

"ENGINEERING YOUR TOMORROW" GIRL SCOUT BADGE WORKSHOPS

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Introduction

The New England Shoreline Section of the Society of Women Engineers (SWE-NESS) and Girl Scout Council in Rhode Island joined forces with SWE student sections from Brown University, the University of Rhode Island, and the United States Coast Guard Academy to develop and run science badge workshops for Junior Girl Scouts (5th and 6th graders) in Rhode Island. Science Sleuth Workshops were offered in February 1994 at Brown University in Providence, Rhode Island and in September 1994 at Brown University and Camp Hoffman in West Kingston, Rhode Island. The workshop consisted of eight stations of hands-on activities that enabled the girls to earn Science Sleuth Badges and to work toward completing other badges as they were introduced to principles of science and engineering.

Why Hold Science Badge Workshops for Junior Girl Scouts?

There is a good deal of evidence that girls are discouraged from careers in engineering and science from a very early age¹. Therefore, early intervention is essential if we hope to be successful at increasing the pool of women in college engineering programs and in the engineering profession.

The girl scout workshops were designed for 5th and 6th graders. At this age the girls were old enough to grasp various concepts from science and engineering, yet they were young enough that they had not been irreversibly discouraged from technical subjects. In addition, getting girls excited about science and math at this age could affect their confidence level and their performance in these subjects as they go through junior high and high school.

There are several advantages to working with an established organization such as the Girl Scouts. Studies have indicated that girls often choose careers in science due to experiences they have outside of school through these types of community organizations². Working with the Girl Scouts is also a convenient way of accessing large groups of young girls for



outreach activities. Because science badges are already a part of the girl scout program, there exists an infrastructure within which we could design our activities. The workshops also fulfilled a need within the Girl Scouts because many troop leaders find it difficult to help the girls with science badges due to a lack of expertise in this area.

A drawback to working through the Girl Scouts is that girls who are not scouts miss this opportunity. In particular, girls from inner cities and economically disadvantaged backgrounds may be disproportionately excluded from this outreach activity. Therefore, similar programs in the schools, and especially in economically depressed areas, would be valuable.

Logistics and Staffing

After SWE-NESS discussed the idea of holding the workshops, Sue Anderson, our current career guidance chair, worked with Girl Scout Council in Rhode Island to solicit interest in the workshops, to find out which science badges were most popular, and to disseminate information to the troops as plans were made. Forms advertising the event with a sign up sheet were distributed to the girls through Girl Scout Council. Planning meetings were held prior to the workshops in order to formulate ideas for each station, make lists of supplies needed, and assign stations.

The workshops were 3 hours in length and up to 100 girls could be accommodated per workshop. The first Science Sleuth Workshop was held at Brown University in February 1994. Due to a snow storm, attendance was low. The same workshop was held at both Brown University and Camp Hoffman in Rhode Island in September 1994. At Brown there was a morning session with 79 girls and an afternoon session with 77 girls. Sue Anderson coordinated activities at Brown University. This location was staffed mostly by Brown University students (about 15) and a couple of SWE-NESS members. At Camp Hoffman there was a morning session with 86 girls. Camp Hoffman activities were coordinated by Linda Kelly who was then the career guidance chair for SWE-NESS. The activities were run by SWE-NESS members (about 10) and about 15 students from the Coast Guard Academy and the University of Rhode Island.

One of the most challenging aspects of the program was organizing and preventing chaos as girls rotated between stations. This was facilitated by giving adequate time between stations and by properly informing the workshop facilitators and the girls on the sequence of events. There were also large signs posted with the number and name of each station.

Science Sleuth Stations

The challenge in designing the stations was to make the activities fun, informative, and hands-on while using supplies that were inexpensive and readily available. The activities were all designed for a 15 minute period except for papermaking and simple machines which were 30 minute stations. Activities were developed in accordance with guidelines set forth in the junior



girl scout badge handbook. The exact format and content for each activity were developed by the workshop leaders using various references and their personal knowledge. *The Way Things Work* by David Macaulay³ was a particularly valuable reference used to help design interesting activities for the workshop.

It is important to document the procedures for each activity and to suggest changes after completing the workshop. This facilitates the improvement of workshops and allows for the dissemination of information to help others interested in planning similar activities. A brief description of each science sleuth station is outlined below:

Station # 1: Making Musical Instruments

At this station girls made their own musical instruments from a shoebox (which they each brought), rubber bands, and blocks of wood which were machined to the correct size prior to the workshop. After making the instruments the girls played simple melodies with them and experimented with changing the pitch.

Station # 2: Growing Crystals out of Sugar

Girls took home a small glass jar containing a sugar solution with a string and paper clip suspended to grow their own sugar crystals. At the workshop, the girls studied sugar crystals that were grown in advance. They also examined and learned about a variety of minerals.

Station # 3: Simple Machines

The girls learned about inclined planes, levers, pulleys, screws, wedges, and wheel and axles. They pulled common objects out of a grab bag and identified the type of simple machine each represented. The girls were most interested in toys that demonstrated the various machine types.

Station # 4: Potpourri

At this station, the girls demonstrated buoyancy by floating objects in a water tub. They also showed that air exerts pressure by blowing through a straw and by using a hair dryer to elevate ping pong balls. Finally, they wrote messages in invisible ink (lemon juice) and read messages sent from the previous group.

Station # 5: Papermaking

The girls made paper from a slurry of water and colored bond paper. Fruit was added to some of the batches for additional color and scent.

Station # 6: Corrosion and Metal Cleaning

The girls observed corrosion of various types of metal and polished metals using toothpaste. They learned about the causes of corrosion.

Station # 7: Stereo and VCR Hookup

The girls learned how to hook up a stereo system and TV/VCR. They learned the purpose of each machine and viewed a videotape.

Station # 8: Fingerprinting

The principles of fingerprinting were demonstrated. Girls used their sugar crystal jars to make fingerprints and dusted and lifted them with baby powder and tape. They compared fingerprints using ink to those lifted from their jars.

Feedback

The girls completed evaluation forms at the end of the workshop before collecting their badges. Table 1 lists the favorite activities from the Brown University September 1994 sessions. Growing crystals and making paper were the most popular activities. Based on the feedback, some of the other activities that were not as well received can be fine tuned for future workshops.

**Table 1: Favorite Activities -
Brown University Sept 1994**

<u>Favorite Activity</u>	<u># Girls</u>
Growing Crystals	62
Making Paper	56
Musical Instruments	11
Stereo/VCR Hookup	10
Fingerprinting	9
Corrosion	8

Table 2 shows the number of girls answering yes and no to questions asked in the evaluation form for each workshop given in September 1994.

It is notable that all of the girls seemed to enjoy the workshop and many of them indicated that they liked science better or were more comfortable with it as a result of the workshop. Most of the girls said that they would attend another similar workshop. Specific comments were extremely positive and enthusiastic.

Table 2: Response to Evaluation Questions in Sept 1994

Q. Did you have fun?

<u>Location</u>	<u>Yes</u>	<u>No</u>
Hoffman	86	0
Brown Morning	79	0
Brown Afternoon	77	0

Q. Would you go to another workshop to earn a different science badge?

<u>Location</u>	<u>Yes</u>	<u>No</u>
Hoffman	84	2
Brown Morning	75	4
Brown Afternoon	77	0

Q. Did you like science before the workshop?

<u>Location</u>	<u>Yes</u>	<u>No</u>	<u>Sort Of</u>
Hoffman	65	19	2
Brown Morning	44	26	9
Brown Afternoon	35	32	10

Q. If you didn't like science before, do you like science better after the workshop (or are you at least more comfortable with it)?

<u>Location</u>	<u>Yes</u>	<u>No</u>
Hoffman	21	0
Brown Morning	35	0
Brown Afternoon	40	2

The Benefits of Cooperative Outreach

There were many benefits of cooperative outreach. Mentoring was facilitated at several levels. The girl scouts were exposed to positive student and professional role models and the college students had a chance to learn more about various technical careers from the SWE-NESS members. In addition, the students enjoyed taking a leadership role in developing and running activities.

Input for planning the workshop from a diverse group of students and professionals also provided for expertise across the broad spectrum of topics covered.

Finally, cooperative efforts allowed small SWE sections to accomplish a great deal. Without cooperation among sections, each individual SWE section would be too small to successfully complete this type of program.



Future Plans

There are plans to develop workshops for other science badges. A workshop is being developed which will enable girls to earn a Science in Action Badge and 3/5 of the requirements for the Science in the Worlds Badge. This workshop is planned for Rhode Island in the fall of 1995. There are also plans to offer a workshop in Connecticut in the spring of 1996.

References

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3. Macaulay, D. (1988). *The Way Things Work*. Houghton Mifflin Company, New York, N.Y.

