Building Relationships that Foster a STEM Continuum for Girls

February 25, 2010

Kiku Johnson, Girls Inc. of Alameda County

Christopher Harris, SRI International

girls inc.®
Girls Incorporated® of Alameda County

SRI International

TERC

InnovaTE3

NSF

Presentation Overview

- Who We Are: Project Background and Partners
- InnovaTE³: Mission, Goals, Curriculum, Participants
- STEM Continuum Programming
- Strategies for Building Relationships
- Youth Development Approach
- Evaluation
- Successes & Challenges
- Discussion

Project Background

STEM continuum for girls across 2 afterschool ITEST programs:

Build IT	InnovaTE3
• 2 yr middle school program	• 4 yr middle & high school program
• Design-based curriculum that integrates computer science and mathematics	• Environmental engineering and innovation curriculum; develop ecologically sustainable innovations
• Promotes girls' IT fluency and knowledge of IT careers	• Value and persist in STEM learning and see pathways for STEM coursework and careers
• Prior 3-year project, 2005-2008 (now in scale-up)	• Current project 2009-2013

Partners

girls inc.®

Girls Incorporated® of Alameda County

Girls Incorporated of Alameda County

- Part of a national organization with 1,500 program sites
- 800,000 K-12 girls nationally served each year
- **Inspiring all girls to be Strong, Smart, and Bold:** out-of-school experiences that address the whole girl: sports, STEM, health, leadership & interpersonal relationships, homework help, career & college preparation

SRI's Center for Technology in Learning

SRI International®

- Part of a nonprofit scientific research & development organization
- Improve learning and teaching through innovation and inquiry
- Research, development, and evaluation expertise
- Focus on formal and informal learning environments

TERC

TERC

- Mathematics and science education in pre-k through college
- Research, curriculum and technology development, and professional development
- Focus on formal and informal learning

InnovaTE³

Girls Innovating with Technology as Entrepreneurial Environmental Engineers

Youth-centered environmental engineering and innovation curriculum (summer and school year)

- Uses a cradle to cradle paradigm (rather than cradle to grave)
- Aims to intrigue and challenge girls to develop ecologically sustainable innovations
- Motivate girls to explore the STEM fields and careers needed to address these important problems

InnovaTE³

InnovaTE³ Goals

InnovaTE³ encourages girls to:

- Value and persist in STEM learning
- See pathways to STEM career
- Understand concepts in Earth system science
- Become fluent in innovation and engineering practices

InnovaTE³ also builds ***Girls Inc.'s*** staff capacity to implement and sustain the InnovaTE³ program

InnovaTE³

InnovaTE³ Curriculum

Year 1: Ecological Impact: Healthy Buildings & Communities

- Exploration of the causes and impact of global warming
- Girls investigate and redesign their own communities, including new buildings for greener living using Google SketchUp and Google Earth
- Girls iterate on their own innovations with the support of STEM professionals

Year 2: Ecologically Sustainable Energy

- Girls explore the challenge of tapping into Earth's energy systems in sustainable ways to achieve ecologically-sustainable energy flows
- Girls iterate on their own innovations with the support of STEM professionals

Years 3 & 4: Pursuing Interests

- Self-directed science inquiry into specific environmental issues and technologies
- Internships w/STEM professionals and focus on college preparation for STEM areas of interest

InnovaTE³

InnovaTE³ Participants

- 135 high school girls in Alameda County, CA
- More than 80% are African American and Latina
- Majority comes from low socioeconomic households
- Girls are recruited to InnovaTE³ through Girls Inc.'s community relationships and existing high school programs
- Eventually reaching more than 300 girls in Alameda County annually

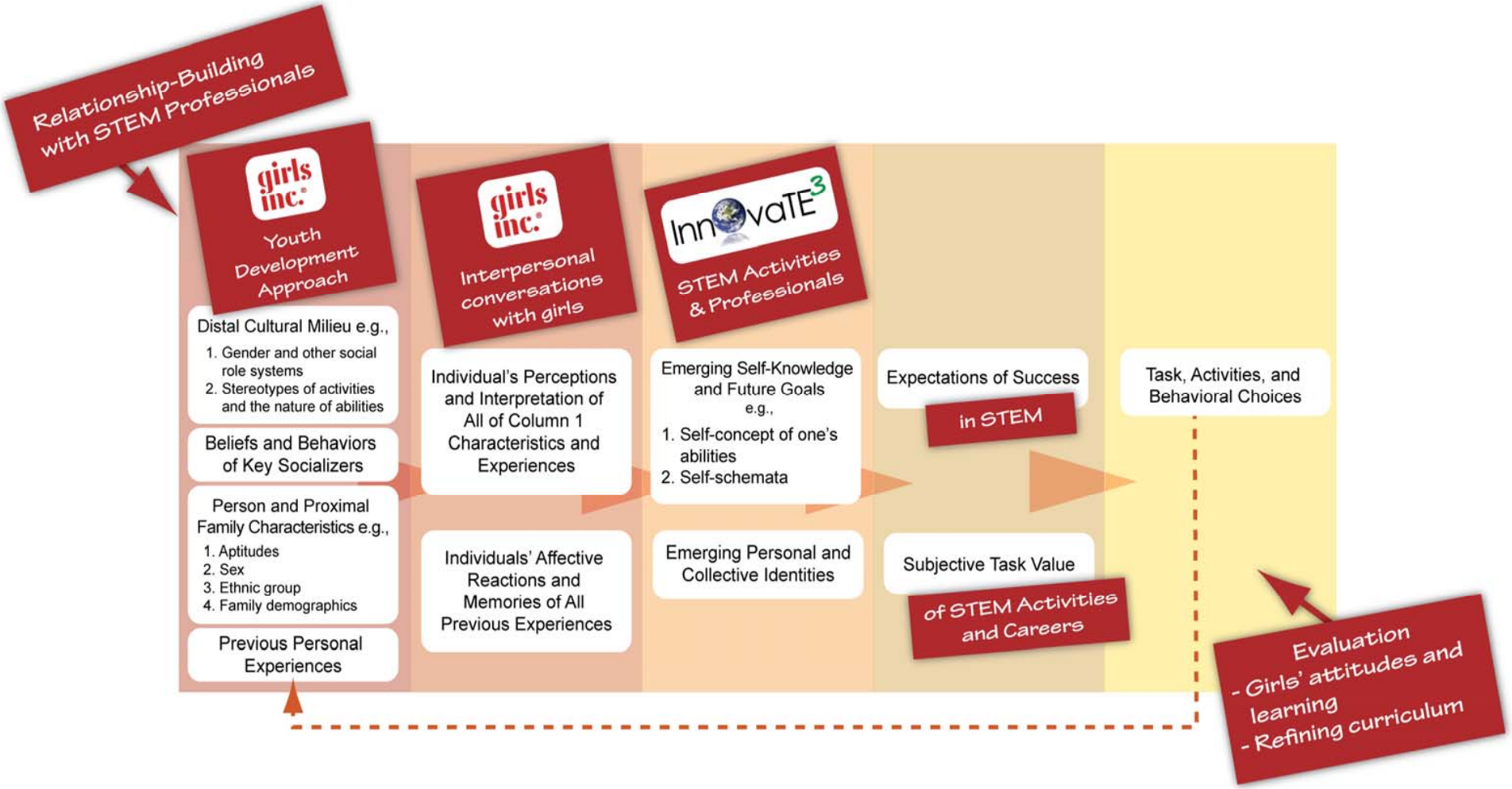
A STEM Continuum for Girls

How can we provide sustained support from middle school through high school that helps girls see STEM as relevant to their lives and as appealing and achievable career choices?

- Identify factors that influence girls entry into STEM:
  - Value girls positions on STEM careers
  - Perceived success in STEM coursework and fields
  - Interest in STEM topics

  (Eccles, 1994, 2006, 2007; Brickhouse, Lowry & Schultz, 2000)
- Create a six-year STEM continuum for middle and high school girls within the Girls Inc. afterschool program

Influencing Girls STEM Choices



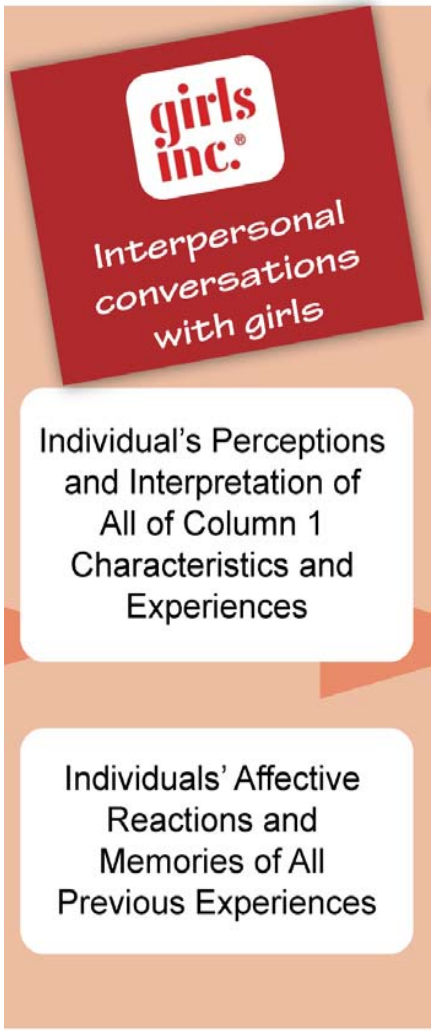
InnovaTE3

Adapted from Eccles, 2009

Key Socializers

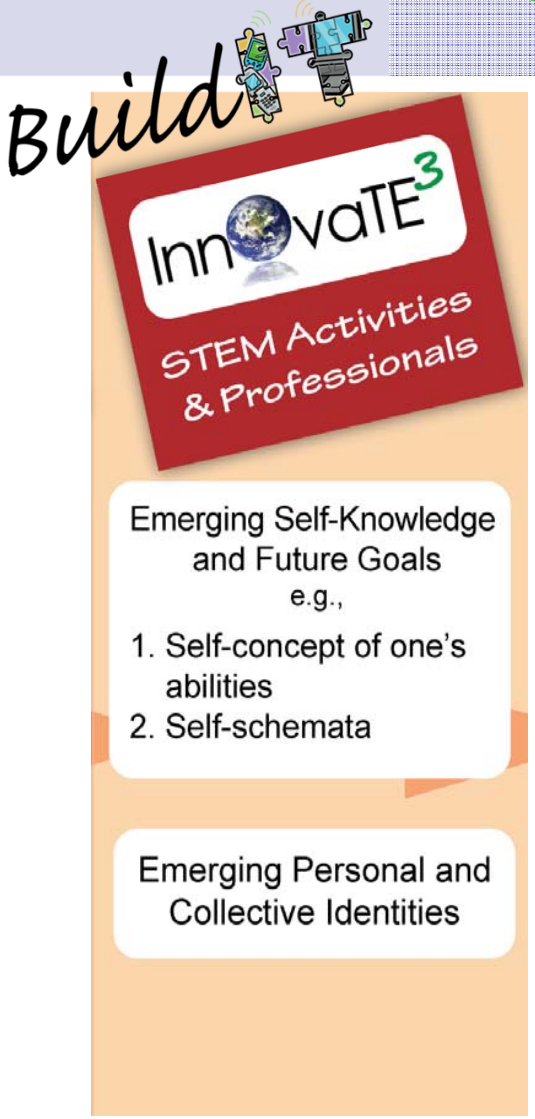
- Girls are influenced by
  - The cultural setting such as gender and racial roles
  - Personal and proximal family characteristics
  - Pervious personal experience
  - Beliefs and behaviors of key socializer, such as Girls Inc.

Interpretations & Interpersonal Conversations



- Girls interpret this information, often on their own
- Girls Inc. has conversations individually and facilitates group conversations frequently about cultural, gender, and racial stereotypes that affect them
- Girls are not alone to interpret their world and who they can be in it

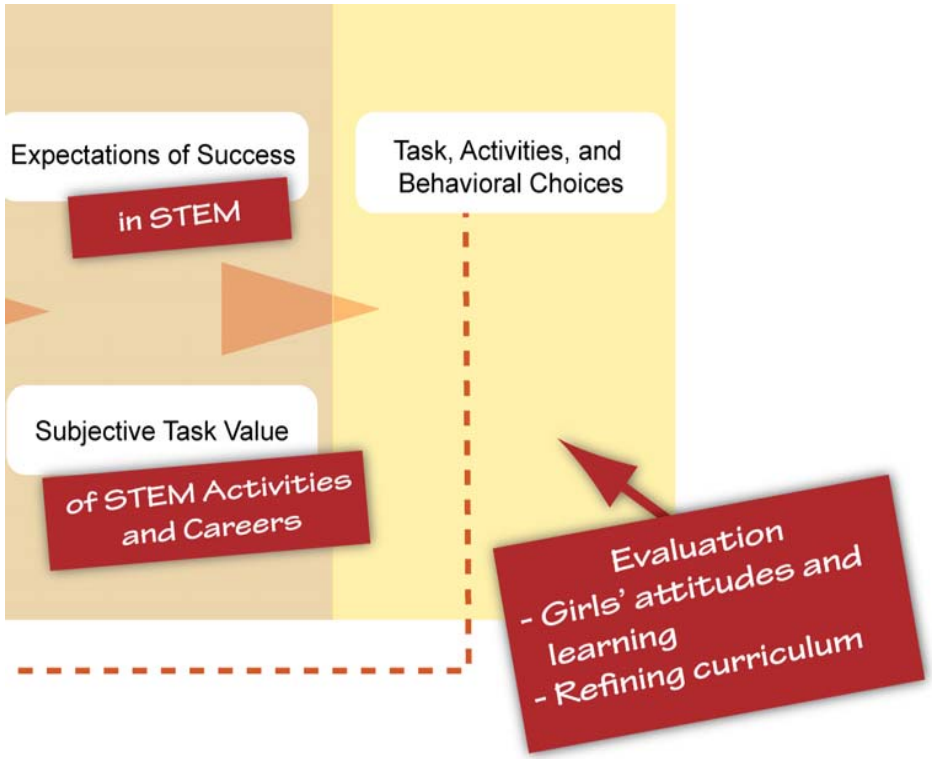
Knowledge & Emerging Self



- Connecting STEM to girls' lives and sense of emerging selves
- Learning science and youth development-based programs Build IT and InnovaTE3 give girls experiences to expect success in STEM and to see its value
- STEM learning situated in the strong youth development context

InnovaTE3

Expecting Success &Valuing STEM

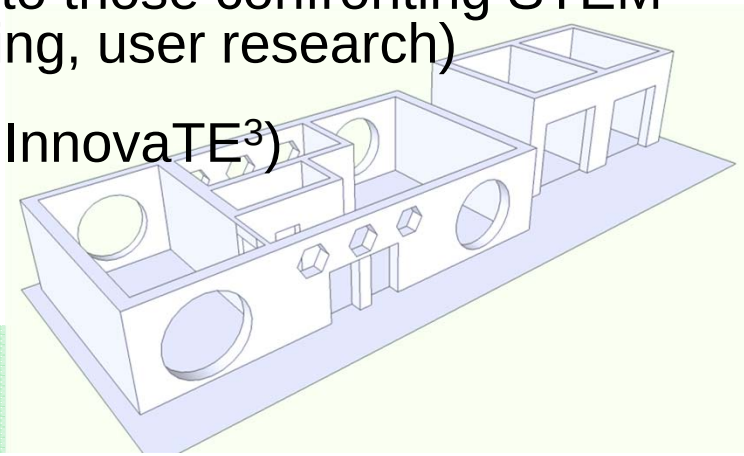


- The three previous columns of the model influence girls' expectations of their success, in this case in STEM, value of a STEM task
- Build IT and InnovaTE3 use summative and formative evaluation tools to see if they are impacting girls' attitudes and learning
- The evaluation helps to refine the curriculum

InnovaTE3

InnovaTE^3 Curriculum features bridging girls, staff & STEM professionals

- Field Trips and visits from STEM Professionals
- Innovation Pitches (presentations) to STEM professionals, peers, and community
- Staff referring to careers throughout curriculum (e.g. trading cards)
- Staff co-leading with STEM professionals, making connections for them and girls to the curriculum
- Girls using similar tools and practices that STEM professionals use (e.g., Google SketchUp, Object-oriented programming)
- Girls working on topics and issues similar to those confronting STEM professionals (e.g., designing, programming, user research)
- Internships (To be developed in Year 3 of InnovaTE^3)



InnovaTE^3

Strategies for Building Relationships with STEM Professionals

1. Establish relationships with several individuals from the organization
2. Make available short and convenient opportunities for interaction
3. Co-plan, schedule, follow up & confirm goals and expectations
4. Discuss how to maintain the relationship, making it a mutually meaningful community giving opportunity
5. Youth agency program manager needs to lead initial charge of contact as the project is in the hands of youth agency

InnovaTE^3

Structures for Building Relationships with STEM Professionals

1. Having program & protocol in place which becomes part of the curriculum and process
2. Ongoing contact and bi-directional feedback
3. Training for STEM professionals is essential

Youth Development Approach

Core setting expectations and tools that foster the learning process

1. Safety
2. Supportive Environment
3. Active Learning
4. Choice
5. Community Involvement
6. Cooperative Learning
7. Leadership Development
8. Meaningful Involvement
9. Skill Building

InnovaTE3

Evaluating Impact

- **Interviews** [formative]
  - girls
  - staff
  - professionals
- **Observations** [formative]
  - girls & staff interactions
  - girls interactions with STEM professionals
- **Survey** [summative]
  - girls

InnovaTE^3

Preliminary Findings: What We're Learning

- InnovaTE³ is finishing it's first year of curriculum implementation
- 1st year data available in summer 2010
- What we're seeing as important:
  - Staff scaffolding career connections
  - Interactions with STEM Professionals helps girls to view STEM coursework and careers as appealing and attainable
  - Intentional activities that relate both to girls everyday lives and to STEM generates enthusiasm, pride, and increased interest with their communities

What We're Learning: Challenges

- It can be daunting to get past the hurdle of reaching out to professionals
- Staging and sequencing the multiple components of the program
- Easier to bring the STEM professionals in, but harder to bring the girls to the professional sites
- Training both STEM professionals and staff

Discussion

Kiku Johnson, Girls Incorporated of Alameda County

kjohnson@girlsinc-alameda.org

Christopher Harris, SRI International

christopher.harris@sri.com

InnovaTE3