Great Science for Girls

STARTER KIT for AFTER SCHOOLS

Tools to build the capacity of after-school centers to deliver programming that will broaden and sustain girls' interest in STEM.

A Project of

The Educational Equity Center at AED

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INTRODUCTION

The "Starter Kit for After School Centers" was developed for center directors as part of the Great Science for Girls: Extension Services for Gender Equity in Science through After-School Programs (GSG).

This Starter Kit provides information to help you in conducting outreach for GSG, understanding the GSG project components and expectations, and securing resources to support your work.

The Starter Kit is available for download on the GSG website, www.edequity.org/gsg.

We look forward to working with you and to receiving feedback on the tools provided in this kit.

Getting Started

EDUCATIONAL EQUITY CENTER AT AED

Great Science for Girls

With funding from the National Science Foundation, the *Educational Equity Center* at the Academy for Educational Development (EEC/AED) is leading a five-year initiative on *Great Science for Girls*: *Extension Services for Gender Equity in Science through After-School Programs (GSG).*

Partners

- AED Center for School and Community Services (CSC)
- AED Center for Youth Development and Policy Research (CYD)
- Curriculum Partners
- Partnerships for Creative Action

Regional Intermediary Organizations
(list in formation)

- The After School Corporation; New York, NY
- The After School Institute; Baltimore, MD
- Alternatives, Inc.; Hampton, VA
- Community Network for Youth Development; San Francisco, CA
- The Consultation Center, Inc.; New Haven, CT
- Chicago Area Project; Chicago, IL
- DC Children & Youth Investment Corp.; Washington, DC
- MCCOY, Inc.; Indianapolis, IN

Educational Equity Center at AED
100 Fifth Avenue, 8th Floor
New York , NY 10011
Phone: 212-367-4572
Fax: 212-627-0407
www.edequity.org

***Great Science for Girls*: Extension Services for Gender Equity in Science through After-School Programs (*GSG*)** increases the capacity of after-school centers to deliver programming that broadens and sustains girls´ interest and persistence in science, technology, engineering and mathematics (STEM).

To reach a large national audience, *GSG* will work with regional intermediary organizations that provide services to networks of after-school centers.

GSG will provide:

- Professional Development Institutes
- On-going technical assistance
- A state-of-the-art interactive website, including research reports, resources, and webcasts
- Access to evidence-based STEM curricula
- A handbook of best practices

Through *GSG*, and the support of intermediaries, after-school centers across the country will be able to provide a learning environment for girls that includes opportunities for leadership and engagement with fun, hands-on, inquiry-based science experiences. During the five-year project period (2006—2011), *GSG* has the potential to impact hundreds of after-school centers, thousands of youth workers, and hundreds of thousands of girls. Given the large number of under-represented low and moderate-income youth who attend after-school programs (Halpern, 2002), girls reached will be from the population that traditionally has been most excluded from the STEM pipeline.

GSG will be guided by an Advisory Committee of leaders in gender equity, science, after-school education, research and youth development.

If you are interested in being part of this initiative, please contact:

Linda Colón, 212-367-4572; lcolon@aed.org
Maryann Stimmer, 212-367-4574; mstimmer@aed.org

Advisory Committee

Jason Freeman, Director, Coalition for Science After School (CSAS); Lucy Friedman, President, The After School Corporation (TASC); Yolanda S. George, Deputy Director & Program Director, American Association for the Advancement of Science; Janet Kelley, Consultant, After School Program Design, Issues & Funding; Priscilla Little, Associate Director, Harvard Family Research Project; Dale McCreedy, Director of Gender and Family Learning Programs, The Franklin Institute Science Museum; Robert Meduna, Extension Educator, 4-H Youth Development; Harriet Mosatche, Vice President, Program Collaborations and Initiatives, Girl Scouts of the USA; Judy Nee, President, National AfterSchool Association (NAA); Faedra Lazar Weiss, Research Associate, Girls Incorporated National Resource Center; Ellen O'Connell, Senior Program Director, Partnership for Afterschool Education (PASE) Jane Quinn, Assistant Executive Director, The Children's Aid Society and Board Member, Coalition for Science After School.

Great Science for Girls

Frequently Asked Questions

What is Great Science for Girls: Extension Services for Gender Equity in Science through After-School Programs (GSG)?

GSG is a five-year project funded by the National Science Foundation to intentionally support girls' interest and persistence in science, technology, engineering and mathematics (STEM).

How does my center benefit from participation in GSG?

- Your center will contribute to knowledge development by participating in a national NSF initiative.
- Your center will have access to evidence-based curricula.
- Your staff will increase their capacity to implement after-school science activities.
- Your center staff will have access to a state-of-the art interactive website.

What are the components of GSG?

√ A Professional Development Institute

√ Program Development Reunions

√ Ongoing technical assistance, via website, telephone

√ State-of-the-art interactive website

√ Ongoing research reports via website, live webcasts

√ Access to evidence-based STEM curricula

√ A handbook of best practices

√ Evaluation

What is meant by "evidenced-based" curriculum?

Evidence-based curriculum has been evaluated according to criteria, e.g. addressing equity, gender, national standards, best practices, cost-effectiveness, etc.

Are the evidence-based curricula for girls only?

GSG has selected six initial curricula programs. After-School Science PLUS, Girls at the Center, SciGirls, Techbridge, and Wonderwise 4-H are suitable for coed or girls-only settings; Girls Inc. Operation SMART is a girls-only program.

What are the goals of the Professional Development Institute?

- To provide interactive training about gender and other science equity issues
- To prepare participants to implement the program at their after-school centers
- To provide in-depth information about the evidence-based curricula

What kinds of support are available on the GSG website?

- Resources
- Research reports
- Communication with other sites
- Webcasts
- Training Materials
- Evidence-based curricula

What resources are available to help me implement GSG?

- Technical assistance around additional fundraising and partnering
- Ongoing access to the local and national *GSG* team
- User friendly website

Who do I contact with additional questions?

- Maryann Stimmer mstimmer@aed.org
- Linda Colón lcolon@aed.org
- Anyone on the project team list

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Great Science for Girls

Talking Points

The following summarizes key literature and research related to providing Great Science for Girls. This information can be used as "talking points" to provide evidence and rationale for the need and for the structure of Great Science for Girls.

What is inquiry-based science?

Science is an active process including skills such as observing, inferring, and experimenting. Inquiry is central to science learning. When engaging in inquiry, students describe objects and events, ask questions, construct explanations, test those explanations against current scientific knowledge, and communicate their ideas to others. They identify their assumptions, use critical and logical thinking, and consider alternative explanations. In this way, students actively develop their understanding of science by combining scientific knowledge with reasoning and thinking skills. Learning science is something that students do, not something that is done to them. "Hands-on" activities, while essential, are not enough. Students must have "minds-on" experiences as well (National Science Education Standards, 1996).

Why Science?

√ Jobs requiring training in STEM will increase by 51% between 1998 and 2008. Unfortunately, American students are ill-prepared to go into STEM careers. Girls in particular are underrepresented in STEM degrees and careers and are missing out on the opportunity to participating in lucrative and growing STEM fields (Afterschool Alliance, 2006).

√ As of 2006, NCLB mandates testing in science as well as reading and mathematics. Informal education delivered in afterschool programs can be a key mechanism in meeting the accountability measures of the "No Child Left Behind" (NCLB) Act (Coalition for Science After School, 2004).

Why Afterschool?

Afterschool has a positive impact on students

√ There is significant research which shows that participation in afterschool programs is positively associated with better school attendance, more positive attitudes towards school work, higher aspirations for college, finer work habits, better interpersonal skills, reduced drop out rates, higher quality homework completion, less time spent in unhealthy behaviors, and improved grades (NIOST, 2003).

√ A meta-analysis of 73 afterschool programs showed that effective programs had a positive impact on students' feelings and attitudes, social behaviors, and school performance (Durlak & Weissberg, 2007).

Based on these findings, researchers estimate that having effective programs would result in:

- 27% more youth with better grades;
- 37% more with higher achievement test scores;
- 35% more youth improving in positive social behaviors;
- 30% more demonstrating less problem behavior;
- 30% more who feel connected and bonded to their school, and
- 43% more who feel better about themselves and their abilities (pg. 28).

Afterschool can support learning in a way that school cannot

√ The afterschool arena is uniquely well-suited to provide learning experiences that can help girls make a personal connection to science. Afterschool puts science in a different context—one that offers social and psychological supports that help overcome obstacles to participation in STEM careers (Walker, Wahl & Rivas, 2005). The less school-like nature of afterschool, where girls often identify with their instructors, has a positive impact on encouraging girls in STEM (Campbell, Storo & Acerbo, 1995).

√ "Combining STEM learning with the youth development expertise of afterschool professionals has potential to revolutionize both fields by integrating each other's strengths. Afterschool programs are proven to teach communication, problem solving, and teamwork skills, which young people need for any career. Afterschool programs give students time to develop an interest in science, which is key to getting students into STEM careers" (Afterschool Alliance, 2006).

√ Afterschool programs give students the time to investigate topics more deeply and participate in hands-on projects (Afterschool Alliance, December 2001).

√ After school programs are typically more flexible than schools, allowing students to spend more time on investigation and engage in deeper inquiry (Coalition for Science After School, 2004).

√ Afterschool programs take time to ensure that students understand how their math and science skills can be applied to real world situations and their everyday lives (Afterschool Alliance, December 2001).

√ By providing an opportunity to learn about math and science in a fun and relaxed atmosphere, afterschool programs spark students' interest in these subjects, which carries over to the regular school day (Afterschool Alliance, December 2001).

Afterschool serves a diverse population of students that are underrepresented in STEM.

√ A large proportion of students who attend afterschool programs are from low-income families, communities of color, and underserved groups (Halpern, 2002). These demographics correlate with those students who are underrepresented in STEM, making afterschool a logical focus of programs aimed at increasing participation in STEM education and careers.

Why a gender focus?

√ Women are underrepresented in STEM degrees and careers. While girls and boys initially have similar interest in STEM content, girls' interest drops precipitously by upper elementary and middle grades (AAUW, 1992).

√ Men earn far more degrees in computer science than women, and the gap is getting wider. In 2004, only 25% of degrees in computer science were awarded to women (NSF, 2007).

√ Women accounted for only 22% of graduate students in engineering in 2004 (NSF, 2007).

Why do we need GSG? Why do youth need GSG?

√ *GSG* presents an important opportunity to bring evidence-based inquiry science to this population of underserved students and to change attitudes about girls and science on the part of both girls and boys**.**

√ Through *GSG*, afterschool centers will be able to provide a learning environment for girls (and boys) that includes opportunities for leadership; active, intelligent engagement with concerned adults and other students; inquiry-based, hands-on experimentation; risk-taking; challenges and problem-solving; cooperative learning and fun. All of these are essential factors in making science accessible and interesting to girls (Campbell and Steinbrueck, 1996; Hansen, Walker and Flom, 1995; Fancsali, 2002; National Science Foundation, 2003).

What about the boys?

√ Experts agree that the high-quality science experiences promoted by GSG are beneficial to girls and boys in promoting interest and participation in STEM (Cahn, 2005).

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Great Science for Girls

Evidence-Based Programs

Seven evidence-based programs have been selected to be part of the Great Science for Girls Extension Services: After-School Science PLUS, Afterschool Universe, Girls at the Center, Girls Inc. Operation SMART, SciGirls, Techbridge, and Wonderwise 4-H. ***These programs have been professionally evaluated and have shown positive outcomes in relation to girls and STEM.*** *New programs that meet the following criteria will be added throughout the project.*

Selection Criteria

- Shows positive outcomes in relation to girls and STEM
- Uses inquiry-based, hands-on methodology
- Incorporates knowledge about girls' learning styles (cooperative learning groups, active learning, etc.)
- Involves students in decision-making, planning, problem-solving, risk-taking and reflection (higher-order thinking skills)
- Increases students' sense of self as learners
- Addresses the STEM standards through informal activities
- Has been piloted and field-tested
- Has a written curriculum or guide book that is user-friendly and accessible
- Uses affordable and easy to obtain materials
- Is adaptable for urban, suburban and/or rural settings
- Meets criteria for quality youth development as well as science content
- Adheres to NSTA safety guidelines
- Includes some level of parent involvement
- Shows awareness of other underrepresented groups

Great Science for Girls

After-School Science PLUS

Developed by: Educational Equity Concepts, Inc. with funding from the National Science Foundation Program for Gender Equity and a variety of local New York City funders

Target age group: 6-14 years old

Setting: Appropriate for all afterschool settings, with coed or single-sex groups

Time needed: Two-four hours per activity (11 activities in all)

Overview

After-School Science PLUS (AS+) includes eleven core activities that focus on inquiry-based science and literacy-through-science. It uses simple materials that are low-cost or free, readily available, and culturally relevant, e.g. recyclables, cooking oil, corn starch, beans, etc. *AS+* has a strong equity focus:

- Provides positive role models of female and male scientists from diverse racial/ethnic groups;
- Presents ideas about careers in science, math, and technology;
- Dispels stereotypes about who can do science; and creates opportunities for students to see science as part of their everyday experiences.

An *Activity Guide* provides all you need to know to conduct the activities, including step-by-step activity instructions, role model materials, family involvement letters in English and Spanish, and science/literacy resources. A *Planning-Guide* provides information about how to implement the program, including staff development, family outreach materials, and sample lesson plans.

Evidence

AS+ is based on the standards-based Playtime is Science in-school curriculum, which was named a "Promising Program" by the Gender Equity Expert Panel of the U.S. Department of Education in 2001. A comprehensive evaluation using a pre-post design revealed that after participating in *AS+* student attitudes about science became more positive and less stereotyped. Group leaders reported that as a result of *AS+* students:

- thought that science is fun
- wanted to do more projects
- discovered that science applies to everyone
- had more opportunities for hands-on science
- were more apt to say everyone does science
- became more positive and not at all stereotyped about girls who do science.

Training

The *Planning Guide* provides all the information a staff developer needs to conduct training to implement the *AS+* program. *AS+* staff development builds on the concept that group leaders already know more science than they realize, and reinforces confidence in their scientific abilities and interests. It includes training in how to conduct inquiry-based science activities; how to extend these activities for literacy programs; group management techniques; strategies for involving parents; and equity resources. Fee-for-service professional development also is available.

Cost

AS+ Program and Activity Guide, $49.95 (additional Activity Guides available for 29.95)
Activity Materials— low-cost, readily available
Training— Basic costs for a full-day training for 30-45 people, with follow up technical assistance via phone or webcasts, are $2,000, plus travel costs and materials. Flexible packages can be arranged based on the needs of the site.
http://www.edequity.org/afterschool_materials.php

Activities

Who Does Science? Creates awareness of the stereotypes about who does science and expand students' vocabulary and view of scientists.
Oobleck: Solid or Liquid? Work with a mysterious mixture to explore liquid and solid properties of matter, using senses, hypothesizing, experimenting, inferring, measuring, observing and concluding.
Creating a Mystery Bottle: Learn about solubility, density, and miscible and immiscible liquids by combining oil, water, and food coloring in recycled plastic bottles and observing the results.
Sink and Float: Investigate displacement, density, and viscosity by predicting, experimenting, and observing which objects sink and which ones float in water and other liquids.
Bubble Science: Explore the concepts of surface tension and develop skills such as observing and model-making through experimenting with bubble-makers.
Making and Tossing Bean Bags: Experiment with concepts of acceleration, force, gravity, and spatial relations, and gain math skills such as estimation, measurement, sorting, and counting.
Building with Wonderful Junk: Develop planning, balancing, problem-solving, mathematical, spatial relations, and social skills through a construction activity using "recyclables" from home.
Ramps, Force and Motion: Explore and understand the relationship between incline, speed, and distance, and learn about spatial relations, graphing, collecting and recording data, predicting, inferring, and measuring.
Discovering How it Works: Gain direct hands-on experience with technology and the use of tools by assembling and disassembling simple safe machines.
Inventors: Use planning, creative-thinking, decision-making, problem-solving, communication skills, and creativity just like scientists to plan, create, and test an invention.
The Mystery Science Visitor: Share information about a future that involves science. In this "guessing game" activity, a science role model gives an idea of what she does in her work and how she became involved in the field.

Great Science for Girls

Afterschool Universe

Developed and funded by: NASA. NASA worked closely with the DC Children and Youth Investment Trust Corporation (CYITC), a DC-based non-profit organization that supports afterschool programming, during both the development and testing phases.

Target age group: Middle-school students (rising 5th graders to 8th graders)

Setting: Appropriate for a variety of settings (astronomy days, summer camps, or year-long afterschool programming), with co-ed or girls-only groups.

Time needed: 45—60 minutes per session (12 sessions in all). The program is flexibly structured and can be implemented on a schedule that best suits your programming needs.

Overview

Afterschool Universe is an out-of-school-time astronomy program targeted at middle-school students. It explores astronomy concepts through engaging hands-on activities and takes participants on a journey through the Universe beyond the solar system. The goal of the program is to excite students about astronomy and science in general and to have a positive effect on attitudes about science.

Although sessions build concepts when attended sequentially, each session is intended to be freestanding as not all participants will attend every session. A comprehensive manual provides background information and detailed descriptions of how to conduct each activity. The manual has been written for leaders with little science background. A companion website provides additional information and resources for the program leader. Most of the materials required are common-household items, some are easily obtained at hardware stores.

Each session usually begins with a brief discussion led by the program leader, then moves into a hands-on activity that students participate in individually or as part of a group. It wraps up with a discussion of what was learned. All the activities are done " in the real world" and do not require the use of a computer. Suggestions for optional web-based activities are provided.

Evidence: Pilot studies and an external evaluation of Afterschool Universe show that participants perceived an increase in their knowledge of astronomy concepts and the study of astronomy. For example, positive responses to the statement "I know a lot about how scientists study stars and planets" increased from 48% to 70% in a pre/post survey of participants. In a pre/post survey of programs serving all girls, girls reported an increase in positive attitudes towards science, interest in science, and understanding that science has applications in the real worlds.

Training: Afterschool Universe requires participants to undergo a two-day training session before they can implement the program or turn-key training for afterschool program providers. They make exceptions for program implementers who can demonstrate a compelling reason for why the training is not necessary. Waivers from training are not available for those who wish to become trainers. The training is provided for free, but participants must cover their travel expenses if they need to travel to a training location.

Cost: The manual is free.

Descriptions of Sessions

Session 1 – Modelling the Universe: Students are challenged to create a model of the Universe. This is an introductory activity that helps students think about where we fit in the Universe, and allows them to model the size, shape, and relative position of objects in the Universe.

Session 2: Cosmic Survey: In this session, students are led through an interactive discussion of size and scale of objects. They are provided pictures of objects on Earth and in space, and asked to rank them in order of various properties, such as: How big? How far? How old?

Session 3: The Astronomer's Toolbox – Telescopes: This session is intended to teach students about one of the basic tools astronomers use --- a telescope. They build a simple telescope, learn what it is used for, and gain an overall understanding of how it works.

Session 4: Invisible light: Students are introduced to the electromagnetic spectrum and the notion that our eyes cannot see all the wavelengths of light. This session explores infrared and ultraviolet light as examples of "invisible light." Students explore how invisible light can be detected, and also learn about transmitters and shields of light.

Session 5: The Astronomer's Toolbox – Spectroscopes: Students learn about additional techniques astronomers use to obtain data about distant objects using light. They build a simple spectroscope and look at light from different sources.

Session 6: Stars and Their Lives: This session discusses the fact that our Sun is a star and provides a basic understanding of how stars work. Students engage in kinesthetic activities reinforced by a follow-up discussion with visual aids.

Session 7: Stars and Their Lives (Part II): This session is an optional extension for those leaders who would like to go into more depth on some details of how stars work.

Session 8 – Our Cosmic Connection to the Elements: An interactive discussion of elements and compounds begins with the leader and students breaking down a substance into smaller pieces that still retain its identity. The discussion continues with the periodic table, common elements and compounds, and the astronomical origin of the elements we are made of.

Session 9: Galaxies: Students learn that a galaxy is a large collection of stars, gas, and dust and we live in a galaxy called the Milky Way. They create a model of our Milky Way galaxy and learn about the different shapes of galaxies. Finally, they build on the concept of light travel time.

Session 10: Black Holes: Students learn about black holes, the densest objects in the Universe. They explore some basic properties of black holes.

Session 11: Visit from a (Space) Scientist or Engineer + Making a Cosmic Quilt: This session presents an opportunity for the students to ask questions that may have built up over the course of the program. It also allows contact with a real scientist or engineer and the opportunity to ask questions about careers in science and engineering.

Session 12: Modelling the Universe - The Sequel: Students repeat the Session 1 exercise to create a model of the Universe, allowing everyone to see how their understanding has changed as a result of this program.

Additional resources in the manual include: Web resources at the end of every session; glossary at the end of the manual; materials checklist; and shopping information for specialty supplies.

Great Science for Girls

Girls at the Center (GAC): Girls and Adults Learning Together

Developed by: The Franklin Institute Science Museum in collaboration with Girl Scouts of the USA, with funding from the National Science Foundation

Target age group: 6-14 years old

Setting: Appropriate for a variety of afterschool and museum settings with girls in collaboration with adult partners; or potentially with younger and older girls working together

Time needed: Flexible - resource guide provides 1.5 hour workshops that can stand alone or be part of a sequence of activities, potentially linked by a theme, sustained across months or years. The original model engaged girls and their adult partners in science on a monthly basis during the school year by alternating events/workshops with "GAC Packs" - activity packets for home exploration.

Overview
The key features of *Girls at the Center (GAC)* are community and museum-based workshops that foster active science investigation, at-home science activities and special family events. *GAC* provides unique opportunities for girls to learn and practice problem-solving, independent thinking and leadership. The program is built around six basic standards-based science themes: communication, energy, habitats, structures, the science of sports, and water. For each theme, there are two workshops—one for girls ages 6-10, one for girls ages 9-14. *GAC Packs*, which are available on the Web (www.fi.edu/gac) in Spanish and English, provide activities on the same topics so that girls and their adult partners may extend the workshop explorations at home. Thematic "tabletop" activities are also provided for more informal needs. A *Guidebook* contains all the resources needed to conduct a successful *GAC* program: ideas for introducing *GAC*, directions for recruiting participants, complete instructions for implementing each theme unit workshop, samples of *GAC* Pack cards, and reproducible handouts in Spanish and English.

Evidence
A comprehensive evaluation, using written questionnaires, face-to-face interviews, focus groups, observations, and telephone interviews, was conducted over a five-year period. Comparisons were made between the responses of first-time participants and those who returned. Results showed that girls participating multiple times:

- reported an increase in their science interest
- consistently enjoyed their experience with science
- shared their experiences with others
- were more likely to aspire to science-related careers
- had a broader and enriched conceptual understanding of science
- more often perceived of themselves as scientists
- had a stronger grasp of how science relates to other parts of their lives

Training
In addition to providing information on building a successful *GAC* program, the *Guidebook* includes a section on training for workshop facilitators. Fee-for-service professional development also is available.

Cost
GAC Guidebook— can be ordered on-line for $23.95
Activity Materials— will vary based on workshop and number of participants. Emphasis is on everyday materials.
Training— Basic costs for a full-day training for 30-45 people, with follow up technical assistance via phone or webcasts, are $2,000, plus travel costs and materials. Flexible packages can be arranged based on the needs of the site.
http://www.fi.edu/gac

Activities

Unit: Communication
Sound Communication, ages 6-10: Design and modify phones to make discoveries about sound. *Communication Devices, ages 9-14*: Explore radio communication and build simple working speaker.

Unit: Energy
Conducting Electricity, ages 6-10: Learn about simple circuits and test materials for conductivity. *Circuits and Conductivity, ages 9-14*: Create a simple circuit and experiment with conductivity.

Unit: Habitat
Backyard Beasty Bugs, ages 6-10: Explore the basic characteristics of insects and how they adapt to their surroundings. *Nature's Hidden Secret, ages 9-14*: Explore the wonders inside owl pellets to gain a deeper understanding of food chains and food webs.

Unit: Sports
Let's Have a Ball, ages 6-10: Design and test balls and explore the science in sports balls. *Skateboard Science, ages 9-14*: Determine how slope, weight, and surface affect ramp sports.

Unit: Structures
Building Bridges, ages 6-10: Build and test structures for the new "Paper Planet Amusement Park". *Amusement Park Structures, ages 9-14*: Design, test and modify bridge structures so people can get to the new Amusement Park.

Unit: Water
What's in the Water, ages 6-10: Learn about water pollution and use problem-solving skills to clean up a river. *Water and Pollution, ages 9-14:* Design filters to clean up the town's river and to protect it from future pollution.

Great Science for Girls

Girls Inc. *Operation SMART®* *(Science, Math and Relevant Technology)*

Developed by: Girls Incorporated® with funding from National Science Foundation, The Ford Foundation, The Carnegie Corporation of New York, The Coca Cola Foundation, CREW Foundation, General Motors Foundation, Verizon Communications, Lucent Technology Foundation, National Endowment for the Humanities and many others.

Target age group: 5/6-18 years old

Setting: Designed for use in collaboration with a Girls Inc. affiliate, with all-girl groups during or after school and in the summer

Time needed: A series of sessions that last at least one semester, or an intensive summer camp

Overview
Girls Inc. *Operation SMART* is an approach to engaging girls and young women in inquiry-based science, technology, engineering and math through hands-on, minds-on experiences. Publications and staff training help after-school programs empower girls to pursue science, math and technology careers. It is a program without walls, where girls interact with STEM professionals as well as after school professionals and volunteers to discover that math, science and technology are all around them. Program guides for all ages incorporate the four elements of the SMART philosophy: exploration, equity, empowerment, and fun. Through operation SMART, girls:

- engage in participatory experiences where they discover that math and science are fun
- inquire, predict, and take risks that make math and science an adventure
- build things, take them apart, and build them better
- ask questions, collaborate on ideas, and pursue their own answers
- interact with professional women in the field
  get motivated to pursue both math and science courses and extracurricular activities before, during and after school.

Facilitators can apply the Girls Inc. *Operation SMART* approach to their own activities. Components of *Operation SMART* with specific guidance for conducting sessions include: EUREKA!, Girls Dig It, and Thinking SMART.

Evidence
Results show that the more a girl participates in Girls Inc. *Operation SMART*, the more favorable is her attitude toward studying science and math. EUREKA!, a component of *Operation SMART*, uses sports and the opportunity to be on a college campus as "hooks" to attract girls in the middle grades to the sciences, focusing on girls of color and those from low-income families. Results show that girls who participated increased the number of mathematics and science courses they planned to take and were more interested in careers in science compared with a control group. Girls who attended Girls Inc. *Operation SMART* sessions have demonstrated increased confidence, competence, and comfort in science, math, and technology. An independent program evaluation showed that, after participation in *Operation SMART*, 75% of girls ages 6-11 reported that the program had a positive influence on their attitudes towards science. Parents rated *Operation SMART* highly (92% average) as a positive influence on their daughters' attitudes towards science.

Training
Programs are offered through a network of 1,500 sites nationwide and in Canada and are facilitated by trained professional staff. To find a Girls Inc. site near you, visit http://www.girlsinc.org.

Cost
Inquire about arrangements with a Girls Inc. affiliate.
http://www.girlsinc.org

Activities

EUREKA!® brings middle-school-aged girls to an intensive four-week day-camp on a college campus, combining math and science with sports, health and career development. Participants continue to meet together over two or three years, with supplements during the school year, including college visits, preparation for standardized tests, and more interactions with math, science, and engineering professionals.

Girls Dig It℠ builds girls' analytical and interpretive skills while they work alongside archaeologists, make exciting discoveries, unveil the past and present of their communities, and share their findings online. Girls Dig It Online℠ enables girls to post their findings on a special website and to learn about archaeologists' lives and careers.

Thinking SMART is a Girls Inc. *Operation SMART* program that links girls ages 12-14 with professionals (particularly women) in the fields of science, technology, engineering, and mathematics. The direct involvement of these individuals, known as "SMART Partners," in the planning and delivery of a Thinking SMART program is key to achieving the intended goal of helping girls think *like* scientists by thinking *with* scientists.

Great Science for Girls

SciGirls

Developed by: Dragonfly TV, Twin Cities Public Television, with funding from the National Science Foundation Program for Gender Equity

Target age group: 6-13 years old

Setting: Appropriate for all after school settings, with coed or single-sex groups

Time needed: One hour and twenty minutes per activity; twenty minutes for an icebreaker, one hour for the activity (14 activities in each volume).

Overview
SciGirls includes 14 standard-based activities that cover a broad range of STEM content areas such as life, physical, earth and space science, technology, engineering, and mathematics. The program offers fun, inquiry-based science experiences suitable for use in a variety of afterschool settings -- camps, clubs, science centers, youth organizations, museums, and center-based afterschool programs. Girls use seven science inquiry steps in each activity: choosing a topic; developing a question; planning an investigation; predicting an outcome; experimenting and observing; interpreting results; and communicating findings. Each of the activities features two parts: a simple icebreaker activity followed by a full science inquiry investigation.

SciGirls materials include two program DVDs and Activity Guides. The DVDs showcase girls doing science investigations, and also include profiles of contemporary women scientists who are currently researching, exploring, and breaking barriers. The activities in the Guides relate to the science performed by the adult role models featured in the videos.

Evidence
A summative evaluation of *SciGirls* found that the curriculum: increased girls' confidence to participate in science, deepened their understanding of the inquiry process, broadened their perception that science is bigger than previously thought, increased their awareness of and interest in science careers, and/or showed them that science can be fun and exciting.

Several other independent studies of the *SciGirls* materials showed statistically significant increases for participants on key science skills and attitudes. For example, one study found:

- Increase in student understanding of how to design and carry out an experiment
- Increase in student interest in doing their own science investigation
- Increase ratings of the importance of charting one's findings in their investigations.

These findings held for both genders and for minority and non-minority students.

Training:
The activities in the guides are user-friendly and easy to follow. Full-day training is available for $250 plus expenses. Training is recommended for those who are not familiar with teaching science or leading science activities.

Cost:
SciGirls, Volume 1 and 2 (Print activity guide and DVD) $59.95 for each volume
SciGirls presents GEMS: A case study in science inquiry for girls (Best Practices DVD) $29.95

Activities
Bogs: Observe how different materials decompose (or don't) when buried.

Dinosaurs: Discover how animal skeletons can help us determine what kinds of animals lived together in an ecosystem.

California Fish: Conduct research about how a fish's mouth type affects what and how it eats.

Music and Sound: Use various lengths of cardboard tubes to learn about pitch and make music.

Luge: Discover how to make a course that takes a marble 12 seconds to complete.

Doghouse Design: Discover what makes a doghouse stay cool when it's hot outside.

Earthquakes: Observe what land features can be seen from different aerial images.

Animal Ears: Experiment to find out how a pet responds to ear position signals.

Double Dutch: Experiment to find out whether it's more important to see or hear the rope while double dutch rope jumping.

Tug-of-War: Discover whether a few big kids or lots of smaller kids make a more successful tug-of-war team.

Soccer Kicks: Experiment to find the relationship between the length of your leg and how far you can kick a ball.

Forensic Science: Conduct an investigation to match the hairs from a "crime scene" to one of the "suspects."

Rabbits: Compare different rabbit breeds while conducting a "Rabbit Olympics".

Microgravity: Create a drop box to discover how ordinary things (e.g., a burning candle, a fizzing seltzer tablet) behave in microgravity.

Wacky Weather: Make a barometer and explore traditional "folk" methods of forecasting the weather.

Rollin' Robots: Design, build and program a LEGO Robot to perform specific tasks.

Great Science for Girls

Techbridge

Developed by: Chabot Space & Science Center, with funding provided by the National Science Foundation, the Gordon & Betty Moore Foundation, S.D. Bechtel, Jr. Foundation, Noyce Foundation, Chevron Corporation, Fitzpatrick Foundation and others.

Target age group: 10-18 years old

Setting: Appropriate for a variety of afterschool settings or other informal learning environments. Designed for girls during or after school and in the summer.

Time needed: Each program box has activities and icebreakers that last for approximately five to six sessions. One session is typically 90 minutes.

Overview
Techbridge was launched in 2000 by Chabot Space & Science Center in Oakland, California to expand the academic and career options of girls and to help address the shortage of women and underrepresented groups in technology and engineering. Since its founding, Techbridge has served over 2,500 girls in grades 5-12 through afterschool and summer programs with hands-on projects, career exploration opportunities, and academic and career guidance to expand girls' interests and options. Techbridge also offers professional development for teachers, role models and partners.

Techbridge curriculum has been developed with girls in mind, building on their interests and introducing activities they haven't had exposure to. The projects foster teamwork skills as girls learn to work together to problem-solve. Girls want to make the world a better place but may not see how science and engineering are compatible with these interests. This year, Techbridge is offering three curriculum units that have proven extremely popular and successful with engaging girls in science, technology, and engineering.

While hands-on projects can spark an interest, Techbridge research has shown that career exploration and role models help make that connection to careers in technology, science and engineering. The curriculum units include career exploration activities and resources to expand career options for girls. Included are also a resource guide and toolkit for role models developed by Techbridge to helps corporations and role models host effective worksite trips and classroom visits.

Evidence
Techbridge carefully monitors its goals and objectives through rigorous evaluation methods, including pre-and post-surveys, focus groups and interviews with girls, teachers, and families and program observations. Girls who have been in Techbridge show increased proficiency in technical skills, confidence, and interest in a career in technology, science or engineering. Techbridge has collected eight years of evaluation results demonstrating the program's success in several key areas:

- Development of technical skills and aptitude
- Increasing self-confidence
- Promoting greater career interest in technology, science and engineering

This year, results showed 95.5% of girls knew more about how things work, 92% learned that teamwork is good for solving problems, 94% feel more confident trying new things, and 94% know more about different jobs. A longitudinal study tracking the long-term impact of Techbridge on past participants shows that because of participating in Techbridge, 81% of respondents report a greater interest in a career in technology, science and engineering.

Training:
Training is offered for each of the curriculum units for a fee.

Cost:
Techbridge is offering reusable program boxes that include lesson plans, career resources and all non-consumable materials required to do the activities. Basic program boxes range between $500 - $1,000, and can be re-used multiple times. Consumable supplies can be ordered separately from Techbridge or purchased on their own.

Activities
Techbridge is offering three of its curriculum units as program boxes:

Green Design: Girls will learn about green design and develop science and engineering skills. They will construct their dream studio from start to finish – from brainstorming an idea, to creating a floor plan, to building with green materials. Through construction and planning, girls will explore and reflect on their energy usage in their home and consider ways in which they can change their habits to lessen their environmental impact. They will decorate their designs with recycled and green materials.

Toy Design and Engineering: This unit combines students' love of play and creativity with the engineering design process. To get the creative process started, students study and dissect toys they are familiar with. They work together in teams to brainstorm ideas, sketch their idea, and prototype their toy. Students will also have a chance to name their toy and make a marketing plan. Through this team process, children are inspired to create a product that gives them a sense of pride and insight into engineering.

Electronics and Circuitry: Girls will learn about electronics and circuitry through a series of hands-on investigations. They will begin with exploration of snap circuits, learn about basic electronic components and build different kinds of circuits. Rounding out this unit, the girls will learn how to solder and put their skills to action, making a project that they can take home.

Great Science for Girls

Wonderwise 4-H

Developed by: The University of Nebraska State Museum and Nebraska 4-H Youth Development with funding from the National Science Foundation and the Howard Hughes Medical Institute

Target age group: 8-12 years old

Setting: Designed for use in 4-H clubs, but appropriate for all afterschool settings, with coed or single-sex groups

Time needed: One hour per activity (five activities per kit; 9 kits in all)

Overview
The *Wonderwise 4-H* series of learning kits features contemporary women scientists as positive role models. Scientist are featured in their labs, out in the field, and with their families. Each kit contains: a 15-20 minute "virtual field trip" video profiling the scientist and her work; an interactive CD-ROM containing a biography of the scientist and downloadable and printable versions of the activity sheets in English and Spanish; and five hands-on, inquiry-based science activities related to the scientist's field of study, with assessment materials and links to National Science Education Standards.
Originally, the kits were developed for classroom use, and were thoroughly tested in formal classroom settings. In 2000, *Wonderwise* was redesigned into *Wonderwise 4-H* for use in informal educational settings, with the following goals:

- motivate 8-to-12 year old youth, particularly girls, to pursue and interest in science and an awareness of scientific active ties and careers
- create a positive image of women and minority scientists
- offer materials that are inquiry-based, multicultural and tie science activities to the work of real scientists
- help youth connect agricultural topics and their underlying scientific principles enhance children's ability to use scientific reasoning.

Evidence
Results show that *Wonderwise* positively influences students' conceptions of scientists and their work. Adult leaders reported that as a result of *Wonderwise* youth:

- engaged in actual scientific activities
- increased their understanding of what science is
- broadened their view of scientists and their work
- became more confident and capable at scientific endeavors increased their understanding of the possibility of a science career.

Findings suggest that girls were more likely to imagine a woman scientist with positive intellectual/work-related and personality traits than boys. They were also more likely to envision their scientists with a lot of friends and as a parent.

Wonderwise has received the highest award from NEA for multi-media broadcast materials for children and was selected for the Nationally Juried 4-H Experiential learning Youth Development Curriculum Collection of 2003.

Training:
Information on how to use kits is available on the website, and there are suggestions in the material for the instructors. No additional training is necessary.

Cost:
Activity books— downloaded free of charge
Activity Materials— most are low-cost and easily accessible, more difficult-to-find items can be ordered from Wonderwise web site.
Kits— $39.95 per kit plus 5% for shipping and handling.
http://wonderwise.unl.edu

Activities

Brenda Ballachey Sea Otter Biologist: observe and record Sea Otter behavior, create a kelp forest community, learn about Exxon Valdez disaster and conduct and oil investigation, figure out how much food a sea otter pup needs.

Peg Bolick, Pollen Detective: learn about plan parts and pollination, dissect a flower, analyze a pollen sample, design and build flowers to attract pollinators, dig for ancient pollen in artificial rocks.

Jannalee Caldwell, Rainforest Ecologist: test the strength and fat content of nuts, design backgrounds to camouflage poison frogs, construct a rain forest tree, create a rain forest community.

Judy Sakanari, Parasite Sleuth: create a parasite classification system, made and dissect as Ascaris worm, examine a pet for ticks and fleas, solve mysterious diseases by finding the problem parasites, unravel the states of a developing tapeworm.

Fatimah Jackson, African Plant Explorer: discover the poisons in everyday foods, examine chemical properties of starch, follow world travels of common foods.

Carmen Cid, Urban Ecologist: use sampling transects to test the diversity of your environment, create a water bud and explore the effects of water pollutants, make a watershed to learn about toxic runoff.

Adriana Ocampo, Space Geologist: investigate how craters take shape, test the effects of weather on the surface of craters, and learn how to read the geological past.

Tolani Francisco, Vet Detective: learn how to make sense of bisons' behavior, take your vital signs and compate data to the vital signs of other animals, compare animal digestive systems and simulate the process of digesting grass.

Cathy Burson, Genetic Counselor: explore your genetic features, discover what's different and the same about you and your group, complete a human chromosome chart, build a model gene and learn some secrets of DNA structures.

Managing Your GSG Project

Great Science for Girls

The GSG Unified Program of Change: What Does it Look Like?

Great Science for Girls provides a learning environment with the three ingredients necessary for student success in STEM.

- √ **Engagement**: awareness, interest and motivation.
- √ **Capacity**: knowledge and skills needed to advance in STEM disciplines.
- √ **Continuity**: opportunities and resources to support advancement in STEM disciplines.

In a GSG Community:

Local industry and business people support GSG by:

- Mentoring youth in science
- Providing opportunities for youth to see women in science
- Advocating for GSG
- Securing corporate sponsorship of GSG programming

Local media supports GSG by:

- Conveying positive and empowering messages to girls and about girls
- Covering the importance of girls' participation in STEM education and careers
- Publicizing GSG programming and efforts

Schools support GSG by:

- Partnering with afterschool centers to offer GSG programming
- Coordinating in-school and out-of-school programs
- Being aware of and promoting student participation in GSG programming
- Promoting family engagement and support for STEM and GSG

Parents support GSG by:

- Advocating for strong STEM-related instruction in school and afterschool programs
- Providing opportunities and experiences that support their child's interest in STEM

In a GSG After School Program:

- The program partners with schools and science-rich institutions
- Staff engage families
- Staff are knowledgeable about gender-equity issues and foster inclusiveness
- Staff model behaviors and attitudes that are gender equitable
- Programs and activities offer girls:
  - √ opportunities for leadership
  - √ active engagement with concerned adults
  - √ inquiry-based, hands-on science experimentation
  - √ risk-taking, challenges and problem-solving opportunities
  - √ cooperative learning environments
  - √ mentors and role models
  - √ books about women doing science
  - √ non-stereotyped messages about who does science
  - √ pictures and posters that convey the message that "science is for me"

GSG program participant outcomes are:

- Increased positive attitudes towards women and STEM
- Less stereotyped attitudes about science
- Increased STEM skills and content knowledge
- Increased science literacy
- Increased interest in pursuing STEM education and careers
- Increased awareness regarding education and career paths in STEM

Great Science for Girls is a project of the Educational Equity Center at the Academy for Educational Development
100 Fifth Avenue, 8th Floor, New York, NY 10011, 212-367-4572, www.edequity.org/gsg.

Great Science for Girls

Partnership Expectations

GSG is a collaborative effort to build the capacity of after-school centers to deliver evidence-based programming to support girls' interest and persistence in STEM. To this end, the following describes the agreed-upon roles and expectations for each partner committed to this initiative.

Intermediaries

- Identify staff to train and provide technical assistance to after school centers
- Participate in Institute and Reunions
- Identify partners in local area to help sustain the work
- Identify a team (intermediaries, afterschool staff, key local partners) for participation in the Institute
- Build local community interest and support for *GSG*
- Integrate youth development principles into training and technical assistance
- Provide regular feedback to EEC/AED and external evaluator (on-line, phone, surveys, in-person)

After-school Centers

- Identify and support the participation of a cohort of staff in the *Great Science for Girls* local training and reunions
- Commit to adapting existing youth programs to incorporate curriculum activities as part of the *GSG* program
- Provide institutional support for trained staff to incorporate GSG activities within the center
- Encourage staff to participate in peer networks and other interactive website activities with the center and across regions, including contributing ideas, information, and resources
- Support the participation of new staff by providing professional development on *Great Science for Girls*
- Participate in formative and summative evaluation activities (pre-post questionnaires, activity feedback forms, personal and/or telephone interviews)

***GSG* Team**

- Provide starter kit information, help with partnering and fundraising
- Conduct institute and reunion for selected staff from intermediaries and/or afterschool centers
- Provide on-going TA customized to local needs
- Develop a handbook of best practices
- Link intermediaries to resources (research, curriculum partners, capacity-building resources)
- Create, moderate and maintain an interactive website

Great Science for Girls
After School Center Readiness Tool

This self assessment is intended as a tool for after school center directors to determine readiness to participate in the Great Science for Girls initiative. This instrument will not be collected and is only intended as a guide for planning and technical assistance needs.

Please rate your level of readiness on the following after school center tasks.

Task	Thinking About it	Working On It (Ready in 6 Months)	Working On It (Ready In 3 Months)	Already There!
Organizational Buy-in — Who needs to be convinced of this important work?				
Secure board or governing body support for *GSG*				
Introduce *GSG* to staff				
Introduce *GSG* to other key staff or community members				
Incorporate *GSG* in annual work plan and budget				
Staffing — Who at our center will be involved in this project?				
Assign staff member to be a liaison for *GSG*				
Identify *GSG* after school center project team (e.g. site liaison, curriculum implementers, community liaison) to train and to implement GSG initiatives				
Community Building — What community resources do we need?				
Explore collaborations with organizations who are doing science/gender work				
Promote *GSG* among stakeholders in the community				
Explore resources such as role models, mentors, and other volunteers				
Fundraising — What funding do we need?				
Create a plan for *GSG*, including staff training costs, materials, and staff time				
Determine your costs based on your plan				
Identify community stakeholders interested in funding the *GSG* activities				
Create a fund-development plan to launch and sustain the *GSG* work				
Training and T.A. Delivery — How will staff be trained and supported?				
Review and select curricula that will meet your needs				
Arrange for training of staff via your local *GSG* intermediary				
Participate in TA visits, conference calls, and *GSG* cross-site community of practice, provide feedback on the GSG website				
Work with other after-school centers to share on curriculum implementation				
Data Collection — What feedback will be required?				
Participate in monthly national evaluation activities				
Conduct local pre-and post-data collection				

Great Science for Girls

Contact List

GSG Team

NY TEAM
Educational Equity Center at AED (EEC/AED)
AED Center for School and Community Services (SCS/AED)
100 Fifth Avenue, 8th Floor ◆ New York, NY 10011

Co-PIs

Merle Froschl
Co-Director
EEC/AED
212-367-4598
mfroschl@aed.org

Barbara Sprung
Co-Director
EEC/AED
212-367-4585
bsprung@aed.org

Cheri Fancsali
Senior Program Officer
SCS/AED
212-367-4560
cfancsal@aed.org

Staff

Linda Colón
Program Manager
EEC/AED
212-367-4572
lcolon@aed.org

Maryann Stimmer
Coordinator of Science Programs, EEC/AED
212-367-4574
mstimmer@aed.org

Eliana Orellana
Research Associate
CSC/AED
212-367-4584
eorellan@aed.org

Amy Weng
Program Assistant
EEC/AED
212-367-4597
aweng@aed.org

DC TEAM
AED Center for Youth Development & Policy Research (CYD/AED)
AED National Training Institute (NTI/AED)
1825 Connecticut Ave, NW ◆ Washington, D.C. 20009

Bonnie Politz
Vice President
Director, CYD/AED
P: 202-884-8270
F: 202-884-8404
bpolitz@aed.org

Delores Holland
Technical Officer III
CYD/AED
P: 202-884-8715
dehollan@aed.org

EVALUATION
Lynn Gregory
Executive Director
Partnerships for Creative Action
69 Sussex Street ◆ Jersey City, NJ 07302
201-434-1988
lwgregory@comcast.net

Intermediaries

John Brandon
President
MCCOY, Inc.
3901 North Meridian
Suite 201
Indianapolis, IN 46208
P: 317-921-1288
F: 317-921-1298
john.brandon@mccoyouth.org

Lori Carter
Professional Development Coordinator
The After-School Institute (TASI)
2 East Read Street, 3rd Floor
Baltimore, MD 21202
P: 410-332-7467 x203
F: 410-332-1824
lcarter@afterschoolinstitute.org

Sue Eldredge
Executive Director
Community Network for Youth Development
657 Mission Street, Suite #410
San Francisco, CA 94105
P: 415-495-0622 x307
F: 415-495-0666
sue@cnyd.org

Peter Guttmacher
Director, Programming and Curricula Development
DC Children & Youth Investment Trust Corp.
1400 16th Street, NW, Suite 500
Washington, D.C. 20036
P: 202-939-1399
F: 202-347-3256
pguttmacher@cyitc.org

Nikki Hale
Coordinator of Training Programs
Chicago Area Project
55 East Jackson Blvd
Suite 900
Chicago, IL 60604
P: 312-663-3574 x247
F: 312-663-5873
nikkih@mail.chicagoareaproject.org

Kathryn Johnson
Executive Director
Alternatives, Inc.
2021B Cunningham Drive
Suite 5
Hampton, VA 23666
P: 757-838-2330
kjohnson@altinc.org

Deborah Stewart
Director, New Haven BEST Initiative
Youth Development Training and Resource Center
The Consultation Center, Inc.
389 Whitney Avenue
New Haven, CT 06511
P: 203-789-7645 x132
dstewart@theconsultationcenter.org

Chris Whipple
Vice President of Operations
The After-School Corporation (TASC)
1440 Broadway, 16th Floor
New York, NY 10018
P: 646-943-8700
F: 646-943-8800
cwhipple@tascorp.org

Advisory Committee/Curriculum Partners

Jason Freeman
Director
Coalition for Science After School
University of California
Lawrence Hall of Science, REA, #5200
Berkeley, CA 94720-5200
P: 510-642-7003
F: 510-643-0309
scienceafterschool@gmail.com

Joan Freese
Manager of Promotions, Publications, and Web, Dragonfly TV
Twin Cities Public Television
172 East Fourth Street
Saint Paul, Minnesota 55101
P: 651-229-1339
jfreese@tpt.org

Lucy Friedman
President
The After-School Corporation (TASC)
1440 Broadway, 16th Floor
New York, NY 10018
P: 646-943-8700
F: 646-943-8800
lfriedman@tascorp.org

Yolanda S. George
Deputy Director and Program Director
American Association for the Advancement of Science (AAAS)
1200 New York Avenue, NW
Washington, D.C. 20005-3928
P: 202-326-6670
ygeorge@aaas.org

Janet Kelley
Consultant
After School Program Design, Issues & Funding
510 Sixth Avenue
Brooklyn, NY 11215
P: 718-788-1835
jk@janetkelley.com

Priscilla Little
Associate Director
Harvard Family Research Project
Harvard Graduate School of Education
3 Garden Street
Cambridge, MA 02138
P: 617-495-9108
F: 617-495-8594
littlepr@gse.harvard.edu

Dale McCreedy
Director, Gender and Family Learning Programs
The Franklin Institute Science Museum
222 North 20th Street
Philadelphia, PA 19103
P: 215-448-1092
F: 215-448-1219
mccreedy@fi.edu

Robert Meduna
Extension Educator
4-H Youth Development
Southeast Research and Extension District
210 Mussehl Hall-East Campus
Lincoln, NE 68583-0714
P: 402-472-9582
rmeduna1@unl.edu

Harriet S. Mosatche
Vice President
Program Collaborations and Initiatives
Girl Scouts of the USA
420 Fifth Avenue
New York, NY 10018
P: 212-852-5723
hmosatche@girlscouts.org

Judy Nee
President
National After School Association (NAA)
529 Main Street, Suite 214
Charlestown, MA 02129
P: 561-741-4641
F: 617-778-6025
jnee@naaweb.org

Ellen O'Connell
Senior Program Director
Partnership for Afterschool Education (PASE)
120 Broadway, Suite 3048
New York, NY 10271
P: 212-571-2664
F: 212-571-2676
eoconnel@pasetter.com

Jane Quinn
Assistant Executive Director for Community Schools
The Children's Aid Society
105 East 2nd Street, Suite 908
New York, NY 10010
P: 212-949-4954
janeq@childrensaidsociety.org

Jennifer Wei
Assistant Director
Techbridge
Chabot Space & Science Center
7700 Edgewater Drive, Suite 519
Oakland, CA 94621
P: 510-777-9170 x308
jwei@chabotspace.org

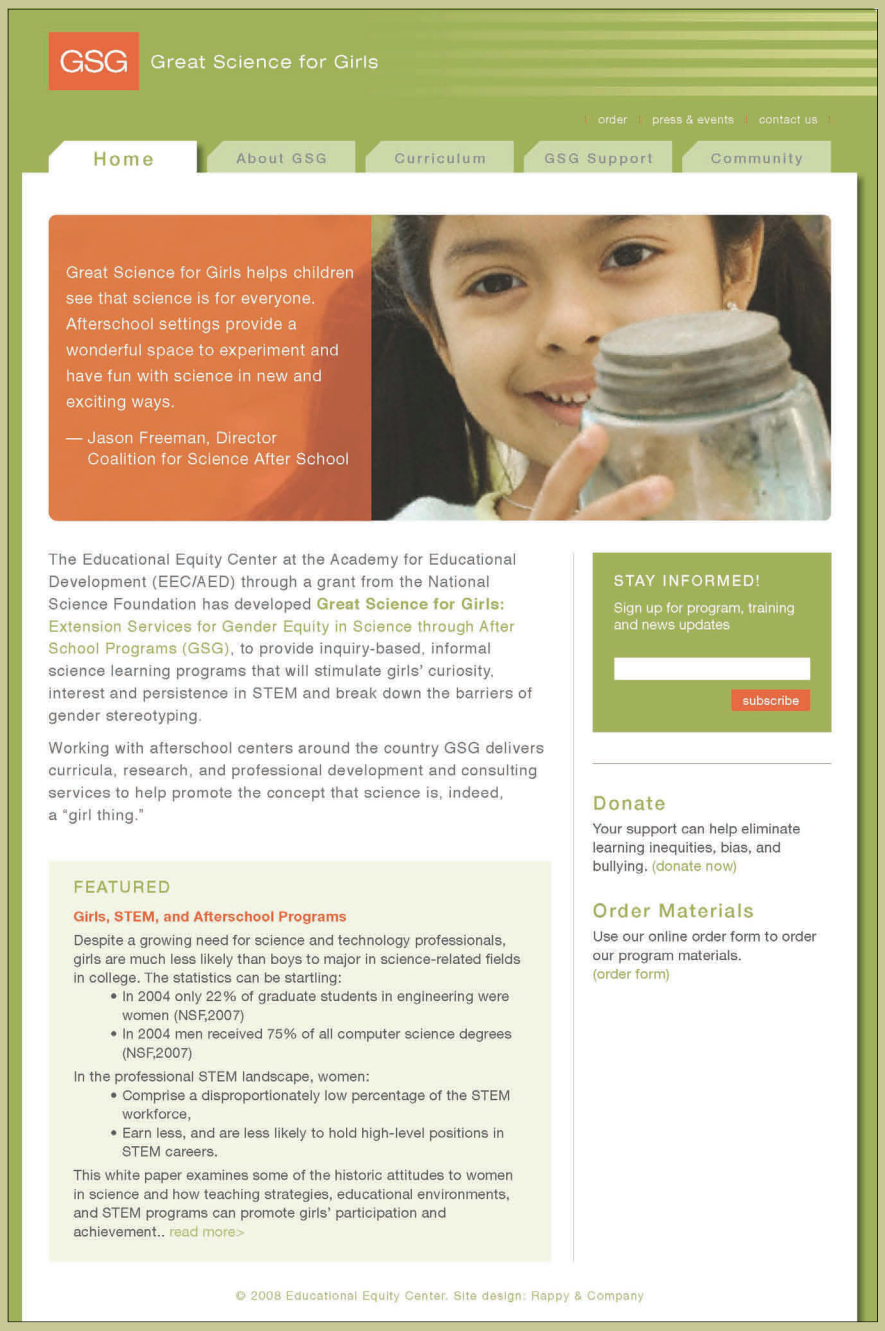
Faedra Lazar Weiss
Research Associate
Girls Incorporated National Resource Center
441 West Michigan Street
Indianapolis, IN 46202
P: 317-634-7546 x118
F: 317-634-3024
fweiss@girls-inc.org

Anita Krishnamurthi
Education and Public Outreach Lead
Astrophysics Science Division
NASA Goddard Space Flight Center
8800 Greenbelt Road
Greenbelt, MD 20771
P: 301-286-2597
Anita.Krishnamurthi@nasa.go

Great Science for Girls

Website Virtual Support System

Visitors to the *GSG* website will be able to learn about the partners involved in this initiative, the importance of targeting girls in science, information on evidenced-based programs, research and other resources (articles, webcasts, websites for girls, etc.). A communication feature will allow easy exchange among all the partners.



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Supporting Your GSG Program

Great Science for Girls

Local Outreach and Funding

Outreach

Local outreach is about following leads and developing relationships. Here are some ideas for potential "leads."

- Biotech associations
- Math/Science/Tech Magnet Schools
- Math/Science/Technology Teachers
- Professional associations
- Science museums
- Software associations
- State Math Teachers Association
- State Science Teachers Association
- State Technology Teachers Association
- Technical Colleges
- University Departments (e.g., computer science, engineering, math, science, technology)

Funding Possibilities

Are any of the following in your local area?

- Technology companies (e.g. Intel)
- Math/science-related companies (e.g. Monsanto)
- Engineering companies (e.g. Lockheed, Boeing)
- Telecommunications (e.g. Microsoft)
- Banks (local and national)
- Local community foundations (might give small grants with discretionary funds for local projects)

Foundations and Corporations

The Foundation Center is a great resource for researching potential foundation and corporate funders. There are inexpensive user packages and an online tutorial. To search the data base, use key words such as girls, science, and equity, or you can search for local corporate offices and funders in your geographic region. www.foundationcenter.org

Great Science for Girls

Dear Families,

Did you know...?

- Many girls lack career guidance and support for pursuing careers in science, technology, engineering and mathematics (STEM).
- There is often a disconnection between girls' dreams, career goals, and their practical plans for reaching those goals.
- Girls have little information about the types of STEM careers available, and the educational requirements to pursue those careers.

The above is why we have joined the efforts of the ***Great Science for Girls (GSG)*** initiative. ***GSG*** is an exciting opportunity to offer science programming in the cooperative learning style that is so appealing to girls. ***GSG*** will provide a proactive approach to dispel stereotypes about who does science, provide roles models from diverse ethnic/racial backgrounds and explore various career options in STEM (science, technology, engineering and mathematics).

How can you help...? Here are some suggestions:

- Actively encourage your child toward careers in the sciences.
- Question stereotypes and challenge perceptions.
- Start early talking about career exploration.
- Seek out opportunities for enrichment.
- Talk about the positive aspects of careers in STEM.

We're excited about this opportunity. Please feel free to ask any questions about this new program at our Center. We'll be counting on your support of this work!

Sincerely,

(Insert name here)
After-School Center Director

Great Science for Girls

Important Facts About Science and GSG

Great Science for Girls (GSG): Extension Services For Gender Equity in Science through After-School Programs *is funded by the National Science Foundation to build the capacity of afterschool centers to deliver inquiry-based programming that will broaden and sustain girls' interest and persistence in science, tehcnology, engineering and mathematics (STEM).*

What is inquiry-based science?

Science is an active process including skills such as observing, inferring, and experimenting. Inquiry is central to science learning. When engaging in inquiry, students describe objects and events, ask questions, construct explanations, test those explanations against current scientific knowledge, and communicate their ideas to others. They identify their assumptions, use critical and logical thinking, and consider alternative explanations. In this way, students actively develop their understanding of science by combining scientific knowledge with reasoning and thinking skills. "Hands-on" activities, while essential, are not enough. Students must have "minds-on" experiences as well (National Science Education Standards, 1996).

Why Science?

√ Jobs requiring training in STEM are expected to increase by 51% between 1998 and 2008. Unfortunately, American students are not well-prepared to go into STEM careers. Girls in particular are underrepresented in STEM degrees and careers and are missing out on the opportunity to participating in lucrative and growing STEM fields (Afterschool Alliance, 2006).

√ As of 2006, NCLB (No Child Left Behind) mandates testing in science as well as reading and mathematics. Informal education delivered in afterschool programs can be a key mechanism in meeting the accountability measures of the NCLB Act (Coalition for Science After School, 2004).

Why Afterschool?

Afterschool can support learning in a way that school cannot.

√ After school programs are typically more flexible than schools, allowing students to spend more time on investigation and engage in deeper inquiry (Coalition for Science After School, 2004).

√ Afterschool programs take time to ensure that students understand how their math and science skills can be applied to real world situations and their everyday lives (Afterschool Alliance, December 2001).

√ By providing an opportunity to learn about math and science in a fun and relaxed atmosphere, afterschool programs spark students' interest in these subjects, which carries over to the regular school day (Afterschool Alliance, December 2001).

Afterschool serves a diverse population of students that are underrepresented in STEM.

√ A large proportion of students who attend afterschool programs are from low-income families, communities of color, and underserved groups (Halpern, 2002). These demographics correlate with those students who are underrepresented in STEM, making afterschool a logical focus of programs aimed at increasing participation in STEM education and careers.

Why a gender focus?

√ Women are underrepresented in STEM degrees and careers. While girls and boys initially have similar interest in STEM content, girls' interest drops precipitously by upper elementary and middle grades (AAUW, 1992).

√ Women accounted for only 22% of graduate students in engineering in 2004 (NSF, 2007).

Why is GSG needed?

√ *GSG* presents an important opportunity to bring evidence-based inquiry science to this population of underserved students and to change attitudes about girls and science on the part of both girls and boys***.***

√ Through *GSG*, afterschool centers will be able to provide a learning environment for girls (and boys) that includes opportunities for leadership; active, intelligent engagement with concerned adults and other students; inquiry-based, hands-on experimentation; risk-taking; challenges and problem-solving; cooperative learning and fun. All of these are essential factors in making science accessible and interesting to girls (Campbell and Steinbrueck, 1996; Hansen, Walker and Flom, 1995; Fancsali, 2002; National Science Foundation, 2003).

What about the boys?

√ Experts agree that the high-quality science experiences promoted by GSG are beneficial to girls and boys in promoting interest and participation in STEM (Cahn, 2005).

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