

# ON MY HONOR: DO SCOUT MERIT BADGES SIMILARLY PREPARE GIRLS AND BOYS FOR A FUTURE IN TECHNOLOGY?

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## ABSTRACT

*The purpose of this study is to examine whether or not scouting activities similarly prepare boys and girls for a future in technology. Technology-related merit badges available to boy scouts and girl scouts during the primary school grades are examined. Differences in types of badges and activities are identified. Results of the study will be used to identify possible strategies for attracting more girls to technology careers.*

**Keywords:** gender issues, women in computing, technology education, technology skills

## INTRODUCTION

As we enter the 21<sup>st</sup> century, women make up only about 30% of the information technology (IT) workforce (15). Many reasons have been offered for the under-representation of women in IT including cultural bias, self-perceptions about computer ability, and lack of female role models. Middle school years have been identified as a “watershed time for boys and girls (7).” By the eighth grade, differences in computer use and attitude between genders are already established.

The purpose of this study is to examine whether or not boys and girls are prepared similarly for a future in technology through scouting activities at the primary school level. Results of the study will be used to identify possible strategies for attracting more girls to technology careers.

## LITERATURE REVIEW -WOMEN IN IT

Women have a long and distinguished history in computing. Ada Augusta Lovelace wrote instructions for Babbage in the 1800s; Adele Goldstine developed the first programs for the Eniac in the 1940s; and Dr. Grace Murray Hopper played a central role in the development of COBOL. Despite these notable accomplishments, women traditionally have been under-represented in the field of information technology (IT).

For almost 20 years, numerous studies have tried to identify reasons for women’s under-representation in computing. A review of research from the 1980s and early 1990s by Butler (7) found several possible explanations including the following:

- A cultural perception exists that technology is a “male” domain.
- Not enough women teachers are available to serve as role models for girls.
- Software design and orientation is biased in favor of boys.
- Boys’ aggressive behaviors’ using technology discourages girls.

Growth of the Internet and World Wide Web in the 1990s highlighted the need for IT workers and high-tech employment opportunities for women. Some promise emerged for increased

interest in computer technology by girls. A 1997 Gallup survey (8) found that teenage boys and girls “report equal levels of computer usage, and express similar levels of confidence in their computer skills.” A USA Today story (13) cited young girls as participants in Web site design for major kid marketers.

Despite such examples that indicate participation could be increasing, several landmark studies paint a different picture:

- A survey of new college freshmen by UCLA’s Higher Education Research Institute found that women were half as likely as men to rate their computer skills as “above average” or within the “top 10%” (14).
- In the past decade, the percentage of college male freshmen indicating an interest in computer science careers has grown by 9.3%; for women it has only grown by 1.8% (14).
- According to AAUW’s frequently-quoted study, Tech-Savvy: Educating Girls in the Computer Age, girls are “not well-represented in computer laboratories and clubs, and have taken dramatically fewer programming and computer science courses at the postsecondary level (1).”

The author of this paper observed declining enrollments of women in the computer information systems program at her own institution. During a five-year period beginning in 1995, when enrollment in the CIS major doubled, the percentage of female CIS majors actually declined. The disappointing trend was a call to action. What can we do to reverse this pattern of enrollment?

The purpose of the current study was to determine whether or not girls and boys are prepared similarly for a future in technology by examining scout merit badge activities. Scouting touches the lives of many children in the U.S. and abroad. According to their respective Web sites, 2.8 million girls in the U.S. are members of the Girl Scouts (9); almost 1.8 million boys are Cub Scouts (2). The merit-badge activities that these scouts engage in reflect the competencies, behaviors, and values that our culture embraces. Differences in scouting activities in the primary grades might shed light upon the career preferences boys and girls show in later years.

## **METHOD AND PROCEDURES**

The study sought answers to the following questions regarding boys’ and girls’ technology experiences in scouting:

- What technology-related merit badges are available for Cub Scouts and Girl Scouts? Are the merit badges required or elective?
- Do merit badge opportunities change with grade level?
- What competencies or activities are emphasized for completion of merit badges?
- Do merit badges emphasize different competencies for boys and girls?

Since the middle-school years are a pivotal time in the formation of attitudes toward technology, the author examined merit badges contained in the Cub Scout (grades 1-5) and Girl Scout (grades K-6) handbooks (3, 4, 5, 6, 10, 11, 12). Although Cub Scouts and Girl Scouts have

many different learning opportunities, the author limited the scope of the study to include only merit badge activities.

The study defines technology badges to include the following areas: craftsman, engineer, handyman, scientist (primarily physical sciences), mathematics, and computers. The first four areas are classified as the “technology group” in the Webelos Cub Scout handbook. The author refined this scope to also include mathematics and computers since women are under-represented in these two areas. To be considered in the study, the entire theme for a badge must involve technology. Badges that use technology for one or two activities are not included. For example, a cooking badge that involves browsing for recipes on the Web would not be included.

Two individuals identified and classified technology badges for each level of scouting. A list of verbs that described the activities associated with each badge was constructed. The verb list provided a vehicle for identifying patterns in badge requirements.

### FINDINGS

Tables 1 and 2 summarize the merit badge structure for Cub Scouts and Girl Scouts during the primary school grades. Cub scouts progress through four levels: Tiger, Wolf, Bear, and Webelos. At each level, some badges are required and some are elective. Girl scouts progress through three levels: Daisies, Brownies, and Juniors. Badges are elective at all three levels. A total of 17 Cub Scout badges and 19 Girl Scout badges fit into one of the six technology areas for examination.

**Table 1: Cub Scout Badge Overview**

Boys	Grade	Badge Requirements	Total Badges		Total Examined	
			Req	Elec	Req	Elec
Tiger	1 <sup>st</sup>	All activities	5	50	0	2
Wolf	2 <sup>nd</sup>	All activities	12	22	1	2
Bear	3 <sup>rd</sup>	Varies with badge	24	24	3	5
Webelos	4 <sup>th</sup> -5 <sup>th</sup>	Varies with badge	1	19	0	4

**Table 2: Girl Scout Badge Overview**

Girls	Grade	Badge Requirements	Total Badges	Total Examined
Daisies	K-1 <sup>st</sup>	All activities	16	2
Brownies	1 <sup>st</sup> -3 <sup>rd</sup>	Choice of 4 activities	53	7
Juniors	3 <sup>rd</sup> -6 <sup>th</sup>	Choice of 6 activities	84	10

To identify differences in requirements by age, the author compared merit badge opportunities for corresponding Cub Scout and Girl Scout grade levels. Table 3 compares Daisies and Tiger Scouts; Table 4 compares Brownies with Wolf and Bear Scouts; and, Table 5 compares Juniors with Webelos.

At the first level, only two technology badges are available for either Daisies or Tigers. However, the two Daisy badges emphasize scientific experimentation (predicting, testing,

observing), while the Tiger badges involve creating or repairing a product. This distinction becomes a common theme at all levels of scouting considered in this study.

**Table 3: A Comparison of Daisy and Tiger Badges**

	<b>Badge</b>	<b>Orientation</b>	<b>Activities</b>
Daisies	Sound Travels	Science	Experiment
	What Would Happen If?	Science	Experiment
Tiger	Make a Model	Craftsman	Make (wood or plastic)
	Bicycle Repair	Handyman	Visit

Table 4 compares badges for Brownies with Wolf and Bear Scouts. As scouts move up to these levels, more technology badge opportunities are available. Four Brownie badges focus on science, two on math, and one on computers. For Wolf and Bear Scouts, five badges focus on engineering skills, three on handyman skills, and one each on science, craftsman, and computer competencies. Note that four of the badges listed for Wolf and Bear Scouts are required.

**Table 4: A Comparison of Brownies with Wolf and Bear Scouts**

	<b>Badge</b>	<b>Orientation</b>	<b>Activity Verbs</b>
Brownies	Computer Smarts	Computer	Browse, chart, discuss, interview, play
	Math Fun	Math	Make (poster, hourglass, secret code), guess, calculate
	Numbers and Shapes	Math	Make (shapes, puzzles)
	Movers	Science	Make (paper flyers)
	Science in Action	Science	Experiment, find
	Science Wonders	Science	Experiment
	Space Explorer	Science	Draw, experiment, find, make (star show)
Wolf	Computers	Computer	Describe, visit
	Tools for Fixing & Building*	Handyman	Build, list, show
	Machine Power	Science	List, make (windlass), use
Bear	Shavings and Chips*	Craftsman	Carve, show, *Whittling Chip Card
	Repairs	Handyman	Fix, refinish, repair, use
	Sawdust and Nails*	Handyman	Build, show, fix
	Aircraft	Engineer	Build, draw, list, explain, ride
	Build a Model*	Engineer	Draw, make (model from kit, floor layout, shopping center, vehicle), visit
	Things That Go	Engineer	Make (scooter, windmill, waterwheel, invention)
	Radio	Engineer	Build, make (radio from kit), operate
	Electricity	Engineer	Make (buzzer, electromagnet, crane with electromagnetic lift), use, wire

\* An asterisk indicates a required badge.

Table 5 summarizes badge opportunities for Juniors and Webelos. Of the 10 badges for girls, 7 are in the areas of engineering and science. Junior Girl Scouts is the earliest level for girls to practice handyman or engineering skills. Webelos Cub Scouts can choose from badges in the areas of craftsman, engineer, handyman, or science. There is no designated math or computer badge for Webelos.

**Table 5: A Comparison of Junior Girls and Webelos**

	<b>Badge</b>	<b>Orientation</b>	<b>Activity Verbs</b>
Juniors	Computer Fun	Computer	Create (newsletter), evaluate, interview, show, use, visit
	Aerospace	Engineer	Browse, experiment, interview, investigate, make (paper planes), participate, visit
	Discovering Technology	Engineer	Discuss, find, put together, investigate, use, visit
	Making it Matter	Engineer	Make (polymer, buzzer, structure), experiment, find, visit, reassemble
	Ms. Fix-It	Handyman	Find, help, learn, read, show, use
	Math Whiz	Math	Calculate, find, guess, list, make (puzzle, secret code, model), predict
	Puzzlers	Math	Calculate, design, make (puzzles), learn, play
	Science Discovery	Science	Draw, experiment, find, make (kaleidoscope, environmental report card), visit
	Science in Everyday Life	Science	Collect, experiment, identify, interview, sketch, write (sci fi), make (timekeeper)
	Science Sleuth	Science	Experiment, find, investigate, make (instrument, paper, crystals), show
Webelos	Craftsman	Craftsman	Build, explain, make (display stand, four useful items)
	Engineer	Engineer	Build, draw, explain, list, visit
	Handyman	Handyman	Arrange, build, clean, help, repair, replace, show
	Scientist	Science	Build, explain, read, show

## DISCUSSION

Several differences regarding girls' and boys' technology experiences are evident from the comparison of merit badges.

### Requirements vs. Electives

At each level of Cub Scouts, at least one merit badge is required. Only Wolf and Bear scouts are required to complete technology-related merit badges. Girl Scouts, on the other hand, have no required badges. While technology opportunities are available at each level of Girl Scouts, merit badges are optional.

### Badge Categories

Through Daisies and Brownies, Girl Scout badges primarily focus on science with some math opportunities and one computer option. Engineering and handyman badges do not appear until the Junior level. No craftsman opportunities that practice the use of tools are evident for girls.

Cub Scouts, on the other hand, provide craftsman and/or handyman badges at each level. No badges are devoted to the area of math, and only one exists in computers. Several engineering opportunities are available starting at the Wolf Cub level.

## Badge Activities

For both girls and boys, activity choices are more prevalent at the later primary years. Tiger and Wolf scouts, as well as Daisies, must complete all specified activities to earn a merit badge. For Bear, Webelos, Brownies, and Juniors, some choice is available in selecting activities to meet badge requirements.

An examination of badge activities shows that girls more often conduct experiments and boys more often build products. This is a common theme at all levels. At the Juniors-Webelos level, visiting a site or interviewing an individual is more often suggested for girls.

In general, Cub Scout activities seem to place more emphasis on understanding “how” or “why” something works than Girl Scouts. This is particularly true when comparing Webelos and Juniors. Consider the science badge comparison in Table 6. Cub Scouts must demonstrate knowledge of the underlying scientific principles used in completing merit badge activities. The Webelos handbook includes explanations and diagrams of Bernoulli’s principle, Pascal’s law, and inertia.

**Table 6: Sample Badge-to-Badge Comparison**

Badge	Badge Requirements	
<b>Webelos: Scientist Merit Badge</b>	The following are required: <ul style="list-style-type: none"> <li>• Read Bernoulli’s principle. Show how it works.</li> <li>• Read Pascal’s law. Tell about some inventions that use it.</li> <li>• Read Newton’s first law of motion. Show in three ways how inertia works.</li> </ul>	Do any six: <ul style="list-style-type: none"> <li>• Show the effects of atmospheric pressure.</li> <li>• Show the effects of air pressure.</li> <li>• Show the effects of water pressure.</li> <li>• Build and launch a model rocket.</li> <li>• Explain what causes fog. Show.</li> <li>• Explain how crystals are formed. Make.</li> <li>• Explain how you use your center of gravity. Show three tricks.</li> <li>• Show three ways your eyes work together.</li> <li>• Show an optical illusion.</li> </ul>
<b>Juniors: Science Discovery Merit Badge</b>	Do at least six: <ul style="list-style-type: none"> <li>• Make a starch solution or iodine alcohol solution. Draw with solution. Observe.</li> <li>• Make a kaleidoscope.</li> <li>• Try these water tricks: Make a needle float. Drop water on a penny.</li> <li>• Make a collage.</li> <li>• Two of the following: make an outdoors drawing; identify five trees, flowers, or animals; or classify five rocks.</li> <li>• Visit or interview a women scientist.</li> <li>• Visit a hands-on science or natural history museum.</li> <li>• Look in the library or on the Web for some optical illusions to share with troop.</li> <li>• Friction experiment: Car on a cookie sheet</li> </ul>	

## Badge Outputs

As previously mentioned, boys are more likely to “build” a product than girls. Both Cub Scout badges and Girl Scout badges include many “make” activities. However, for Cub Scouts, most of these involve actually using construction materials and tools. This is not true for girls who

often use paper or cardboard with minimal tools. The author believes this is noteworthy for at least two reasons. First, construction activities could provide confidence-building opportunities that are absent in the Girl Scout experience. Second, lack of construction activities could suggest “appropriate” gender roles that later influence career choices. Clearly increasing the use of building activities for Girl Scouts should be considered.

### CONCLUSIONS AND FUTURE DIRECTION

The findings of this study indicate that differences do exist in how scouting prepares girls and boys for technology. Although both Cub Scouts and Girl Scouts offer technology-related badge opportunities, areas of emphasis and activities differ. Since most badges are elective, this study can only provide insight into available opportunities. Additional research is needed to determine differences between boys and girls with respect to actual badges completed.

Both Cub Scouts and Girl Scouts offer additional learning opportunities. Future research should consider the entire package of activities that scouting embraces, not just merit badges alone.

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