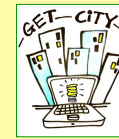




GET CITY - Green Energy Technology at the Boys and Girls Club of Lansing

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Objectives

- To provide low-income and minority youth from Lansing youth a year round science and engineering program focused on green energy through application of advanced IT skills.
- To investigate how a university-community-business partnership program fosters youth knowledge and skills in the areas of energy production and sustainability in the urban center & greater awareness and communication around the energy issues that face cities and around STEM trajectories for youth in IT, engineering, and energy production and sustainability

Business & Community Partners: Lansing Board of Water and Light & Michigan Energy Options

Program Design

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

- Year-round Program:** Two year cycle (280 hours) emphasizing energy technology themes.
- Mentors**
- Community Energy Events**
- Parent involvement**
- Youth-designed Website:** <http://getcity.org>
- Youth Leaders**



Gathering data on different green roofs throughout the Lansing area!

Units	IT Skills	Cross Cutting Content Big Ideas
Year 1 <ul style="list-style-type: none"> How healthy is Lansing? Investigate and model the relationship between energy use and the environment through urban heat islands. The Energy Crisis: Investigate and model Lansing's energy production and demand and its relationship to the carbon footprint. Taking action Part I: How can we save energy? Energy conservation & efficiency in the local community: audits, practices & policies. 	Data gathering and analysis: GIS, Digital Probes, MS Excel, Digital photography & video editing. Electronic concept mapping: on-line survey technology. Communication: Web design; i-movie	Energy and the environment <ul style="list-style-type: none"> Energy is the ability to do work Energy can be changed into many forms (stored & moving) Electrical energy can be generated in a variety of ways. Each method has its economic, environmental, and physical advantages and disadvantages. Traditional electricity production emits pollutants (carbon emissions & particulate) that can cause health & environmental problems Increased use of electricity impacts the environment. Renewable vs. non-renewable energy sources. Clean burning versus non clean burning Relationship between carbon emissions and climate change
Year 2 <ul style="list-style-type: none"> Green Jobs: Investigating the role of green energy technologies in the current job and market place Should Lansing build a new power plant? Arguments a coal/biomass hybrid power plant & the science of renewable energy and its connection to climate change. Taking Action Part II: Green Design. Investigate green design through the case study of green roofs in and around Lansing. 	Data gathering and analysis: Accessing & analyzing local and national databases. Advancing with GIS, Digital Probes, MS Excel, Digital photography & video capture Communication: Blogging; podcasting; advancing with video editing; i-movie	Energy technologies <ul style="list-style-type: none"> Comparing and contrasting forms of renewable energy: biomass, wind, solar (efficiency, effectiveness in Lansing, harvesting, carbon emissions) Energy conversion (from electricity or hydrogen as intermediate forms) Climate change & Environmental Sustainability <ul style="list-style-type: none"> Humans can take action to reduce climate change and its impacts Humans may be able to mitigate climate change by reducing greenhouse gas concentrations through processes that reduce carbon emissions A combination of strategies is needed to reduce greenhouse gas emissions. The most immediate strategy is conservation of oil, gas and coal, including short term (renewable and alternative sources) and long term (change in how humans use energy) strategies. Actions taken by individuals, communities, states, & countries all influence climate.

Research Design

Research Questions

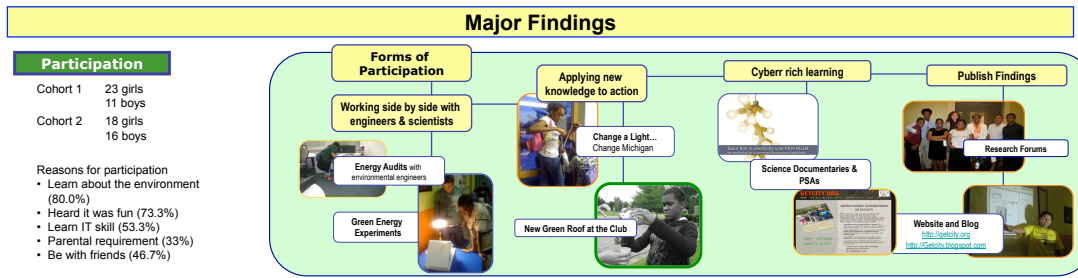
- Program Evaluation**
- To what extent was GC implemented successfully each year and over time? What adaptations occurred? What factors supported and impeded implementation?
 - In what ways do participating students: grow in their knowledge & confidence of IT? exhibit interest in pursuing careers related to science and IT?
- Research into student learning**
- What forms of knowledge, identity, & engagement frame youth's changing participation in energy and IT?
 - How do youth articulate the relationship between green energy and environmental sustainability (i.e., climate change), seek to acquire new information about it, and take a stand in their community?

Research Design

- Program Documentation**
- Attendance
 - Activities
 - Staffing & Participants
 - Milestones

- Ethnographic:**
- Video footage
 - Observation Fieldnotes
 - Interviews
 - Artifacts

- Quantitative: Pre/Post instruments on**
- Knowledge
 - Attitudes
 - Values



IT Skill Development

GET City students' technology skills, use, and value increased significantly above student demographics, suggesting that these increases were due to student characteristics, but rather associated with GET City participation.

Mean Change in Student Technology Skills, Use, and Value Year Two (* p<.01)

Variable	Time One Mean	Time Two Mean
Perceived Technology Skills	2.11	3.41*
Perceived Technology Use	2.62	3.73*
Perceived Technology Value	2.62	2.94*

For example...

Item	Year 1 post	Year 2 post
Use computer to write papers or print documents	78	92
Use a spreadsheet to enter and calculate numbers	48	77
Use a spreadsheet to create graphs	41	69
Use a database to enter information	56	85
Use a database to search for & sort information	48	85
Use a video camera to make a video	74	100
Use video software to edit videos	48	85
Use digital camera and scanners to get pictures onto a computer	56	92
Use image-editing software to edit pictures	33	54
Use presentation software to create presentations	70	100
Use multimedia software to create products	28	100
Use web authoring software to create Web pages	37	92
Use search engines to find information on the Web	67	100
Narrow Web searches using "or," "and," or "not"	48	77
Use GIS software to gather information	44	100

GET City students' post-secondary educational expectations elevated to match their aspirations after participating in the program. This finding suggests that GET City is positively impacting urban students by decreasing the gap among low-income and high-income students' educational expectations.

Students Education Aspirations and Expectations (* p<.01)

Variables	Year One		Year Two	
	Time One Correlation	Time Two Correlation	Time One Correlation	Time Two Correlation
Educational Aspirations & Expectations	.28	.95**	.11	.61**

Discourses & Complex Problem Solving around Climate Change & Environmental Sustainability

Getting smart about wind energy

Do you think the LBWL should build a new power plant?

Youth's decision-making on the power plant issue was situated within multiple and sometimes competing and conflicting Discourses. These discourses and the values associated with them framed the stances youth took and the questions they asked.

Scientific information about renewable energy sources took on significance as youth attempted to figure out how they might reconcile values associated with different Discourses.

"The bad problems would be that the new coal plant will pollute the air and it would cause more global warming and it would cause carbon dioxide... Kids could get asthma from breathing those horrible chemicals."

"I think that they should consider that we can not have wind because there's not a lot of wind in Lansing. We really can't have sun because we in Lansing do not have a lot of sunlight. We have a lot of cloudy days in Lansing. Since we don't have those resources, if there are other sources of energy that are healthier for the environment than we should use those resources."

"Yes. I want them to build [the new power plant] because it [the old power plant] gives over too much pollution, it would be a good step forward, there will be more jobs needed to build it and there won't be so much of CO2 produced because of the biomass."

"This will bring a lot more pollution and global warming."

"Will this plant need more workers that the old one?"

Identity and Agency: Youth as Community Science Experts

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

Making the [urban heat island] movie made me feel... it made me feel good to know that I am a super star! And I am a movie star! And it made me feel really good that I could do a lot of work, and that I'm really not lazy! Oh, 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.

"This is ace reporter Ron. 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? They are beads. Not little droplets. Beads! I cannot believe this! The people around here are so unknowledgeable. We should really do something about this. Have a heat island awareness day. This is Ron Brown from Boys and Girls Club News signing off. Catch you on the flip side!"

—LH Documentary, We're Hot! What about You?

Calabrese Barton, A. & Tan, E. (2010). We're burning Agency, Identity and Science Learning Journal of the Learning Sciences.
 Calabrese Barton, A. & Tan, E. (in press). The Evolution of the Hour: Making a Case for Science and Technology Literacy as a Shared Participation. In D. Hoover (Ed.), International Technology Handbook. Amsterdam: Sense Publishers.