>> tech savvy girls

?*!

Resource Guide

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**Visit www.fcps.edu/fairfaxnetwork/savvy or www.aauw.org/research to order
a VHS copy of *Tech Savvy Girls* or to download additional resource guides.**

Tech Savvy Girls Project: The Background

Tech Savvy Girls is the result of the efforts of three women. These women accepted the challenge to educate parents and teachers on the importance of encouraging girls in technology and on how to make computer technology accessible and inviting to girls. After reading the American Association of University Women (AAUW) Educational Foundation report, *Tech-Savvy: Educating Girls in the New Computer Age* (2000), Elizabeth wondered what could be done so that the report's important research and its recommendations could be better understood and implemented by parents, teachers, and school counselors. Thus, the idea to make a video that translates the AAUW Educational Foundation's groundbreaking research into action began to evolve.

Elizabeth, Laura, and Clare had worked together over the past ten years with the Reston-Herndon Area Branch of the American Association of University Women in organizing the GEMS (Girls Excelling in Math and Science) Conference for fifth and sixth grade girls, held in the schools of Reston and Herndon, Fairfax County, Virginia. The GEMS conference brought together professional women— whose careers require math, science, and technology—who conducted hands-on workshops for the girls in their career fields. Clare and Laura also conducted a parent workshop at the GEMS Conference that emphasized the parents' role in encouraging their daughters to develop their interests and abilities in higher math, science, and technology courses throughout their school years. Additionally, Laura ran an after-school math and science club for fifth and sixth grade girls for seven years.

Laura and Elizabeth were also members of the Fairfax County Commission for Women, Girls, and Technology Advisory Committee, which meets quarterly to share information about ongoing programs and to facilitate networking for project development. Through this community coalition of approximately 40 organizations, Elizabeth and Laura had access to community resources and were encouraged to produce this video and an accompanying guide.

A special note of appreciation must be given to the Fairfax County Public Schools Department of Information Technology, the American Association of University Women (AAUW) Educational Foundation, Herndon High School, the Reston-Herndon Area Branch of AAUW, the Fairfax County Commission for Women, Dr. Mae Jemison, and Dr. David Sadker, for their commitment of time, expertise, staff members, and volunteers. Especially noteworthy are the contributions of Sandra Brennan and Lesley Persily. Sandra, a Fairfax Network producer-director, helped us navigate smoothly through the video production process. Lesley Persily, program manager for the Fairfax County Commission for Women, willingly gave of her time and expertise in identifying the many technology-related community and school programs in our area and providing relevant statistics.

In 2001, we received a $10,000 grant from the AAUW Educational Foundation to cover the costs of producing and disseminating the video, this guide, and other expenses that arose with this type of project. In turn, the AAUW Educational Foundation received a grant from the National Science Foundation (NSF) to more widely distribute these materials during the 2003-2004 school year.

The video presents girls, teachers, administrators, parents, and professional women in science and technology fields in one community telling their experience. It also highlights successes and pinpoints concerns in areas in which more work needs to be done. As we continue to discuss and research these issues, we find that these experiences are common across many communities.
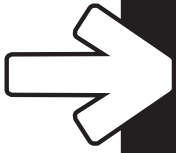
We realize that a video cannot make changes. Change occurs in our schools, communities, and organizations through people. The viewer guide offers information, worksheets, and references to help you understand this complex issue. In addition, this guide provides suggestions on how to use this video to inform groups and individuals.

Our goal in producing the video and guide is twofold: First, we hope that viewers—parents, teachers, and counselors—further develop their awareness of the critical need to make the evolving technology more inviting and accessible to girls, especially during the formative years from early childhood through middle and high school. Second, our goal is that viewers will gain ideas on what each individual can do to encourage girls to learn and explore the many opportunities available for a Tech Savvy Girl.

Elizabeth Vandenburg, Project Director
Laura Reasoner Jones, Co-Director
Clare Dvoranchik Klunk, Co-Director
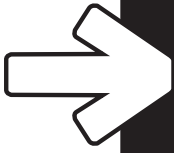
Who Should View Tech Savvy Girls?

Any person or group who is interested in making the evolving technology more inviting and accessible to girls, especially in the formative years from early childhood through middle and high school.

Suggestions for Viewers

Before viewing the video:
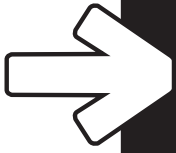- Read "Why Be Concerned" on page 7.

While viewing the video, ask yourself:
- What did I already know? What is new information for me?
- Does the video match the experience of your daughters, your students, girls that you know? How?
- Does your school or community have programs similar to those shown in the video? What are they?
- What new insights did I gain?

After viewing the video:
- Discuss the ideas presented in the video and their experiences with your daughter(s), your students, or girls that you know; encourage the girls to discuss related personal experiences.
- Ask about or research programs available in the schools. Some starting places are:
    - Parents—your child's teacher, school counselor, and school administrators.
    - Teachers and counselors—colleagues, school administrators, and members of professional networks.
- Ask about or research programs available in the community. Some starting places are:
    - Community center, churches, library.
    - Group leaders, such as those in Girl Scouts, after-school programs, and sports programs.
- Think what you might do to encourage the girls that you know. Some ideas are:
    - Encourage daughters and/or students to enroll in technology classes.
    - Begin a girls' after-school club like GEMS in the video.
    - Initiate a course or curriculum project in your school.
    - Become a Girl Scout leader and take part in the group's technology programs.
    - Recruit professional women with science, math, or technology careers to take part in career days.
    - Implement one or more of the Tech-Savvy report recommendations.
        - Integrate computer technology across the curriculum to include music, art, and literature as well as science and engineering.
        - Redefine computer literacy to include lifelong application of relevant concepts, skills, and problem-solving abilities.
        - Respect and encourage multiple points of entry into the computing field, such as design or mathematics.
        - Change the public image of computing to the reality of men and women working together to solve real problems in all career fields.
        - Prepare tech-savvy teachers to focus on the design of classroom materials and curricula that complement computer technology and their teaching styles.
        - Begin a discussion on equity (gender, race, and class) for educational stakeholders.

– Educate students about technology and its impact on traditional career fields, not only computer and network support.

   ◆ Be recognized as a tech-savvy woman or a tech-savvy man.

- Decide what you can do.
- Make your plans.
- Do it.

Ideas for Using Tech Savvy Girls

Use the video for:
- Teacher in-service training
- Parent Teacher Association (PTA) meetings
- Service clubs
- Science and technology associations
- Community projects for businesses
- Community projects for organizations
- Leader training for community groups such as Girl Scouts, summer camps, after-school programs, student groups, and religious institutions
- Community education on your community cable channel

Sample Program Agenda

The program below—including a speaker—would be for a 60-minute program. For planning purposes, suggested time for each item is in parentheses and topics in *italics* are optional.

- Introduction (approximately 5-10 minutes).
   ◆ Introductions (if appropriate).
   ◆ Explain purpose of the program or video (if appropriate).
   ◆ Give out worksheets.
   ◆ Briefly state information on Why Be Concerned (page 7).
- Show video (approximately 20 minutes).
- *Discuss responses to worksheet 1 in groups of two or three (approximately 5 minutes).*
- *Share responses to worksheet 1 in larger group (approximately 5 minutes).*
- *Speaker or panel discussion (approximately 15 minutes per presenter).*
- *Develop an action plan (approximately 5 minutes).*
- Set date for action plan follow-up and closing comments (approximately 5 minutes).
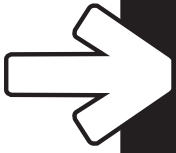
Program Planning Checklist

For a group of two to seven people:

- ❑ Obtain copy of video.
- ❑ Set time and place for the program.
- ❑ Reserve room (if applicable).
- ❑ Invite people (advertise).
- ❑ Develop plan for viewing (link to suggested meeting plan).
- ❑ Copy worksheet documents for each person.
- ❑ Plan refreshments (optional; keep them simple, e.g., each person bring own, pot luck, or just provide a beverage).
- ❑ Other _____

For a group of eight or larger:

- ❑ Obtain copy of video.
- ❑ Invite a speaker(s) who knows about school and/or community programs for girls to answer questions from audience.
- ❑ Invite panel of individuals who are teachers, leaders, or administrators of programs to speak about their programs.
- ❑ Set time and place for the program.
- ❑ Reserve room (if applicable).
- ❑ Develop program agenda.
- ❑ Plan for refreshments (optional).
- ❑ Advertise the program, e.g., send invitations, e-mail, or fliers, or call newspaper, etc.
- ❑ Request fliers, brochures, and information about existing community and school programs.
- ❑ Make copies of worksheets as handouts for participants.

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On the day of the program:

- ❑ Arrange seating.
- ❑ Check VCR equipment.
- ❑ Place copies of agenda, handouts, and brochures at the meeting location.
- ❑ Serve refreshments.
- ❑ View and discuss the video, and develop an action plan.
- ❑ Other _____
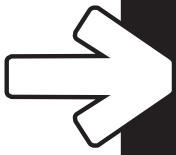
Why Be Concerned?

This section summarizes research that indicates the critical need to make the evolving technology more inviting and accessible to girls, especially during the formative years from early childhood through middle and high school. First, we highlight critical findings from *How Schools Shortchange Girls* (AAUW, 1992). Second, we present our community that is already doing much to encourage girls to become tech savvy, yet the number of girls who enroll in technology classes is still low. Lastly, we summarize the key findings of *Educating Girls in the New Computer Age Report* (AAUW, 2000).

How Schools Shortchange Girls

> *Girls have increased the kinds of math and science courses they take in high school. For example, in 1998, more girls took Algebra 2 and Geometry than in 1990. Taking these courses by the ninth and tenth grades is seen as a major predictor of a student's continuing to college.*
>
> National Center for Education Statistics, *Trends in Educational Equity of Girls and Women,* 2000.

The influential study, *How Schools Shortchange Girls* (AAUW, 2000), challenged the assumption that girls and boys receive an equal education in our public schools and found that girls were lagging behind boys in the critical areas of higher-level math and science achievement and measures of self-esteem. Many educators, parents, organizations, professional organizations, community organizations, and the media responded with publicity, funding, recommendations, further research, and innovative programs. Some progress has been made, especially in heightened awareness of gender issues in the schools.

We are now at a crossroads; technology and computer knowledge continue to become more integrated in all areas of work and there is a growing requirement for a scientifically and technologically literate workforce. *Balancing the Equation* (The National Council for Research on Women, 2001) documents the need for women and girls who represent at least 50 percent of the talent pool to be equitably represented in the sciences for their insights and questions. Their report also finds that programs that work well for women and girls also work well for men and boys.

Our Community

Fairfax County Public Schools enrolled 160,966 students for 2000-01 in 234 schools and centers making it the 12th largest school system in the nation. It is technologically rich and advanced in many ways. All classrooms are wired for Internet connection. The number of network devices, computers, printers, and other hardware reached approximately 60,000 by fall 2000. During the 1999-2000 school year, personnel provided approximately 8,000 additional computers to schools to support essential instruction.

However, a closer look at who actually uses this equipment reinforces the observation made by AAUW in its Tech-Savvy report. Girls are too often being left behind when it comes to technology education. According to a 1999 analysis of elective courses by the Fairfax County Office for Women, the largest gender differences were in professional and technical studies

> *There is a major difference in attitude between girls who chose to take technology education and those who did not; only a few girls were willing to be "pathbreakers" and challenge stereotypes about nontraditional careers for women. Most girls could not picture themselves in technological jobs and were reluctant to be in classes where they were one of the few girls.*
>
> S. Silverman and A. Pritchard, "Building Their Future: Girls and Technology Education in Connecticut," *Journal of Technology Education,* 1996.
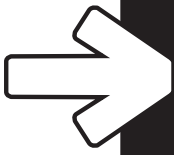
courses. Boys were more than 90 percent of the students in network administration, design and technology, electronics, and engineering. Girls, on the other hand, were more than 90 percent of the students in fashion design, fashion marketing, early child care, practical nursing, and cosmetology. This analysis suggests that girls may not be adequately prepared for the generally better paying technology careers of the 21st century workforce. (These enrollment statistics also served as a case study for the Tech-Savvy report by AAUW, pp. 46-47)
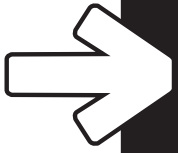
Tech-Savvy: Educating Girls in the Computer Age

The Tech-Savvy report (AAUW 2000) addressed the question: "How do we educate girls to become tech-savvy women?" The report identified four key themes:

- Girls have reservations about the computer culture, especially the passivity of their interactions with the computer and the narrow, technical focus of programming classes.

- Teachers in grades K-12 are concerned with the gap between classroom needs, curriculum, school division expectations, dearth of professional development, and timely technical assistance and quality of educational software.

- Statistics on girls' participation in the culture of computing show low representation in computer courses, laboratories, and clubs.

- Girls' alternatives to computer science courses are computer "tools," such as databases, graphics, online publishing, and other "productivity software."

Worksheet 1
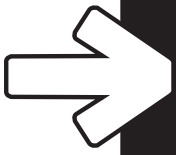
Complete this worksheet while viewing the program.

What is new information for me?

What did I already know?

Does the video match the experience of your daughters, your students, and/or girls that you know? How?

Does your school or community have programs similar to those shown in the video? What are they?

What new insights did I get?

Worksheet 2

Programs Available in My Community:

School Programs:

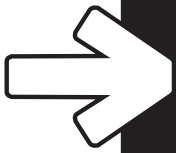| Program	Point of Contact	Phone Number

Notes:

Community Programs:

Program	Point of Contact	Phone Number

Notes:

What I want to do:

Selected References for Educators and Parents

American Association of University Women. *How Schools Shortchange Girls: A Study of Major Findings in Education*. Washington, D.C.: AAUW. 1992.

American Association of University Women. *Hostile Hallways*. Washington, D.C.: AAUW. 1993.

American Association of University Women. *Growing Smart: What's Working for Girls in School*. Washington, D.C.: AAUW. 1995.

American Association of University Women. *Girls in the Middle: Working to Succeed in School*. Washington, D.C.: AAUW. 1996.

American Association of University Women. *Gaining a Foothold: Women's Transitions Through Work and College*. Washington, D.C.: 1998.

American Association of University Women. *Gender Gaps: Where Schools Still Fail Our Children*. Washington, D.C.: AAUW. 1998.

American Association of University Women. *Tech-Savvy: Educating Girls in the New Computer Age*. Washington, D.C.: AAUW. 2000.

Mann, Judy. *The Difference: Growing Up Female in America*. New York: Warner Books. 1994.

Margolis, Jane and Allan Fisher. *Unlocking the Clubhouse: Women in Computing*. Cumberland, Rhode Island: MIT Press. 2002.

National Council for Research on Women. *Balancing the Equation: Where Are Women and Girls in Science, Engineering, and Technology*. New York: The National Council for Research on Women. 2001.

Orenstein, Peggy. *School Girls: Young Women, Self-Esteem, and the Confidence Gap*. New York: Doubleday. 1994.

Pipher, Mary. *Reviving Ophelia: Saving the Selves of Adolescent Girls*. New York: Ballantine. 1994.

Sadker, Myra and David Sadker. *Failing at Fairness: How America's Schools Cheat Girls*. New York: Touchstone Press. 1995.
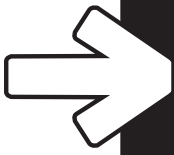
Selected Online Resources for Educators and Parents

21st Century Teachers. *www.nekesc.k12.ks.us/21tea.html*
   Nationwide nonprofit initiatives dedicated to helping K-12 teachers learn, use, and
   effectively integrate technology in the curriculum for improved student learning.

4000 Years of Women in Science. *www.astr.ua.edu/4000WS/*

Association for Women in Science. *www.awis.org/*

Chabot Space & Science Center. *www.chabotspace.org/visit/programs/techbridge.asp*
   Educational programs and resources funded by the National Science Foundation.

Committee on Women in Science and Engineering. *www4.nationalacademies.org/osep/cwse.nsf*

Contributions of 20th Century Women to Physics. *www.physics.ucla.edu/~cwp/*

Dad and Daughters. *www.dadsanddaughters.org/*
   An online newsletter and resources with suggestions on ways fathers can inspire, understand,
   and support their daughters.

Digital Divide. *www.pbs.org/digitaldivide/*
   This PBS site highlights technology gaps in four areas: schools, gender, race, and workplaces.

Educators' Web Site for Information Technology. *www.edc.org/EWIT/*

Exploring Gender and Technology in Learning Environments: A Web-Based Instructional Resource.
www.gse.harvard.edu/~wit/exploring/

Girl Scouts. *www.girlscouts.org/*

Institute for Women in Trades, Technology, and Science. *www.iwitts.com/*

New Moon Publishing. *www.newmoon.org/index.html*
   This publishing company offers media for girls and adults.

SMETE Open Federation. *www.smete.org/*
   An online library and gateway to a comprehensive collection of science, math, engineering,
   and technology education content and services.
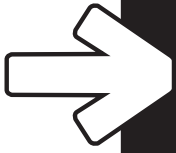
Society of Women Engineers. *www.swe.org/*

Wired Women. *abcnews.go.com/sections/tech/WiredWomen/wiredwomen.html*
   An online magazine maintained by *abcNEWS.com*.

Women in Aviation Resource Center. *www.women-in-aviation.com/*

YWCA. *www.ywca.org/*
   Technology program locations and resources.

Selected Web Sites for Girls

Beakman and Jax. *www.beakman.com*

CoolMath. *www.coolmath.com*
 This site has online mathematics and science games for students and resources for parents
 and educators.

Discover Engineering Online. *www.discoverengineering.org*
 Anything you want to know about engineering including links to videos, projects, and creative ideas.

The Exploratorium Science Museum. *www.exploratorium.edu*

Junior Engineering Technical Society. *www.jets.org*

Mathematics Challenges for Families. *www.figurethis.org*
 Provides interesting math challenges that middle school students can do at home with their families.

National Academy of Engineering's Celebration of Women in Engineering. *www.nae.edu/cwe*

National Engineers Week. *www.eweek.org*
 Activities, competitions, resources, and information for K-12 students, parents, and teachers.

National Engineers Week Future City Competition. *www.futurecity.org*

Science Academy Software Basket Math. *www.scienceacademy.com/BI*

Science Service. *www.sciserv.org*
 This nonprofit site promotes science, math, and engineering.

Scientific American. *www.sciam.com*

Society of Women Engineers. *www.swe.org*
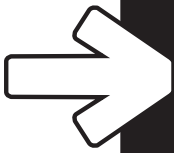
TryScience. *www.tryscience.org*
 Online and offline activities from science and technology centers worldwide.

Women in Aviation. *www.wai.org*

Women of NASA. *quest.arc.nasa.gov/women/intro.htm*

Women of Achievement Index With Biographies. *www.edc.org/WomensEquity/women.htm*

Selected Books for Girls

These books have girls as main characters using science, math, or technology to solve mysteries, save lives, or just have fun.

Ames, Mildred. *Anna to the Infinite Power.* 1981.

Adler, David. *The Fourth Floor Twins and the Silver Ghost Express.* 1986.

Balan, Bruce. *Blackout in the Amazon.* 1997.

Barron, T. A. *Heartlight.* 1990; *The Ancient One.* 1992; *The Merlin Effect.* 1994.

Byars, Betsy. *The Dark Stairs.* 1994; *The Computer Nut.* 1984.

Christopher, Matt. *Supercharged Infield.* 1985.

Connell, David D. *The Case of the Unnatural.* 1993; *Despair in Monterey Bay.* 1993; *The Map With a Gap.* 1994; *The Case of the Willing Parrot.* 1994; *The Case of the Smart Dummy.* 1995; *The Case of the Mystery Weekend.* 1995.

Cottonwood, Joe. *Quake! A Novel.* 1995.

Creech, Sharon. *The Wanderer.* 2000.

Curry, Jane. *The Watchers.* 1975.

Delton, Judy. *Computer Clues.* 1998.

Dickinson, Peter. *Eva.* 1988; *A Bone From a Dry Sea.* 1992.

Domke, Todd. *Grounded.* 1982.

Doolittle and McClay. *The Earth Is My Mother.* 2000.

Duane, Diane. *So You Want to Be a Wizard.* 1983.

Evans, Sanford. *Naomi's Geese.* 1993.

Fleischmann, Paul. *Phoebe Danger, Detective, in the Case of the Two-Minute Cough.* 1983.

Foreman, Lelia Rose. *Shatterworld.* 1995.

Fourie, Corlia. *Ganekwane and the Green Dragon.* 1994.

George, Jean Craighead. *The Missing Gator of Gumbo Limbo, an Ecological Mystery.* 1992; *The Firebug Connection, an Ecological Mystery.* 1993; *The Case of the Missing Cutthroats, an Ecological Adventure.* 1996.

Golio, Janet. *A Present From the Past.* 1995.

Haddix, Margaret Peterson. *Turnabout.* 2000.

Harris, Mark Jonathan. *Solay.* 1993.

Heisel, Sharon. *Wrapped in a Riddle.* 1993.

Hermes, Patricia. *Fly Away Home.* 1996.

Hoover, H. M. *Winds of Mars.* 1995.
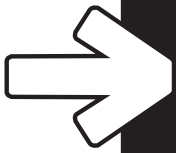
Howarth, Leslie. *Weather Eye.* 1995.

Hughes, Monica. *Invitation to the Game.* 1990.

Hyatt, Patricia. *Coast to Coast With Alice.* 1995.

Ingold, Jeanette. *Airfield.* 1999.

Isdell, Wendy. *A Gebra Named Al.* 1993; *The Chemy Called Al.* 1996.

Jocelyn, Marthe. *The Invisible Day.* 1997.

Kahn, Sharon. *Kacy and the Space Shuttle Secret.* 1996.

Katz, Welwyn Wilton. *Whalesinger.* 1990; *Time Ghost.* 1995.

Kehret, Peg. *Screaming Eagles.* 1996; *The Secret Journey.* 1999.

Klause, Annette Curtis. *Alien Secrets.* 1993.

Konigsburg, E. L. *The View From Saturday.* 1996.

Lasky, Kathryn. *Double Trouble Squared.* 1991; *Shadows in the Water.* 1992;
A Voice in the Wind. 1993; *Star Split.* 1999.

L'Engle, Madeleine. *A Wrinkle in Time.* 1962; *A Wind in the Door.* 1973; *A Swiftly Tilting Planet.* 1978.

Levy, Elizabeth. *A Mammoth Mixup: a Brian and Pea Brain Mystery.* 1995.

Lindbergh, Anne. *Bailey's Window.* 1984; *The Hunky-Dory Dairy.* 1986; *The Shadow on the Dial.* 1987.

Logan, Carolyn. *The Power of the Rellard.* 1988.

Machall, Dandy Daley. *Don't Bug Me, Molly.* 1997.

Mackay, Claire. *The Minerva Program.* 1984.

McKinley, Robin. *The Blue Sword.* 1982; *The Hero and the Crown.* 1984.

McMullen, Kate. *The Great Ideas of Lila Fenwick.* 1986.

Mikaelsen, Ben. *Stranded.* 1995.

Murphy, Catherine. *Songs in the Silence.* 1994.

Myers, Edward. *Climb or Die.* 1994.

O'Dell, Scott. *Island of the Blue Dolphins.* 1960.

Pearson, Susan. *Eagle Eye Ernie Series.*

Peterson, Melissa. *The Cocoa Commotion.* 1997.

Pfeffer, Susan Beth. *Kid Power.* 1977; *Rewind to Yesterday.* 1988.

Philbrick, Rodman. *The Last Book in the Universe.* 2000.

Powell, Pamela. *The Turtle Watchers.* 1992.

Pullman, Philip. *The Golden Compass.* 1995; *The Subtle Knife.* 1999.

Ransome, Arthur. *The Swallows and Amazons Series.*

Raskin, Ellen. *The Westing Game.* 1978.

Riehecky, Janet. *The Mystery of the UFO.* 1996; *The Mystery of the Missing Money.* 1996.

Ritchie, Alan. *Erin McEwan, Your Days Are Numbered.* 1990.

Rorby, Ginny. *Dolphin Sky.* 1996.

Ruckman, Ivy. *Melba the Brain.* 1979.

Snyder, Zilpha Keatley. *Secret Weapons.* 1995.

Thimmesh, Catherine. *Girls Think of Everything: Stories of Ingenious Inventions by Women.* 2000.

VanDraanen, Wendelin. *Sammy Keyes: Girl of Mystery series.*

Verney, Sarah. *Calling All Planets.* 1997.

Wasserman, Elga. *The Door in the Dream.* 2000.