansing area energy is produced, and the implications of relying primarily on fossil fuels to create electricity. Youth conducted energy audits and used findings to design efficient energy practices. Youth will communicate their how to reduce one's carbon footprint in public service announcements that will be submitted to air on local television.
Spring: ***Lansing and the new green economy: Taking Action!***: Youth will conduct a public service campaign on green energy technologies, careers, and environmental sustainability.

Culminating Event: Green Energy Community Fair

(2) Connecting Youth with Careers. Youth are supported in GET City by Energy/IT Mentors. Mentors work with youth during scheduled activities and hold mentoring sessions to discuss careers and the high school and college transition. Mentors include undergraduate engineering majors and engineers, energy scientists and technicians.

(3) Community Energy Events. GET City hosts two community energy events each year, allowing youth to showcase their research findings and to engage community participants in energy and IT activities.

(4) Parents. GET City offers IT/Energy workshops for parents, and supports parent participation.

(5) Student-developed and maintained website. Youth design and maintain the GET City website: http://getcity.org

(6) Youth Leaders. 13 Cohort 1 GET City "graduates" participate as youth leaders in Cohort 2.

Being a Community Science Expert **cuts against the stereotype of low-income urban youth as lazy and uninformed**. Youth documentaries show an active curiosity about the green energy and a desire to help others learn about its. 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.

Re: Naomi, how did making the Urban Heat Island documentary make you feel?
Naomi: Oh it made me feel proud cos I know I had put a lot of stuff into movie, in that I actually made a movie, I'm going to be a star… and like, its just a great experience…
Re: Shernice, how did making the movie make you feel?
Shernice: Um, making the movie made me feel… it made me feel good to know that I am a super starrer! And I am a movie starrer! And it made me feel really good that I could do a lot of work, and that I'm really not lazy!
Jeremy: Well, being the director and the founder of the movie…it makes me feel very proud that I produced the movie with me FELLOW teammates cos they were very good too.. but you know…I did A LOT of the work… I'm so proud… that the movie can be shown at [the local university]…
Shernice: Ok, I like the people to think of me as a smart intelligent person, that knows what she's talking about. And, and to think that she's very smart and intelligent.

Research Design

External Evaluation (Brown University)

- To what extent was GC implemented successfully each year and over time? What adaptations occurred? What factors supported and impeded implementation?
- In what ways do participating students grow in their knowledge and confidence of advanced IT?
- To what extent do participating students exhibit interest in pursuing careers related to science and IT?

Data collection instrument	Participants involved	Type of Data	Measurement
Interviews	Program Staff	Qualitative	Program awareness, recruitment procedures, facilities, logistics, scheduling, training & communication
Surveys	Participating Students	Quantitative	Knowledge of technology use, aspirations for IT careers, level of engagement in Get city, career intentions
Focus Groups	Participating Students	Qualitative	Experiences in program (I.e. conflict with other scheduled activities, technology resources at home, frequency and duration of program), parental involvement
Secondary Data	Participating Students	Quantitative	Attendance at program activities
	Energy Mentors	Quantitative	Frequency of interaction with students
	Participants' parents	Quantitative	Frequency of involvement
	Program	Qualitative	Documents/artifacts representing program milestones or key implementation activities

Research into student growth as technology empowered scientists/ engineers (MSU)

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

Data collection instrument	Participants involved	Type of Data	Measurement
Program documentation	Program Staff	Quantitative and Qualitative	Recruitment activities and "yield", enrolled participants, program delivery, staffing, participant attendance, program events & milestones (community events, publications/conference presentations)
Pre/Post test	Participating Students	Quantitative	Knowledge of science & technology covered in Get city
Interviews and Surveys	Participating Students	Quantitative and Qualitative	Knowledge of science & technology, aspirations for SMT related careers, identity & community connections, experiences in the program
Fieldnotes	Participating Students Participating Parents	Qualitative	Forms of participation at program activities Forms of participation, frequency of involvement
Artifacts	Program	Qualitative	Documents/artifacts representing program milestones or key implementation activities

Major Findings

Participation

Who participated?
Cohort 1: 33 students (girls, boys)

Cohort 2: 34 students (Girls, boys)

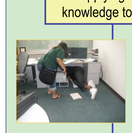
Reasons for participation
Many youth noted that they valued GET City for the skills they learned, for the opportunity to have "real voice" in the community, and for its social and fun value. Student web pages, accessed through the GET City website, support content covered. Students noted exposure to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

> *"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."*

Forms of Participation

Applying new knowledge to action

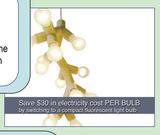


ENERGY AUDITS at the Club and at MSU in collaboration with environmental engineers

WEATHERIZATION
Assisted in weatherizing the Boys and Girls Club to help save energy.

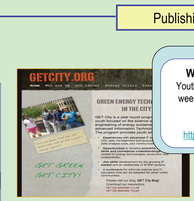
Using advanced IT environments to *synthesize findings* and *take a stance* within the community

SCIENCE DOCUMENTARIES
Using I-movie compiled research findings on the urban heat island effect in Lansing (summer 07) and the carbon footprint of the Club's lunch program (summer 08).



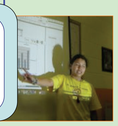
PUBLIC SERVICE ANNOUNCEMENTS
PSAs focused on energy efficient practices and aired on Lansing's CBS affiliate (WLNS) and at Lansing's City Hall on Earth Day.

Publishing Findings



WEBSITE and BLOG
Youth designed and contribute weekly to project website and blogs:
http://getcity.org
http://Getcity.blogspot.com

RESEARCH PRESENTATION
to Lansing Mayor's Energy Advisory Panel on the results of their Go Green Go Lansing Survey.



Knowledge and Skill Development

The **IT Tools** taught and used to enhance deep understanding of science /engineering include: (a) *Data gathering and analysis tools* and (b) *Communication Tools.*

Tables 1 and 2 indicates how these IT tools played prominent roles in the major products created and disseminated by the youth in GET City.

Table 1: Data Gathering and Analysis IT Skills for Cohort 1 Activities

IT Skills	UHI and Carbon Footprint Documentaries	PSA	Website	Go Green Survey	Earth Day Exhibit	Green energy & economy	Hybrid Power Plant
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	■				■	■	■

Table 2: Communication IT Skills for Cohort 1 Activities

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

Identity and Agency: Youth as Community Science Experts

Key Finding #1: *The youth in GET City take up the identity and practice of a* ***Community Science Expert*** *[CSE] when given opportunities to engage in authentic IT driven activities*

The youth position themselves as knowledgeable in green energy science concepts and practices. They take positions within the community that allow them to act upon this knowledge.

- Engaging in rigorous science content exploration
- Situating rigorous science content in their community with onsite investigations, drawing upon local knowledge and experience
- Taking Up an Expert Stance:
  - Supporting scientific accounts with multiple representations
  - Detailed scientific accounts using hybrid discourse
  - Work ethic of an expert
  - Authentic audience

"This is ace reporter Ron Brown. Boys and Girls Club News. I am surprised that people don't think this is an urban heat island. Right now you can actually see the beads of heat induced sweat. Do you see it? [Ron points to his forehead where he is visibly sweating.] They are beads. Not little droplets. Beads! I cannot believe this! The people around here are so unknowledged. We should really do something about this. Have a heat island awareness day. Yah. This is Ron Brown, from Boys and Girls Club News signing off. Catch you on the flip side!"

--UHI Documentary, We're Hot! What about You?

- Calabrese Barton, A. & Tan, E. (2008). We be burning: Agency, Identity and Science Learning. Presented at the International Conference of the Learning Sciences. Utretch, Netherlands. June 2008.
- Calabrese Barton, A. & Tan, E. (*in press*). The Evolution of Da Heat: Making a Case for Scientific and Technology Literacy as Robust Participation. In D. Hodson (Ed.). International Technology Handbook. Amsterdam: Sense Publishers.

Key Findings #2: *One mechanism by which the youth in GET City work to become legitimate participants in a range of science related communities (i.e., GET City, Mayor's Energy Policy Council*, MSU Energy Audit Teams) is by creating "**hybrid spaces**" that integrated scientific and non-scientific discourses.

- Youth sought to create and enact a hybridized discourse that called attention to and elevated the value of their scientific findings. This point is important partly because of how this kind of hybridity allowed the youth to engage in public acts of scientific practice in the middle of a youth-centered, nonacademic social club space. Using hybrid discourses to elevate the value and visibility of science seems to move beyond earlier research claims that youth engage in hybridity in the effort to maintain personal and social status while also having to engage in academic discourses and practices.
- 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.

- Hokayem, H. & Calabrese Barton, A. (accepted). From a Hybrid Discourse towards legitimate Peripheral Participation. NARST Annual Meeting Anaheim, CA, April 2009.