

# Guide to Promising Practices in Informal Information Technology Education for Girls

NCWIT | GIRL SCOUTS OF THE USA



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Dear Educator:

This *Guide to Promising Practices* is designed to help with your efforts to interest, educate, and support girls in learning about information technology (IT). This resource specifically targets informal education programs in IT that serve girls between grades 6 to 12. Its purpose is to share effective practices crucial for improving girls' experiences in IT.

These practices have been identified by a recent project sponsored by the Girl Scouts of the USA, the K-12 Informal Education Hub of the National Center for Women & Information Technology (NCWIT) and a number of other research studies. The Girl Scout project, conducted by the Puget Sound Center for Teaching, Learning and Technology (PSCTLT), surveyed 156 informal IT education programs nationwide, asking them which promising practices most contributed to the success of their programs. The contents of this guide are based on their responses and corroborating evidence from site visits to four programs.

The site visits provided a fuller picture of how practices identified by the survey contribute to program success. Promising practices were observed in action, and details were provided during interviews with instructors and program directors, and focus groups with program participants. The programs selected for site visits served girls only, rather than being co-educational, since these sites were more likely to use and have knowledge of promising practices for girls.

This guide identifies the top eight promising practices as identified by the educators surveyed, and it includes specific examples of how promising practices were used at the four programs visited. For each practice, we also include relevant quotes from girls involved in the different programs.

We hope that your program will find this resource useful in your curriculum planning and improvement efforts. Although this guide is especially geared toward IT programs, research suggests that many of the practices are also applicable to other informal education programs.

Sincerely,



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## Promising Practice #1:



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### Examples

*Examples of hands-on activities observed during site visits to informal IT programs included:*

- *Groups of girls building a robot that could accomplish certain functions*
  - *Programming a computer game*
  - *Writing code to a word game*
  - *Girls interacting in a simulation environment and experiencing technology as though they had a disability*
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## Make it hands-on! Provide active learning experiences.

### Overview of Practice:

Hands-on learning experiences engage participants in activities where they learn by doing rather than taking a more traditional role of reading and writing. In a national survey of informal IT education programs, hands-on activities received the highest rating of practices that contribute to a program's success (4.9 on a 5 point scale). It was also most frequently identified as being among the top five most important practices for informal IT programs.

Hands-on activities can be useful for challenging participants in a group with a large range of background knowledge and skills. They involve multiple learning modalities and, therefore, retention of content is higher. Participants enjoy the interactive elements and often develop a sense of accomplishment that comes from completing an activity.

### Key Strategies/Tips:

- Communicate the goals and background information about the activity so participants are able to relate it to a learning concept or product they are going to create
- Ensure that the activities challenge diverse sets of learners
- Allow participants to make mistakes and problem-solve on their own
- Explain what to do and why rather than doing it for participants
- Relate activities to relevant real-life experiences
- Place participants in groups to practice collaboration and team work skills

### Quotes:

“By providing the girls with hands-on experiences during camp they were able to retain the information learned and hopefully apply it in other situations. What made the hands on activities so successful was the small group size, the low student to staff ratio, and verbal support from instructors. Through utilizing a variety of teaching styles and having appropriate technology available, the information was retained.”

— Survey Respondent

“Our curriculum is primarily hands-on and lab-based, with students building projects and actively solving problems in teams. Our surveys (intake to program exit) show a dramatic increase in the students' confidence and self-rated ability to tackle engineering, computer science, and applied math subjects.”

— Survey Respondent

“Girls love this program because they can explore through hands-on activities—there's not a lot of ‘sitting around’ and it's ‘not too much like school.’”

— Survey Respondent

## Promising Practice #2:



### Think small groups! Create opportunities for girls to work with others.

#### Overview of Practice:

Girls enjoy more collaborative work, rather than engaging in competitive tasks. Informal education programs are often viewed as opportunities to be social and meet people. In a nationwide survey of informal IT education programs, opportunities for participants to work together with others received the second highest rating of practices that contribute to a program's success (mean of 4.73 on a 5 point scale).

Group work also provides opportunities for participants to gain other skills such as how to function in a team and effectively communicate in group settings. Participants can learn from one another and practice using IT terminology and articulating IT concepts.

#### Key Strategies/Tips:

- Assign group member roles so every participant has a way to contribute
- Create diverse groups so that participants can learn from one another
- Model team work by having multiple instructors collaborate
- Allow more time for activities, as working in groups usually takes longer than working individually

#### Quotes:

“It is easier to work with pairs, when you work together and use teamwork.”

—Participant

“We pay special attention to the social dynamics of the programs and do social engineering so that all girls get to interact with one another and practice teamwork.”

— Survey Respondent

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### Examples

*Group work was observed during site visits to informal IT programs. In the participant interviews, multiple girls commented on how fun it was to meet new people or to work with their friends. The social aspects of the programs created an energized atmosphere where girls were animated and excited to engage in the activities.*

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## Promising Practice #3:



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### Examples

*An example of a project-based learning activity that uses inquiry methods and is relevant to girls is one where the participants create a solution for creating more computer games that appeal to girls. Participants will have to find out what prevents girls from playing existing computer games and what would attract them to others. Next, they might work to create a game and assess its appeal to girls.*

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## Make it real! Provide project-based learning activities that relate to real-life issues that interest girls.

### Overview of Practice:

Project-based learning activities are typically related to real-life issues and involve inquiry learning strategies where participants create questions they then try to answer. Learning occurs in the process of creating a testable question, choosing methods to investigate that question, interpreting results and creating a final product that incorporates findings. In project-based learning, participants' roles are similar to those working in the IT field.

Participants are easily engaged and motivated in their work when it is something they are interested in, and that is relevant to their lives. Relevant content will vary based on participant characteristics. Instructors take a guiding role in advising the participants by facilitating the learning activity rather than transmitting information.

### Key Strategies/Tips:

- Survey the participants prior to planning activities to find out what would be interesting and relevant to their lives
- Discuss explicitly the connections between activities and the real-world
- Encourage participants to come up with questions and think of how to answer them on their own
- Stress that project-based questions are not easily answered and have no wrong or right answer: answers are constructed from the information gathered and analyzed by participants
- Promote projects that involve participants in improving their community
- Find a “real-world” audience for the results of the activity—this should add motivation to learners and accuracy to their results

### Quotes:

“Any hands-on activities work very well for the girls as do examples where we tie together what the project is with real-world examples. We’ve noticed that projects are much better received when we tie them to something in the ‘real-world’ that matters to the girls.”

— Survey Respondent

## Promising Practice #4:



### Examples

*DigiPen Institute operates a grant-funded technology camp for middle school girls in Seattle, Washington. During the camp, girls learn how to program their own computer games. Participants mentioned that they enjoyed expressing themselves through their work and showing their personalities. The program director recognized the importance of giving girls choices in designing their games. The instructor noted that the girls were proud of the work they designed on their own. Similarly, one participant said, “After you finish any game, you get all proud—that sense of accomplishment. I felt proud when I was done.”*

## Allow for exploration! Offer opportunities for girls to use technology to explore, design, and create.

### Overview of Practice:

Participants enjoy having time to explore aspects of information technology, whether by investigating a computer programming language or playing with robotics. They should be given time to experiment with different settings, features, applications to become more familiar and comfortable with the technology.

The creative and design features of informal learning activities can invoke a sense of ownership in projects as participants often feel that their personality shows through their work. They identify with the product of their activities and gain a sense of pride when it is a reflection of themselves.

### Key Strategies/Tips:

- Allow time at the beginning or end of sessions for participants to “play around” with technology
- Integrate design into activities by having participants add backgrounds, color or other graphic elements
- Encourage participants to show each other what they have learned, or to support each other by answering questions and discussing features of programs
- Select a program location that allows access to technology for exploration, design, and creativity

### Quotes:

“They were really proud of what they made and the fact that they built this themselves. The design process and I did this, the sense of accomplishment.” —Instructor

“Girls need to be able to personalize their games, make their own choices about actions and about what their games look like.” —Program Director

## Promising Practice #5:



### Examples

*Sally Ride Science Camp is an overnight camp run by Education Unlimited on college campuses across California. At a Berkeley robotics session, the instructor spoke about the importance of forming positive relationships with participants, “Developing that rapport, that’s the number one most important thing... Personality and getting along is a big part of it. Someone who is considered ‘cool’ has a much easier job getting students involved. They’ll be excited to build it (a robot).” The program director specifically looks to hire staff that are, “Smart, flexible, open to different ways that people do things” as well as academically prepared. Observing the camp, it was apparent that participants got along well with their instructor and enjoyed her guidance and humor.*

## Staff matters! Employ experienced staff (or volunteers) that can relate well to girls and create a fun atmosphere.

### Overview of Practice:

Program instructors and staff that work directly with the participants have a lot of influence on the experience of the participants and the success of the program. Teenage girls are often shy and instructors can make them feel comfortable and excited to learn by being animated, using humor and being outgoing. Participants appreciate the relaxed learning atmosphere of informal education programs, and staff plays a large role in setting the program tone.

Participants tend to affiliate more with those who are similar to them, by age, ethnicity or gender, but it is possible to find other shared characteristics or interests that can help participants form positive relationships with staff members. Since the staff may be the only personal contact that participants have with somebody who works in IT, this relationship is even more important.

### Key Strategies/Tips:

- Find common connections between staff and participants
- Use humor during interactions with participants
- Set a relaxed atmosphere to make participants feel comfortable
- Provide constructive feedback in a positive manner
- Actively listen and validate participants’ comments
- Employ staff that are relaxed and comfortable around girls

### Quotes:

“If staff are fun and relate well to girls, girls like the program regardless of the topics. So staffing is even more important than fun or meaningful activities to connect the girls to our science goals.”  
— Instructor

“While I do think it is important to have good activities, we have found that good staff is far more important. If girls don’t relate to staff, the best activities in the world won’t mean much to the vast majority of the girls.”  
— Survey Respondent

## Promising Practice #6:



### Examples

*A challenge exists in how to recruit girls to informal IT education programs. Many girls-only programs strive to reach girls that have little or no experience or interest in IT. Additionally, co-educational programs often have difficulty attracting equal numbers of female participants. Programs suggest drawing girls in by recruiting groups of friends, as they enjoy doing activities with one another. Personal invitations support and encourage girls' interests and involvement in IT. It is also effective to advertise the program as being fun, rather than stressing academic aspects. Finally, girls like to know that what they will learn will be useful and relevant.*

## Build in “girls-only” time! Create opportunities for girls-only learning environments.

### Overview of Practice:

There are a large number of IT programs that serve girls only. In a national survey, programs designed for girls indicated that their girls-only environment strongly contributed to their success. However, many of the co-educational programs responding to the survey believed that their co-ed learning environment could also be effective for girls. The girls-only programs indicated that girls tend to feel more comfortable in a girls-only environment, and they are able to relax, learn, and take more risks. A single-sex learning environment also eliminates the problem of ensuring equal distribution of program resources, so that, for example, boys are not getting more time on the computers.

Girls-only environments increase the participants' awareness that there are other girls and women who are engaged in IT activities, supporting the idea that girls belong in the field.

### Key Strategies/Tips:

Even if your program is co-educational, there are practices you can adopt to ensure that girls feel comfortable in the learning environment.

- Create a time or space that is for girls only
- Include information on female role models, bring in female speakers, or assign participants female mentors
- Educate boys on the status of females in IT

### Quotes:

“One thing that is nice is that it’s all girls. If there were boys in the room, they would behave differently. They still think it’s geeky, so they might not act all excited.”

—Instructor

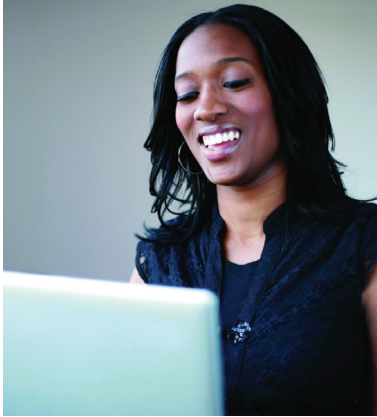
“Girls feel more free to experiment and hypothesize in an all-girl environment.”

—Survey Respondent

“The more comfortable the girls feel, the more open their minds will be to learning something. If all goes well, the girls won’t even realize they are being ‘taught’ something because they will be having too much fun doing the activity.”

—Survey Respondent

## Promising Practice #7:



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### Examples

*Program directors of several programs were observed to be readily available to support their staff and answer questions. They were all highly organized and resourceful. At the Sally Ride Science Camp, the program director met with staff in a weekend retreat before the program started to plan curriculum and share the program's philosophical views. The DigiGirlz program director brought in a community group to lead team-building activities, because she felt they had more expertise in that area.*

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## Leadership matters! Retain an experienced program director with strong leadership skills.

### Overview of Practice:

While staff practices are important because of their direct effect on participants' experiences, program directors who structure and plan the program influence other aspects of the program operation. Their role includes hiring and providing professional staff development, setting and communicating clear program goals, ensuring there is adequate funding to support the program structure and goals, engaging in program improvement efforts, and forming community partnerships.

Program directors can be powerful voices and proponents for their programs. It is beneficial when program directors hold strong personal beliefs in the purpose and goals of their program. They can serve as role models for the staff and participants by being strong leaders.

### Key Strategies/Tips:

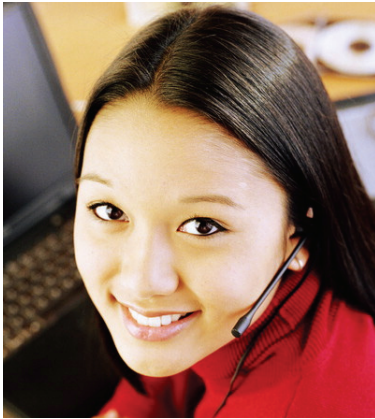
Successful program directors:

- Set clear program goals and communicate them to staff, participants, parents and other relevant groups
- Ensure adequate program funding to support necessary program components
- Solicit participant and staff feedback to address immediate problems
- Conduct and use program evaluations to improve program elements
- Form community partnerships and collaborations in order to capitalize on potential resources and expertise

### Quotes:

“Minority girls in the program think that they can be successful because their female minority Program Director has been successful. Students were motivated to be as successful as the Program Director, and they won multiple science awards at regional and national science competitions with projects they developed in our ‘Girl Power’ program.”  
— Survey Respondent

## Promising Practice #8:



### Examples

*Microsoft supports the DigiGirlz week-long technology camp for high school girls located on their campus in Redmond, Washington. The program features a number of career education activities, including a network sheet where girls write down an interesting fact and the contact information of Microsoft employees they meet. There are also job shadowing opportunities and lunches where Microsoft employees and participants eat lunch together at small tables. Sessions are offered in résumé building and job statistics, and during other sessions, the Microsoft volunteers speak about their daily job responsibilities and shared their career paths. Participants leave the camp with newly acquired IT skills, and contacts and information about how to succeed in IT.*

## Showcase career opportunities! Offer exposure to a variety of information technology careers.

### Overview of Practice:

In a national survey of informal IT education programs, the most commonly stated program goals included aspects of career education. Program directors are aware of the under-representation of women professionals in IT fields and work to increase girls' interest and awareness of IT to increase the probability that they will pursue education and careers in IT.

Career education can change the negative perception that girls hold about IT. Simply introducing a woman currently working in the IT field to girls can eliminate the stereotype that IT professionals are male. Matching participants with mentors working in IT was the most highly rated career practice on the survey. The personal connections made through one-on-one communication can be a powerful influence. It is valuable to stress the aspects of IT that might appeal to girls, such as the room for creativity, flexibility and appropriate compensation.

### Key Strategies/Tips:

- Match participants with mentors that they can communicate with on a personal level
- Engage participants in activities that reflect actual work done in IT
- Bring in speakers to speak about their experiences in IT
- Arrange field trips to expose participants to the reality of IT work
- Make it easy for women professionals in IT to volunteer

### Quotes:

“Our students are matched with e-mentors, women who work in STEM fields. Students value the e-mentoring relationship and it expands their knowledge of career options. Some mentors give ‘career talks’ when they visit clubs, and the girls enjoy those too, when they are done well.”

—Program Director

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