

# Construction Outreach Event with Girl Scouts of the USA and Cal Poly Women in Construction

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For an industry that is struggling to find enough workers, the limited amount of women entering construction is proving to be a significant issue. Some of the major reasons for this are social norms and stereotypes that discourage young girls from entering traditionally male careers. Outreach events that present girls with more positive messages about their potential for starting a career in construction are beneficial for both the girls and the construction industry. Cal Poly's Women in Construction Club (WIC) and Girl Scouts of the USA are two organizations that can aid this cause and inspire more girls to consider a construction career. This paper aims to determine an event that WIC can organize for Girl Scouts that will be successful in showing girls there is a place for them in construction. Interviews were conducted with several individuals with experience organizing Girl Scout events and a survey regarding volunteering interest and event specifics was sent to construction management majors at Cal Poly. In general, the event should target elementary-aged Girl Scouts and consist of several 30 minute, hands-on activities each covering a basic construction topic. The major goals of the event include providing the girls with a positive experience, getting them excited about construction, and helping them visualize themselves in the construction industry.

**Key Words:** Outreach, Girl Scouts, Construction Education, Women in Construction, Women in STEM

## Introduction

Despite general acceptance of women in construction (Fielden, 2001), construction remains a male-dominated field. A significant lack of women choosing a career in construction is an issue for an industry that suffers from continuing labor shortages. A 2019 report from the Associated General Contractors of America found that 79% of construction companies are looking to hire more employees, but 78% of companies report struggling to find these employees. This problem has highlighted the importance of recruiting young people, particularly women who, as of 2016, make up only 9.1% of the construction industry (NAWIC, 2016). The problem is not that women are not interested in construction or better suited for less technical careers, it's that they have received messages since they were children that STEM jobs are not for them (López-Sáez, 2011; Guimond, 2001; Francis, 2014). Outreach events that introduce girls to construction allow girls to develop an interest in the field and can potentially lead to more women entering the construction industry.

Cal Poly's Women in Construction Club (WIC) and Girl Scouts of the USA are both dedicated to supporting and empowering women and girls. Both organizations can help change girls' and society's perception of the construction industry through events that educate girls and their parents about a career in construction. This paper will examine outreach strategies for exposing girls to STEM topics, past Girl Scout events, and the opinions of those who have worked with Girl Scouts to determine how WIC can organize a successful outreach event.

### *Barriers to Girls Choosing a Career in Construction*

There are several factors that contribute to the lack of women entering the construction industry. One of the main issues is the belief that men are better suited for STEM careers. Girls and women often receive overwhelmingly negative messages about entering STEM careers (Milgram, 2011). There is a perception that the construction industry is too dirty and masculine for women and that men have a better natural ability to use construction tools (Pringle, 1998; Fielden, 2001). Stereotypes for gender and STEM exist throughout society and are shared by those who have significant influence over girls. Parents are likely to dissuade their daughters from pursuing a career in

construction due to the perception that it is too dirty and physical for girls (Fielden, 2001). Additionally, career counselors generally see construction as a better option for men and point men in that direction more often (Francis, 2014).

This attitude has proven to be a major barrier to girl's and women's perspective on career choices. Girl's career choices are limited when they perceive that important people in their lives, such as their parents, will not value their choice (López-Sáez, 2011). In addition to the people around them, girls limit themselves with stereotypes. Beliefs that women are not as good as men in technical subjects have a direct effect on a girl's perception of her own abilities and therefore career options (Guimond, 2001). These perceptions tend to start well before girls begin choosing their careers as well. Gender identity forms in childhood and effects an individual's choices thought their life (Bem, 1981). Negative messages about women in STEM significantly affects girls as early as elementary school (López-Sáez, 2011).

One of the reasons that many people believe that men are better at construction jobs and STEM in general is the lack of ability to picture women in these fields. The lack of women in construction means that there is a lack of female role models. Parents and girls struggle to see construction as a good career for women when they don't see women in the industry (Pringle, 1998). When girls interact with women in STEM, it's easier for them to understand that women can be successful in STEM, to identify with technical careers, and do better on STEM tests (Stout, 2011; Milgram, 2011). An additional factor that contributes to difficulty picturing women in construction is a lack of knowledge about the industry. Students and the adults around them tend to know very little about the construction industry (Pringle, 1998). School counselors who recommend construction to boys more than girls also report having less knowledge of construction than those who do not promote construction more to boys (Francis, 2014). From a young age, girls feel discouraged from pursuing STEM careers like construction but affirming their ability to be successful in traditionally masculine careers keeps their career options open.

### *STEM-Related Activities for Girls*

There have been many events and activities created to introduce girls to STEM. Construction camps are a popular form of outreach for older girls. These camps typically target high-school aged girls and focus on promoting their interest in the construction industry through hands on activities. Girl Scouts of the USA also has several badges related to engineering for different ages groups. Their mechanical engineering badge booklets provide examples of how to present each activity as well as activities appropriate for younger girls.

#### *Construction Camp*

These construction camps, which run for several days, include information about the construction industry, introduce the girls to female role models, and create a supportive environment that focuses on building confidence. The activities are usually hands on and teach practical construction skills. The girls often use construction tools, including power tools. There are some slight differences in the agendas of each camp but they all have the same goals: to help girls see themselves in construction, understand that there is a place for them in the industry, and give them the confidence to pursue a construction career.

Women in Construction Summer Institute at Colorado State University is one of the organizations putting on a construction summer camp. The activities done in this camp focus on major construction management skills such as planning and scheduling. For one of the activities, the girls were tasked with building a bridge out of Legos including making a list of materials and a delivery schedule. This activity taught the girls important skills as well as educate them on the construction process and role of the construction manager. On other days, they built concrete lamps and experimented with 3-D technology. The girls were also introduced to women in the construction industry who can share with them their experience in the industry (Dodge, 2017).

The National Association of Women in Construction (NAWIC) also hosts a construction camp called Camp NAWIC. Similarly to the construction camp at Colorado State, Camp NAWIC presents the girls with successful women from different areas of the building process. The girls typically learn about utilities, carpentry, electrical, and other trades through hands-on activities in a gender-neutral environment (2019 Camp NAWIC, 2019). Let's Build Construction Camp for Girls also provides an introduction to construction trades with the same reassuring setting.

The July 2019 schedule for the camp includes safety, carpentry, electrical, concrete, masonry, wall assemblies, and interior finishes. The high school girls also get to go on field trips to observe construction first hand (Let's Build Construction Camp for Girls, 2019).

### *Girl Scout Badges*

Girl Scouts of the USA is a youth organization for girls that focuses on developing leadership skills and confidence through earning badges, selling cookies, and other activities. The younger Girl Scouts are Daisies who are kindergartners and first graders, Brownies who are second and third graders, and Juniors who are fourth and fifth graders. Each age group has different badges designed with their age and capabilities in mind.

Each mechanical engineering badge booklet has three different badges that girls can earn. Each badge has an introduction, purpose, and reflection portion. The introduction gives a brief background on the model that the girls are going to make and general concepts that relate to the activity. The purpose is one sentence stating what the girls will learn from this specific activity. The girls are asked at the end of each badge what they are inspired to do with their newly learned skills. Interspersed between the steps to earn each badge are definitions of terms such as “friction” and “brainstorming”, explanations of basic engineering concepts, and some history about what the girls are building. For example, there is a section about female board game inventors that went along with the board game design badge for Daisies (Girl Scouts of the USA, 2018b).

The steps and objectives of the mechanical engineering badges get increasing complicated as the girls get older. For Daisies, there are only three steps total that focus on building a simple model and testing it (Girl Scouts of the USA, 2018b). There are five steps for Brownies’ badges. They start with learning about the general concept behind the object they’re building, create their models, test them, and share their results (Girl Scouts of the USA, 2018a). Juniors also follow five steps for their badges but they learn more specific engineering concepts, analyze the results they get from testing, and think of ways to improve their designs (Girl Scouts of the USA, 2018c). For example, there is a mechanical engineering badge for building a car for each age group. Daisies use craft materials to make a car that they can test rolling on different materials (Girl Scouts of the USA, 2018b). Brownies build a race car using basic knowledge of speed and what makes things go faster or slower. They also build a race track to test the cars (Girl Scouts of the USA, 2018a). While Juniors use knowledge of potential and kinetic energy to build a balloon car that uses air power (Girl Scouts of the USA, 2018c).

### *Previous Research into Girl Scout Event*

There has been some previous research into a potential WIC event with Girl Scouts. Interviews were conducted with Dana Richard, program manager at Girl Scouts of California’s Central Coast, and Kristin Abele, elementary outreach chair for Cal Poly Society of Women Engineers (SWE). The event should be about three to four hours long with several 30 minute activities (personal communication, January 11<sup>th</sup>, 2019). SWE organizes events for Girl Scouts with typically 3 different engineering-related activities (personal communication, January 15<sup>th</sup>, 2019). To keep the girls’ interest, the events should stay active and be hands-on. For older girls, it was recommended to have a panel of students, professors, and other people who could provide information about college or the construction industry as part of the event (personal communication, January 11<sup>th</sup>, 2019). Having a theme and general storyline is a way that SWE maintains the interest of it is elementary-aged Girl Scouts (personal communication, January 15<sup>th</sup>, 2019). It was also recommended to have t-shirts made for the volunteers to identify them (personal communication, January 11<sup>th</sup>, 2019). The event should also include an opening with a presentation for parents and a closing where the girls receive patches. It is recommended to have some kind of information about construction management for the parents and to create patches for the event instead of earning official ones. When it comes to planning the event, SWE forms subcommittees with about 10 people who are given different titles and responsibilities (personal communication, January 15<sup>th</sup>, 2019). Sign-ups for the event should be electronic and a small fee should be charged as an incentive to come to the event (personal communication, January 11<sup>th</sup>, 2019).

## **Methodology**

Several interviews were conducted with individuals from Cal Poly Society of Women Engineers (SWE) and Girl Scouts of the Central Coast. These interviews were semi-structured and covered specific aspects of the event such as

scheduling the planning the event, determining age appropriate activities for the girls, and the scale of the event in addition to overall goals of the event, inspiring the girls, and educating their parents.

A survey was sent electronically to students in the Cal Poly Construction Management Department. To understand respondents' knowledge of construction and experience with children and organizations similar to Girl Scouts, they were asked about their year in school and involvement with children and youth organizations. The students were able to select 'yes' or 'no' and their year in school. Following these questions, respondents were asked about what construction topics were most interesting to them and what they believed would be the best format for the activities. They were given several options that they could select for each question. The options for construction topics come from construction activities done in construction camps for girls. The final questions gathered interest in volunteering in the event. Students were asked about their interest in leading groups of Girl Scouts and being part of a committee to plan the event and asked to leave their contact information (see Appendix A).

## **Results**

### *Interviews*

When scheduling the date for the event, it is recommended to check with Dana Richards at Girl Scouts of California's Central Coast, to ensure that the date does not conflict with other Girl Scout events (personal communication, April 24th, 2019). It would also be helpful to advertise the event through the Girl Scout website so that it will be visible to parents (personal communication, April 17th, 2019). If the event is taking place on Cal Poly's campus, the room should be booked as soon as possible. Registration should take place about 1 to 2 months before the event and have a hard and a soft deadline. Sometimes parents miss the deadline but still want to sign up. It is suggested to have the soft deadline about one and a half weeks before the event and have the hard deadline one week before the event (personal communication, April 24th, 2019). Google Forms was the suggested program to use for the sign up sheet (personal communication, April 15th, 2019). After they sign up, parents should be sent an email with more information about the event and liability forms for Cal Poly that they will be asked to print and bring to the event. It is a good idea to have some extra forms at the event incase some parents for get to do this (personal communication, April 24th, 2019). Additionally, although someone from Girl Scouts could organize the sign up sheet for WIC, it is better that WIC handles that themselves. If there is a small fee for the event, as mentioned in one of the previous interviews, WIC will have immediate access to the money if they organize the sign up sheet themselves (personal communication, April 15th, 2019).

SWE's subcommittees usually begin to meet one to two months before the event (personal communication, April 24th, 2019). Usually the members of this subcommittee are determined well before the first subcommittee meeting and before the start of the quarter (personal communication, April 17th, 2019). When the subcommittee meets, they work out several parts of the event. This includes coming up with the specific activities that the girls will be doing, determining the materials needed for the activities, testing the activities to make sure that they will work, and creating a volunteer scrip for the activities. The volunteer scrip is a guide for the activity that includes an overview of and instructions for the activity (personal communication, April 24th, 2019).

There is a minimum number of adults that are needed for different Girl Scout age groups. For example, two adults are needed for 6 Daisies while two adults are needed for 12 Brownies. For a group of 50 girls who are a mix of Daisies and Brownies, kindergarten through third grade, at least 10 to 15 adults are required (personal communication, April 15th, 2019). However, having more adults per Girl Scout is easier. It is recommended to have one volunteer for every two to three Girl Scouts. For a group of 40 girls, there should be 25 volunteers. This way, there are enough volunteers to lead each group of girls as well as others taking pictures, volunteers talking to parents, and extras incase some people drop out (personal communication, April 17th, 2019). SWE trains their volunteers for an hour about a week before the event. During this meeting, they run through the event's schedule, safety concerns they should watch out for, reminders about the overall goal of the event, and the activity instructions (personal communication, April 24th, 2019).

WIC has the freedom to organize an event for any ages, but it is easier to focus on younger girls because they are easier to plan for and make happy (personal communication, April 15th, 2019). SWE allows a maximum of 60 girls at their event, but this is a lot for WIC's first time putting on this kind of event. 30 to 40 girls would be a better

amount to start out with. SWE's Girl Scout event consists of three different labs that cover some of the major engineering topics (personal communication, April 17th, 2019). The event usually begins with an opening presentation for the parents. Next, volunteers are matched with their group of girls and go off to complete the first and second labs. The girls get to stop for a snack break in-between the second and third labs and the event is concluded with a closing ceremony (personal communication, April 24th 2019).

While the girls are doing their labs, SWE has a presentation and activity for the parents that teaches them about engineering careers and how to support their daughters in engineering (personal communication, April 17th, 2019). The presentation and activity lasts for about an hour and a half total. Similarly to the activities that the girls do, the parent activity is usually something that teaches parents about a basic engineering concept. For example, one year, parents had to give volunteers directions on how to make a sandwich, an activity that is meant to teach people how to communicate clear instructions. Parents don't have to stay for this presentation and are also welcome to follow and watch their girls instead (personal communication, April 24th, 2019). Parents of older girls might not stay for the event and may only drop off and pick up their girls. Although for younger girls, it may be better to have parents nearby to help keep them under control (personal communication, April 15th, 2019).

SWE's events typically have a theme to make the activities more interesting for the girls. Themes for younger girls are usually more whimsical while themes for older girls are less "storybookish" (personal communication, April 17th, 2019). However, a theme is not necessary (personal communication, April 15th, 2019). The length of the activities for younger girls should be no longer than 30 minutes but activities for older girls can be longer. They can have a few 45 minute activities for one in-depth activity (personal communication, April 15th, 2019). When pairing the girls off with volunteers and if entire troops show up for the event, it is recommended that troops stay together since the girls know each other (personal communication, April 17th, 2019). After the groups get together, the volunteers usually start with an ice breaker (personal communication, April 24, 2019) and begin each activity with an overview of the basic concepts (personal communication, April 17th, 2019).

SWE occasionally uses [teachengineering.org](http://teachengineering.org) as a resources for activities that can be done with kids (personal communication, April 24th, 2019). There are many different options for activities that can be done with the girls, but the most important part of the event for the younger girls is that they have a good experience and see older girls excited about construction. The more technical aspects of the activities become more important when it comes to older girls. In addition to hands-on activities, it was suggested to give the older girls advice about college and the construction industry (personal communication, April 15th, 2019). Building a bridge is an example of a good activity for the younger girls. If the activity involves food, it is a good idea to remind the girls to not eat it and to choose a food that the girls will not be tempted to eat (personal communication, April 24th, 2019). It is also important to keep in mind that different age levels have different capabilities. An event with elementary-aged girls will likely content mostly Daisies and Brownies so the activities need to be able to be done by girls five to eight years old (personal communication, April 17th, 2019).

During the closing ceremony for SWE events, everyone is thanked for coming, SWE volunteers go over highlights of the day, and group leaders call girls names to hand them badges (personal communication, April 24th, 2019). Having custom patches is fun for the girls and also a good motivation for coming to the event. Take home activities are not necessary but can be done (personal communication, April 15th, 2019). SWE gives out a take home activity for parents to do with their children that teaches them both about engineering and lets them bond (personal communication, April 17th, 2019).

### *Survey*

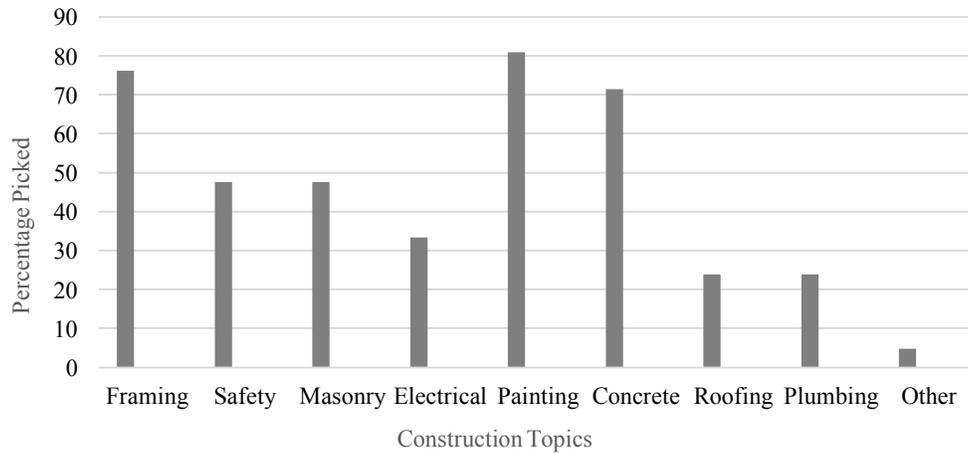
The survey was sent electronically to students in the construction management department and received a total of 21 responses. The survey covered questions relating to students' experience with kids and the construction management program, specifics relating to the activities, and interest in volunteering. Most respondents were in their second or fourth year at Cal Poly as shown in Table 1. A majority of those who participated in the survey have been part of a youth organization and had experience with kids. 71.43% of students reported that they had been a member of a youth organization, while 28.57% had not. 76.19% have had experience working with kids and 23.81% had not.

Table 1

***Students' Year in School***

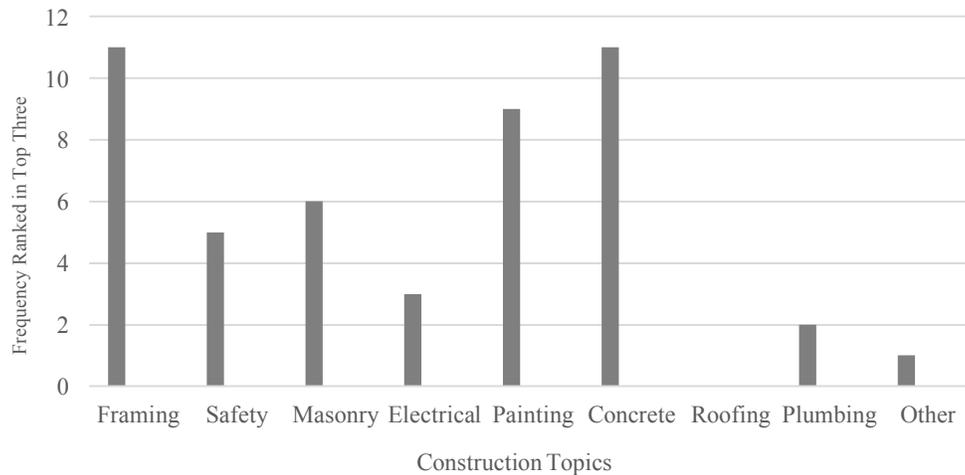
1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year	5 <sup>th</sup> + Year
4.76%	38.10%	14.29%	28.57%	14.29%

As shown in Figure 1, painting, framing, and concrete were the most common topics that students had interest in.



*Figure 1: Construction Topics that Students Find Interesting*

When it came to ranking these topics, framing and concrete were most often listed in respondents' top three choices, with concrete placed as most interesting more often than any other topic. Figure 2 shows the frequency with which students ranked the topics in their top three choices. Table 2 shows how many times each topic was ranked first, second, or third.



*Figure 2: Frequency of Ranking Topics in Top Three*

Table 2

***Top Three Ranking of Construction Topics***

Rank	Construction Topics							
	Painting	Framing	Masonry	Concrete	Plumbing	Electrical	Safety	Other
1 <sup>st</sup>	4	4	1	5	1	-	1	1
2 <sup>nd</sup>	2	5	2	4	-	1	2	-
3 <sup>rd</sup>	3	2	3	2	1	2	2	-
Total	9	11	6	11	2	3	5	1

Most respondents believed that hands-on and group activities would be best. When it came to interest in volunteering, 55.00% were interested and 45.00% were not. 35.00% were interested in being part of the committee, while 65.00% were not. 11 people left their contact information due to their interest in volunteering.

Table 3

***Activity Formats***

Hands-on Activities	Group Activities	Individual Activities	Theoretical Activities
95.24%	85.71%	19.05%	9.25%

**Discussion and Recommendations**

Considering that this is WIC’s first event with Girl Scouts, it would be better to have a smaller group of girls than SWE and focus on only younger girls. There should be no more than 30 to 40 girls at the event. WIC should only focus on elementary-aged girls, or Daisy, Brownie, and Junior Girl Scouts, because they easier to plan for and girls begin to question their ability to have a STEM-related career around this age. For an event with 40 girls, 25 volunteers will be needed. There were only 11 construction management majors who were interested in volunteering. So in order to put on an event of this scale, volunteers will need to come from outside the construction management department. An alternative option would be to decrease the number of Girl Scouts at the event.

*Scheduling and Event Preparation*

The event should be scheduled towards the end of the quarter with consideration for other Girl Scout events that may be going on around the same time. There are several things that need to be done well before the event takes place. The items that should be brought to the event include the following:

- Extra liability forms,
- T-shirts for the volunteers,
- Custom patches or pins,
- Snacks for the Girl Scouts,
- Materials for activities,
- Scrips for volunteers,
- Opening presentation about the construction industry.

The event should be advertised through the Girl Scout Website and the sign-up sheet for the event should be out about one to two months before the day of the event. The activities will also take some time to plan and test. A committee should plan to meet at least a month before the event to begin to determine activities, get materials and volunteers scrips together, and test the activities. The rest of the volunteers need to be brought together a week before the event to go over what is happening during the event and their roles.

*Content of the Event*

The event should begin with an opening presentation for parents that will give an overview of construction and a career in the industry. Girls should then be paired with volunteers before going off to do the first activity. Each volunteer should have about two to three girls to watch over. Elementary-aged girls will only stay interested in activities for about 30 minutes, so each activity should be no longer than that. About three 30 minute activities with a snack break in between would be appropriate. The day should conclude with the girls receiving their patches and a closing ceremony that wraps up the events. While the girls are busy doing the activities, the presentation for parents can continue and there can be an activity done with the parents if there are enough volunteers and resources. As for the activities themselves, hands-on, group activities and some possible individual activities should be the formats used. Hands-on activities will keep the girls engaged. Similarly to SWE's Girl Scout event, each activity for WIC's event should cover a general topic in construction. Concrete, framing, and painting were some of the most interesting topics for the event among construction management majors.

### *Overall Goals of the Event*

The overall goal with an outreach event that introduces girls to construction is to combat negative messages from society. This event should help girls see themselves in a construction career by presenting them with female role models, building their confidence through the activities, and promoting interest in construction through fun and positive experiences. It is also important that the girls feel they will be supported if they choose to pursue a career in construction. This is done through educating parents about the construction industry, what a career in construction looks like, and how to support their daughters.

### **Conclusion**

From a young age, girls are discouraged from pursuing STEM careers like construction because of negative messages from society and adults around them. An event that counteracts these messages has the potential to give girls the opportunity to develop an interest in construction and produce more construction professionals in the future. For the Cal Poly Women in Construction Club to host a successful outreach event with Girl Scouts of the USA, it should focus on 30 to 40 elementary-aged girls and follow a similar schedule to the events that SWE organizes for Girl Scouts. There should be several 30 minute activities about major construction topics and some form of education on construction for the parents. WIC should give the girls a positive experience and make them feel confident and supported while they participate in the activities. Changing perceptions of the construction industry is not a simple task but outreach events and education can make a significant impact.

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**Appendix A**  
Survey Questions and Results

<b>Q1 What year are you?</b>		
1 <sup>st</sup>	4.76%	1
2 <sup>nd</sup>	38.10%	8
3 <sup>rd</sup>	14.29%	3
4 <sup>th</sup>	28.57%	6
5 <sup>th</sup> +	14.29%	3
Total		21

<b>Q2 Have you ever been a member of a youth organization?</b>		
Yes	71.43%	15
No	28.57%	6
Total		21

<b>Q3 Do you have experience working with kids?</b>		
Yes	76.19%	16
No	23.81%	5
Total		21

<b>Q4 The event will consist of several hands on, kid-friendly activities based on major parts of construction. Which of the following construction topics would you have been interested in learning about as a kid? (select all that apply)</b>		
Framing	76.19%	16
Electrical	33.33%	7
Concrete	71.43%	15
Safety	47.62%	10
Painting	80.95%	17
Roofing	23.81%	5
Masonry	47.62%	10
Plumbing	23.81%	5
Other (please specify)	4.76%	1
Total		21
Other (please specify): “money management”		

<b>Q5 Of the topics you selected, please rank your top three in order of interest. (first being the most interesting)</b>		
1	“painting, framing, safety”	
2	respondent skipped this question	
3	“painting, masonry, plumbing”	
4	“plumbing, safety, painting”	
5	“painting, electrical, concrete”	
6	“framing, concrete, painting”	
7	“concrete, painting”	
8	“money management, framing, safety”	

9	“concrete, painting, masonry”
10	“safety, framing, masonry”
11	respondent skipped this question
12	“painting, concrete, framing”
13	“framing, concrete, electrical”
14	“framing, concrete, electrical”
15	“concrete, framing, painting”
16	“concrete”
17	“framing, safety, masonry”
18	“concrete, masonry, framing”
19	respondent skipped this question
20	respondent skipped this question
21	“masonry, framing, concrete”

**Q6 Which of the following formats do you think are best? Multiple may be used during the event. (select all that apply)**

Individual Activities	19.05%	4
Group Activities	85.71%	18
Hands-on Activities	95.24%	20
Theoretical Activities	9.52%	2
Total		21

**Q7 Would you be interested in volunteering in this event in Fall Quarter 2019? (volunteers will lead a group of two to three girl scouts through a few construction-based activities)**

Yes	55.00%	11
No	45.00%	9
Total		21

**Q8 Would you be interested in being part of a committee to help plan the event? (the committee will meet a few times prior to the event to determine the specific activities that will be done with the girl scouts)**

Yes	35.00%	7
No	65.00%	13
Total		21