InnovaTE³

Girls Innovating with Technology as Entrepreneurial Environmental Engineers

Year 1 Report
July 31, 2009
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SRI International's Center for Technology in Learning
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CONTENTS

PARTNERS, COLLABORATORS, AND RESOURCES

Partners
- SRI International's Center for Technology and Learning (SRI)
- Girls Incorporated of Alameda County (GIAC)
- TERC
- Rockman et al (Rockman) as the external summative evaluator

Collaborators & Resources
The InnovaTE[3] team consulted the following resources to develop Unit1:

Ecological Impacts of Climate Change (National Research Council, 2008).

Understanding and Responding to Climate Change (National Research Council, 2008).

Global Climate Change Impacts in the United States (U.S. Global Change Research Program, 2009).

The Rough Guide to Climate Change (Henson, 2008).

Pew Center on Global Climate Change http://www.pewclimate.org/

Earth Science Literacy Principles (NSF-EAR-0832415, 2009).
http://www.earthscienceliteracy.org/

National Science Education Standards (National Research Council, 1996).

Environmental Defense Fund Global Warming http://www.edf.org/page.cfm?tagID=517

EPA Climate http://epa.gov/climatechange/index.html

California Climate Change Portal http://www.climatechange.ca.gov/

Dr. Art's Guide to Planet Earth (Sussman, Chelsea Green, 2000). www.planetguide.net

Zero Footprint Calculator http://calc.zerofootprint.net/

Cradle to Cradle: Remaking the Way We Make Things (McDonough, 2002).

Climate Literacy Network Portal http://communities.earthportal.org/CLN/

Kid Wind http://www.kidwind.org/

Lawrence Berkeley Lab http://www.lbl.gov/Education/ELSI/pollution-main.html

Engineering Toolbox http://www.engineeringtoolbox.com/co2-emission-fuels-d_1085.html

Stanford Solar Center http://solar-center.stanford.edu/teachers/

Encyclopedia of Earth http://www.eoearth.org/

Alliant Energy http://www.alliantenergykids.com/

US Dept. of Energy (EERE)
http/:www.energysavers.gov:your_home:space_heating_cooling:index.cfm:mytopic=12300

Home Energy Guide http://www.energyguide.com/

Google Earth http://www.google.com

Renewable Energy Resources
http://www.teachers.ash.org.au/jmresources/energy/renewable.html

Innovation: The Five Disciplines for Creating what Customers Want (Carlson & Wilmot, 2006).

The Green Dollhouse Project
http://www.greendollhouse.org/greenbuilding.shtml

OKALA: Curriculum from Industrial Designers Society of America that provides an introduction
to ecological and sustainable design for practicing and beginning designers
http://www.idsa.org/whatsnew/sections/ecosection/okala.html

Clean Energy Entrepreneurs' Forum . Bay Area, CA. Evening lectures on energy and green
buildings

Green Building Conference at SRI International, June 11, 2009

MELT 14 year old girl produced this video on global warming
http://video.google.com/videoplay?docid=5617318652349295608

Story of Stuff shows how the consumption of more stuff is harming Earth
http://www.storyofstuff.com/

Life Cycle of Toast shows how production of food impacts our climate
http://www.bullfrogfilms.com/catalog/t.html

Mindset by Dr. Carol Dweck's

Build IT: Girls Building Information Technology Fluency Through Design (NSF ESI-0524762)

Netlogo

Stopwaste.org

Exchanged ideas with the following ITEST grantees focused on environmental science:
- Global Challenge Award ITEST program
- EcoScienceWorks: Exploring and Modeling Ecosystems Using Information Technology
- Investigating Green Energy Technologies in the City (GET City)
- Learning through Engineering Design and Practice: Using our Human Capital for an Equitable Future
- M-SOS-W: Middle Schoolers Out to Save the World

ACTIVITIES

SRI International, TERC, and Girls Incorporated of Alameda County are developing the InnovaTE^3 curriculum, which uses a cradle-to-cradle paradigm (rather than cradle to grave) to intrigue and challenge high school girls to develop ecologically sustainable innovations. Creating these innovations motivates girls to explore Earth system science, and the STEM fields and careers needed to address these important problems. The InnovaTE^3 curriculum, professional development, and assessment materials are portable to Girls Inc.'s 1,500 program sites that reach more than 800,000 girls annually.

InnovaTE^3 is a problem-based curriculum that capitalizes on girls' interest in design and environmental issues. It provides structured interactions with STEM professionals, including having girls participate in engineering teams and presenting their innovations to STEM professionals. InnovaTE^3's use of the innovation process, cradle-to-cradle design approach, an embedded assessment system, and a six-year continuum (2 years of Build IT in middle school and 4 years of InnovaTE^3 in high school) of STEM experiences for girls to encourage their interest in STEM careers will provide new insights and opportunities for research on learning STEM concepts in informal learning environments.

The InnovaTE^3 team is developing a coherent portable program that includes

- Curriculum
  – Problem-based activities, developed using the *Understanding by Design* approach, that incorporate the design and innovation processes as a means for girls to learn to define problems and then test and critique the value of their solutions.
  – An assessment system that includes embedded formative assessments and scaffolds for evaluating fluency in Earth System Science, innovation, and engineering.
  – Frameworks for involving STEM professionals.
- Professional development and supports for the youth leader staff to develop the staff capacity, as well as the organization's knowledge and resources, to run a technology and Earth system science program beyond the 3 years of the grant.
- Evaluation instrumentation and research findings.

InnovaTE^3's goals are to encourage girls to
- value and persist in STEM learning
- see pathways for themselves to STEM career(s)

- understand concepts in Earth system science, particularly the ways that humans affect Earth systems
- become fluent in innovation and engineering practices

In addition, the InnovaTE[3] program also seeks to build Girls Inc.'s staff capacity to implement and sustain STEM programming.

Year 1 Goals and Achievements

The goal for the first year of the InnovaTE[3] project was to develop, pilot, and implement Unit 1, the summer program. The team successfully:

- Developed logic model and refined goals for program
- Developed, piloted, and refined all formative and summative evaluation instruments
- Wrote more than 40 hours of curriculum
- Piloted the curriculum in the Spring 2009 with ten 9th and 10th grade girls
  - Made revisions to the curriculum based on this pilot.
  - See summary of revisions in *Learning from the pilot* below.
- Ran a four-day professional development for program leaders. Two GIAC InnovaTE[3] managers co-led the professional development with SRI and TERC.
- Implemented Unit 1: Ninety girls in eighth and ninth grade participated in the summer session held from July 6 through July 31.
  - 45 of these girls are in the Vets program and will matriculate out of InnovaTE at the end of the summer. These girls were included in InnovaTE only this year because it was helpful to staff to teach the same program to Rookies (first year InnovaTE[3]) and Vets (second year InnovaTE[3]).
  - Next year, new Rookies will complete Unit 1 and Vets (returning Rookies) will complete Unit 4 of InnovaTE[3] during the summer.

Learning from the pilot

In order to systematically collect information from the four pilot sessions to inform the curriculum development, the formative evaluation team observed and recorded the enactment and reflections with girls led by staff. At the end of each pilot session girls participated in discussions about their experience of the curriculum. The formative evaluation team also interviewed staff following each of the four pilot sessions. Three of the four sessions were also video taped for the TERC team to view remotely and as a record for the whole development team.

The evaluation team documented whether instructors enacted the curriculum as the developer intended and whether girls were engaged. Results were disseminated to the curriculum team and GIAC staff who used it to modify the curriculum and rewrite certain activities. Below is a summary of the findings from the pilot:

Strengths:

- Very interesting content
- A number of good entry-points for girls: such as themes of global warming and landfills (which they need help becoming familiar with), design topics like shoes, ipods, cell phones etc, and familiar problem solving experiences like personal relationships.

Areas for growth:
- Too much information (girls can't process it all, and facilitator has to rush through)
- Assumes knowledge the girls may not have
- Too much emphasis on teaching, telling, and girls listening.
- Not enough opportunity for girls to express their ideas and get into discussions
- Needs to be made more meaningful and salient to the girls
- More hands-on and interactive components, and rearrange so that activity gets front-loaded instead of the other way around (girls will learn from experience, not lecture)
- Clarify for girls and leaders how sections of the curriculum fit together.
- Too many topics for girls to grasp – energy section may need to move to school year.
- Girls need more context to learn about and apply innovation, rather than learning it as a standalone concept.

Evidence from the professional development and observations of the summer program in July 2009 indicate that the majority of these issues were successfully addressed in the revised curriculum and that the leaders and girls are engaged with the summer curriculum. There is still a tendency for the science instruction to have too much instruction and become too didactic from a youth development perspective. The formative evaluation of the summer will provide feedback to the curriculum team for improvements to Unit 1 and future units.

Curriculum implemented during the summer program (July 6-31, 2009)
The following describes the revised curriculum, implemented during the summer.

Unit 1 Summer
The Earth System Meets Innovation

In this unit that starts in the summer and continues through the school year, girls explore how they, the buildings in which they live, and their communities relate to the Earth's system. The following essential questions guide this exploration:
    (1) How is the Earth a system?
    (2) What makes a building green?
    (3) What is eco-innovation?

The four weeks during the summer introduce girls to the earth as a system, including the problem of global warming, and engage girls in learning to use the innovation process to develop cradle-to-cradle solutions to address global warming issues. Specifically, girls develop cradle-to-cradle designs that address energy, materials, water, air quality, and community resources such as transportation for homes and other building in their neighborhoods. Throughout the summer, girls use a "Innovation Notebook" to keep track for themselves how multiple types of systems (body, building, community, earth) relate to each other and where potential problems exist that could be addressed innovatively.

The following reflection questions will be used to provide scaffolds for girls to develop their Innovation Notebooks and help girls address the three essential questions for the unit:
    (1) where does energy come from
            (1a) how is energy transformed (at this stage).

(2) what is energy used for
      (2a) how is energy transformed (at this stage).
(3) where does energy go
      (3a) how is energy transformed (at this stage).

The summer includes
- Four weeks (40 hours) to prepare girls for the school year segment of this unit.
- Girls participate in at least two fieldtrips where they can interact with a variety of STEM professionals.
- Each day of programming is approximately 2 hours and 15 minutes and can be divided into separate sessions as noted on the curriculum plan for that day.

In Week 1, Girls learn that their bodies are a system, buildings are a system, and their communities are a system in preparation for week 2 where they learn that earth is a system. Girls also learn that while energy is transformed, it is neither created nor destroyed.

In Week 2, Girls learn that earth is a system and that wasted energy results in CO^2 generation that leads to global warming.

In Week 3, Global warming activities encourage girls to think of solutions to these issues in preparation for developing innovations for alternative energy sources for a home.

In Week 4, Girls learn the innovation process in the context of developing solutions for a building & community that they design.

Girls went on three field trips during the summer. Because of the large number of girls, two of the organizations hosted half of the girls on the same day:

- Albany Bulb (22 girls on July 10). Landfill site near where many of the girls live. Girls saw how waste was managed and talk with engineers about alternatives for the future. http://www.albanybulb.com/

- Save the Bay (22 girls on July 10). Girls participated in Save the Bay's Watershed Education Program, exploring watershed issues by on the water and land. http://www.savesfbay.org/site/pp.asp?c=dgKLLSOwEnH&b=479747

- Solar Living Institute (all 45 girls on July 17). The institute promotes sustainable living through environmental education. Girls visited the Solar Living Center to experienced renewable energy, sustainable living, alternative fuels, natural buildings, and gardening. http://www.solarliving.org/

Processes Used in Materials Development
SRI, GIAC, and TERC collaborate to develop the curriculum. Using an *Understanding by Design* (Wiggins & McTighe, 1998) approach, SRI and TERC develops the enduring understandings, evidence of learning, and ideas for the activities, including the mathematics-related activities, performance tasks, and existing activities from sources noted. SRI and TERC provide an outline

to GIAC in order to discuss these initial ideas and begin to define the activities. The team then drafts a schedule and a draft of the unit.

GIAC reviews a draft of the unit. Feedback is given to the SRI and TERC team and changes are agreed to in a design meeting. SRI and TERC incorporate changes into the curriculum documentation. Advisors are consulted individually by e-mail for input to the curriculum as well. GIAC pilots the activities with 10 girls who are Eureka participants, but will not participate in InnovaTE^3 since they have matured beyond the Rookie and Vet levels of Eureka when InnovaTE^3 is implemented. The pilot illuminates important changes that need to be made to the curriculum, which SRI and TERC implement.

SRI leads the professional development at which the GIAC team (program manager, program coordinator, and program leaders) engages with the curriculum as learners (the girls) and facilitators. This process highlights additional necessary changes, which SRI and TERC make to the documents, and in some cases, GIAC makes to their implementation approach.

The formative evaluation team uses observations of the implementation and interviews with staff and the girls to provide feedback to the curriculum developers in a formative evaluation report for each unit. Details on the formative evaluation process are in the Evaluation Activities section.

Evaluation Activities
The formative and summative evaluators and the development team met several times over the course of the year to discuss the goals of the program, describe expected outcomes and indicators, and develop tools to assess the program's success in achieving its goals. The formative and summative evaluators and development team members from SRI, GIAC and TERC met in December 2008 to develop a program logic model (see Addenda.) This model served as a guide for program staff in aligning program activities with outcomes and goals, as well as guiding the development of evaluation instruments. Formative and summative evaluators used the outcomes specified in the logic model to identify the constructs and concepts to be evaluated and the instruments to be used.

The formative and summative evaluators also collaborated on the development of the InnovaTE3 survey, which has four parts: background; STEM attitudes and interests; awareness of STEM careers, necessary education, and environmental issues; and content knowledge. These elements are described in further detail in the summative evaluation section. Additional activities of the formative and summative evaluation teams are described below.

Formative evaluation
The formative evaluation uses a case study method to evaluate curricular effectiveness, as outlined by the National Research Council (2004). The formative evaluation will document implementation processes and also generate hypotheses about the mechanisms through which effects are achieved and contexts that matter for achieving impacts. Formative evaluators capture the curriculum implementation at all stages: pilot, professional development, and enactment. The research questions for the formative evaluation are:

(1) Which of the curricular activities do staff find easy or challenging to enact, and how do they adapt them to their program conditions?

(2) What supports are available to staff and what further supports might they need for successful implementation?

(3) How are girls engaging with the curriculum content?

(4) What evidence is there that girls are thinking about and revising their thinking about and plans for STEM courses and careers?

Methods and sources
Informing the formative evaluation design and approach are theories of how girls construe STEM tasks as of high or low interest (Eccles, 1994), a theory of learning as a form of intent participation that transforms over time to prepare girls for increasingly complex STEM engagement (Rogoff, Paradise, Arauz, Correa-Chavez, & Angelillo, 2003) and the idea that voluntary organizations and programs like Girls Inc "compete" for members and retain members only when activities and participants align to members' attitudes and values (McPherson, 1983).

The formative evaluation team has developed and piloted the following instruments to date:

1. *Science content knowledge assessment and creative problem-solving survey.*
   These items are included in the InnovaTE³ survey. The team focused on items to elicit girls' understanding of Earth system science and innovation, and their preference for environments and practices that foster innovation.

2. *Case study interviews with girls.* To inform the field about the efficacy and mechanism of the InnovaTE3 strategy and the role girls' choices play in their STEM participation, formative evaluators have developed case analyses that document the participation of 23 girls in the program. Girls will be interviewed annually or semi-annually, and data from observations and surveys will be incorporated as well. In addition to informing the efficacy of the program, interviews are also designed to inform implementation questions. The formative evaluation team piloted the interview protocol during the pilot of the curriculum, and they are using the protocol in interviews this summer.

3. *Interviews with program staff.* Once or twice each year, formative evaluators will conduct individual interviews with selected GIAC staff to identify successful strategies and barriers to implementation and evaluate staff capacity. The formative evaluation team piloted the interview protocol during the pilot of the curriculum. To date, staff and instructors are being interviewed during the implementation of the summer session curriculum.

4. *Observations of program activities.* Formative evaluators have begun observing selected program activities during the summer implementation of Unit 1 to understand the implementation context, inform curriculum development and to refine data collection instruments. The observation protocols were piloted during the pilot of the curriculum. Evaluators are using the observation protocol to capture the summer implementation of Unit 1.

5. *Staff logs*. For sessions that are not observed, formative evaluators are using a GIAC developed staff log form, which will allow program leaders to give rapid feedback on curriculum activities, girls' engagement, and their own comfort level with the curriculum.

See Addenda for a copy of each of these protocols.

Process for developing protocols
The protocols were developed on the basis of meetings early in the program year with all involved parties. Representatives from TERC, Rockman et al, SRI, and GIAC met in December, 2008, to develop a logic model for the goals and outcomes of the program. Working from the research questions established in the proposal, SRI and Rockman continued working together to refine the logic model before instrument development took place in early 2009. The survey instruments were developed collaboratively between formative evaluators at SRI and summative evaluators at Rockman. They were refined in the spring and piloted in the early summer before being administered at the very beginning of the summer session. The SRI team developed all formative evaluation protocols.

Next steps
The data from the summer session will be analyzed and aggregated both to contribute to the larger data set for the program as a whole as well as to inform the refinement of the summer curriculum and the development of the after school curriculum for the 2009-2010 school year.

In year 2 the formative evaluation will follow the 23 case study girls, following up with additional interviews. Observations of the program's after school activities will be made as well as additional interviews with staff. The evaluation will focus on the implementation of the curriculum and staff capacity to provide the program.

Also in year 2, the formative evaluation team will collaborate with advisors from industry to develop a rubric to evaluate the innovation skills and preparedness for engineering work demonstrated in the artifacts youth create for Innovation Celebrations and Innovation Pitches.

Summative evaluation
The summative evaluation of the InnovaTE^3 project will assess the impact of the project on outcomes for girls using a quasi-experimental design, in which changes in outcomes for a treatment group will be compared with changes in outcomes for a matched comparison group.

Summative research questions
1) To what extent do girls develop interest and confidence in pursuing additional STEM content knowledge?
2) To what extent do girls enhance their knowledge of a variety of STEM careers and interest in pursuing a specific STEM career?
3) To what extent do girls develop understanding of core concepts in Earth systems science and apply that understanding to engineering design challenges?

4) To what extent do girls deepen their environmental awareness, particularly their recognition of the human role in earth systems, and change their attitudes and behaviors as a result of this awareness?
5) To what extent do girls increase their fluency in the innovation process and preparedness for the engineering workforce?
6) To what extent does staff capacity to engage girls in integrating innovation with science content grow at GIAC?

Instrument development
Evaluators met to specify the constructs contained in the research questions, and to develop items to assess each construct. Constructs described knowledge, attitudes, and behaviors of interest. Where possible, evaluators used items from previously validated instruments.

The survey instrument includes the following sections:

Background: demographics, STEM coursework, STEM extra-curricular and other types of activities, future education plans

STEM Attitudes and Interests: interest in science and math, usefulness of science & IT, efficacy of scientists in improving the world, likelihood to choose a STEM career, preference for activities that foster innovation, and attitudes and behaviors related to the environment

Awareness: identifying the education and experience needed to have a desired STEM career, awareness and understanding of environmental issues

Content Knowledge: science, engineering, and innovation concepts aligned to the content girls learn in the curriculum

The survey was piloted with four middle school girls from a local multicultural youth development organization. The girls took the survey and then provided feedback on their understanding of the questions and the appropriateness of various response options. All feedback was taken into account in revising the survey before administering it to program participants. See Addenda for the Survey.

Comparison group recruitment
Over the three years of the project there will be three cohorts of girls, each with approximately 45 girls in the treatment group. In order to counteract an expected attrition rate of approximately 25% each year from the comparison group and to promote good matches to the treatment group, the comparison group for Cohort A will contain approximately 90 members, for Cohort B approximately 60 members, and Cohort C approximately 50 members.

Summative evaluators enlisted contacts at middle schools in the vicinity of the Girls Inc. of Alameda County, in the cities of San Leandro and Oakland, and also at other Girls Inc. of Alameda County programs to assist with recruitment of girls for the comparison group. These efforts yielded 22 volunteers for the comparison group. Evaluators then expanded their efforts by contacting Girls Inc. programs throughout the state of California. These efforts are ongoing, and are expected to achieve the goals for the completion of the comparison group.

Next steps
Evaluators will continue to recruit for the comparison group, and will begin to administer the Survey to the comparison group girls. Comparison group girls will have the option to complete the survey online or to receive a paper copy in the mail to be completed and returned.

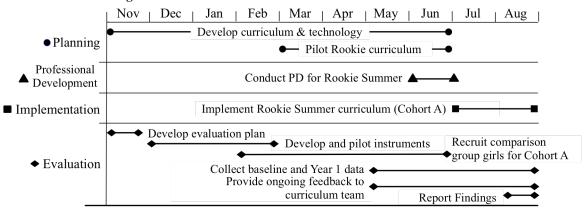**Support from Sources Other than NSF**
The computer equipment used in the program is existing GIAC equipment funded through various GIAC funders.

Three environmental organizations supported the program by providing field trip opportunities for the girls: Save the Bay; Solar Living Institute; and Albany Bulb.

Project Schedule and Status
As outlined in our project's proposal, we have successfully completed all of our deliverables for curriculum development, professional development, implementation, and evaluation. We have piloted and implemented the summer curriculum of Unit 1. Findings from the first implementation will be analyzed in August and September.

Year 1: Nov 2008-Aug 2009

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug

● Planning — Develop curriculum & technology — Pilot Rookie curriculum

▲ Professional Development — Conduct PD for Rookie Summer ▲——▲

■ Implementation — Implement Rookie Summer curriculum (Cohort A) ■——■

◆ Evaluation — Develop evaluation plan — Develop and pilot instruments — Recruit comparison group girls for Cohort A — Collect baseline and Year 1 data — Provide ongoing feedback to curriculum team — Report Findings

The team is on track for implementation of Units 2 and 3 during the 2009-2010 school year.

Project Challenges

Curriculum development
One of the strengths of this program and its ITEST predecessor, Build IT (ESI-0524762), is the use of the co-design process by two organizations: one with strengths in the learning sciences (SRI) and the other with strengths in youth development (GIAC). In Build IT, our first ITEST grant, we learned that seeking agreement on the curriculum was key to the strength of the curriculum and assessments (Koch, Gorges, Penuel, Haertel, & Bryan; in press). When both parties brought their expertise to the table, the curriculum and youth benefited.

The past nine months have proved very challenging for the curriculum team. There is a tension between the science curriculum and the youth development perspective. As mentioned above, this tension is key and effective as long as resolutions are achieved through effective iteration. We have made some modifications to the team, including adding Dr. Christopher Harris, a researcher and science curriculum writer with expertise in Earth system science and assessment, to the team. Dr. Harris is a recent hire at this grant's prime organization: SRI International's Center for Technology in Learning. We are also incorporating more of the GIAC format for curriculum into our existing format from Build IT. That format includes

> 1. Open activity/warm up that provides girls with a common experience or challenges their thinking on current practices.
> 2. Maximum of 10 minutes information sharing by instructor.
> 3. Girls practice with these new ideas. They need chances to fail and learn from mistakes.
> 4. Main activity that enables participants to apply this information to their own settings = implementation.
> 5. Girls reflect on what they've learned in a group discussion.

We are also adhering to a scheduled iteration process in order to make sure we have time to make necessary changes prior to curriculum planning and enactment by GIAC.

Staff Training and Development
Four program leaders participated in four 4-hour sessions. The two managers of the program felt confident from their experience piloting the curriculum and participating in the co-design of the curriculum to co-facilitate the PD with SRI and TERC. This early adoption of leading the PD indicates staff is developing the capacity to facilitate the InnovaTE^3 curriculum. See Addenda for agenda and materials used in the PD>

Outreach Activities
In addition to the project's advisors, the development team has reached out to environmental and STEM organizations and individuals for field trips and as resources for the curriculum.

ADDENDA

Advisory Board
The Advisory Board includes **Ian MacGregor**, former director of Geosciences at NSF; **Barbara Heydorn**, director of SRI's Center of Excellence and Energy, with expertise in innovations practice for clean energy and technologies; **Brenda Stegall**, director of National Programs and Training for Girls Inc.; **Steve Gerrish**, a leader in cradle to cradle innovation and design for sustainability; **Lucinda Sanders**, CEO of the National Center for Women and Information Technology; **Patti Schank** educational technology; and **Ripudaman Malhotra** expert in eco-innovations, specifically chemistry and engineering related projects.

Several of the advisors attended the project's kickoff meeting and have been contacted individually for input into the curriculum based on their expertise.

Documents from InnovaTE³

All of the documents developed by the InnovaTE³ team are available on the project wiki, accessible at **https://wiki.sri.com:1800/display/ITER/InnovaTE3+Reporting**
Login: nsf
Password: buildit

Curriculum Documents
The curriculum documents include 4 weeks of curriculum, a session planner, plus supporting materials.

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In Week 2, Girls learn that earth is a system and that wasted energy results in CO2 generation that leads to global warming.

In Week 3, Global warming activities encourage girls to think of solutions to these issues in preparation for developing innovations for alternative energy sources for a home.

In Week 4, Girls learn the innovation process in the context of developing solutions for a building & community that they design.

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- Save the Bay (22 girls on July 10). Girls participated in Save the Bay's Watershed

Education Program, exploring watershed issues by on the water and land.
http://www.savesfbay.org/site/pp.asp?c=dgKLLSOwEnH&b=479747

- Solar Living Institute (all 45 girls on July 17). The institute promotes sustainable living through environmental education. Girls visited the Solar Living Center to experienced renewable energy, sustainable living, alternative fuels, natural buildings, and gardening.

Professional Development for Girls Incorporated of Alameda County
The agenda for the 4 day (4 hours each day) professional development highlights the participants, leaders and their roles, and the activities for each day. The powerpoint slides for 3 of the 4 days were used to guide activities and discussions.

Evaluation Documents
The following protocols and logic model were developed for the formative and summative evaluations:

1. Logic model
2. Pilot observation protocol
3. InnovaTE³ survey
4. Girl interview protocol
5. Staff interview protocol
6. Instructor interview protocol
7. Summer session observation protocol
8. Summer session observation debrief form

Logic model
The evaluation and curriculum development team participated in the creation of the logic model to establish the project's goals and evaluation focus.

Pilot observation protocol
The purpose of the protocol was to capture the degree to which the curriculum was implementable, whether it engaged girls, which activities worked and which activities did not work.

InnovaTE³ survey
The survey focused on girls' attitudes toward STEM-related content, careers, and ideas. It elicited responses about dispositions toward innovative practices and environments. It also assessed girls' knowledge of curriculum-specific concepts and ideas. GIAC staff administered the surveys at the start of the summer program. The survey results will be applied to the summative evaluation analysis and formative evaluators will also used it to gauge the efficacy of the program, in particular as the data is integrated with the case study findings.

Girl interview protocol

The interview protocol for participating girls was intended to elicit information about constructs central to the curriculum. The questions were oriented around the following ideas:

- Implementation:
  - Girls' experience of the curriculum
  - Social context of the implementation
  - Learning
  - Girls' interests and connections with ideas in the activities
- Formative:
  - Girls' awareness of problems in their community
  - Problem solving strategies
  - Thinking and planning careers
  - Fixed versus growth mindset

Staff interview protocol

Based on staff's experiences on site as well as ongoing communication with instructors, the staff interview protocol was designed to gather data on how staff viewed the curriculum in the following aspects:

- Implementation
- Outcomes for Girls
- Outcomes for GIAC
- Next steps

Instructor interview protocol

The instructor interview protocol elicits information about how instructors experience the curriculum, their assessments of the girls' interest and engagement with the lesson plans and various activities, challenges they face while implementing and what modifications they make to the curriculum in response. It also asks about supports they have received from various stakeholders. It asks the instructors to discuss their experience with the professional development, the impact of the program on future work, and what next steps they will take.

Summer session observation protocol

The observation protocol was designed as an open-ended running documentation of curricular activities with attention paid to the following constructs:

- Girls' engagement
- Collaboration
- Roles
- Content
- Innovation
- Technology use
- Instructors
- Mathematics

Summer session observation debrief form

The observation debrief asks observers to summarize observations on the basis of the constructs outlined above.

Presentations
PI gave a presentation to Exploritorium staff on July 22. 2009. Scaling Build IT, the middle school program developed by the SRI and GIAC team, and the goals and approach of the InnovaTE[3] program were the focus.

ITEST PI Meeting (February 2009) Washington, DC. *InnovaTE[3] description flyer, poster* and *Scaling Build IT* presentation.

Singapore Innovation Workshop (January 2009). Singapore. The PI co-lead a 5 day workshop with Singapore's National Institute of Education for educators to bring innovation practices into their schools and classrooms, and to foster students' innovation skills. Introductory activities from InnovaTE[3] were used. This work with Singapore is ongoing and will continue to inform and be informed by InnovaTE[3].

References
Koch, M., Gorges, T., Penuel, W. R., Haertel, G., & Bryan, M. (in press). Checking in on youth learning without youth checking out: Developing and implementing embedded assessments of youth learning for an informal learning environment. *Journal of Advanced Academics*.

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