Efficacy of a STEM Program: POWER Camp

Areca Everage, Charles Feldhuas, Terri Talbert-Hatch, Eugenia Fernandez

Indiana University Purdue University Indianapolis

average@iupui.edu, cfeldhau@iupui.edu, ttalbert@iupui.edu, efernand@iupui.edu

Abstract
Indiana University Purdue University Indianapolis (IUPUI) hosts an annual summer camp for high school girls, called POWER Camp that introduces participants to the engineering field. The purpose of this study was to determine the efficacy of the POWER Camp in improving the perceptions of the participants regarding desire to pursue an Engineering career and perceived success in Engineering.

Having a balanced number of women to men in STEM careers is beneficial, thus it is important to understand the perceptions of women regarding STEM fields in order to make work in these areas more attractive and desirable for females. This study surveyed the participants of the 2011 IUPUI POWER Camp in an effort to establish the program's effectiveness. The Correlated-Groups t test was used to statistically validate the perceived effectiveness of this program. This research is significant in that it adds to the body of knowledge regarding female perceptions of STEM fields and their pursuit of STEM careers.

Introduction
Over the past few decades it has become increasingly necessary for women to get out of the home and enter the workforce. This has led to an increase in the female presence on college and university campuses and the number and types of jobs that women are now choosing to pursue (Bureau of Labor Statistics, 2006). Even though women are more prevalent on jobsites, there are still some industries that remain male-dominated and often these include Science, Technology, Engineering, and Mathematics (STEM) fields. There are many factors that play a role in women either not having a desire to enter into or not continuing their careers in the STEM fields. These factors range from educational interest to on-the-job issues (Kossuth, 2003). Studies have also shown that women are more interested in careers that they feel add value to society (Miller, 2000). Often, when engineering is promoted as a profession, it is not advertised in a manner that shows relevance to society (Farrell, 2002).

There are now a number of STEM-based programs that were created to foster awareness and interest in young people to seek secondary education and careers in the STEM fields. These programs are offered by many different organizations such as the Build IT program sponsored by Girls, Inc. (Koch, 2010). Project Lead the Way (PLTW, 2011) is a national program that works to promote pre-engineering courses at middle schools and high schools. Olin College sponsors a program in which Olin College students mentor local high school students who are participating in FIRST (For Inspiration and

Recognition of Science and Technology) (Kossuth, 2004). Indiana University Purdue University Indianapolis sponsors MEAP (Minority Engineering Advancement Program) to assist with the advancement of groups typically underrepresented in engineering fields (MEAP, 2011). STEM Club was created to tutor and encourage youth taking STEM related courses, (STEM Club, 2011). Finally, Pathways to Engineering encourages interest and academic preparedness among elementary, middle school and high school students in several of the Indianapolis public schools (Central Indiana I-STEM Network, 2011).

STEM curriculum tends to be more of interest to males than females, so there are some STEM programs that have been developed for females only. These are designed to increase female interest in STEM education by allowing girls to apply their knowledge to real-world situations through hands-on activities. The sponsors of these programs have hopes of attracting more females to STEM fields. The state of New Hampshire sponsors a Lego and robotics program specifically for girls (Kossuth, 2004). The University of Wisconsin sponsors several programs that focus on attracting females to STEM fields including Women in Engineering Career Day, Sky's the Limit, and Piecing It All Together (Landgraf, 2008). At Indiana University Purdue University Indianapolis, a camp has been developed called Preparing Outstanding Women for Engineering Roles (POWER, 2011). Certainly various experiences have been developed and offered to underrepresented minorities, especially females, to entice them to consider STEM careers. Research, however, must be conducted to see if these programs are working, and if they can be replicated nationally to help the U.S. become more competitive by recruiting and retaining females and minorities in STEM fields.

Literature Review

The Discrepancy of Women to Men in the STEM Workforce

The roles of women in the United States have shifted drastically in a relatively short period of time. More women are taking up careers instead of staying at home rearing children on a full-time basis. In an effort to make this possible the United States government has enacted laws to protect women and make workplaces equitable to men and women. Although the possibility for women to gain access into what used to be considered male dominated careers has increased, there is evidence to suggest that the female presence in STEM fields is still lacking compared to the number of males that make up these fields. For example, in the field of Information Technology, the percentage of female presence in 1986 was at 40 percent, but at the end of 1999 had plummeted to 29 percent (McCorduck, 2005).

According to the Committee on Maximizing the Potential of Women in Academic Science and Engineering (2007) women, constituting roughly half of the total U.S. workforce and half of the degree recipients in a score of scientific fields, only make up one-fifth of the nation's scientific and technical workers. This is alarming considering the number of women who have already and are now seeking degrees and entering the workforce compared to those a few decades ago.

The research of David Beede, et. al. (2011) shows that women who have earned a STEM degree are less likely than men to enter into STEM occupations; they have a tendency to, instead, work in education or healthcare. Men, therefore, are more likely than women to have a STEM job regardless of educational attainment. Beede and his colleagues have also surmised that within the computer and math workforce (the largest of the four STEM components) the presence of women dropped three percentage points from 2000 to 2009. The lower numbers of women compared to men in such technical career areas, which are rather low, beg the question, "what is happening to deter women from joining, or staying in such careers?"

Constraints on Female Entrance and Retention in the STEM Workforce

One of the most convincing dilemmas facing women today regarding entering the study and employment of STEM fields is dissuasion. In fact, 60% of women surveyed said they experienced discouragement in college, 41% in high school, and 35% in the workplace (Nagel, 2010). Surprisingly college professors are the worst offenders of discouraging women from studying STEM. Dr. Ibram Rogers (2010) supports this research by revealing that college professors dissuade 60% of women from pursuing their interests in STEM. Nagel also concludes that other strongly dissuasive factors include colleagues, family members, advisors, teachers, and guidance counselors. Even when females do enter into STEM-based education, they find it difficult to be viewed as equal to men. It has been discovered that, in the case of postdoctoral applicants, for females to be judged as productive as their male counterparts, they need to publish three more papers in prestigious journals than men, or 20 more papers in less-known publications (Lewin, 2010).

Many women are discouraged when seeking employment with STEM organizations. Stephen Ceci and Wendy Williams (2010) found that on average, STEM organizations are more apt to hire a man than a woman, although they both have identical qualifications. Their research also shows that male and female reviewers rated resumes lower when they were made aware that the author was a woman. This is evidence of not only dissuasion, but also of discrimination. David Beede and colleagues (2011) also suggest that discrimination occurs by stating that for every dollar earned by a man in STEM, a woman earns 14% less.

Dr. Ibram Rogers (2010) argues that there is a hierarchy within STEM workplaces, with males dominating the hierarchical structure. The inherent thinking that men are more apt for STEM work has made it more difficult for women to succeed in their STEM careers. It seems that the general feeling is that men have a better comprehension than do women. This has a huge effect on the desire for women to continue in such workplaces. If a woman feels she is being underrepresented and that her strengths are not being utilized, she will eventually seek an alternate career field.

Conversely, according to Rosser and Taylor (2009), there are two primary factors, among multiple forces, pushing women to leave the STEM workforce. These include women feeling the need to balance career and family, where it seems that their career consistently takes away from family time, and a lack of professional networks. Even though the roles

of women have changed in recent times, they still feel the obligation to ensure that family needs are met, thus not having the ability to balance their work life and home life in tandem. Women begin to feel burdened by the stress of attempting to balance the two, consequently leading them to seek a career that will enable them to better meet both demands. Also, a lack of professional networks takes a toll on their professional wellbeing. Having a number of professional networks allows working people to better perform their professional functions, since networks can provide much needed and useful insight. Without professional networks and home life balance, women often feel inadequate in their job.

Programs Designed to Entice Females into STEM Careers

In order to generate interest in STEM related careers, many organizations and programs attempt to engage children in STEM fields at a much younger age. These programs are occurring all across the country and sponsored by various organizations. For instance, the Austin Youth River Watch program is one in which at-risk middle and high school students participate in improving the water quality of the Colorado River. Students routinely conduct tests on water- quality, write reports to the Lower Colorado River Authority, and conduct presentations of their findings (Turner, 2001).

The U.S. Naval Academy provides a Summer STEM Camp for grades 8-11 that enhances the application of math and science principles to promote technological and engineering interests in young people (Summer Stem Camp, 2010). In this program students must demonstrate superior academic performance and accomplishment.

While many of these programs are coed, some are developed for females only. EUREKA! is a program that is part of Girls Incorporated's Operation Smart. This program runs through the summer and school year using sports and the opportunity to visit a college campus as a way to entice the girls to attend. The target audience for this program includes girls from low- income families and also girls of color. While in the program, girls are able to participate in sports activities, hands-on math, science, and computer activities, career-focused field trips, and health education (Campbell, 1995).

C-Tech, which stands for Computers and Technology, at Virginia Tech is a two-week summer camp for high school girls that introduces participants to engineering and related technologies through various hands-on activities, laboratories, and presentations. It is designed to help develop and sustain the interests of women in engineering and the science and provides opportunities to apply knowledge of these disciplines to real world situations (C-TECH2, 2010). These programs for girls combine hands-on activities, role models, mentoring, internships, and career exploration to improve self-confidence and an interest in STEM college curriculum and careers and help reduce the conceived sexist attitudes associated with the male-dominated industry (Fancsali, 2002).

Research has been performed to evaluate the effectiveness that STEM programs for young people have on furthering STEM education and ultimately leading them to enter the STEM workforce. Fancsali (2002) argues that girls show less positive attitudes toward the sciences than boys, and thus are much less likely to major in science-related

college fields. Fancsali goes further to state that women are less likely to complete any undergraduate or graduate degree related to STEM. Women, therefore, as mentioned throughout this study, comprise a disproportionately low percentage of the STEM workforce.

Purpose

The purpose of this study was to determine the efficacy of the IUPUI POWER Camp in improving the perceptions of the POWER Camp participants with regards to their desire to pursue a STEM career and their perceived success in STEM fields.

In this quantitative study, the subjects were given the POWER Camp Perception Survey (Appendices A and B), which utilizes a Likert scale at the beginning of the POWER Camp session (June 19 in the first group session). At the end of the Power Camp session, (June 26 in the last group session), the survey was given a second time to the same participants.

Methodology

Design

Surveys provide the ability to quantify the attitudes and opinions of a population (Cresswell, 2009). Since the purpose of this study was to determine how much the perception of the participants changed as a result of the POWER Camp a cross-sectional survey of perception was chosen for this study.

Cross-sectional studies are studies in which all the participants are studied at the same time. A benefit to a cross-sectional study is that all the participants can be studied in a short period of time (Jackson, 2009). A cross-sectional model is appropriate for studying the perception of those attending the POWER Camp in that everyone was given the survey in a very quick fashion. In a repeated cross-sectional study, different groups are studied over time using the same methods. This method is especially beneficial when the goal is to understand how a population has changed over time (Engel & Schutt, 2005). The scope of this research was the POWER Camp of 2011.

Sample

A convenience sample is a sample in which participants are chosen in a way that is convenient to the researcher (Jackson, 2009). Every participant in the 2011 POWER Camp was surveyed since it was convenient for the researcher to administer the surveys to all in attendance, making this a convenience sample. Since all POWER Camp participants were high school age females, all those surveyed were from this same population. The population was not stratified by any criteria prior to administration of the survey. Research in a single-group pretest/posttest design makes the assumption that any changes in survey results between the pretest and posttest are the result of the treatment (Jackson, 2009). Any differences in the surveys pre- and post-POWER Camp were assumed to be a result of the participants' experiences during the POWER Camp.

Since sixteen of the twenty-nine POWER Camp attendees submitted the required permission form, the sample size for this research was sixteen.

Instrumentation

This questionnaire was based from a survey that has been used for at least five years by Girls, Inc. to evaluate the efficacy of their girls focused STEM program (Koch, et al, 2010; Babbie, 1990). The survey was retitled "Power Camp Perception Survey" and can be found in Appendices A and B. According to Sudman and Bradburn (1982), it is useful to incorporate questions that have been used in previous surveys as these questions have already been evaluated. This results in a need for less strenuous testing and also provides greater validity to the survey. Since the questions from the original survey were modified to suit the topics addressed in the POWER Camp, validity and reliability was reviewed prior to administering the survey.

Three people in the field of technology evaluated the content validity (Litwin, 2005) of this survey to gain some external opinions as to whether or not the items presented in the survey produced the desired output. Each of the evaluators independently stated that the questions were, in their opinion, appropriate given the subject matter and audience. They also agreed that the questions presented would produce the desired output.

Survey reliability is most often evaluated by utilizing test-retest reliability. Using test-retest, a survey is generally considered to be reliable if the correlation coefficient is 0.7 or higher (Litwin, 2005). The reliability of this survey was evaluated by a group of five random people at two different times prior to the 2011 POWER Camp to ensure that the reliability of the survey instrument was acceptable. These willing test subjects were initially given the survey on May 24, 2011 and then again on June 2, 2011. Each question in the survey was evaluated separately using the Pearson product-moment correlation coefficient or Pearson's *r*. When both variables are measured using either an interval or ratio scale, Pearson's *r* is the most common measurement used to determine the correlation coefficient (Jackson, 2009). Pearson's *r* was evaluated for each statement in the survey. Each question was found to have a correlation coefficient between 0.70 and 1.00, which is considered reliable as previously noted when using test-retest to evaluate reliability.

The questionnaire (appendix A) was administered using a self-administered paper survey shortly after the participants' arrival at POWER Camp on Sunday, June 19, 2011 between 7:30 p.m. and 8:30 p.m. Eastern Time during the first group session of the camp and then again during the last small group session between 9:45 a.m. and 10:30 a.m. Eastern Time on June 25, 2011, the last day of the POWER Camp session (appendix B). Those open ended questions were not evaluated as part of this research.

Data Analysis

A Correlated-Groups t test was used to compare the means of related within-participants samples. The hypothesis for a Correlated-Groups t test is that there was no significant difference between the means of the two related samples, $H_0: \mu_1 - \mu_2 = 0$. The corresponding alternative hypothesis is that there was a significant difference in the

means of the two related samples, $H_a: \mu_1 - \mu_2 > 0$ (Jackson, 2009). This results in the t test being a one-tailed t test. As the goal of this research was to determine whether or not participation within the POWER Camp affected the participants' perceptions regarding engineering, the Correlated-Groups t test was the most appropriate measure to use (Jackson, 2009).

Results

The survey given to the POWER Camp participants utilized a Likert scale to gauge the person's agreement with the statement. For all statements, a value of 5 was used to indicate that the person strongly agreed with the statement, a value of 4 was used to indicate that the person agreed with the statement, a value of 3 was used to indicate that the person was neutral with regard to the statement, a value of 2 was used to indicate that the person disagreed with the statement, and a value of 1 was used to indicate that the person strongly disagreed with the statement.

Positively Worded Statements

Table 1 shows the statements presented to the participant that were hoped to have been made more agreeable as a result of participating in the camp session. Additionally, Table 1 shows the pre-test mean, the post-test mean, the t value obtained from the Correlated-Groups t test, corresponding p value, and whether or not the change was significant based on the t value obtained. As can be seen in the table, the average values for all of the statements increased (were more agreeable) after the POWER Camp session than before the session. Utilizing the t value obtained from the Correlated-Groups t test with $\alpha = .05$ and 15 degrees of freedom, a t value obtained would need to have an absolute value greater than critical value of 1.753 in order to be significant. Based on this, only two of the statements had a significant change in value.

Table 1

Positively Worded Survey Statements

Statement	Pre Test Average	Post Test Average	t obtained	p value	Significant or Not Significant
It would be pretty fun to work in an engineering related job.	3.8125	4.1875	1.1448	0.1351	Not Significant
I know what types of classes to take in high school if I want to have a career in engineering.	3.5000	4.3750	2.9066	0.0054	Significant
Women are as successful as men in engineering careers.	4.3125	4.5000	0.6132	0.2745	Not Significant
People who work in engineering related jobs make lots of money.	3.9375	4.2500	1.4315	0.0864	Not Significant
Careers in engineering are exciting.	3.8750	4.5000	4.0379	0.0005	Significant
I would like a job related to engineering because they are challenging.	3.9375	4.1875	1.1677	0.1306	Not Significant
Women are as good as men in science and math.	4.8125	4.9375	1.4639	0.0819	Not Significant

The first positively worded statement with a significant change in value was, "I know what types of classes to take in high school if I want to have a career in engineering." This statement had an average pre-test value of 3.500 indicating slight agreement with the statement. The average post-test value for this statement was 4.3750, which indicates a much stronger agreement with the statement than during the pre-test with 15 degrees of

freedom and α of .05, $t(15) = 2.9066$, $p < .05$. This is confirmation that the change in average was significant according to the Correlated-Groups t Test.

The other positively worded statement with a significant change in value between the pre-test and post-test was, "Careers in engineering are exciting." The pre-test average for this statement was 3.8750 indicating near agreement with this statement at the beginning of the POWER Camp session. The post-test average for this statement was 4.5000 indicating more than mere agreement with the statement with 15 degrees of freedom and α of .05, $t(15) = 4.0379$, $p < .05$. This is strong confirmation that the change in average was significant for this statement.

Negatively Worded Statements

Table 2 shows the statements presented to the participant that were hoped to have been made less agreeable as a result of participating in the camp session. Additionally, Table 2 shows the pre-test mean, the post-test mean, the t value obtained from the Correlated-Groups t test, corresponding p value, and whether or not the change was significant based on the t value obtained. The average values for all but one of the statements decreased (were less agreeable) after the POWER Camp session than before the session. Utilizing the t value obtained from the Correlated-Groups t test with a = .05 and 15 degrees of freedom, a t value obtained would need to have an absolute value greater than 1.753 in order to be significant. Based on this, five of the eight statements had a significant change in value.

Table 2

Negatively Worded Survey Statements

Statement	Pre Test Average	Post Test Average	t obtained	p value	Significant or Not Significant
It is difficult for women to have successful engineering careers.	2.0625	1.2500	-2.5462	0.0112	Significant
I might be willing to try a job related to engineering, but I don't think I would like it.	2.1250	1.7500	-2.0868	0.0272	Significant
Mostly men work in engineering related jobs.	3.3125	3.8125	1.8257	0.0439	Significant
I would not like to work in an engineering job, because they are too difficult.	1.8750	1.6250	-1.2910	0.1081	Not Significant
I would not like a job related to engineering, because I do not like science or math.	1.6875	1.6250	-0.3676	0.3592	Not Significant
People with a job related to engineering have to know too much.	1.9375	1.8750	-0.2225	0.4135	Not Significant
It would be pretty boring to work in an engineering related job.	1.9375	1.6250	-1.7752	0.0481	Significant
People who work in engineering related jobs are not very cool.	1.5625	1.2500	-2.6112	0.0098	Significant

The first negatively worded statement with a significant change in value was, "It is difficult for women to have successful engineering careers." This statement had an average pre-test value of 2.0625 indicating disagreement with the statement. The average post-test value for this statement was 1.2500, which indicates a much stronger disagreement with the statement than during the pre-test with 15 degrees of freedom and

α of .05, $t(15) = -2.5462$, $p < .05$. This is confirmation that the change in average is significant according to the Correlated-Groups t Test.

The next negatively worded statement with a significant change in value was, "I might be willing to try a job related to engineering, but I don't think I would like it." This statement had an average pre-test value of 2.1250 indicating disagreement with the statement at the beginning of the camp session. The average post-test value for this statement was 1.7500 which indicates a stronger disagreement with the statement than during the pre-test with 15 degrees of freedom and α of .05, $t(15) = -2.0868$, $p < .05$. The change in average between the pre-test and post-test, therefore, was significant.

The negatively worded statement, "Mostly men work in engineering related jobs," also showed a significant change between the pre-test and post-test averages. This statement had an average pre-test value of 3.3125 indicating slight agreement with the statement at the beginning of the camp session. The average post-test value for this statement was 3.8125, which indicates a stronger agreement with the statement than during the pre-test with 15 degrees of freedom and α of .05, $t(15) = 1.8257$, $p < .05$. The change in average between the pre-test and post-test, therefore, was significant.

The negatively worded statement, "It would be pretty boring to work in an engineering related job," showed a significant change between the pre-test and post-test averages. With a pre-test average of 1.9375, the attendees disagreed with this statement at the beginning of the camp. The average post-test value for this statement was 1.6250 which indicates a stronger disagreement with the statement than during the pre-test with 15 degrees of freedom and α of .05, $t(15) = -1.7752$, $p < .05$. The change in pre-test and post-test averages, therefore, was significant.

The final negatively worded statement showing a significant change between the pre-test and the post-test was, "People who work in engineering related jobs are not very cool." With a pre-test average of 1.5625, the attendees disagreed with this statement at the beginning of the camp. The average post-test value for this statement was 1.2500 which indicates a stronger disagreement with the statement than during the pre-test with 15 degrees of freedom and α of .05, $t(15) = -2.6112$, $p < .05$. The change in pre-test and post-test averages, therefore, was significant.

Conclusion

There is an ongoing problem facing our society in which females feel unmotivated to enter into education and careers in STEM fields. Research has shown that STEM is indeed male-dominated, with only one-fifth of this workforce being comprised of women (Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2007). Although it is beneficial to have a balanced number of men and women in these careers, the trend remains that men are more apt to enter into these fields than are women.

The purpose of this study was to determine the efficacy of the IUPUI POWER Camp in improving the perceptions of the POWER Camp participants with regards to their desire to pursue a STEM career and their perceived success in STEM fields. With seven of the

fifteen evaluated statements showing a significant positive change in perception amongst the POWER Camp participants, it is evident that the experiences at POWER Camp do impact the participants' perceptions regarding engineering and how women fit into engineering roles. Furthermore, of the fifteen statements, fourteen of those statements trended in the desired direction.

Summary of Results from the Study

The first survey question that deemed to be positively significant was "I know what types of classes to take in high school if I want to have a career in engineering." STEM education within schools now seems to be more important than ever before. In fact, there are many preparatory schools that have been instituted and are continuing to be instituted whose primary focus is on the sciences and mathematics. School administrators, perhaps, are now strongly persuading children to have an open interest for STEM work and are making them aware of what they need to accomplish scholastically in order to foster interest in this area. POWER Camp and other organizations like it should work in tandem with such schools and provide further information on the educational requirements needed to enter STEM careers.

At the beginning of the 2011 POWER Camp participants showed that they thought it "difficult for women to have successful engineering careers." The survey given at the end of the session, however, showed that their perception changed in a significantly positive way. If STEM programs such as Power Camp educate children about the laws and let them know that all people are equal and should be treated equally, then further positive perceptions in this area will be gained.

Another question with overall significantly positive results was the one that reads "it would be pretty boring to work in an engineering related job." Participants of POWER Camp began with preconceived ideas about such work, but upon completing the session changed this perception due to the information given them and the activities that they took part in. It seems that the organizations that helped organize the summer camp provided insight into what really occurs within such jobs. POWER Camp and similar organizations should always teach young people that the type of work they are marketing is fun and exciting.

Finally, the statement "people who work in engineering related jobs are not very cool" also showed significantly positive results. Once again, participants began the summer camp with predetermined thoughts of people in this type of field, which they changed throughout the duration of the program. During the session the participants became acquainted with people who actually have engineering careers. Upon meeting these people the participants changed their view of the people that work within this industry. It is very advantageous for STEM programs to allow participants to meet people who work in the STEM field so that they can see first-hand how interesting these professionals are and that they do not lead a dull life.

There was only one statement in the survey that showed negative results from the beginning of the session to its completion. The statement that had the negative result was

"mostly men work in engineering related jobs." From research discussed in the Literature Review section of this study it is obvious that this statement is, in fact, true. There is nothing that STEM programs can do to change that perception since it is a fact. What STEM programs can do is inform participants that women are just as capable of performing the job as men are and that there is a necessity to equalize the gender gap within the STEM field. The education they provide should perpetuate an interest and a curiosity in young women that may help to bridge that gap.

Recommendations

It is recommended that this survey be used as a longitudinal study and given to future participants of the POWER Camp. This is especially beneficial in understanding how the perceptions of the population changed over time (Engel & Schutt, 2005). This information could prove invaluable in ensuring the program's activities remain relevant through the years. Other studies, such as a case study and open-ended surveys, could also be conducted with the purpose of finding the motives behind the participants' change of ideas over the course of the POWER Camp session.

Based on the results of the survey, it is recommended that the POWER Camp spend more of their activity time portraying women in the engineering field. It is evident that the attendees of the 2011 POWER Camp session came away from it with a stronger belief that mostly men work in engineering careers. Local companies in the engineering field organize many of the activities in the POWER Camp session and if the POWER Camp staff could recommend increased female involvement in these activities and any others on the schedule, perhaps the view that it is primarily a man's domain would not be reinforced through the course of the camp session.

The same survey should be shared with other programs geared toward encouraging young women to pursue careers in the STEM fields. Results could be shared among the programs along with the activities the programs run, who runs and coordinates those activities, how those activities are executed, and any other information. As the number of these programs sharing the results of the survey and other pertinent information increases, trends may begin to be visible. Demographic information regarding the attendees was not captured for the purposes of this study, however doing so and incorporating this information in future years may reveal further trends. Comparing the geography, family situation, or other student demographics may prove to be a key indicator of which activities could make a program successful.

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Appendix A – Pre-Camp Survey

POWER Camp Perception Survey

Name_____

How much do you agree with each of the following statements? Choose one response for each statement by circling the corresponding number ranging from 5 for Strongly Agree to 1 for Strongly Disagree.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
It would be pretty fun to work in an engineering related job.	5	4	3	2	1
It is difficult for women to have successful engineering careers.	5	4	3	2	1
I might be willing to try a job related to engineering, but I don't think I would like it.	5	4	3	2	1
Mostly men work in engineering related jobs.	5	4	3	2	1
I would not like to work in an engineering job, because they are too difficult.	5	4	3	2	1
I know what types of classes to take in high school if I want to have a career in engineering.	5	4	3	2	1
Women are as successful as men in engineering careers.	5	4	3	2	1
People who work in engineering related jobs make lots of money.	5	4	3	2	1
I would not like a job related to engineering, because I do not like science or math.	5	4	3	2	1
People with a job related to engineering have to know too much.	5	4	3	2	1
Careers in engineering are exciting.	5	4	3	2	1
I would like a job related to engineering because they are challenging.	5	4	3	2	1
It would be pretty boring to work in an engineering related job.	5	4	3	2	1
People who work in engineering related jobs are not very cool.	5	4	3	2	1
Women are as good as men in science and math.	5	4	3	2	1

Appendix B – Post-Camp Survey

POWER Camp Perception Survey

Name_____

How much do you agree with each of the following statements? Choose one response for each statement by circling the corresponding number ranging from 5 for Strongly Agree to 1 for Strongly Disagree.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
It would be pretty fun to work in an engineering related job.	5	4	3	2	1
It is difficult for women to have successful engineering careers.	5	4	3	2	1
I might be willing to try a job related to engineering, but I don't think I would like it.	5	4	3	2	1
Mostly men work in engineering related jobs.	5	4	3	2	1
I would not like to work in an engineering job, because they are too difficult.	5	4	3	2	1
I know what types of classes to take in high school if I want to have a career in engineering.	5	4	3	2	1
Women are as successful as men in engineering careers.	5	4	3	2	1
People who work in engineering related jobs make lots of money.	5	4	3	2	1
I would not like a job related to engineering, because I do not like science or math.	5	4	3	2	1
People with a job related to engineering have to know too much.	5	4	3	2	1
Careers in engineering are exciting.	5	4	3	2	1
I would like a job related to engineering because they are challenging.	5	4	3	2	1
It would be pretty boring to work in an engineering related job.	5	4	3	2	1
People who work in engineering related jobs are not very cool.	5	4	3	2	1
Women are as good as men in science and math.	5	4	3	2	1

Please write your answers to the following questions:

As a student participant, what did you enjoy most about the POWER camp?

What did you least like about the camp?

Is there anything that was not included among the activities that you would like to have gotten to do?

Do you have any further comments about the POWER camp?

If you participated in the evening event, what did you enjoy most and why?

How did the POWER camp influence your decision to pursue a degree in engineering?

Appendix C – Survey Raw Data

	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
It would be pretty fun to work in an engineering related job.	5	5	5	5	5	5	3	4	3	3	4	5	3	4	4	2	4	5	3	5	5	3	4	1	3	4	4	4	5	3	4	5	5
It is difficult for women to have successful engineering careers.	1	1	1	1	3	2	1	1	1	1	4	1	1	1	4	1	1	1	1	1	1	1	3	2	1	2	3	1	2	2	2	2	1
I might be willing to try a job related to engineering, but I don't think I would like it.	1	1	1	1	2	2	2	2	2	2	1	1	2	3	3	3	3	2	2	1	2	2	2	2	2	1	1	1	4	2	2	1	1
Mostly men work in engineering related jobs.	2	2	2	4	5	5	4	5	4	4	5	5	3	4	3	3	3	2	3	4	4	4	2	4	4	4	4	2	2	4	4	4	4
I would not like to work in an engineering job, because they are too difficult.	1	1	1	1	3	2	2	2	3	3	1	1	1	3	3	3	2	1	2	1	2	1	1	1	3	2	1	1	2	2	2	1	1
I know what types of classes to take in high school if I want to have a career in engineering.	3	5	4	4	4	5	4	4	2	4	5	5	1	4	4	3	5	5	2	3	3	5	4	5	5	5	1	4	4	4	5	5	5
Women are as successful as men in engineering careers.	5	5	4	4	5	4	5	5	4	5	5	5	3	4	5	2	3	5	5	5	4	5	5	5	5	5	3	5	5	3	5	5	5
People who work in engineering related jobs make lots of money.	3	4	3	5	4	5	3	2	5	5	5	5	3	4	5	4	3	3	4	3	3	4	5	5	5	5	4	5	3	4	5	5	5
I would not like a job related to engineering, because I do not like science or math.	1	1	1	1	2	2	3	2	1	1	1	1	1	3	2	2	1	1	3	2	2	1	1	1	3	2	2	2	3	4	1	1	1
People with a job related to engineering have to know too much.	1	2	1	1	4	2	2	2	2	2	1	1	3	2	3	3	2	2	2	1	2	1	2	1	1	1	2	3	2	2	1	1	1
Careers in engineering are exciting.	4	5	4	5	5	5	3	5	3	4	5	5	3	3	3	3	4	5	4	5	4	5	5	5	3	3	4	5	3	4	5	5	5
I would like a job related to engineering because they are challenging.	4	5	5	5	4	4	4	4	3	4	4	5	4	3	3	1	4	5	4	5	4	4	5	5	3	4	4	4	4	3	4	5	5
It would be pretty boring to work in an engineering related job.	1	1	2	1	2	1	2	2	2	2	1	1	3	3	3	3	2	2	2	1	2	1	1	1	1	2	2	1	3	2	2	1	1
People who work in engineering related jobs are not very cool.	1	1	1	1	1	1	1	1	2	2	2	1	2	1	3	3	2	1	1	1	1	1	1	1	1	1	2	1	2	2	1	1	1
Women are as good as men in science and math.	5	5	5	5	5	5	5	5	5	5	5	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	4	5	4	5	5	5	5