WORCESTER POLYTECHNIC INSTITUTE

A Survey and Best Practices Guide to University Involvement in FIRST

IQP

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1 Abstract

FIRST is an organization which looks to motivate youth to pursue engineering and technical fields by partnering them with professionals to contend in sport-like competitions. This IQP was asked to determine why and how universities have become involved with FIRST. Using a survey answered by 93 post-secondary institutions across the country, the team discerned that schools tend to be involved with FIRST because it adds visibility and because they want to promote engineering, science, and technology. In fact, 93% of schools surveyed saw the latter as a moderate to high source of motivation. With data provided in the report as well as guides contained in the appendices, schools currently not involved will be able to make an educated decision about whether or not to take the plunge.

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2 Acknowledgements

We would like to take this moment to thank a few individuals whom without their support this project would not have been possible:

- Professor Kenneth Stafford and Professor Lance Schachterle, for all of their guidance, advice, dedication, and diligence in reviewing our drafts,
- Dr. Vince Wilzcynski, for generously agreeing to an interview as well as for reviewing our final work,
- Colleen Shaver and Nick Swayne, for providing us with a plethora of information each regarding their competitions,
- Deb Dexter, for helping format this behemoth of a paper,
- All of our 93 survey respondents, and any intermediary contacts who forwarded our emails along the way
- And our parents for helping fund this opportunity of a lifetime, the opportunity to attend a school of our dreams.

3 Introduction

This project analyzes the partnership between universities and FIRST, For Inspiration and Recognition of Science and Technology. Specifically, the Interactive Qualifying Project (IQP) identifies the value added to a university associated with becoming an affiliate, in addition to the methods considered the most optimal. As FIRST continues its mission to reach and inspire more students, there exists an unmet need for a study that outlines the benefits universities can achieve with such a relationship. Worcester Polytechnic Institute (WPI), a team sponsor from FIRST's beginning, has therefore sponsored this project to meet that need.

Prior research regarding FIRST has primarily looked into the organization's effects on its high school participants. Brandeis University published results of a study in 2005 that compared students who had been involved in FIRST and students who had not. It is important to note that these students had similar backgrounds in math and science otherwise. The study produced an interesting correlation between participation in FIRST and a student's choices and expressed wishes regarding college as well as post-secondary careers. The Brandeis study asserts that students who participate in FIRST are three times more likely to enroll in engineering specific degrees and almost four times as likely to expect to pursue occupations in the engineering field.

This IQP looks into the advantages in the relationship between universities and FIRST. It relies on a ten minute survey administered to 93 post-secondary academic institutions across the United States, diversified by their level of involvement and affiliation with the program. Although the survey included questions regarding basic demographic information

about the schools, the focus is on three main domains of why universities tend to be involved with FIRST.

- *Admissions and visibility:* institutions provide scholarships and other engagements to attract more students.
- *Engineering education*: universities participate to increase the respect and visibility for the engineering program at the school, both internally and externally.
- *Outreach and Community affairs*: colleges provide FIRST support in order to reach out to the community and develop a positive image in the community.

Research such as this could be a useful marketing tool for the FIRST community to recruit more college partnerships in the future. Through publishing the benefits of becoming involved with the program as well as the best practices for doing so, more universities may make well-informed decisions. FIRST is often described as a win-win situation for all involved, especially if executed with the most effective methods. The goal of this report is to suggest why this could be true, and describe what the majority of universities find the right methods to be.

4 Executive Summary

FIRST (For Inspiration and Recognition of Science and Technology) was founded in 1989 to help expose high school students to science and engineering. Its goal is to help maintain the high level of innovation and invention that has been a key part of United States industry over the past 50 years. The method that was used to pursue this was to provide a competition for students from around the globe to solve problems with the help of professional engineers, scientists and entrepreneurs. An important part of this model is the support of each team of students by one or more sponsors to fund the operations of the team. Universities have great potential as sponsors of FIRST teams because they have a large resource base to support the operations of FIRST in many ways. This report looks at the ways universities support FIRST already, as well as the perceived benefits to this support, and will give examples for other interested universities to get involved at any level.

To determine the reasons why universities are in FIRST, the students developed and administered a ten-minute online questionnaire to 93 post-secondary schools across the United States, just reaching statistical significance as outlined below. The students can be 95% confident about the results in this paper with an error margin of seven and a half percent. The original target number of responses was 100, as shown below.

$$n = \frac{194}{1 + 194 * (.07)^2} = \frac{194}{1.9506} = 99.457 \approx 100$$

Equation 1: The method for determining the proper sample size as outlined by Glenn Israel[1]

[1] Determining Sample Size can be accessed at http://edis.ifas.ufl.edu/pd006.

The results suggest that there is a spectrum of support to FIRST starting at the left with providing a scholarship and moving to the right with hosting a workshop, supporting a team, and hosting a competition.

5 Literature Review

The most prevalent research regarding FIRST's impact is focused on its high school participants. They explore topics such as the future career paths of FIRST participants, the skills students feel they learn and develop during their time with the program, and the college performance associated with participation in FIRST. These studies also look to define both the "best practices" for implementing FIRST in high schools.

5.1 More than Robots[2]

FIRST approached Brandeis in 2002 to conduct an evaluation of the FIRST Robotics Competition at schools in urban communities examining three distinct areas:

- What is FIRST's impact on a student's college and career trajectory?
- What are the "best practices" for implementing FIRST at a high school?
- What impact does FIRST have on the high schools themselves, as well as the team sponsors?

5.1.1 Methods

To do this, the team surveyed FIRST graduates from 10 schools selectively picked to represent low income, urban, and minority students. These schools were in either the New York or the Detroit/ Pontiac metropolitan areas. The surveys consisted of questions regarding the students' aspirations, accomplishments, and thoughts regarding their experiences with FIRST.

[2] Melchior, A., Cohen, F., Cutter, T., & Leavitt, T. (2005). More than robots: an evaluation of the FIRST robotics competition participant and institutional impacts. Waltham, MA: Brandeis University. Retrieved from http://usfirst.org/uploadedFiles/Who/Impact/Brandeis_Studies/FRC_eval_finalrpt.pdf

The team also conducted interviews at the represented schools in order to understand the implemented processes and develop a set of best practices.

5.1.2 Results

The results of the survey suggested that there was a correlation between a student's participation in FIRST and their personal development. For example, 95% expressed an increased understanding of the value of teamwork, and of the 99% of FIRST participants who graduated high school, 89% attended college. The latter figure is 24% higher than the national average of high school graduates. Students were three times as likely to choose engineering as their major.

Students involved with FIRST also expressed an increased interest in giving back to their communities. In fact, FIRST students expressed interest in volunteering twice as often, when compared to a control group of students with similar math and science backgrounds who were selected from the National Beginning Postsecondary Student Survey data.

Data from the site interviews implied that FIRST also had a positive impact on the involved schools. In fact, eight out of 10 schools used FIRST to create new courses or integrate robotics into currently existing courses. In addition, the robotics teams often led to higher school spirit, and in one cited case, increased enrollment because the school's visibility amplified.

5.2 Educational Effects of FIRST Robotics[3]

A team of four students at Worcester Polytechnic Institute in 2007 devoted their project to investigating a possible correlation between participation in FIRST during high school and academic success in college. Led by their advisors, Professor Ken Stafford and Professor Brad Miller, the group surveyed undergraduates at WPI and reviewed academic records from the institution's registrar. This was to uncover differences in both academic performance and school engagement between students who had participated in First Robotics Competition (FRC) and those who had not.

5.2.1 Methods

Before they could judge whether or not college success correlated with participation in FIRST, the IQP team interviewed individuals from both the WPI Admissions and Career Development Center, to define and quantify the terms of college success. These officials, including Ed Connors and Kristin Tichenor from Admissions, reported that college success was defined first and foremost by graduating college on time.

The group gathered responses for their survey by emailing the undergraduate alias at WPI, soliciting responses from students who had originally participated in FIRST. They received 67 responses total, six of which were from students who had never been affiliated with FIRST. These responses were discarded due to the purpose of the study.

[3] Goldberg, E., Kurzmack, W., & Slezycki, M. (2007). *Educational effects of FIRST robotics* (Interactive Qualifying Project No. 07E064I)Worcester Polytechnic Institute

5.2.2 Results

The survey indicated that students involved with FIRST were less likely to receive negative academic standings, and more likely to hold leadership positions as well as to be involved on campus. On the other hand, data from the registrar showed that the students who participated in FIRST in high school performed at the same caliber as students who had not. The group explained this was possibly due to the fact that WPI accepts students who perform at a certain level, and therefore there would not be much variability of the data in that sense.

It is evident that the most prevalent research regarding FIRST is focused on the high school experience, specifically the FIRST Robotics Competition (FRC). The purpose of the Survey and Best Practices Guide to University Involvement with FIRST was to begin filling in the gap of research which looks at participation at the college level.

6 Methodology

The IQP was a new and exciting experience for all four of the students involved; none of them had conducted a formal research study of this nature before. In order to become better prepared for the tasks at hand, the students researched not only about the FIRST organization, but also the practices for developing, writing, and administering a successful unbiased survey. To follow are sections documenting the methods, both successful and unsuccessful, by which the students gathered background information, developed the survey, and solicited responses.

6.1 Domains of Motivation and Involvement

In order to study and describe the levels of involvement and motivation for university partnerships with FIRST, the project team first had to describe what characterized involvement and motivation. The team used two main strategies to accomplish this. First a focus group of undergraduate students, who were currently volunteering in the FIRST program at WPI, was established. This was to gain understanding of the key concepts associated with the program itself and frame questions for the second strategy: an interview with Dr. Vince Wilzcynski, the author of several books and articles on the subject of FIRST, particularly focusing on the potential for FIRST in a university setting.

The focus group consisted of five students who were not only involved in the WPI FIRST organization, but had been involved with FRC in high school as well. The students' questions focused on what they believed, or had witnessed, were strategies taken by universities to support the FIRST program. The students gave examples such as university student mentors aiding in the design process as well as universities providing monetary support to a high school

team. The research team realized afterward that the focus group was helpful in broadening their understanding of the topic, but rather inefficient because of the lack of diversity in the group of students selected. The sample was biased and focused mainly on the support universities can supply to specific teams.

Before continuing on to the interview with Dr. Wilzcynski, the project team concluded that involvement could include more than just support to a high school FRC teams. Universities can provide for any of the FIRST organizations: FRC, First Tech Challenge (FTC), First Lego League (FLL), and Junior First Lego League (Jr. FLL). Dr. Wilzcynski defined three main domains by which a university can be motivated. From these reasons, the team members were able to deduce methods and strategies for universities to be involved.

6.1.1 Engineering Education

This domain focused on the ideas of adding value to the university's engineering program. One example of value added would be an increase in the level of respect for the engineering school itself among its competitors. The university could make use of the FIRST program in its coursework as well. Lastly, a university could raise the visibility of engineering on its campus, perhaps in turn increasing the funds given to the school, and increasing alumni support. The strategies for involvement motivated by this domain would be encouraging the university's students to participate through either a club or via a required design course, and to perhaps host FIRST competitions on campus, regardless if the university sponsors a specific team.

6.1.2 Admissions

Another key domain Dr. Wilzcynski discussed, contained the benefits associated with the universities' admissions. By affiliating with FIRST, the university attracts more students who have been involved with the program. Admissions officers can use this resume characteristic as a preexisting filter to better differentiate between two good scholars. A specific admissions strategy which many schools use is to provide scholarships for students who have been involved with FIRST throughout high school. Another strategy is running FIRST camps for students in high school, usually juniors, to stimulate their interest in the university itself.

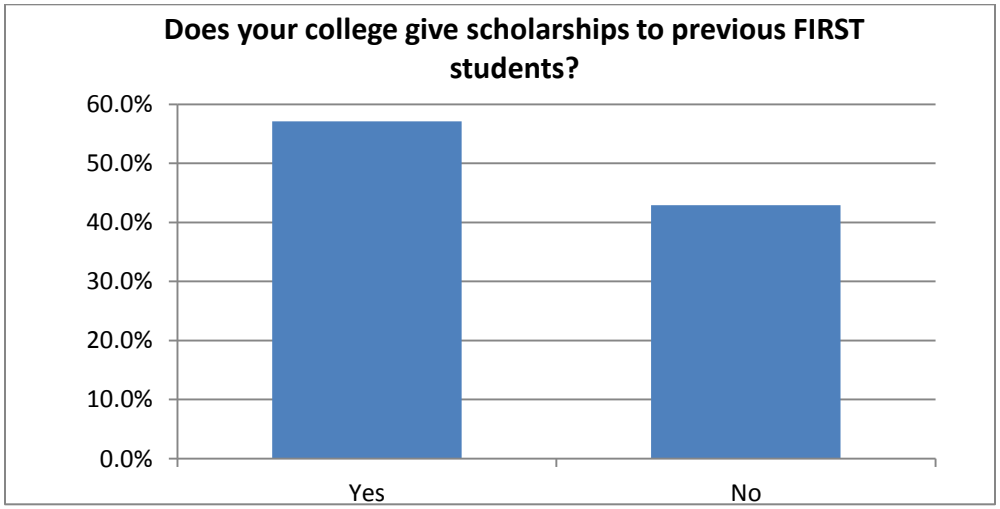


Figure 1: Rate of scholarship-awarding respondents

6.1.3 Town Gown Relationships

Dr. Wilzcynski cited *town gown relations* as the third domain, the idea that the university would be an event host and community contributor. Universities use FIRST as a method of reaching out to a community in need by providing local support. For example, a strategy for involvement here would be running workshops about the engineering design process or sponsoring teams at inner city schools, who otherwise would not get the same

exposure to the thrills of math and science. The town gown domain is certainly not limited by this.

6.1.4 Strategies for being affiliated

The project team took the three domains and translated them into several involvement categories. Eventually, the researchers determined five which would be most useful to segment the sample population.

- Providing scholarships
- Providing funding to a team, or the FIRST organization otherwise
- Providing space for teams to work
- Volunteering: Mentoring by students, faculty, and staff
- Hosting competitions

6.2 The Sample

The research team identified the population for this survey to be post-secondary institutions who were involved with FIRST in at least one of the five categories listed above. To find those who met the criteria the students went to the official FIRST website and reviewed the publically available lists of scholarships, teams and competitions. Identifying colleges from the lists of competitions and scholarships was a relatively easy endeavor, especially compared to the process of extracting colleges from the list of teams.

The researchers had to first record the number of teams in each state, and then divided the states so that each of the four group members had the same amount of teams to research. From there, they looked up each team to see if it had a university sponsor or mentors who

were from a university. If the team met any of these characteristics, the university was added to a growing list. The students boiled a list of 1671 teams to 194.

After obtaining the list of publically available university affiliates, the students compared the list to one provided by FIRST. There were several differences between the lists which could be a result of being sent an older list of universities. After looking over the two lists the students decided to combine the lists, to create the final compilation of universities involved in FIRST.

With this list, the students weighted each school based on the categories outlined in the previous section. Most categories were worth a single point, while mentoring was worth two points since it involved a greater time commitment. Upon completion of scoring, they determined how many points were allotted to each of the three stratifications. Schools that scored one or two points were classified as minimally involved, schools that scored three or four points were classified as moderately involved, and schools that scored five or six points were classified as significantly involved. Once the team had assembled the completed list of schools for each involvement level, they were able to build a sample, which included enough schools from each category to accurately represent that category. As there were only three schools in the third category, major involvement, the team decided it would be ideal to survey all three schools.

Table 1: Stratification versus Number of Universities

Stratification #	# of U
1	119
2	34
3	16
4	15
5	7
6	3

TOTAL	194

The researchers determined a statistically significant sample size based on the population of 194 universities, a confidence interval of 95%, and a margin of error of seven percent. This yielded one hundred schools.

$$n = \frac{N}{1 + N(e)^2} \; where \; n = sample \; size; N = population; e = error$$

$$n = \frac{194}{1 + 194 * (.07)^2} = \frac{194}{1.9506} = 99.457 \approx 100$$

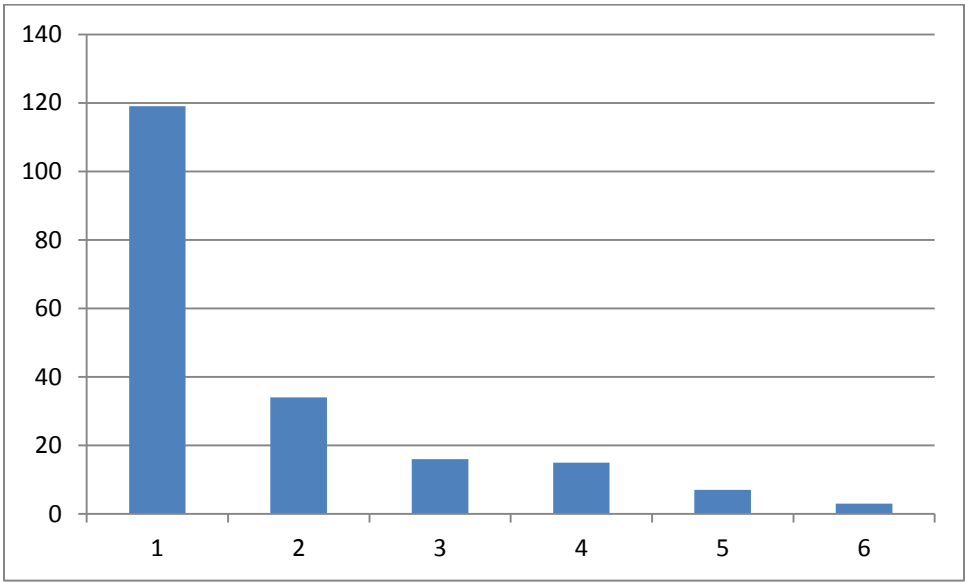


Figure 2: Number of post-secondary schools in each stratification score.

6.3 The Survey

Using a the survey plan as developed by Arlene Fink in *The Survey Handbook*, the students developed the questionnaire which would be used to gather the data relating to a

university's practices. To follow is each step of the plan and the students' methods for carrying out each task.

6.3.1 Define the objectives of the survey.

The students reviewed the IQP proposal to identify the objectives of their survey. The IQP itself was established to provide an explanation for why universities are involved with FIRST as well as a guide of best practices for those interested to join. Therefore, the survey's objectives were as follows:

- Determine why universities are involved with FIRST
    - What benefits do they experience from the process?
- Determine how universities are involved with FIRST
    - What would be the best way to become involved?
    - What is the spectrum of involvement in terms of cost and effort?
- What would non-involved schools want to know in order to make a better educated decision?

6.3.2 State the hypothesis.

The hypothesis should be an educated guess of the final result of the study[4]. The group hypothesized that there would not be a one-size fits all scenario that would guide a university's involvement with FIRST, but that, depending on the level of commitment the university would be willing to give, there would certainly be specific options for those levels.

[4] Fink, A. (1995). The survey handbook. Thousand Oaks, California: Sage Publications.

6.3.3 Determine a method for administering the survey.

The research group determined that a self-administered internet survey would be the most reasonable method for distributing the questionnaire. Because the university population spanned across the United States, it was not deemed reasonable to administer the survey in person, and because of the students class and work schedules, administering the survey via telephone was also ruled out. The students elected to use SurveyMonkey.com because of its advanced data analysis options in addition to the convenience that the WPI robotics had an *unlimited* account with the website.

6.3.4 Develop questions, review with experts, revise and submit for approval.

Because the surveys would be self-administered, the students had to ensure that each question was precise and unambiguous. After drafting the survey, the students reviewed and revised each questions with both of the advisors for the project, Professor Kenneth Stafford of the Mechanical Engineering department and Professor Lance Schachterle of the Humanities and Arts department before submitting the final version to the institutional research board for approval.

6.4 Soliciting Responses

Once they had attained IRB approval, the researchers sent an email including a hyperlink of the survey's web address to the one hundred they had selected randomly from the original population. Originally, each student in the IQP team was given twenty five contacts to reach out to and solicit a response; however, after a few weeks, the teammate with a significant lead in the number of garnered responses was designated as the person in charge for soliciting responses. Her main strategy was to personalize each message to its recipient, but also to send

the emails at a time that the recipient was most likely at their computer. This way, she reasoned, the contact would witness the email arriving.

Because of the high non-response rate, the team ended up reaching out to most of the contacts in the original population in order to reach statistical significance. In addition, the team delegated another member to call up the remaining recipients who had not responded to the survey or declined to participate earnestly begging for five to ten minutes of their time.

7 Results

7.1 The Sample

A total of 93 post-secondary educational institutions from the United States completed the online questionnaire, giving the project statistical significance at 95% with a confidence margin of seven and a half percentage points. The target respondent for this survey was a faculty or staff member who provides the main point of contact between FIRST and the administration. Among this sample, 55.1% considered themselves to be public, 37.1% as private, 5.6% as community colleges, 1.1% as religiously affiliated private universities, and 5.6 as Liberal Arts oriented universities. One of these schools identifies itself as a historically black university. Schools were able to select more than one classification. The schools represent 35 states, and span across the country from California to Florida to New Hampshire. See below for a chart with the basic demographics of our sample.

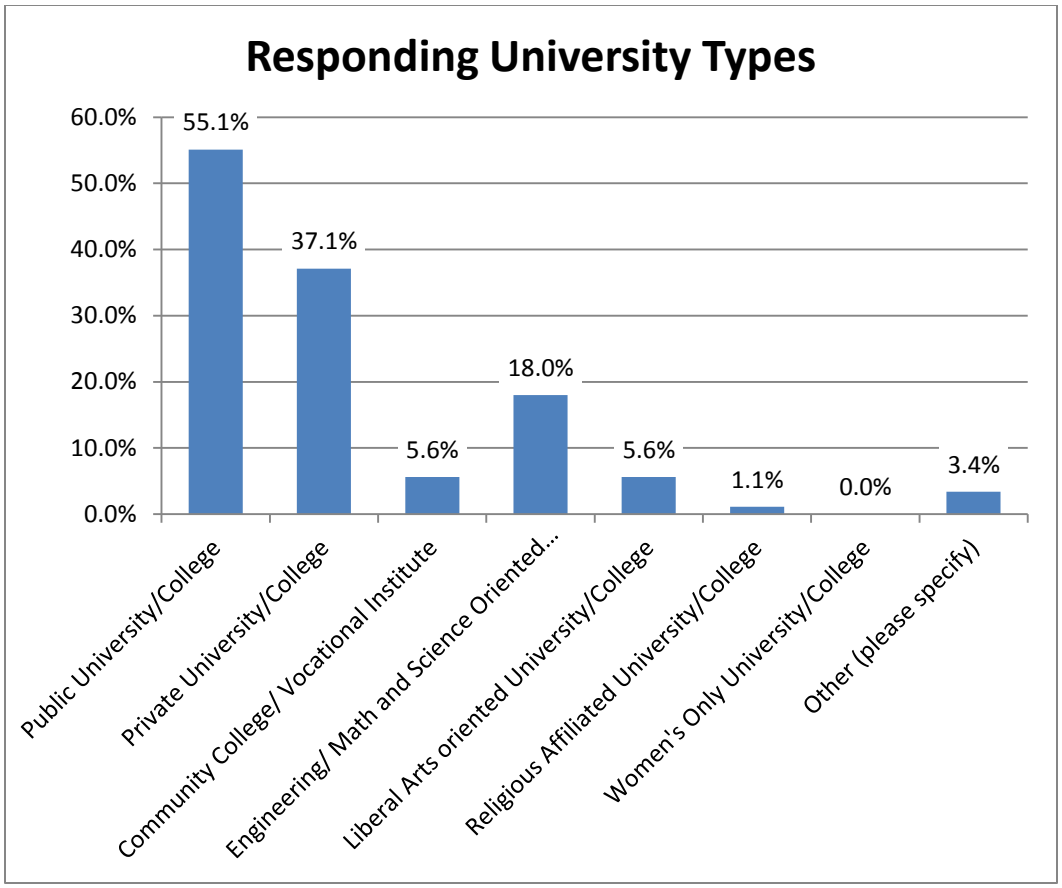


Figure 3: Spectrum of Respondents

When asked if aware of a FIRST organization on their campus, 79.3% of faculty surveyed indicated that their university was affiliated with FIRST on some level. Of the 20.7%, which identified that their university as unaffiliated, 13.3% indicated their admissions department took FIRST experience into account during the admissions process. In addition, 26.7% of the unaffiliated schools offer some sort of scholarship for students who have been involved with FIRST.

When asked if their university uses FIRST as a metric during the admissions process, 49% responded yes, and another 53% responded that there is a scholarship program for students involved in FIRST available through the college. These awards are usually small, with 59%

awarding under $5,000. However, a majority of these scholarships are renewable or given for 4 years.

7.2 Universities with No FIRST Affiliation

During the survey development stage, the students decided to expand the questionnaire to try and determine why some schools are not currently affiliated with FIRST. To address this, the survey had several questions for these respondents to try to determine why they were not affiliated and to see if there was anything that could be done to interest them in pursuing support of FIRST on the institutional level.

Of our respondents, 18 replied that, to the best of their knowledge, their institution was not affiliated with FIRST at all. When asked about their familiarity with FIRST before our survey, a large majority of the unaffiliated respondents replied they have at least heard of FIRST, and a majority of those respondents expressed they believe that they know all they need to know. Directly following, a question was asked if the respondent was supplied with more information about FIRST programs, and the impact they have, would they be willing to add a FIRST program to their university. A majority of respondents (10 of 14) stated that they probably would not consider adding FIRST support to their universities; however a slight minority replied that they were potentially open to providing support. As a follow up question, those who responded no were asked the reason for this answer. Answers to this question varied, but the most common theme was a lack of funding or other programs that they university already supports.

A large majority of these respondents also disclosed that their universities already are affiliated with other STEM programs (8 of 10 respondents). One informed the group that their

university supports Project Lead the Way, while the others either have in house STEM programs or programs supplied by the NSF.

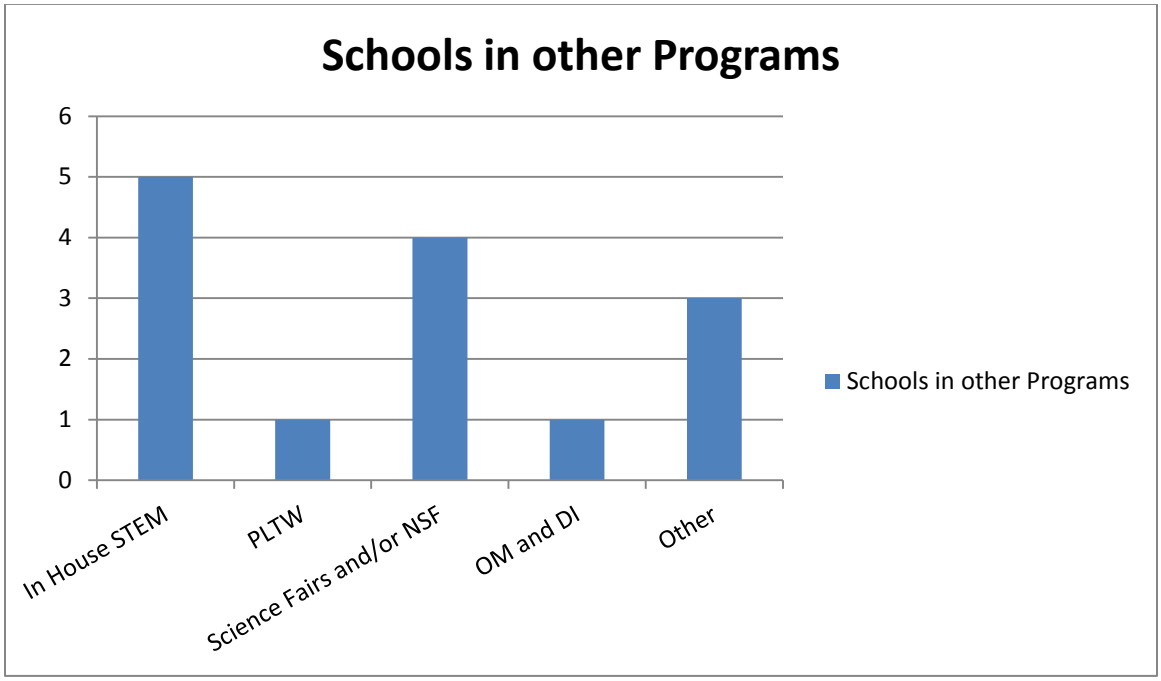


Figure 4: The programs in which respondents not involved with FIRST are currently involved

Having determined at the beginning of the project that these unaffiliated universities are the eventual audience, they were asked about what information they would be interested in to assist them in making a decision on FIRST. Of seven respondents, four suggested more information on ways FIRST could work with other STEM programs which the university already supports, and three would like more information demonstrating the impact FIRST has on its student participants.

7.3 FIRST Programs

One goal of the project was to survey and represent schools involved which each of the four FIRST programs: FRC, FTC, FLL, and Jr.FLL. This allowed the team to demonstrate that

affiliation with FIRST is dynamic and diverse, giving a newcomer several options and ways of customizing a FIRST program to meet their needs. 53.1% of the respondents identified hosting competitions for FRC, while FLL was the most popular competition choice at 59.4%. Results also demonstrated that many schools were involved with more than one program. Of the 17 schools which indicated they host competitions for FRC, ten host at least one competition for another FIRST program.

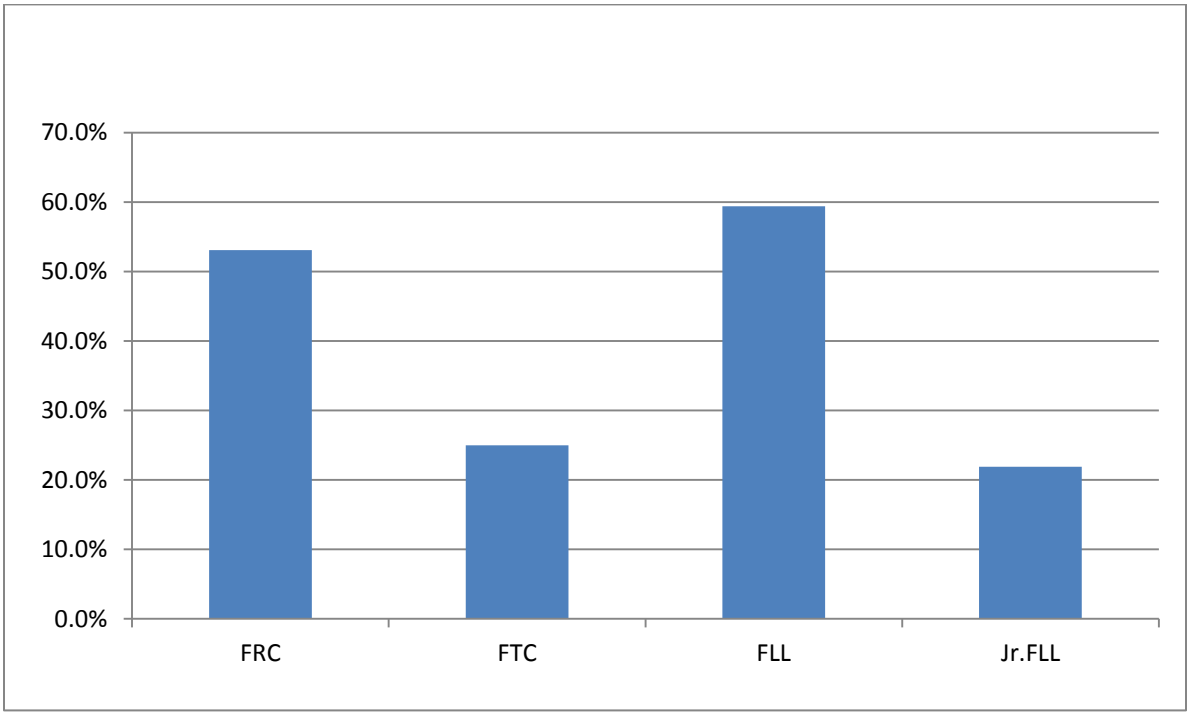


Figure 5 - Types of FIRST Competitions Held

When asked about the cost of competition, the majority of respondents stated that they budget $50,000 or less for their competitions, with five respondents stating that their budget for a competition was greater than $50,000.

7.4 Types of Motivation

It was evident in the results that many schools are motivated to be involved with FIRST in order to raise awareness and respect for engineering, science, and technology. In fact, 96% of schools who indicated they were involved with FIRST classified this motivation as medium or high, 73% of them selecting high. Another high area of motivation was to raise awareness of the school's engineering program to others off campus. This was demonstrated by 87% of respondents suggesting high or medium priority, with 58.5% suggesting this as a high priority. A majority of respondents revealed that they were not highly motivated to be involved with FIRST in order to attract funding from outside sources.

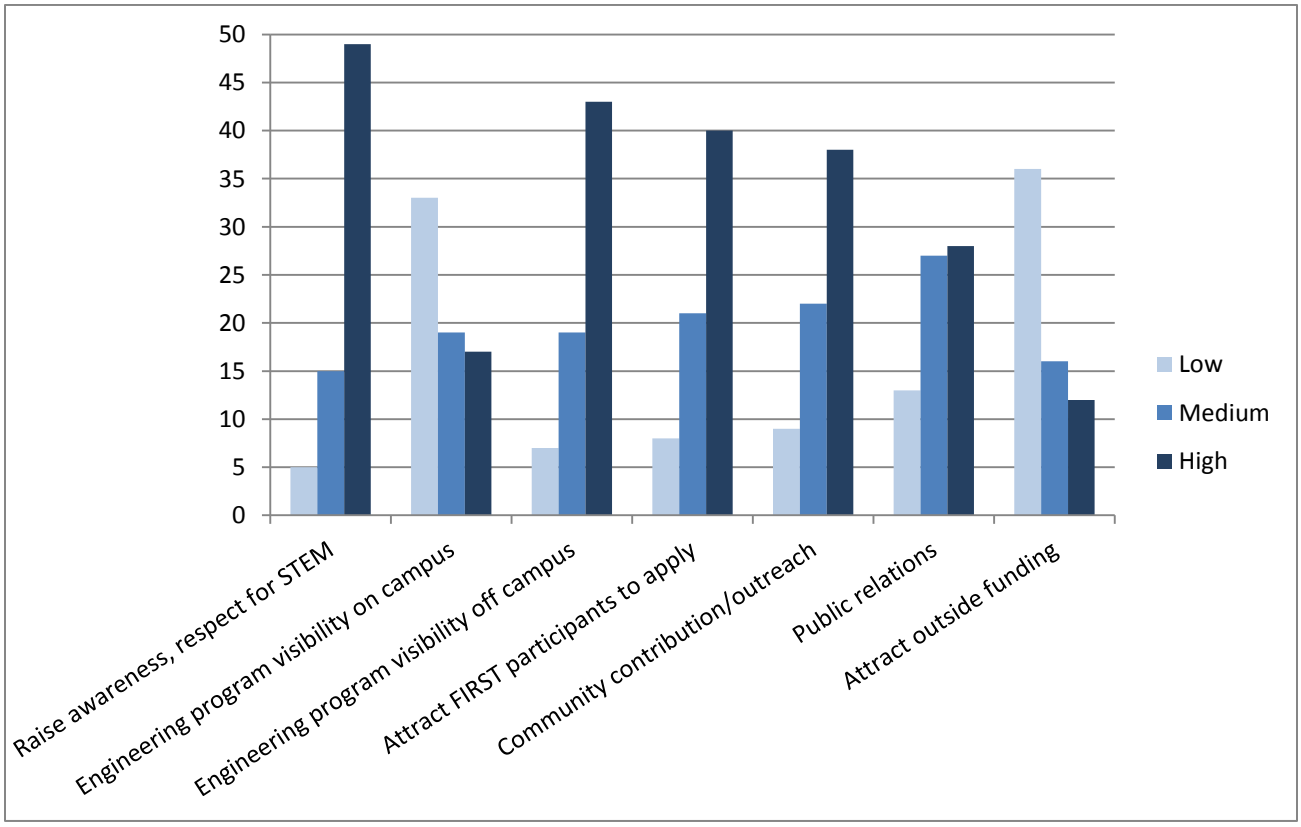


Figure 6: Number of schools who indicated level of motivation

Schools who responded are also showing a trend of increased involvement with FIRST in the past 5 years. 66.1% of respondents replied that they are observing increasing involvement within their institutions and with 42.6% of all respondents suggesting that they are seeing moderately increasing involvement. Also of note is that 5.9% of respondents are reporting what they would consider extensive involvement levels in their universities.

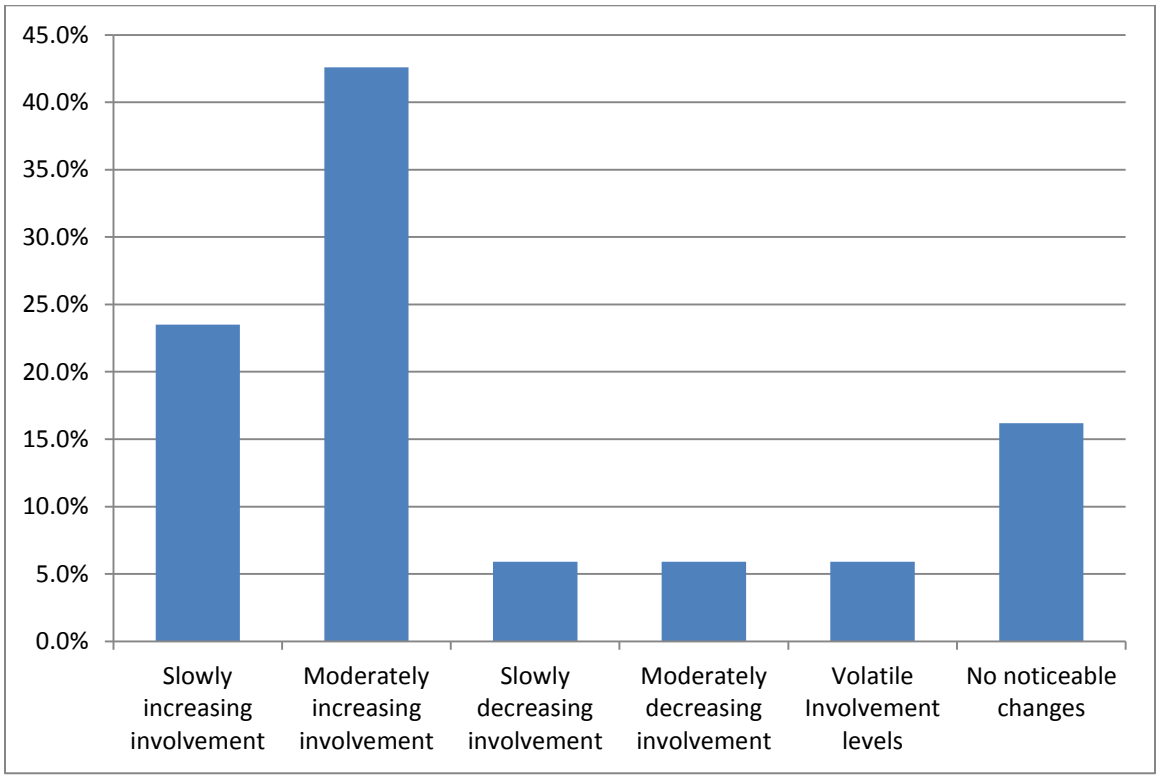


Figure 7: Trends of Involvement within Supporting Universities over the Past Five Years

When asked about the length of time the respondent has personally been involved with FIRST, no clear average length of time was apparent from the equal distribution from 1-12 years. This suggests that FIRST has attracted equal amounts of interest from faculty and staff over the past 12 years. In comparison, when the question is applied to universities, there are 2 distinct peaks at 3-4 years (15 respondents) and 7-8 years (10 respondents) of involvement.

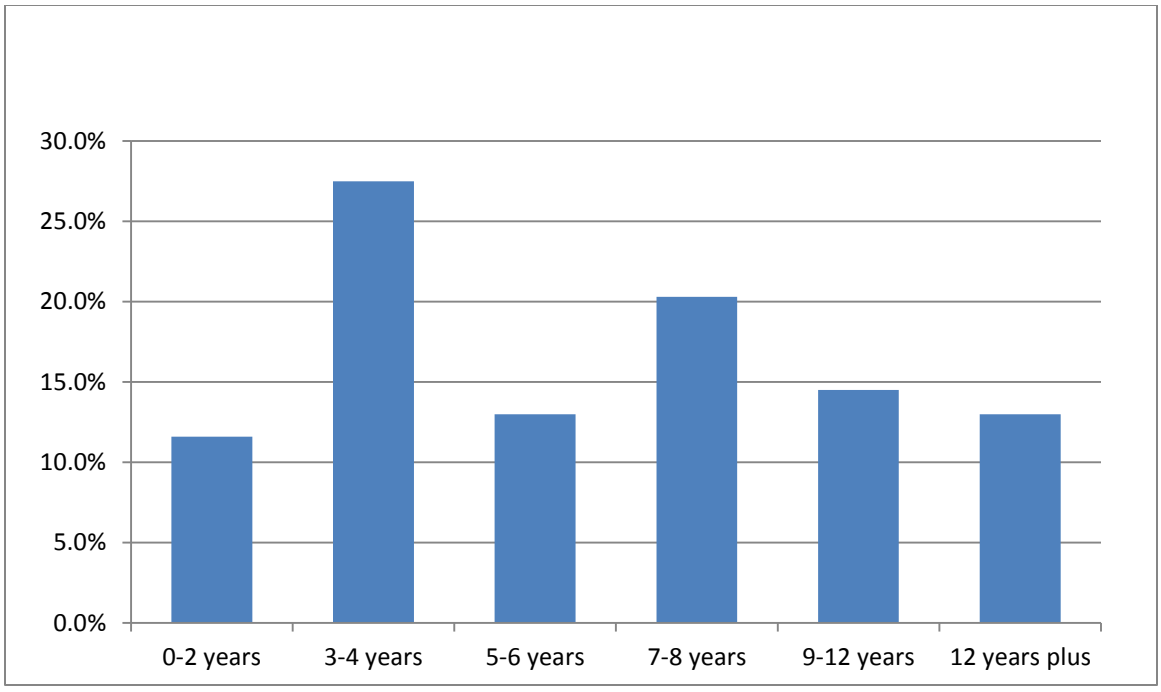


Figure 8: Time Institution has Spent in FIRST

One very interesting fact is that FIRST appears to not affect the opinion that respondents have of their university, with 48 replying that it has no effect on their opinion and 19 replying that it does. Of those 19, 17 describe their change of opinion as a positive shift and replied that they would be more interested in working for a university that supports FIRST, while two of them describe it as negative and would be less interested in working for a FIRST supporting institution.

7.5 Types of Involvement

Involvement with FIRST ranges across a large spectrum. 69.7% of schools surveyed which support FIRST, support at least one team. University students are also an important part of a university's FIRST programs, with 29 of the surveyed schools reporting that their students provide support for FIRST programs, ranging from mentorship of teams and volunteering for

competitions to teaching educational workshops. When asked about the factors which encourage college students to participate, 14 of the 29 responded that their students provide support because of previous experience with FIRST. Another 10 of these 29 respondents believe it is because students find the activities fun.

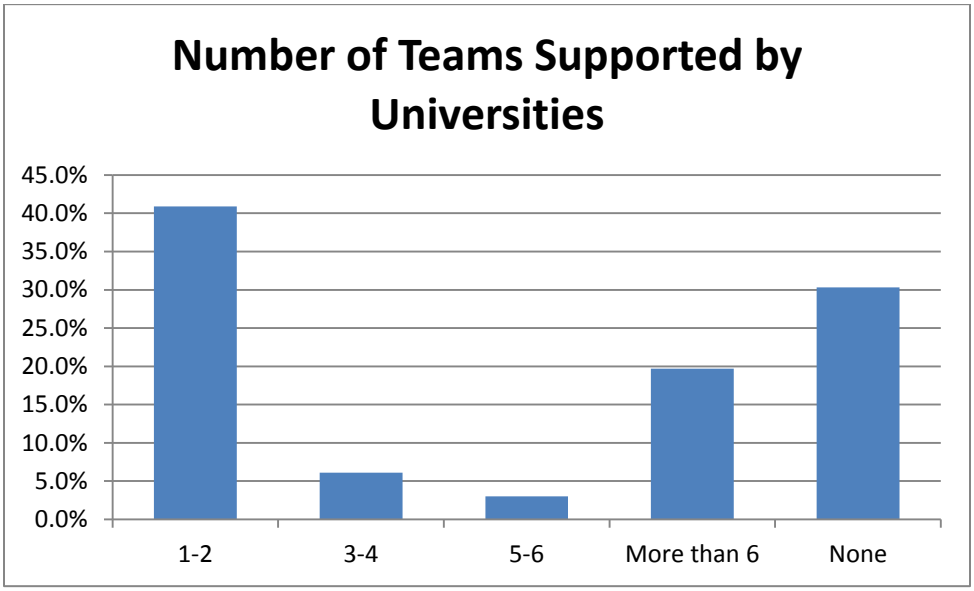


Figure 9: Breakdown of respondent team support

Many universities responded acknowledging that they offered various incentives to students to participate in the FIRST program offered at their institution. These incentives can include course credit, community service, graduation requirements, lab space, or even federal work-study positions. Other reported incentives amounted to extra-credit for courses, followed by graduation requirements, and volunteer/community service hours.

8 Results Discussion

The results indicated that more often than not, universities are motivated for three major reasons to participate in FIRST: visibility of the school, awareness and respect for STEM, and community outreach. In other words, the results supported our three domain hypothesis discussed earlier.

8.1 Visibility

Many respondents reported that raising visibility of both the engineering program, and the school itself, was moderately to highly motivating. Those who found visibility to be a high factor also indicated that they took a student's involvement with FIRST into account during the admissions, and many also offered these students extra scholarships. This implied, therefore, that the universities looked to recruit students of the FIRST caliber to their campus.

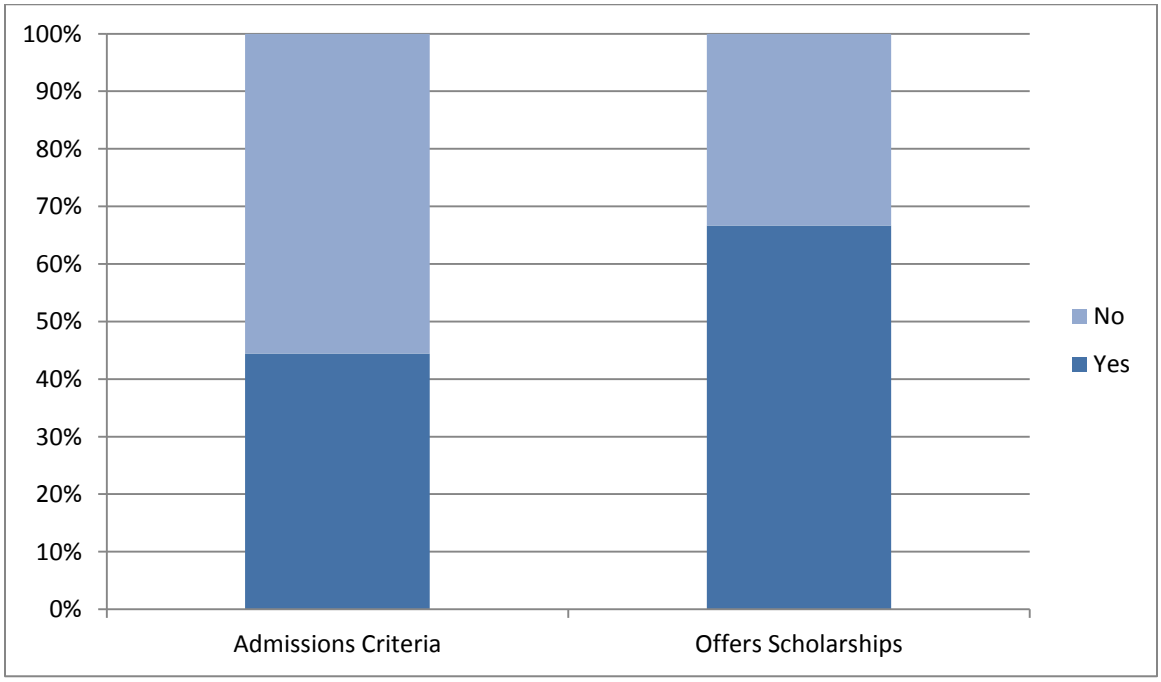


Figure 10: Schools that find visibility highly motivating and their admissions related actions

8.2 Awareness and Respect

Another main area of motivation which respondents identified was “to raise awareness and respect for engineering, science, and technology.” In fact, 94% of schools found this to be a moderate or high motivation. This statement directly links to FIRST’s mission, which is *"To transform our culture by creating a world where science and technology are celebrated and where young people dream of becoming science and technology leaders (usFirst.org),”* and shows that their core values spread throughout the organization’s university participants. The idea that these universities are so authentically engaged in this program suggests that FIRST possibly attracts universities with these core values.

8.3 Community Outreach

The last major reason universities were motivated to be involved with FIRST was their desire to give back to their communities. This corresponds with results from the study conducted at Brandeis, which suggested that high school participants were twice as likely to volunteer in their community as non-participants. Of the respondents, of the current survey, which indicated that student mentors volunteered their time to FIRST, more than half of universities cited that students did so because they found it fun and felt compelled to give back after being involved in high school.

9 Limitations to Research

Although the IQP students were able to draw several conclusions based on why universities are motivated to be involved in FIRST, it is important to highlight what the data does not say, as to ensure that the data are not falsely interpreted. The survey focused primarily on universities that were already involved with FIRST in some aspect, whether by offering scholarships, mentoring teams, giving workshops, or hosting competitions in any of the four programs, with few questions aimed at universities who were not already involved or affiliated. These select questions mostly looked to see whether or not these universities were familiar with FIRST and what information they would appreciate having before deciding to become involved. One therefore cannot make comparisons or assumptions regarding universities involved with FIRST versus those who are not.

10 Conclusion

Throughout the IQP process, it has become evident that there are several ways universities are involved with FIRST. The data suggest that sponsorship and mentorship are the largest ways that they help out teams; however, hosting and running competitions are becoming a larger part of the university-level involvement as the organization's lifetime grows. The survey has shown the wide spectrum from schools which are extremely involved to schools which only provide scholarships, with the most trending towards the latter end. The purpose in conducting this investigation was to survey and establish best practices for becoming involved with the organization. These include points such as how to best run a competition, supporting a team, becoming known in the FIRST community, while keeping solutions dependent on the school's available budget of money and time commitment. While acknowledging that this paper will not be a cure-all resource, it will hopefully be a guide to basic FIRST knowledge, finding other important resources, and understanding the impacts of becoming involved.

11 Appendices

11.1 FIRST History

The foundation For Inspiration and Recognition of Science and Technology (FIRST) was founded in 1989 as the brainchild of Dr. Woodie Flowers, a professor of Mechanical Engineering at MIT, and Dean Kamen, an inventor and founder of DEKA Research and Development, to inspire American students to become leaders in science and technology fields[5].

The main competition held by FIRST is the FIRST Robotics Competition (FRC), modeled after a sporting event and aimed toward high school students. FRC began in 1992 with the game "Maize Craze," with 28 high schools participating in Manchester, New Hampshire[6]. FRC has developed into a worldwide competition, with over 2,200 teams and 55,000 high school students participating. These teams receive a challenge in early January with a kit of standard parts, and have six and a half weeks to design, build and test a functioning robot for the competition[7]. Students then compete with their robots in regional competitions, with the winning teams competing at the world championship. Teams often approach local corporations for funding, and through these sponsorships, students learn about providing proper recognition to these sponsors as well as showing that funding is used appropriately. These close relationships between FIRST teams and their supporters can result in many beneficial relationships between students and potential employers.

[5] http://usfirst.org/aboutus/content.aspx?id=160
[6] http://usfirst.org/aboutus/content.aspx?id=880#frc_history
[7] http://usfirst.org/aboutus/content.aspx?id=160

The basis for the competition was a course taught by Dr. Flowers at MIT, Introduction to Design, where students had to build robots competitively, yet they were not discouraged from consulting each other for help[8]. This cooperative competitiveness, which Dr. Flowers termed "gracious professionalism," has formed the basis of FRC. It is not uncommon for teams to help each other with supplies, labor, ideas or other things during the build season, and then be fierce competitors during the regionals. It is not uncommon for teams to loan each other parts, tools or software code even in the midst of preparing for the next match at a regional[9].

The goal of FRC is to inspire high school students to recognize the necessity of science and technology in the world today by teaming students with mentors in their area to complete a project on time and under budget. These mentors can be a variety of people, including engineering professionals, college students, high school teachers, and other members of the community. The mentors provide a positive role model for these students; they are there to help the students learn proper engineering and safe manufacturing, as well as providing support for fundraising and other logistical concerns[10].

In 1998, FIRST decided to pursue methods for more students to become involved, and created the FIRST Lego League (FLL), which aims for students aged 9-14 in the United States and Canada, 9-16 worldwide. FLL follows a similar structure as FRC; however, it utilizes the Lego Mindstorms® robotics kit, as opposed to requiring large scale fabrication and programming like FRC. The games are modeled after real life problems and students are required to give a

[8] Wilczynski, Vince. FIRST Robotics Competition: University Curriculum Applications of Mobile Robots. Int *J of Engng* Ed.Vol 22, No. 4, pp 792-803, 2006.

[9] http://usfirst.org/aboutus/content.aspx?id=36

[10] http://usfirst.org/roboticsprograms/coachesmentors/default.aspx?id=14766

research presentation at their competitions. FIRST leaders chose Lego as the basis for the robotics competition because it allows for teams to purchase relatively inexpensive, yet powerful robotics kits that allow students to use any Legos they own to build their robots. FLL has grown to reach over 171,000 children ages 9-16 worldwide, and has become an important part of STEM education in many schools[11].

In 2004, FIRST again expanded the age groups that can be involved by introducing Junior FIRST Lego League (Jr. FLL). This competition, aimed at elementary school students from ages 6-9, uses a topic which was related to the FLL theme for the year. Students are tasked with researching some aspect of the theme, and then creating a poster that details that research as well as a Lego model which must use some type of simple machine and incorporate some moving elements[12]. FIRST only provides basic guidelines regarding the events, and therefore Jr. FLL events are run by their communities[13]. Jr. FLL is an opportunity for younger students to meet other students who are interested in science and technology.

Finally, in 2005, FIRST developed a small scale, low cost alternative to FRC, now called FIRST Tech Challenge (FTC), which in the beginning utilized Innovation First's VEX robotics kit. This compromised of erector set like construction elements, which are used to produce robots at approximately a 1:3 scale to the robots built for FRC. The FTC season follows much the same as the FRC season, with a challenge game revealed to teams with a limited amount of time to build a robot to complete the challenge, while fitting within limitations for weight and size. FTC

[11] http://usfirst.org/aboutus/content.aspx?id=160
[12] http://usfirst.org/aboutus/content.aspx?id=160
[13] http://usfirst.org/uploadedFiles/Jr.FLL_2009_Event_Guide.pdf

has around 1,500 teams with approximately 15,000 students participating worldwide[14]. In 2008, FTC moved away from the VEX Robotics system to a hybrid system, using the Lego NXT hardware as the robot controller along with a new structural framework system called TETRIX to interface Lego bricks and sensors with the metal frame[15]. FTC is an attempt to reach more schools and more students with a low cost alternative to FRC.

A final note about FIRST involves the scholarships offered to students who are involved in the program. Universities and companies now offer over $13.8 million in scholarship opportunities annually, with colleges often using FIRST as a preexisting filter to find students with major project experience who are also passionate about science and technology. According to FIRST, 60% of scholarships awarded to FIRST alumni are for STEM major programs; however there are scholarships for a range of interests[16]. Scholarships are usually merit based, and all are available to high school students who are currently involved in a FIRST program. Through these awards, students are given the opportunity to achieve success beyond FIRST.

[14] http://usfirst.org/aboutus/content.aspx?id=160
[15] http://www.usfirst.org/roboticsprograms/ftc/content.aspx?id=17121
[16] http://usfirst.org/aboutus/scholarships.aspx

11.2 Team Resources:

There are several resources already available for those wishing to start a team or start a competition with the FIRST program.

- **FIRST Robotics Competition** (for ages 14 to 18)
  - FIRST Official Website:
    - Ways to Become Involved: http://www.usfirst.org/roboticsprograms/frc/content.aspx?id=14538
    - What is FRC?: http://usfirst.org/roboticsprograms/frc/content.aspx?id=5504
    - Starting an FRC Team: http://www.usfirst.org/uploadedFiles/What/FIRST_Robotics_Competition/It_is_Fun/Starting%20an%20FRC%20Team.pdf
    - FRC Handbook: http://www.usfirst.org/uploadedFiles/Community/FRC/Team_Resources/FRC%20Handbook.pdf
  - Team in a Box, an informational DVD: http://www.team341.com/tiab/index.php
  - Chief Delphi, an online forum and resource for teams: http://www.chiefdelphi.com/forums/portal.php
  - ASME Guide to Starting a FIRST Team: http://www.asme.org/Events/Contests/Guide_Starting_FIRST_Team.cfm
- **FIRST Lego League** (For Ages 9-14)
  - FIRST Official Website:
    - Team Stuff: http://usfirst.org/roboticsprograms/fll/content.aspx?id=17723
    - What is FLL: http://usfirst.org/roboticsprograms/fll/content.aspx?id=16890http://www.firstlegoleague.org/what-is-fll/twocol.aspx?id=251
  - VA/DA FLL Coaching Resources : http://www.vadcfll.org/coaching.html
- **Jr. FIRST Lego League** (For Ages 6-9)
  - FIRST Official Website:
    - Starting a Team: http://usfirst.org/roboticsprograms/jfll/content.aspx?id=13144
- **FIRST Tech Challenge** (For Ages 14 to 18) http://www.usfirst.org/roboticsprograms/ftc/content.aspx?id=14666

11.3 Roadmap to Involvement

Based on data obtained from the survey and casual email correspondence with respondents, the IQP team found that rather than having one specific method for best practices, there was a spectrum from minimal to extensive commitment from the university. Those interested could start at the minimal end of the spectrum and move down as time went on. The team coined this as the "Roadmap to Involvement" and provides the step by step guide below.

11.3.1 Scholarships

A scholarship is a way for a university to attract students from FIRST and encourage the FIRST programs without very much commitment or effort. Whether the university decides to offer $500 or full tuition to one or multiple students, the payoff allows them to greatly stand out amongst schools who decide not to. Based on the data gathered from the survey, the average scholarship amount is approximately $4,716.44.

11.3.2 Financially Supporting a Team

The next threshold would be financially supporting a team. It requires a slightly larger amount of funds, and more time volunteered from people involved from the university; however it will raise the awareness of the university to students who might be interested in science and engineering. The increased visibility of the university is advertising which will reach several hundred interested parties for far less cost than an advertising campaign. The total cost to the university would run anywhere from a few hundred dollars to over $10,000.

11.3.3 Investing in Human Capital

The third level of involvement that can be seen in FIRST support is multi-team support, through such methods as teaching workshops and summer camps. These require more time and money than the previous two methods, but make education a greater priority and increase visibility even more. This is because the efforts would not be limited to one team, but could reach a multitude of students, and the workshops' curriculum could be easily reused once developed. Workshops require a fair understanding of the systems being taught, extensive planning of the material covered, and persons qualified to teach the material and run the events. Topics for workshops could be anything from the design process, to programming skills, and team logistics.

11.3.4 Fully Supporting a Team

The fourth level of involvement is Full Team Support. This requires a larger budget and more support from a number of mentors, as well as a team to work with, and an appropriate location with the proper resources for manufacturing. This level of involvement can be quite demanding, and can require a large amount of material resources as well as support in the form of mentorship from university faculty, staff, and students. Some of the resources required include a work area for the team, funding to register for competitions and purchase parts and materials.

11.3.5 Hosting a Competition

The final level of involvement is the hosting of a FIRST competition. This requires by far the most money and the most volunteer support. At its largest, an FRC regional competition can cost upwards of $250,000 and requires a full event staff and sports arena to host. An

official regional requires approval from FIRST to host, but preseason and postseason tournaments can also be held in order to prepare for the ultimate level of support.

11.4 Mentorship and Sponsorship 101

For a university wishing to become involved with FIRST there are several options including sponsoring a team and hosting FIRST events. Appendix 11.5 discusses the latter option in great detail. Approximately three fourths of schools surveyed support at least one FIRST team in any of the four programs. This section explains the best way to go about supporting a FIRST team.

11.4.1 Mentors

Most schools affiliated with a FIRST team or teams recruit undergraduate students to act as mentors to the participants. It is important that veteran FIRST students, who then give back to the program by mentoring, understand the difference of their position as opposed to a student participant in the organization. In a focus group of undergraduate mentors at WPI, many cited that too much involvement by a team's college-age mentors created a more stressful environment, and students from both groups were less likely to stay involved. The IQP therefore recommends that mentors provide more of a guiding influence to the creative process as opposed to taking a more active role.

One technique that might help prevent this removal of control, from the hands of the high school team members, is to allow the students to develop designs in small groups with minimal mentor involvement, and then have these groups present these designs to the mentors and the other groups. After the team as a whole has chosen a design, the mentors can step in and assist the high school students in creating a final detailed design. The FIRST supplied mentor's guide specifically refers to the mentor's role as a facilitator for group thought

and discussion and not as a major decision making part of the team.[17] The role of a mentor in a FIRST team is to lend their greater knowledge of the engineering process to the team as a whole, in order to be a role model for aspiring engineers and to assist these aspiring engineers to complete the task set before them in a safe and complete manner.

One good way to prevent poor mentor- student balance or other problems is to have one mentor take on the role of "head mentor." The role of the head mentor is to coordinate with all the other mentors, ensuring that the team stays on task and focused, selecting work and meeting hours, and providing clear guidance for the whole team. This person could work with the high school team captain to help run meetings, however they should refrain from micro-managing the team's day to day operations.

For FTC, one can anticipate smaller groups of students, thereby requiring fewer mentors than FRC. A good ratio for each team is one mentor for every six students. This allows for the students to have a good relationship between their mentor and the rest of the team. The smaller scale of the robots is also not conducive to a large team, so the average team size should be between three to ten students, with one to two mentors providing support. The role of an FTC mentor is much the same as an FRC mentor, and many of the same principles apply to both mentor roles.

The most important part of providing mentorship to a FIRST team is to remember that FIRST is a chance for the students to be exposed to engineering and to complete a real world

[17] The Mentor's Guide can be found at: http://usfirst.org/uploadedFiles/Community/FRC/Team_Resources/Mentoring%20Guide.pdf (accessed 1/20/11)

engineering project before reaching college. As such it should be seen as a chance for the students to learn valuable skills in the engineering world, and the mentors should approach it as an opportunity to teach these valuable skills to the students, not as a project that they will use their own skills to complete.

Programs such as FRC and FTC can also be used for an academic purpose at the university level, providing students exposure to the entire spectrum of the engineering process. In a 2006 article, Dr. Vince Wilczynski and Dr. Woodie Flowers outlined four levels at which FIRST could be used in a university context, including as an introduction to engineering course or potentially as a capstone design course[18]. The survey conducted for this report showed that using FIRST for class material is rather rare among the respondents, regardless of the potential FIRST has for engineering education.

11.4.2 Team Sponsorship:

Sponsorship is an important part of the FIRST experience for FRC teams. Larger budgets result in a need for fundraising and sponsorship. It is a good idea for the university to provide a main contact for all the teams sponsored. This should be a person who takes an interest in the operation of the teams, as well as someone who could provide feedback on how the team can improve in their operations. Another important part of sponsorship is to allow teams to present their work to several representatives of the university. This allows the students to realize how valued their developments are to the university.

[18] Wilczynski, V. & Flowers, W. (2006). FIRST Robotics Competition: University Curriculum Applications of Mobile Robots. *International Journal of Engineering Education*. 22(1), 1-4.

Another form of sponsorship can be in providing a manufacturing support for local teams. Many high schools do not have the capability for some of the manufacturing, such as a machine or welding shop, which may be needed for an FRC robot. If the university has a machine shop any similar manufacturing facilities, access to these resources could be a priceless asset to a robotics team. The university can either train the team members to use the processes available to them, such as offering classes on the safe operation of a lathe, or allow the team to supply proper dimensioned drawings so trained operators can manufacture the parts for the team.

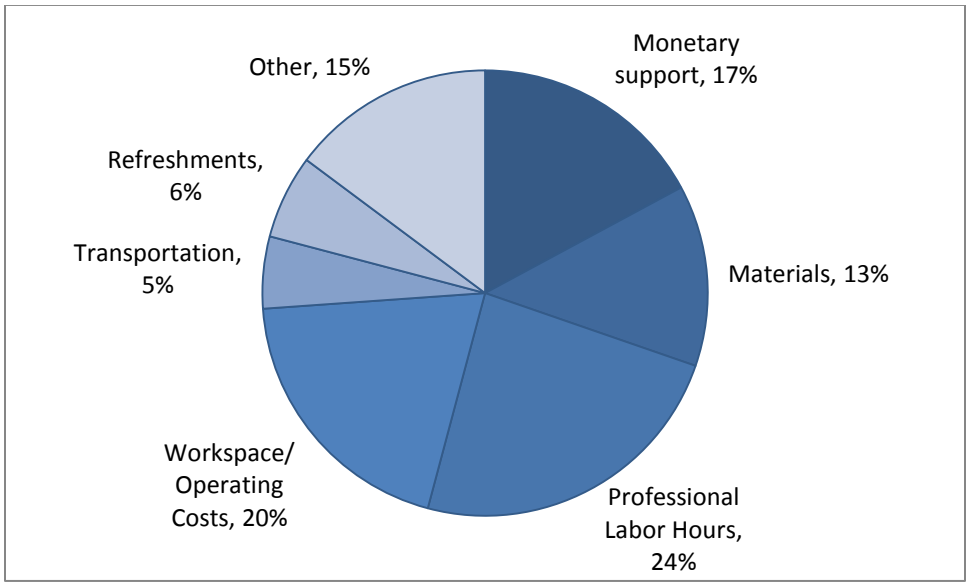


Figure 11: Reported Average Distribution of University Assets Toward FIRST Support

Another form of sponsorship is to provide a workspace for teams to use. An important part of FIRST is providing a safe workspace for teams to operate in, and many high schools no longer have facilities which would be suitable for robot construction. A moderate to large sized room with a high ceiling as well as plenty of light and workspace is important to the success of a

FIRST team. Providing a location for teams to work on campus also can improve the relationship college student mentors have with the team, as it allows more college students to participate as mentors.

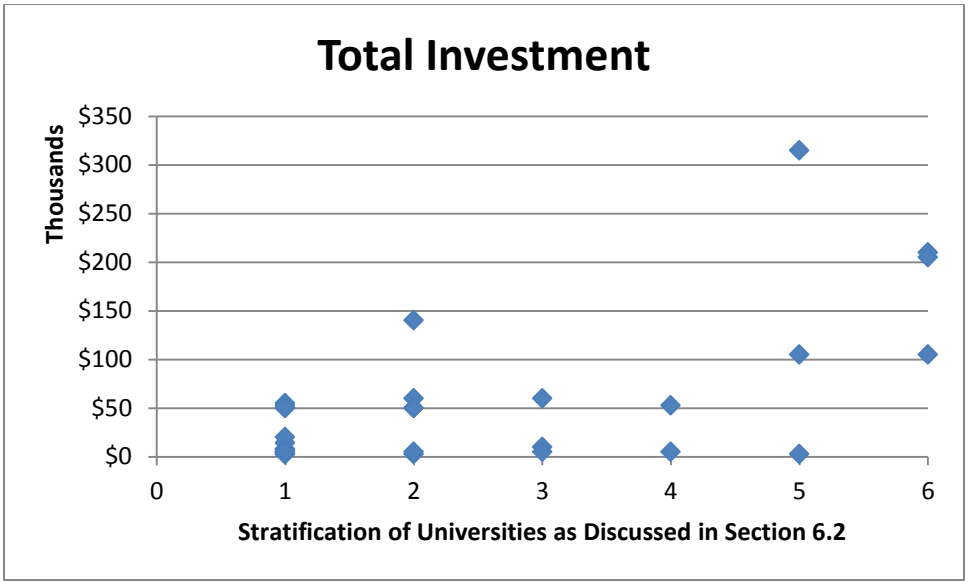


Figure 12: University Investment versus Level of Involvement

11.5 Competitions

Through a meeting with Colleen Shaver, the Assistant Director of the Robotics Resource Center at WPI, the students learned many different aspects of the major FIRST competitions. Throughout the WPI Regional (FRC), Battlecry@WPI (FRC), and Robonautica (FLL), WPI attracts a wide variety of teams. The planning for these events happens year-round, with the main focus for FLL beginning at the start of the academic year and for FRC starting towards the end of the first semester. In general, there are five key points that must be taken into consideration when running a competition: venue, volunteers, budget, planning, and media/communication.

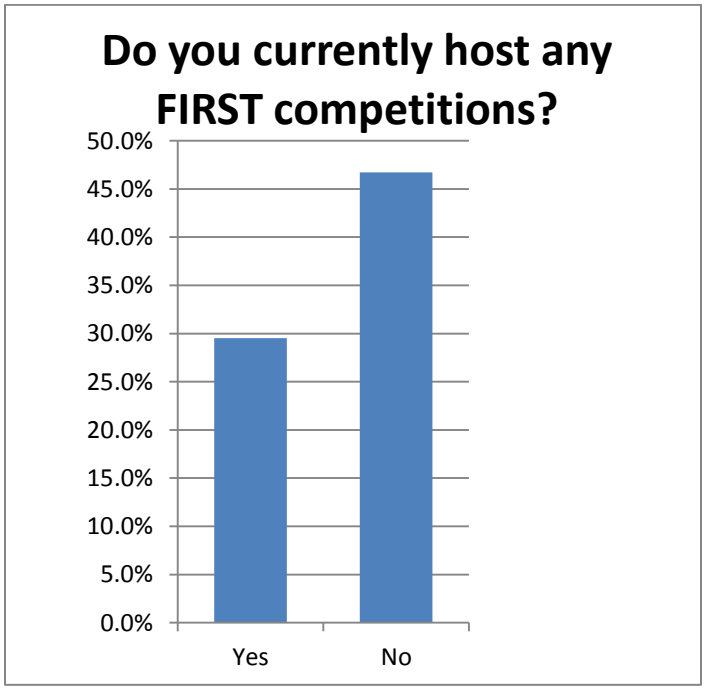


Figure 13:Number of Schools Which Host Competitions

11.5.1 Venue

The venue is the first priority which should be taken care of, for without a venue there can be no competition. It must sustain enough space to house field(s), pits, and seats or stands for viewing the matches. For FLL, plan on hosting between 48 and 64 teams. Provide an

equivalent number of pits, enough seating for an average of ten people per team, and at least one main competition field. The venue can also serve as a place for teams to congregate and have meals together should the outdoor weather be undesirable. For FRC, in addition to the aforementioned requirements, one should plan on also holding a VIP event for important officials from school, such as the President, Dean, Vice-President, and also for special guests. FRC also has a higher average number of people per team, 20, which should be taken into account. Lastly, it is important that the university supplies decent security for the event.

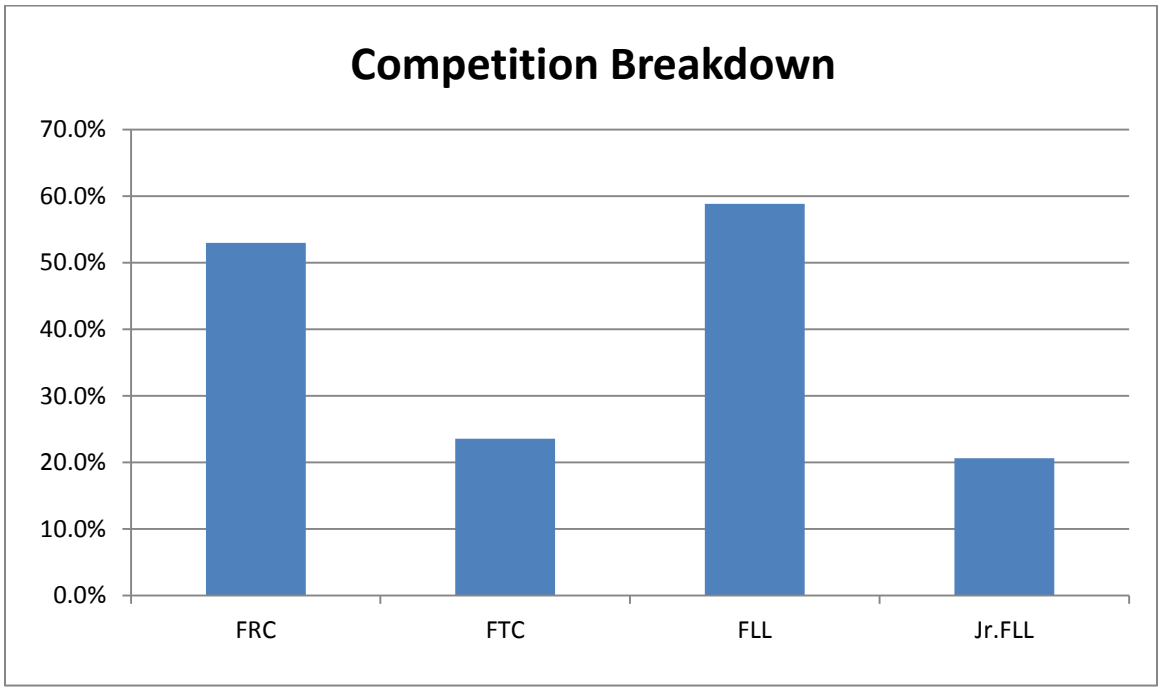


Figure 14Breakdown of Competitions by FIRST event

11.5.2 Volunteers

Volunteers are the next major aspect towards competition success. They are the tools which keep your competition running smoothly and soundly. If the university runs an official FIRST competition, FIRST has a system in place to guide the process. They employ people to assist in starting and maintaining regional competitions, and these employees will facilitate

receiving the materials from FIRST, as well as coordinate with some of the major sponsors. The only drawbacks to running an official FIRST competition are that the expected level of quality is greater than that of an off-season and it often requires more capital than its counterpart as well. A university must strive to keep up the morale of its volunteers, because they provide a public face of the competition. Providing breakfast and lunch for volunteers throughout the event, including on setup and tear down days, is a good way to maintain good volunteer morale.

11.5.3 Budget

The third focus of competition is successful budgeting. This includes keeping a spreadsheet for each year's competition, so that you may adjust accordingly to suit a specific year's needs. Minimizing costs on major activities will allow a small steady percentage to remain for miscellaneous items and unforeseen tasks. A solid budget also includes fundraising, which can usually be found through corporate sponsorship, or utilizing the registration fees of the competition.

As stated before, planning the event is a year-round process. Past experiences should always be used as a base for how much money to allocate; however, quotes from outside services should generally be obtained at least a month ahead. Internal catering should be able to provide accommodations with three or four days' notice. Assuming the university has recruited all the necessary volunteers, it should book the venue for as much as one week before the event through the end of the event, so that other services may set up. Field set up should be a one-day event the day before the competition starts.

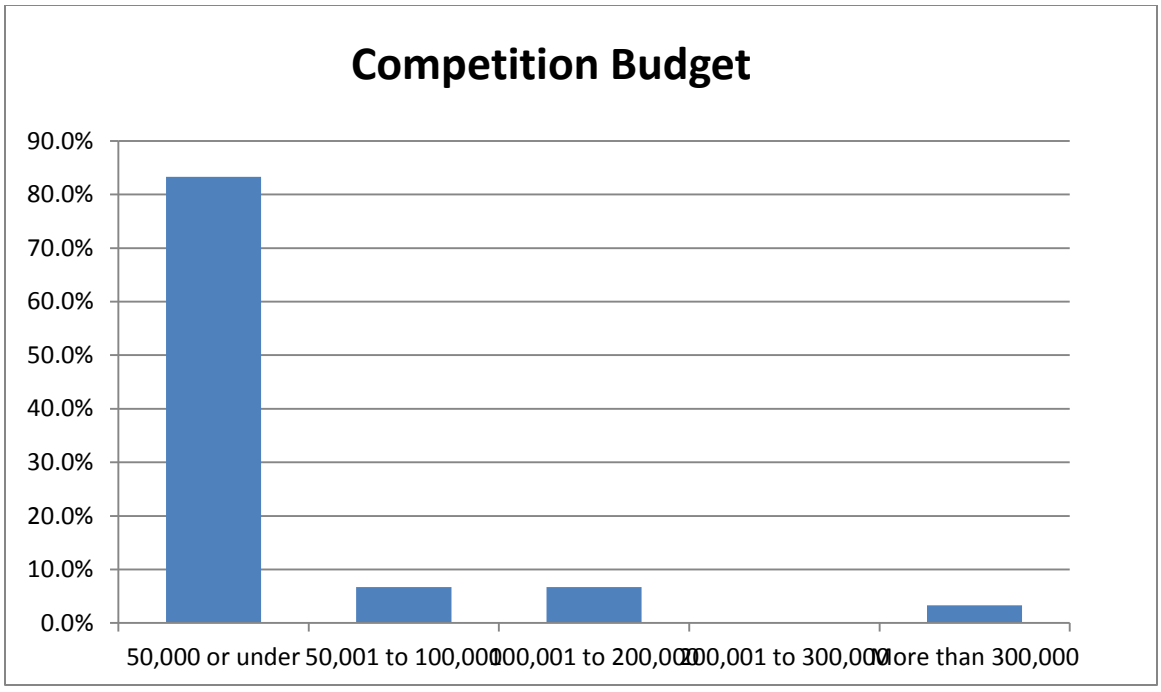


Figure 15: Number of schools versus cost of competition

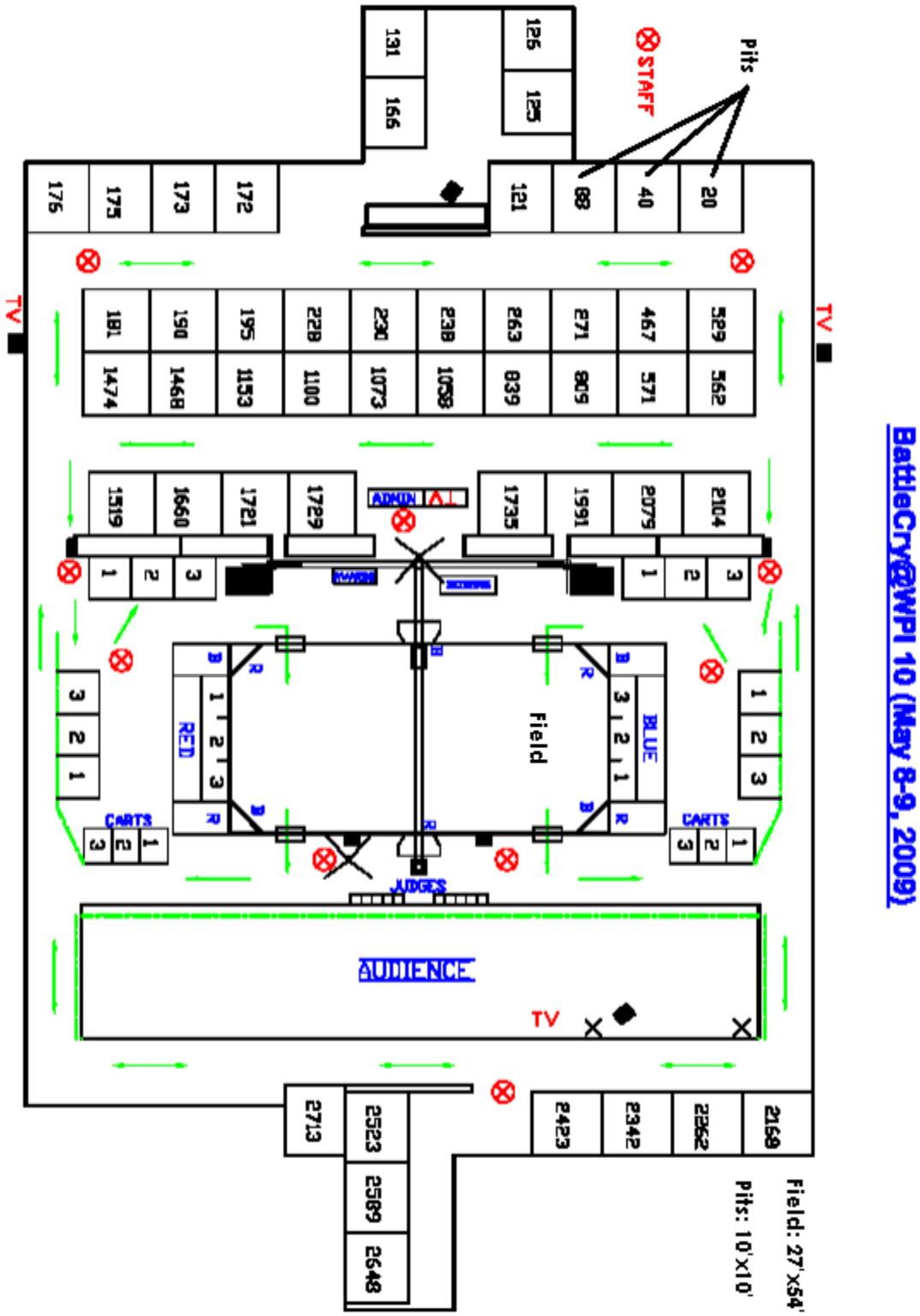
11.5.4 Media and Communication

Advertisement at a regional is a key point for sponsors. Showing their names in places such as banners and PowerPoint presentations are acceptable ways to display those who have made significant donations to the competition, as well as major FIRST sponsors. Registration is also a part of communications. Also the ability to provide information to teams about local options for hotels is always a good idea. Hilton, Courtyard, and similar options are usually affordable and can have reduced prices if a large block of rooms is rented for the same event. They also often offer shuttle services which could be anywhere from an 8-person minivan to a small bus, which are useful for transporting teams to and from their hotels throughout the day as needed. If the university campus has limited parking options, it should consider providing teams with a map of the area and suggested parking options within walking distance.

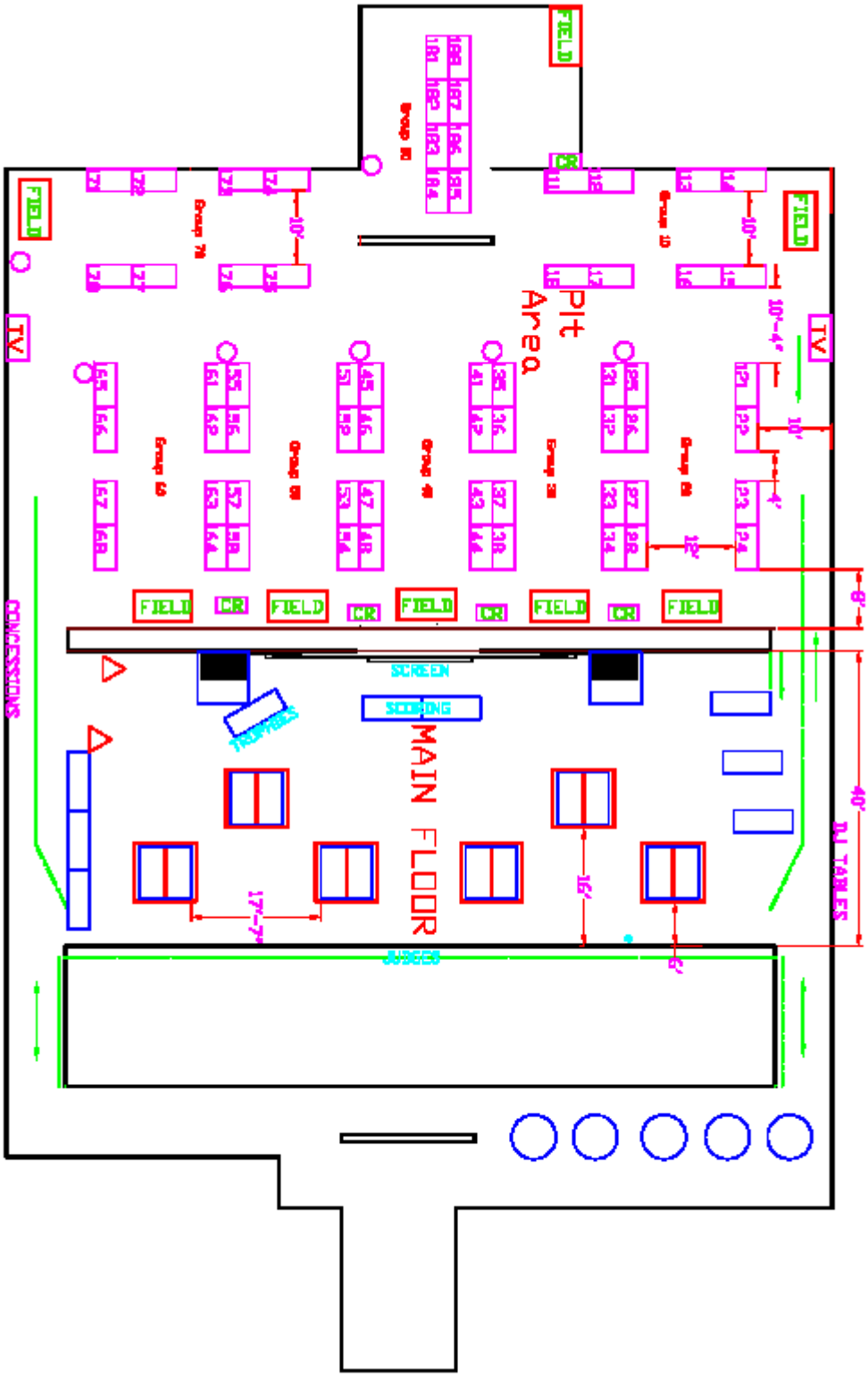
11.5.5 Traffic

Event traffic, be it vehicular, pedestrian, and robotic, should be kept organized and safe. This means having clearly marked lanes for movement, and making sure that there is enough space for all parties involved to move around freely. In terms of traffic flow inside the venue, pit areas should be marked with tape on floors and “chain-link fences” around the external perimeter of said area. There should be lanes in the pit area wide enough for pedestrians to walk and be able to stand clear of robots in motion, and to accommodate two robots travelling in opposite directions. The flow around the field area should be directed by queuing volunteers, so that time is not wasted and carts do not collide, as well as keeping people safe. This can be achieved by utilizing one side of the field area solely for robots entering from the pit area, and one side for robots exiting the field area.

Example of FRC Offseason Layout:



Example FLL Layout:



11.5.6 Sample FRC Offseason Schedule of Events

	Day 1
1500-1600	Team Registration & set-up
1515	Practice Begins
1615	Opening Ceremony
1630	Play Begins (qualifying rounds)
1830	Dinner Break
1930	Play Resumes
2100	Pits Close
	Day 2
0700-0800	Late Team Registration & set-up
0715	Practice Begins
0830	Opening Ceremony
0845	Play Begins
1145	Final Alliance Selection
1200	Lunch Break
1300	Finals Begin
1700	Awards Ceremony
1730	Event Ends

11.5.7 Sample FLL Schedule of Events

0730	**Doors Open**
0815	Mandatory Coaches Meeting
0845	Opening Ceremonies
0910	Matching and Judging Begin
1330	Lunch Break
1400	Judging Resumes
1415	Matches Resume
1600	Playoff Matches Begin
1730	Awards Ceremony
1900	Event Ends

11.6 Solicitation via Email

Below are the emails sent to the 93 contacts in order to solicit responses to the survey.

11.6.1 October 29, 2010

Hello (Person's Name),

My name is (EMAILER), I'm a junior at Worcester Polytechnic Institute working on a project regarding FIRST, and I was hoping that I could take up between 5 and 10 minutes of your time. Currently, there exists an unmet need for a study that outlines why it would be beneficial for universities to become involved with FIRST. Previous studies, such as the one conducted by Brandeis in 2002, look more into the reasons why students should be motivated to join. As the organization continues to grow, we see that it will be important to recruit more universities to take the plunge, and the current research alone is not enough to convince them. This is where you come in. My preliminary work shows that (COLLEGE) currently has some affiliation with the FIRST organization. I would greatly appreciate if you would consider taking a 5 to 10 minute survey regarding the FIRST practices at your institution.

Please let me know if you are interested and feel free to ask any questions that you may have. You can reach me at this email, or by phone: 555-555-1234. Following the study, my project group plans to publish the results and we would be happy to send you our findings when they complete.

Looking forward to hearing from you,

(EMAILER)

11.6.2 November 4, 2010

Hi (PERSON'S NAME),

My name is (EMAILER), I'm a junior at WPI working on a project regarding FIRST in collaboration with Purdue, and I was hoping that I could get your help filling out this survey. Currently, there exists an unmet need for a study that outlines why it would be beneficial for universities to become involved with FIRST. Previous studies, such as the one conducted by Brandeis, look more into the reasons why students should join. As the organization continues to grow, it will be important to recruit more universities to take the plunge, and the current research alone is not enough.

This is where you come in. I would greatly appreciate if you would consider taking a 5 to 10 minute survey regarding the FIRST practices at (COLLEGE).

Please feel free to ask any questions that you may have. You can reach me at this email, or by phone: 555-555-1234. Following the study, my project group plans to publish the results and we would be happy to send you our findings when they complete.

Looking forward to hearing from you,

(EMAILER)

QUICK SUMMARY: I am doing research to see why universities would benefit from being involved with FIRST robotics. Even if your university is no longer or has never been affiliated with USFIRST, I would appreciate you filling out the survey. It should take approximately ten minutes of your time. Here is the link: http://www.surveymonkey.com/s/9CH2XPQ

11.6.3 January 18, 2011

Good (TIME OF DAY) (PERSONS NAME)
I'm urgently writing to you on behalf of my project group, the FIRST organization, as well as the Institutional Research Board of WPI to ask for your help. Currently nearing our project deadline, we still lack the responses necessary to have statistically significant data. Five to ten minutes of your time would mean that the past six months of ours will not go to waste.

Our study looks to suggest why universities such as yours choose to be part of FIRST in some manner. We also plan to include several informative appendices in our publication, included but not limited to what the survey suggests as the best practices for a university wishing to become involved. This publication could prove to be very valuable as FIRST continues to grow and search for more support.

The survey is completely voluntary and you can choose to cancel, change, or void your response at any time. Should you decide, we can omit your, as well as your institution's name from our results. We simply need your voice and opinion.

If you have any questions or concerns, please do not hesitate to contact me via email or phone at 555-555-1234.

EMAILER

Here is the survey link: http://www.surveymonkey.com/s/9CH2XPQ

11.8 Publically Available List of Schools

University	Score
Adelphi University	1
Arizona State University	1
ASME-International Petroleum Technology Institute	1
Baker College	1
Bradley University	1
Bridgerland Applied Technology College	1
Bucknell University	1
Burlington County Institute of Technology	1
Carnegie Mellon University	1
Case Western Reserve University	1
City College of New York	1
Clemson University	1
Cleveland State University	1
College for Creative Studies	1
College of the Atlantic	1
Colorado State University	1
Colorado Technical University	1
Cuyahoga Community College	1
Daniel Webster College	1
DePaul University	1
DigiPen Institute of Technology	1
Embry-Riddle Aeronautical University	1
Fairleigh Dickinson University	1
Farmingdale State College	1
Ferris State University	1
Florida A&M University	1
Florida Institute of Technology	1
Fox Valley Technical College	1
Gateway Technical College	1
George Mason University	1
Glendale Community College	1
Grand Valley State University	1
Hampshire College	1
Hartford Community College	1
Harvey Mudd College	1
Hennepin Technical College	1
Herzing College	1
Iowa State University	1
John Tyler Community College	1

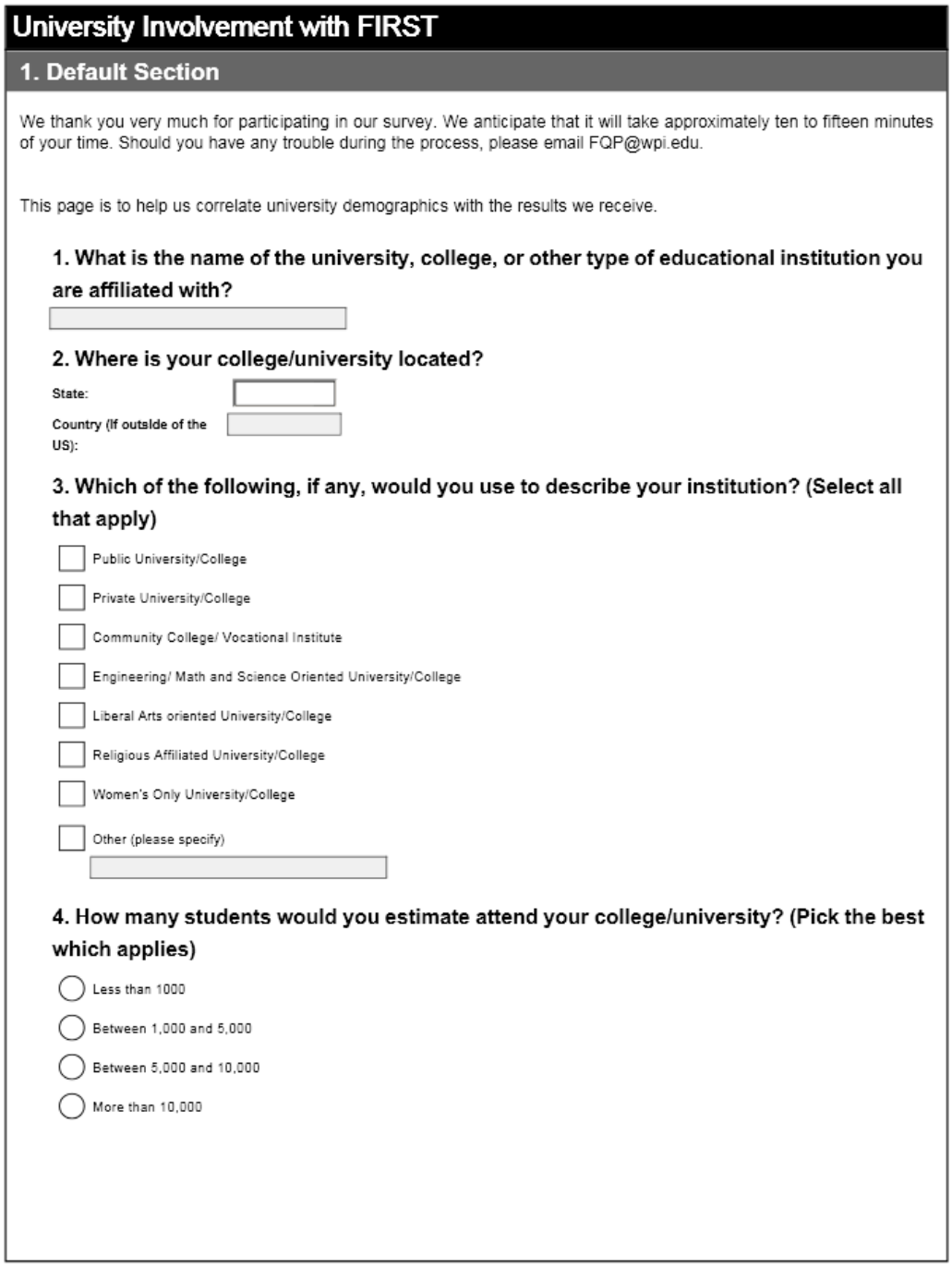
Johnson & Wales University	1
Kansas State University	1
Lake Michigan College	1
Lake Superior State University	1
LaSalle Academy	1
Lawrence Technological University	1
Lindenwood University	1
Manhattan College of Engineering	1
Marquette University	1
Metropolitan Community College	1
Miami University	1
Michigan State University	1
Michigan Technological University	1
Milwaukee Area Technical College	1
Milwaukee School of Engineering	1
Minnesota West Community and Technical College	1
Miramar College	1
Mississippi State University	1
Missouri University of Science and Tech	1
Mohave Community College	1
Molloy College	1
Morgan State University	1
NCSU College of Engineering	1
New England Institute of Technology	1
New Hampshire Technical Institute	1
New Mexico State University	1
New School	1
New York City College of Technology	1
NJ Institute of Technology	1
Northwestern University	1
Notre Dame	1
Oklahoma State University	1
Oregon Institute of Technology	1
Oregon State University	1
Patrick Henry Community College	1
Pave University (Prinston)	1
Pennsylvania College of Technology	1
Plymouth State University	1
Portland Community College	1
Ranken Technical College	1
Saint Vincent College	1
San Antonio College	1
San bernadino Valley College	1

San Jose City College	1
San Jose State University	1
Schoolcraft College	1
Seattle Pacific University	1
Sierra College	1
Southern Illinois University	1
Southwest Research Institute	1
Spring Arbor University	1
Springfield Technical Community College	1
St. Louis Community College	1
Stevens Institute of Technology	1
Temple University	1
Tennessee State University	1
Tennessee Technological University	1
Texas A&M	1
Texas southmost College	1
Texas Tech University	1
UMASS Lowell	1
United States Naval Academy	1
University of Arizona	1
University of Arkansas	1
University of California	1
University of Cincinnati	1
University of Delaware	1
University of Maryland	1
University of Nebraska	1
University of New Orleans	1
University of Pittsburgh	1
University of Rochester	1
University of South Carolina	1
University of South Florida	1
University of Utah Department of Physics and Astronomy	1
University of Wisconsin-Madison	1
Vermont Technical College	1
Washington State University	1
Westewood College	1
William Paterson University	1
Ball State University	2
Boston University	2
Brown University	2
Capitol College	2
College of Southern Maryland	2
Drexel University	2

Eastern Michigan University	2
Hofstra University	2
Illinois Institute of Technology	2
James Madison University	2
Kettering University	2
Longwood University	2
Mississippi Gulf Coast Community College	2
MIT	2
Montana state University	2
Montclair State University	2
Norfolk State University	2
North Carolina A&T State University	2
Penn State	2
Stony Brook University	2
Thomas Nelson Community College	2
University of Denver	2
University of Hawaii	2
University of Houston	2
University of Illinois	2
University of Kansas	2
University of Missouri	2
University of Nevada	2
University of New Hampshire	2
University of Southern California	2
University of Southern Maine	2
University of Toronto	2
University of Waterloo	2
Wayne State University	2
California Polytechnic	3
Clarkson University	3
Georgia Tech	3
PACE	3
Quinsigamond Community College	3
Sweet Briar College	3
Triton Community College	3
University Detroit Mercy/University of Dertroit	3
University of Central Florida	3
University of Dayton	3
University of Texas	3
University of Tulsa	3
University of West Florida	3
Virginia Tech	3
Western New England College	3

Yale	3
California State University	4
Columbia	4
El Camino College	4
Norwich University David Crawford School of Engineering	4
Salem County CC	4
Tulane University	4
University of Hartford	4
University of Kentucky	4
University of Michigan	4
University of Minnesota	4
University of Pennsylvania	4
University of Washington	4
Virginia Commonwealth University	4
Washington University in St. Louis	4
Wentworth Institute of Technology	4
Northwest Vista College	5
Olin College of Engineering	5
Polytechnic University	5
Purdue	5
Rensselaer	5
The Ohio State University	5
Washtenaw Community College	5
Northeastern	6
RIT	6
WPI	6

11.9 The Survey



University Involvement with FIRST

1. Default Section

We thank you very much for participating in our survey. We anticipate that it will take approximately ten to fifteen minutes of your time. Should you have any trouble during the process, please email FQP@wpi.edu.

This page is to help us correlate university demographics with the results we receive.

1. What is the name of the university, college, or other type of educational institution you are affiliated with?

2. Where is your college/university located?

State:

Country (If outside of the US):

3. Which of the following, if any, would you use to describe your institution? (Select all that apply)

- [ ] Public University/College
- [ ] Private University/College
- [ ] Community College/ Vocational Institute
- [ ] Engineering/ Math and Science Oriented University/College
- [ ] Liberal Arts oriented University/College
- [ ] Religious Affiliated University/College
- [ ] Women's Only University/College
- [ ] Other (please specify)

4. How many students would you estimate attend your college/university? (Pick the best which applies)

- ◯ Less than 1000
- ◯ Between 1,000 and 5,000
- ◯ Between 5,000 and 10,000
- ◯ More than 10,000

University Involvement with FIRST

5. To the best of your knowledge, is your university affiated with For Inspiration and Recognition of Science and Technology (FIRST)?

- ◯ Yes
- ◯ No

2. For Those Without Affliation

This page is written specifically for universities are not currently involved or affiliated with FIRST.

1. Have you personally heard of FIRST before?

- ◯ Yes, I know all there is to know.
- ◯ Yes, I have heard about it a little.
- ◯ Yes, I have heard of the program.
- ◯ No, I have not.

2. FIRST's vision is "To transform our culture by creating a world where science and technology are celebrated and where young people dream of becoming science and technology leaders" as explained by Dean Kamen, the founder.

If you were provided with more information about the program and its impacts, would you consider adding a FIRST program to your university?

- ◯ Yes, definitely
- ◯ Yes
- ◯ Perhaps
- ◯ Probably not
- ◯ Definitely not

If you answered no, why not?

3. Are there any outreach programs focused on STEM which you university is currently affiliated with?

- ◯ Yes
- ◯ No

University Involvement with FIRST

4. What programs is your univeristy currently involved with?

- [ ] Project Lead the Way
- [ ] Best Robotics
- [ ] Savage Soccer
- [ ] Women in Industry
- [ ] Math Team
- [ ] Other (please specify)

5. What information do you believe would be most helpful in making your decision? (select all which apply)

- [ ] Statistical analyses and conclusions of why universities similar to yours are involved with FIRST
- [ ] Optimal methods and practices which your university could follow to become involved with FIRST
- [ ] Ways FIRST could work in concert with existing outreach programs at your university
- [ ] Information demonstrating the impact FIRST has on its students participants

Other (please specify)

3.

Information regarding FIRST's impact on its student participants already exists. Go to USFIRST.Org, and select "Impact" for more information.

1. Does your university consider a students' history with FIRST during the admissions process?

- ◯ Yes
- ◯ No

4. Three distinct domains

We believe that the motivation for universities falls under three specific categories: Engineering Education Promotion, Admissions (visibility, easy qualifying measure), and Community outreach. The following questions begin to classify your involvement and motivation.

University Involvement with FIRST

1. What do you believe motivates your university to support/participate in FIRST? Please rate each of the following based on low motivation (or none), medium motivation, or high motivation.

	1. Low	2. Medium	3. High
Raise awareness and respect for engineering, science and technology	◯	◯	◯
Raise awareness of your university/college's engineering program internally (on campus)	◯	◯	◯
Raise awareness of your university/college's engineering program externally (off campus)	◯	◯	◯
Attract students who participated in FIRST to apply to your institution	◯	◯	◯
Community contribution/outreach to surrounding area	◯	◯	◯
Public relations with surrounding area	◯	◯	◯
Attract funding from outside providers (alumni, state and federal grants, etc)	◯	◯	◯

Other high rank (please specify)

2. To your knowledge how many years has your institution been involved with FIRST?

- ◯ 0-2 years
- ◯ 3-4 years
- ◯ 5-6 years
- ◯ 7-8 years
- ◯ 9-12 years
- ◯ More than 12 years

3. In your opinion, how would you describe the trends of involvement of your university in FIRST in the past 5 years? Pick which best applies

- ◯ Slowly increasing involvement
- ◯ Moderately increasing involvement
- ◯ Slowly decreasing involvement
- ◯ Moderately decreasing involvement
- ◯ Volatile Involvement levels
- ◯ No noticeable changes

University Involvement with FIRST

4. How many years have you personally been involved with FIRST, whether as a faculty advisor, competition coordinator, source of funding, or other type of FIRST affiliate not mentioned?

- ◯ 1-2 years
- ◯ 3-4 years
- ◯ 5-6 years
- ◯ 7-8 years
- ◯ 9-12 years
- ◯ More than 12 years

5. Does the affiliation with FIRST change your opinion of the institution you work for?

- ◯ Yes
- ◯ No

5.

1. Would you describe this change of opinion as positive or negative?

- ◯ Positive
- ◯ Negative

2. Would you be more interested, less interested, or indifferent working for a university or institution which supports FIRST?

- ◯ More interested
- ◯ Less interested
- ◯ Indifferent

6.

These questions continue to classify your level of involvement.

University Involvement with FIRST

1. How much would you estimate your university donates to FIRST in terms of the following categories per year?

	$1 to $5000	$5001- $10,000	$10,001-$15,000	Above $15,000	No Funding
Monetary support	◯	◯	◯	◯	◯
Materials	◯	◯	◯	◯	◯
Professional Labor Hours	◯	◯	◯	◯	◯
Workspace/ Operating Costs	◯	◯	◯	◯	◯
Transportation	◯	◯	◯	◯	◯
Refreshments	◯	◯	◯	◯	◯
Other	◯	◯	◯	◯	◯

Other (please specify)

2. How many teams does your college/university support?

- ◯ 1-2
- ◯ 3-4
- ◯ 5-6
- ◯ More than 6
- ◯ None

7.

1. Do students at your university provide support for the FIRST programs affiliated with the institution?

- ◯ Yes
- ◯ No

8.

University Involvement with FIRST

1. How long, on average, have the students participating in FIRST at your university been involved in FIRST by any means? (estimate, and pick the best that applies)

- ◯ 1 year
- ◯ 2 years
- ◯ 3 years
- ◯ 4 years
- ◯ 5+ years

2. What type of support do these students provide? (please select all that apply)

- ☐ Mentorship
- ☐ Volunteering for competitions
- ☐ Providing outreach to area schools
- ☐ Teaching Educational Workshops
- ☐ Other (please specify)

3. Why do you believe your students are most compelled to participate in FIRST as college students? (please select the best answer)

- ◯ FIRST is a required part of a class
- ◯ Students find the activity fun
- ◯ Volunteer hours requirement
- ◯ Students are compensated financially
- ◯ Previous experience in FIRST
- ◯ Other (please specify)

4. Is there any program within your university to encourage your students to participate?

- ◯ Yes
- ◯ No

9.

University Involvement with FIRST

1. What incentives are given to encourage this participation?

- [ ] Extra credit for a specific course
- [ ] Volunteer hours credit- IE workstudy requirements
- [ ] Degree requirement for Graduation
- [ ] Monitary Compensation
- [ ] Other (please specify)

2. Do you currently host FIRST competitions (of any FIRST variety) at your college/university?

- ◯ Yes
- ◯ No

10.

1. Which organizations of FIRST do you host competitions for?

- [ ] FRC
- [ ] FTC
- [ ] FLL
- [ ] Jr.FLL

2. How often does your institution host a competition?

- ◯ Every two years
- ◯ Once a year
- ◯ Twice a year
- ◯ More than twice a year

University Involvement with FIRST

3. How many teams on average sign up for your competition(s)?
(for answers that would be on a border, select the lower valued option, i.e. for 20 teams, select the first choice)

- ◯ 10-20
- ◯ 20-30
- ◯ 30-40
- ◯ 40-50
- ◯ 50-60

4. How many teams are admitted to the competition?

- ◯ 10-20
- ◯ 20-30
- ◯ 30-40
- ◯ 40-50
- ◯ 50-60

5. How much do you typically budget for a competition?

- ◯ 50,000 or under
- ◯ 50,001 to 100,000
- ◯ 100,001 to 200,000
- ◯ 200,001 to 300,000
- ◯ More than 300,000

6. Which regions are typically represented at your competitions?

- ☐ Northeast (ME, NH, VT, MA, CT, RI)
- ☐ Mid Atlantic (NY, PA, DE, DC, MD, NJ)
- ☐ South (AL, FL, GA, KY, LA, MS, NC, SC, TN, VA)
- ☐ Midwest (IL, IN, IA, KS, MI,MN, MO, NE, ND, OH, SD, WV, WI)
- ☐ West(AK, AZ, CA, CO, HI, ID, MT, NV, OR, UT, WA, WY)
- ☐ Southwest (AK, AR, NM, OK, TX)
- ☐ International

11. Admissions

University Involvement with FIRST

1. Does your university consider previous involvement in FIRST during the admissions process?

- ◯ Yes
- ◯ No

2. What percentage of your student body has had some level of involvement with FIRST?

- ◯ 0-1%
- ◯ 2-4%
- ◯ 5-7%
- ◯ 7-9%
- ◯ 9%+

3. Does your college give scholarships to students who have been involved with FIRST?

- ◯ Yes
- ◯ No

12.

1. What is the highest scholarship amount that your school awards to a FIRST participant per year? Please only include the amount included in the FIRST scholarship and disregard financial aid contributions and other forms of merit aid.

- ◯ $100-$2,500
- ◯ $2,501-$5,000
- ◯ $5,000-$10,000
- ◯ $10,001-$20,000
- ◯ $20,001-$40,000

More than $40,000 (please specify)

2. Is the scholarship:

	Yes	No
Renewable?	◯	◯
Given for 2 years?	◯	◯
Given for 4 years?	◯	◯

University Involvement with FIRST

13. End

1. Thank you for your participation in this survey. Do you permit us to publish your university/college's name in our results?

- ◯ Yes
- ◯ No

If yes, please digitally sign your name

2. Would you like to receive a link to our published results when they become available?

- ◯ Yes
- ◯ No

11.10 The Raw Data

Below is the raw survey data as taken from Survey Monkey in the report titled “Summary Report.” This shows the number of responses for each question and types of responses.

University Involvement with FIRST

SurveyMonkey

1. What is the name of the university, college, or other type of educational institution you are affiliated with?

	Response Count
	93
answered question	93
skipped question	1

2. Where is your college/university located?

		Response Percent	Response Count
State:		100.0%	93
Country (if outside of the US):		6.5%	6
answered question			93
skipped question			1

3. Which of the following, if any, would you use to describe your institution? (Select all that apply)		
	Response Percent	Response Count
Public University/College	**52.7%**	**49**
Private University/College	39.8%	37
Community College/ Vocational Institute	5.4%	5
Engineering/ Math and Science Oriented University/College	19.4%	18
Liberal Arts oriented University/College	5.4%	5
Religious Affiliated University/College	1.1%	1
Women's Only University/College	0.0%	0
Other (please specify)	3.2%	3
	answered question	**93**
	skipped question	**1**

4. How many students would you estimate attend your college/university? (Pick the best which applies)		
	Response Percent	Response Count
Less than 1000	7.5%	7
Between 1,000 and 5,000	21.5%	20
Between 5,000 and 10,000	11.8%	11
More than 10,000	**59.1%**	**55**
	answered question	**93**
	skipped question	**1**

5. To the best of your knowledge, is your university affiated with For Inspiration and Recognition of Science and Technology (FIRST)?

	Response Percent	Response Count
Yes	**79.1%**	**72**
No	20.9%	19
	answered question	**91**
	skipped question	**3**

6. Have you personally heard of FIRST before?

	Response Percent	Response Count
Yes, I know all there is to know.	**47.1%**	**8**
Yes, I have heard about it a little.	23.5%	4
Yes, I have heard of the program.	23.5%	4
No, I have not.	5.9%	1
	answered question	**17**
	skipped question	**77**

7. FIRST's vision is "To transform our culture by creating a world where science and technology are celebrated and where young people dream of becoming science and technology leaders" as explained by Dean Kamen, the founder. If you were provided with more information about the program and its impacts, would you consider adding a FIRST program to your university?

	Response Percent	Response Count
Yes, definitely	13.3%	2
Yes	13.3%	2
Perhaps	**40.0%**	**6**
Probably not	33.3%	5
Definitely not	0.0%	0
	If you answered no, why not?	10
	answered question	**15**
	skipped question	**79**

8. Are there any outreach programs focused on STEM which you university is currently affiliated with?

	Response Percent	Response Count
Yes	**86.7%**	**13**
No	13.3%	2
	answered question	**15**
	skipped question	**79**

9. What programs is your univeristy currently involved with?			
		Response Percent	Response Count
Project Lead the Way		5.9%	1
Best Robotics		0.0%	0
Savage Soccer		0.0%	0
Women in Industry		0.0%	0
Math Team		5.9%	1
Other (please specify)		**100.0%**	**17**
		answered question	**17**
		skipped question	**77**

10. What information do you believe would be most helpful in making your decision? (select all which apply)

	Response Percent	Response Count
Statistical analyses and conclusions of why universities similar to yours are involved with FIRST	25.0%	3
Optimal methods and practices which your university could follow to become involved with FIRST	25.0%	3
Ways FIRST could work in concert with existing outreach programs at your university	**66.7%**	**8**
Information demonstrating the impact FIRST has on its students participants	41.7%	5
Other (please specify)		6
answered question		**12**
skipped question		**82**

11. Does your university consider a students' history with FIRST during the admissions process?

	Response Percent	Response Count
Yes	**100.0%**	**2**
No	0.0%	0
answered question		**2**
skipped question		**92**

12. What do you believe motivates your university to support/participate in FIRST? Please rate each of the following based on low motivation (or none), medium motivation, or high motivation.

	1. Low	2. Medium	3. High	Rating Average	Response Count
Raise awareness and respect for engineering, science and technology	7.1% (5)	21.4% (15)	**71.4% (50)**	1.64	70
Raise awareness of your university/college's engineering program internally (on campus)	**48.6% (34)**	27.1% (19)	24.3% (17)	0.76	70
Raise awareness of your university/college's engineering program externally (off campus)	10.0% (7)	27.1% (19)	**62.9% (44)**	1.53	70
Attract students who participated in FIRST to apply to your institution	11.4% (8)	30.0% (21)	**58.6% (41)**	1.47	70
Community contribution/outreach to surrounding area	12.9% (9)	31.4% (22)	**55.7% (39)**	1.43	70
Public relations with surrounding area	18.8% (13)	39.1% (27)	**42.0% (29)**	1.23	69
Attract funding from outside providers (alumni, state and federal grants, etc)	**55.2% (37)**	26.9% (18)	17.9% (12)	0.63	67
			Other high rank (please specify)		4
				answered question	**70**
				skipped question	**24**

13. To your knowledge how many years has your institution been involved with FIRST?		
	Response Percent	Response Count
0-2 years	11.4%	8
3-4 years	**27.1%**	**19**
5-6 years	12.9%	9
7-8 years	21.4%	15
9-12 years	14.3%	10
More than 12 years	12.9%	9
	answered question	**70**
	skipped question	**24**

14. In your opinion, how would you describe the trends of involvement of your university in FIRST in the past 5 years? Pick which best applies		
	Response Percent	Response Count
Slowly increasing involvement	23.9%	17
Moderately increasing involvement	**40.8%**	**29**
Slowly decreasing involvement	5.6%	4
Moderately decreasing involvement	5.6%	4
Volatile Involvement levels	5.6%	4
No noticeable changes	18.3%	13
	answered question	**71**
	skipped question	**23**

15. How many years have you personally been involved with FIRST, whether as a faculty advisor, competition coordinator, source of funding, or other type of FIRST affiliate not mentioned?

	Response Percent	Response Count
1-2 years	20.6%	14
3-4 years	19.1%	13
5-6 years	**23.5%**	**16**
7-8 years	14.7%	10
9-12 years	17.6%	12
More than 12 years	4.4%	3
	answered question	**68**
	skipped question	**26**

16. Does the affiliation with FIRST change your opinion of the institution you work for?

	Response Percent	Response Count
Yes	28.6%	20
No	**71.4%**	**50**
	answered question	**70**
	skipped question	**24**

17. Would you describe this change of opinion as positive or negative?		
	Response Percent	Response Count
Positive	**90.0%**	**18**
Negative	10.0%	2
	answered question	**20**
	skipped question	**74**

18. Would you be more interested, less interested, or indifferent working for a university or institution which supports FIRST?		
	Response Percent	Response Count
More interested	**85.0%**	**17**
Less interested	10.0%	2
Indifferent	5.0%	1
	answered question	**20**
	skipped question	**74**

19. How much would you estimate your university donates to FIRST in terms of the following categories per year?

	$1 to $5000	$5001-$10,000	$10,001-$15,000	Above $15,000	No Funding	Rating Average	Response Count
Monetary support	**47.4% (9)**	5.3% (1)	5.3% (1)	10.5% (2)	31.6% (6)	1.69	19
Materials	**55.6% (10)**	16.7% (3)	0.0% (0)	0.0% (0)	27.8% (5)	1.23	18
Professional Labor Hours	**33.3% (6)**	16.7% (3)	16.7% (3)	11.1% (2)	22.2% (4)	2.07	18
Workspace/ Operating Costs	**38.9% (7)**	11.1% (2)	16.7% (3)	5.6% (1)	27.8% (5)	1.85	18
Transportation	35.3% (6)	0.0% (0)	0.0% (0)	0.0% (0)	**64.7% (11)**	1.00	17
Refreshments	41.2% (7)	0.0% (0)	0.0% (0)	0.0% (0)	**58.8% (10)**	1.00	17
Other	28.6% (4)	7.1% (1)	0.0% (0)	14.3% (2)	**50.0% (7)**	2.00	14
						Other (please specify)	5
						answered question	**19**
						skipped question	**75**

20. How many teams does your college/university support?

	Response Percent	Response Count
1-2	**42.0%**	**29**
3-4	5.8%	4
5-6	2.9%	2
More than 6	18.8%	13
None	30.4%	21
	answered question	**69**
	skipped question	**25**

21. Do students at your university provide support for the FIRST programs affiliated with the institution?		
	Response Percent	Response Count
Yes	**93.9%**	**46**
No	6.1%	3
	answered question	**49**
	skipped question	**45**

22. How long, on average, have the students participating in FIRST at your university been involved in FIRST by any means? (estimate, and pick the best that applies)		
	Response Percent	Response Count
1 year	15.9%	7
2 years	**25.0%**	**11**
3 years	18.2%	8
4 years	22.7%	10
5+ years	18.2%	8
	answered question	**44**
	skipped question	**50**

23. What type of support do these students provide? (please select all that apply)

	Response Percent	Response Count
Mentorship	**81.4%**	**35**
Volunteering for competitions	65.1%	28
Providing outreach to area schools	62.8%	27
Teaching Educational Workshops	39.5%	17
Other (please specify)	16.3%	7
	answered question	**43**
	skipped question	**51**

24. Why do you believe your students are most compelled to participate in FIRST as college students? (please select the best answer)

	Response Percent	Response Count
FIRST is a required part of a class	2.3%	1
Students find the activity fun	**43.2%**	**19**
Volunteer hours requirement	2.3%	1
Students are compensated financially	2.3%	1
Previous experience in FIRST	40.9%	18
Other (please specify)	9.1%	4
	answered question	**44**
	skipped question	**50**

25. Is there any program within your university to encourage your students to participate?		
	Response Percent	Response Count
Yes	**55.8%**	**24**
No	44.2%	19
	answered question	**43**
	skipped question	**51**

26. What incentives are given to encourage this participation?		
	Response Percent	Response Count
Extra credit for a specific course	23.8%	5
Volunteer hours credit- IE workstudy requirements	14.3%	3
Degree requirement for Graduation	9.5%	2
Monitary Compensation	33.3%	7
Other (please specify)	**52.4%**	**11**
	answered question	**21**
	skipped question	**73**

27. Do you currently host FIRST competitions (of any FIRST variety) at your college/university?		
	Response Percent	Response Count
Yes	**56.9%**	**37**
No	43.1%	28
	answered question	**65**
	skipped question	**29**

30. How many teams on average sign up for your competition(s)? (for answers that would be on a border, select the lower valued option, i.e. for 20 teams, select the first choice)

	Response Percent	Response Count
10-20	25.7%	9
20-30	11.4%	4
30-40	11.4%	4
40-50	17.1%	6
50-60	**34.3%**	**12**
	answered question	**35**
	skipped question	**59**

31. How many teams are admitted to the competition?

	Response Percent	Response Count
10-20	**25.7%**	**9**
20-30	11.4%	4
30-40	20.0%	7
40-50	17.1%	6
50-60	**25.7%**	**9**
	answered question	**35**
	skipped question	**59**

28. Which organizations of FIRST do you host competitions for?		
	Response Percent	Response Count
FRC	51.4%	18
FTC	25.7%	9
FLL	**57.1%**	**20**
Jr.FLL	20.0%	7
	answered question	**35**
	skipped question	**59**

29. How often does your institution host a competition?		
	Response Percent	Response Count
Every two years	5.4%	2
Once a year	**75.7%**	**28**
Twice a year	13.5%	5
More than twice a year	5.4%	2
	answered question	**37**
	skipped question	**57**

32. How much do you typically budget for a competition?

	Response Percent	Response Count
50,000 or under	**83.9%**	**26**
50,001 to 100,000	6.5%	2
100,001 to 200,000	6.5%	2
200,001 to 300,000	0.0%	0
More than 300,000	3.2%	1
	answered question	**31**
	skipped question	**63**

33. Which regions are typically represented at your competitions?

	Response Percent	Response Count
Northeast (ME, NH, VT, MA, CT, RI)	27.0%	10
Mid Atlantic (NY, PA, DE, DC, MD, NJ)	13.5%	5
South (AL, FL, GA, KY, LA, MS, NC, SC, TN, VA)	24.3%	9
Midwest (IL, IN, IA, KS, MI,MN, MO, NE, ND, OH, SD, WV, WI)	**29.7%**	**11**
West(AK, AZ, CA, CO, HI, ID, MT, NV, OR, UT, WA, WY)	5.4%	2
Southwest (AK, AR, NM, OK, TX)	5.4%	2
International	0.0%	0
	answered question	**37**
	skipped question	**57**

34. Does your university consider previous involvement in FIRST during the admissions process?

	Response Percent	Response Count
Yes	38.2%	29
No	**61.8%**	**47**
	answered question	**76**
	skipped question	**18**

35. What percentage of your student body has had some level of involvement with FIRST?

	Response Percent	Response Count
0-1%	**56.9%**	**37**
2-4%	24.6%	16
5-7%	12.3%	8
7-9%	3.1%	2
9%+	3.1%	2
	answered question	**65**
	skipped question	**29**

36. Does your college give scholarships to students who have been involved with FIRST?

	Response Percent	Response Count
Yes	**57.7%**	**45**
No	42.3%	33
	answered question	**78**
	skipped question	**16**

37. What is the highest scholarship amount that your school awards to a FIRST participant per year? Please only include the amount included in the FIRST scholarship and disregard financial aid contributions and other forms of merit aid.

	Response Percent	Response Count
$100-$2,500	**36.7%**	**18**
$2,501-$5,000	22.4%	11
$5,000-$10,000	26.5%	13
$10,001-$20,000	4.1%	2
$20,001-$40,000	10.2%	5
More than $40,000 (please specify)		6
answered question		**49**
skipped question		**45**

38. Is the scholarship:

	Yes	No	Rating Average	Response Count
Renewable?	**65.9% (27)**	34.1% (14)	1.34	41
Given for 2 years?	23.1% (6)	**76.9% (20)**	1.77	26
Given for 4 years?	**67.6% (25)**	32.4% (12)	1.32	37
answered question				**46**
skipped question				**48**

39. Thank you for your participation in this survey. Do you permit us to publish your university/college's name in our results?		
	Response Percent	Response Count
Yes	47.0%	39
No	**53.0%**	**44**
	If yes, please digitally sign your name	27
	answered question	**83**
	skipped question	**11**

40. Would you like to receive a link to our published results when they become available?		
	Response Percent	Response Count
Yes	**80.5%**	**66**
No	19.5%	16
	answered question	**82**
	skipped question	**12**