BuildIT
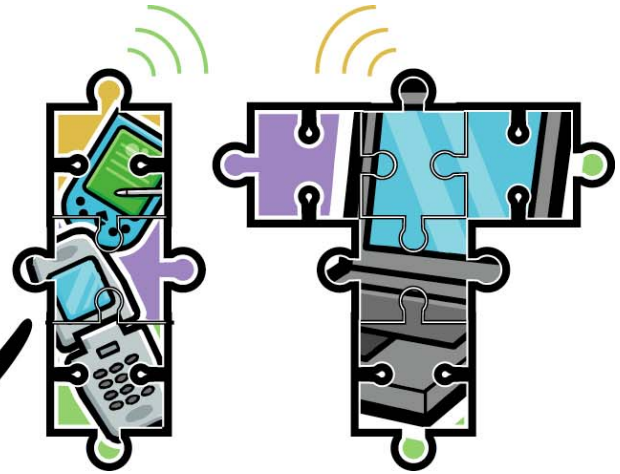
Girls Building Information Technology Fluency Through Design

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Our IT Workforce

- **Information Technology Workforce issues**
    - Current IT workers retire and move into other business areas (Gartner, 2005)
    - Decline in number of individuals graduating with computer science undergraduate or graduate degrees. As much as a 39% drop in some cases (Computing Research Association, 2005)
    - IT labor needs continue to grow and change with technology innovations (U.S. Depart of Commerce, 1999s)

- Women constitute 45% of the workforce in the U.S. but hold only 12% of science and engineering jobs in business and industry (National Council for Research on Women, 2001).

Girls & Technology

Middle and high school girls comment about their use of computers (interviews by the Commission on Technology, Gender, and Teacher Education, 2000):

"We can, but we don't want to."

"Girls have other priorities. Guys are more computer-type people."

Computer science instruction that emphasizes the 'web' of associations between programming, design, and other areas of the curriculum would help to attract a more diverse group of learners, and would advance computer fluency for all students.

(*Tech-Savvy*, AAUW, Commission on Technology, Gender, and Teacher Education, 2000).

Mission

Develop a problem- and design-based curriculum that promotes middle school girls' information technology (IT) fluency and incorporates the STEM content of computer science and mathematics.

Goals

Motivate middle school girls to
- use technology
- build and strengthen their technology fluency
- take high school algebra and geometry courses in preparation for postsecondary STEM education and/or IT careers.
- explore IT and pursue IT careers.

The Team & Participants

The Team

- SRI International's Center for Technology in Learning
- Girls Incorporated of Alameda County
- Advisory board members with expertise in assessment, evaluation, technology, and youth development;
- IT professionals
- HTA as the summative evaluation lead

Participants

- 150 middle school girls in Alameda County, CA.
- 82% are African-American and Latina
- majority comes from low socioeconomic households
- disseminate to Girls Inc.'s 1,500 program sites nationally

Build IT Approach
Portable materials for distribution

- Develop problem- and designed-based curriculum
  - Follow the *Understanding by Design* (UbD) approach.
  - Teach computer science concepts through design and communication technologies.
  - Connect computer science topics and mathematics concepts.
  - Provide participatory design team experiences.
- Develop frameworks for involving local IT professionals.
- Provide youth staff professional development materials
- Embed formative assessments (i.e. Performances) for evaluating technology fluency to provide
  - evaluators, teachers, parents, and youth staff with evidence of student learning,
  - youth staff with formative assessment data they can use to adjust instruction
  - girls with information to reflect and iterate on their work.
- Conduct formative and summative evaluation to inform the iterative design of the curriculum and to understand what girls are learning.
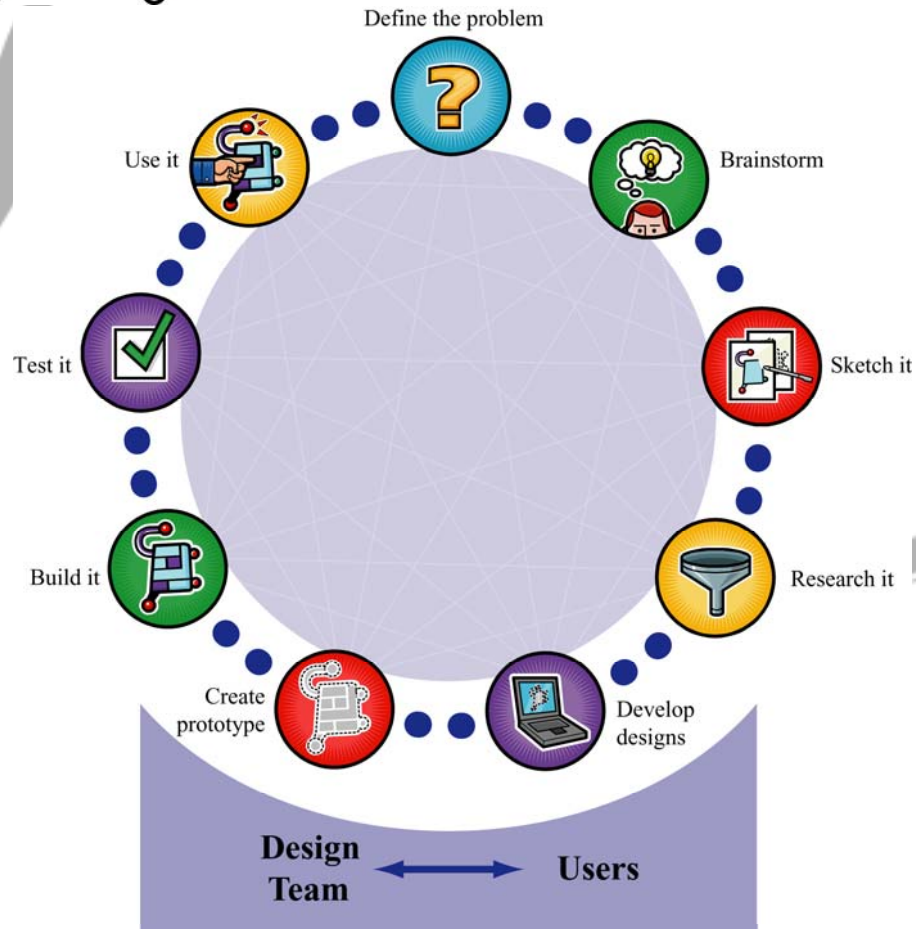
UbD

- What do we want girls to learn?
  - Being Fluent with Information Technology
  - Secretary's Commission on Necessary Skills
  - National Council of Teachers of Mathematics
- What evidence will show that they've learned it?
  - Embedded Performances (activities and Family Tech Night presentations)
  - Interviews & Observations
  - IT Attitudes Survey
  - IT Concepts Survey
- *Then* the develop the activities

Unit 1
The Design Process

- Unit 1: Redesigning Your World (one semester, after school; Apprentice level).

    - **Performances**: *Elements of the design process*; Eliciting and incorporating users' feedback; Presenting the Design Process

Define the problem

Use it

Brainstorm

Test it

Sketch it

Build it

Research it

Create prototype

Develop designs

Design Team ← → **Users**

Six Units
240 contact hours

- Unit 2: Design Online: Communication Tools, the Web, and the Internet (one semester, after school; Apprentice level).

  - **Performances**: *Form and function*; Linking blog pages; Model how email and web page information travels on the Internet; Presenting their blogs and demonstrations of how the Internet works

- Unit 3: Redesigning the Web (two weeks during the summer; Apprentice level).

  - **Performances**: *Functionality can be visible or hidden*; *role of engineering conventions;* Draw what the html will do.

- Unit 4: Communication Tools and Mobile Devices (two weeks during the summer; JourneyGirl level).

- Unit 5: Finding the Right Tool for the Job (one semester, after school; JourneyGirl level).

- Unit 6: Troubleshooting (two weeks during the summer; JourneyGirl level).

Questions We Are Addressing

- Are girls who participate in Build IT more likely to become interested in IT careers and make plans to take courses in high school to help prepare them for those careers?

- Do girls who participate in Build IT become more knowledgeable about IT careers and learn more basic IT concepts?

- Do girls who participate in Build IT develop more contemporary IT skills and intellectual capabilities for IT?

- Does Girls Inc. grow in its capacity to offer programs focused on developing IT fluency over the course of the project?