

**CyberPatriot Season VII
Local Evaluation Update
Spring 2015**

Submitted to

Beyond the Bell Branch

Los Angeles Unified School District

By

Stephen Price, Ed.D.

Lisa Vang



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Executive Summary

Established in August of 2011, Beyond the Bell's (BTB) CyberPatriot program prepares students in grades 7-12 for the Air Force Association's National High School Cyber Defense Competition. The competition is entirely online and challenges student teams across the United States to find and remove vulnerabilities from computer operating systems and networks. Teams are organized into ROTC and Open categories, with a demonstration bracket for a small number of middle school teams. In competition, CyberPatriot teams must also remove spyware and malware, just as a network administration department would do for a business or government agency. Success depends on knowing the intricacies of Windows, Linux, and CISCO systems.

In the last four years, BTB has emerged as the most successful CyberPatriot program in the United States, placing more teams into the finals and garnering a national championship. BTB was named a 'Center of Excellence' by the Air Force Association in 2012 and received the Hoyt Vandenberg Award in 2015. BTB also has the distinction of placing the only two majority female teams ever to compete in the Open Division national finals.

"Standing on a stage in Washington D.C. was a turning point for me. I realized I am good at cybersecurity, and that it is a non-programming job in computers that pays very well."

*- CyberPatriot Participant
North Hollywood High School*

Participants in the BTB CyberPatriot programs receive training, mentorship, and internship opportunities from industry and academic partners. Lead corporate partners are Aerospace Corporation, CISCO, Dun and Bradstreet Credibility (a major financial contributor), JPL, Northrop Grumman, and Space X. Engineers from Los Angeles Unified's Information Technology Department provide technology support and are critical in helping BTB teams master networking. BTB also engages CyberPatriot alumni who return from college to their schools and teach a new generation the fundamentals of security, and how to prepare for the CyberPatriot competition.

As BTB's primary academic partner, Cal Poly Pomona, provides a venue for training and local competitions. Cal Poly students coach BTB CyberPatriot teams as they progress toward competition. California State University, Northridge and West Los Angeles Community College also provide training and support for BTB teams.

Following the 2014-15 competition season, BTB commissioned ERC to perform a student survey to determine if participation in the program leads to a career in a STEM field. Successful matriculation for students remains the priority of BTB's Take Action after school program, of

which the CyberPatriot program has become the signature technology training and career preparation program.

During April of 2015, a survey of BTB high school participants (n=49) in the CyberPatriot VII season showed:

- A 51.0% increase in the number of students who reported having a lot of knowledge or advanced understanding of cybersecurity principles (from 4.1% to 55.1%).
- A 36.7% increase in the percentage of students who are somewhat or very likely to pursue education or a career in cybersecurity (from 44.9% to 81.6%).
- A 34.7% increase in the percentage of students knowing a lot about cybersecurity career opportunities and how to pursue them (from 2.0% to 36.7%)
- A 22.5% increase in the percentage of students who are somewhat or very likely to pursue education or a career in a STEM field (from 57.1% to 79.6%).
- A 22.4% increase in the number of students who think that a career in cybersecurity is fairly or very accessible to women (from 53.1% to 75.5%).

More than 72% of participants found the CyberPatriot program to be pretty or very engaging, and more than 72% also found it to be fun, with 23.4% saying that CyberPatriot was the most fun of all the extra-curricular activities in which they had participated. The April 2015 survey replicated the Air Force Association's National Post-Competitor Survey and showed similar results.

Student focus groups conducted during the spring of 2015 confirmed that participation in CyberPatriot greatly improved participants' understanding of cybersecurity principles, understanding of the cybersecurity industry, and influenced a population of students with college-going aspirations to focus their higher education goals on preparing for computer-related STEM or cybersecurity careers.

The most common suggestions for improving the program were to establish a standard curriculum to be taught within all CyberPatriot programs, and that recognition is needed for placing in CyberPatriot competitions (medals, trophies, and assemblies) that is equivalent to that received by sports or academic decathlon participants at their school.

CyberPatriot VII Post-Season Competitor Survey

Survey Design

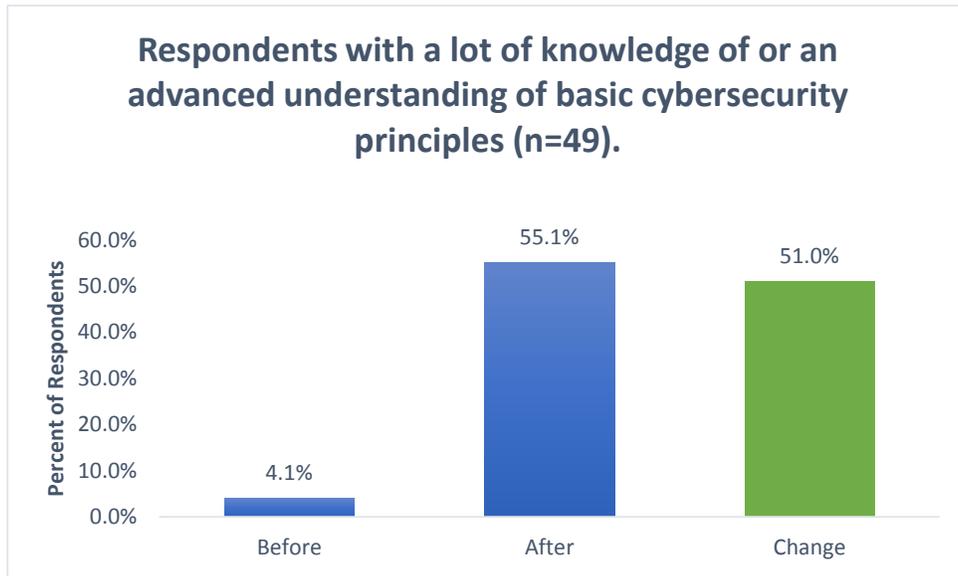
During April of 2015, student participants in the CyberPatriot VII season of competition were surveyed in seven areas:

- 1) Knowledge of cybersecurity principles
- 2) Knowledge of cybersecurity career opportunities
- 3) Likelihood of pursuing a STEM education or career
- 4) Likelihood of pursuing an education or career in cybersecurity
- 5) The degree to which they perceive females are welcomed into the cybersecurity career field
- 6) The degree to which they considered the CyberPatriot competition to be engaging
- 7) The degree to which they considered the CyberPatriot competition to be fun
- 8) Plans after high school

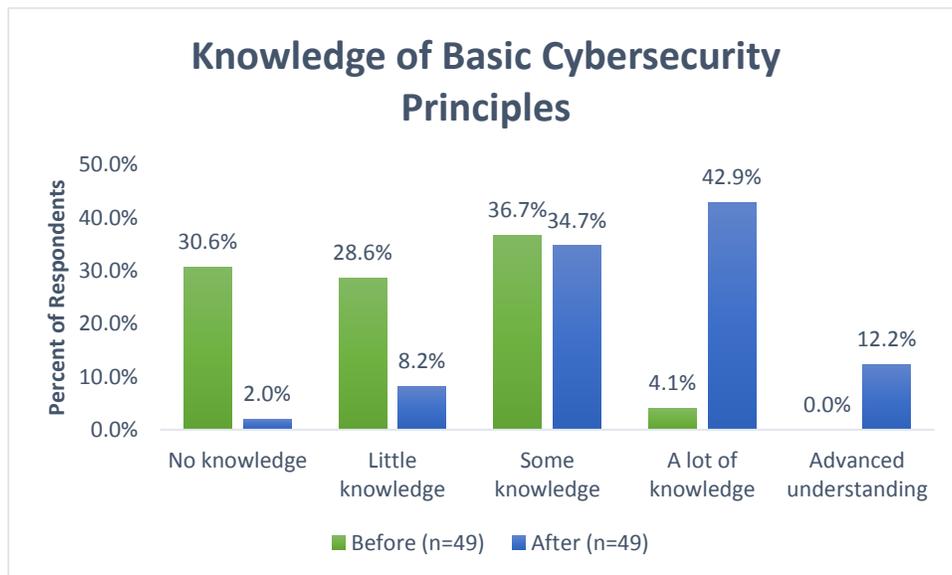
This survey was a retrospective survey, asking students to rate themselves on items before and after participation in the CyberPatriot season. A total of 49 students who participated in the CyberPatriot VII season completed the survey.

Knowledge of Cybersecurity Principles

Prior to the CyberPatriot program, few participants (4.1%) perceived themselves to have a lot of knowledge or an advanced understanding of basic cybersecurity principles. This percentage grew to 55.1% after competing in CyberPatriot, a 51% gain.

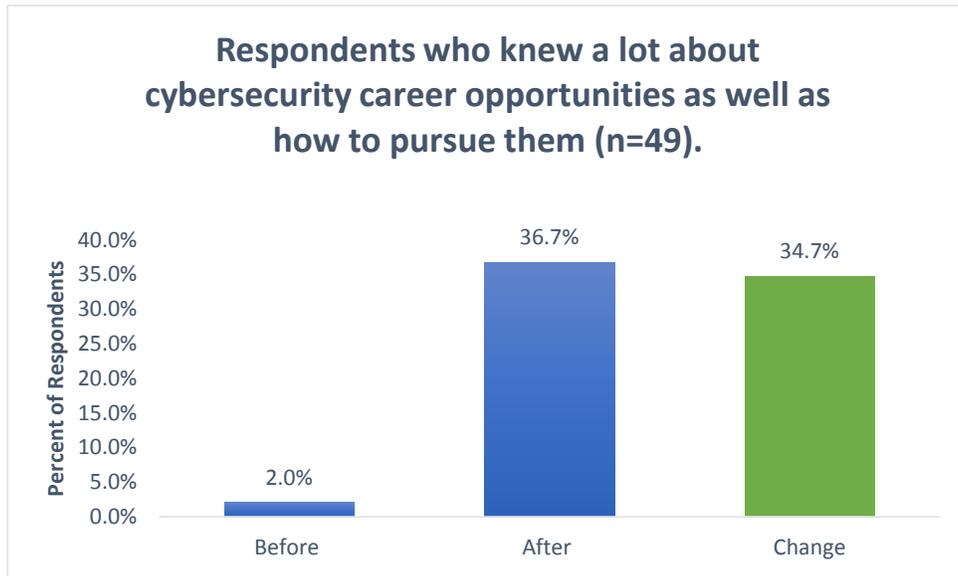


Specific percentages for each response on this item are shown in the bar graph below. Students were asked to rate their knowledge of basic cybersecurity principals both before and after the CyberPatriot season.

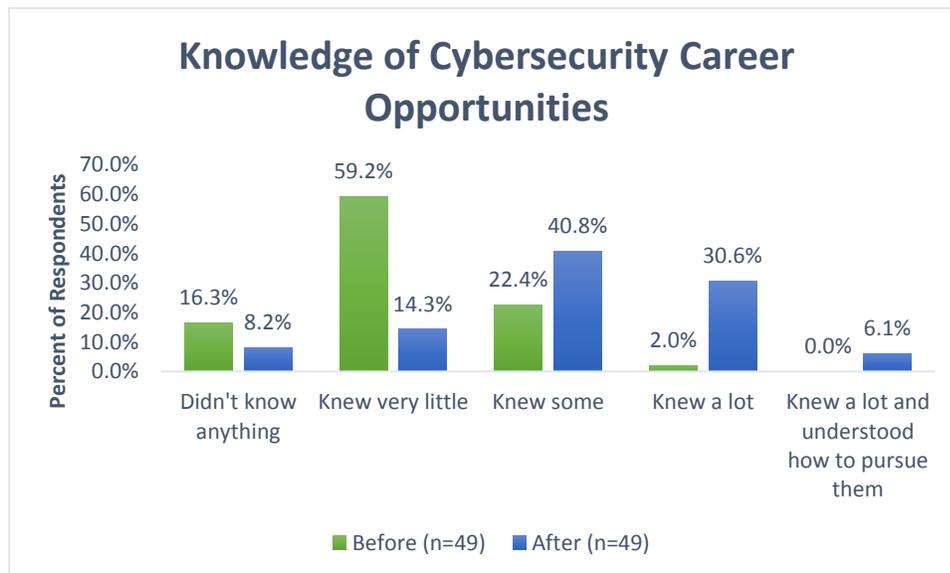


Knowledge of Cybersecurity Career Opportunities

Prior to the CyberPatriot program, few participants (2.0%) perceived themselves to know a lot about cybersecurity career opportunities or how to pursue them. This percentage grew to 36.7% after competing in CyberPatriot, a 34.7% gain.

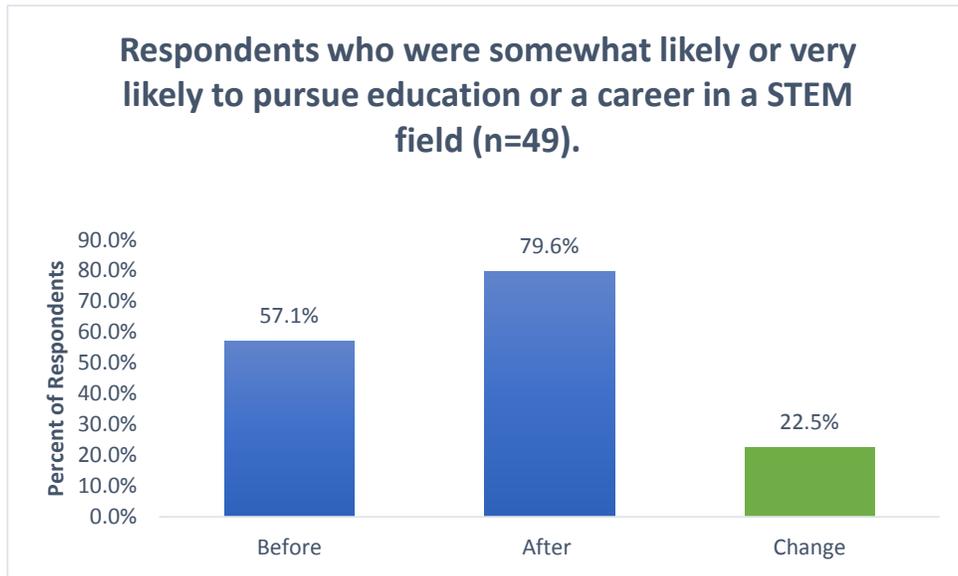


Specific percentages for each response on this item are shown in the bar graph below. Students were asked to rate their knowledge of cybersecurity career opportunities both before and after the CyberPatriot season.

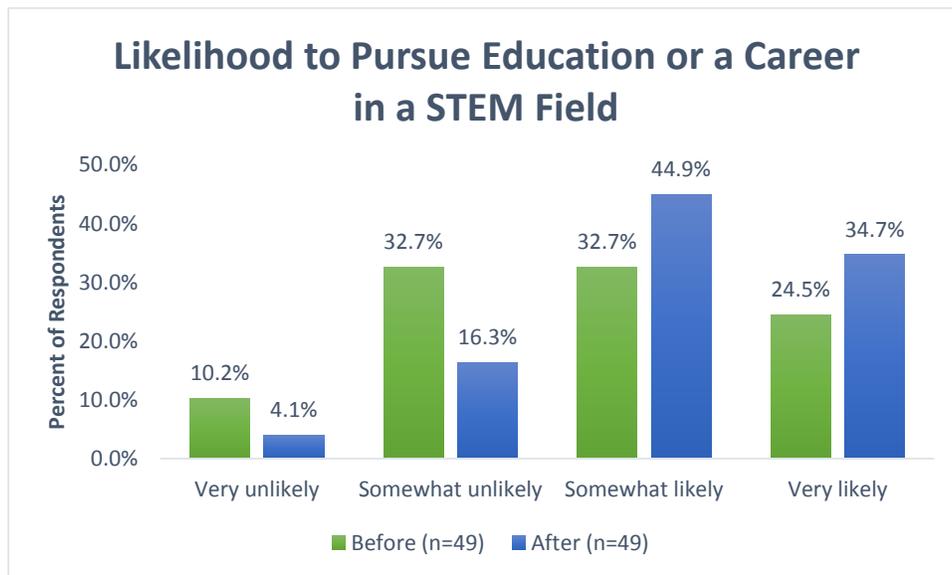


Likelihood of Pursuing a STEM Education or Career

Prior to the CyberPatriot program, 57.1% of participants perceived themselves as somewhat likely or very likely to pursue education or a career in a STEM field. This percentage grew to 79.6% after competing in CyberPatriot, a 22.5% gain.

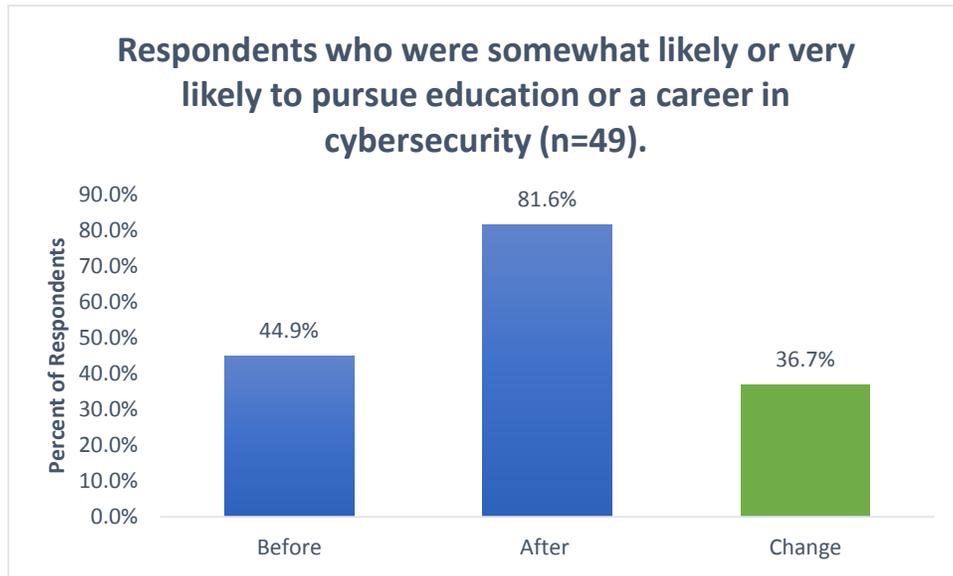


Specific percentages for each response on this item are shown in the bar graph below. Students were asked to rate their likelihood of pursuing a STEM education or career both before and after the CyberPatriot season.

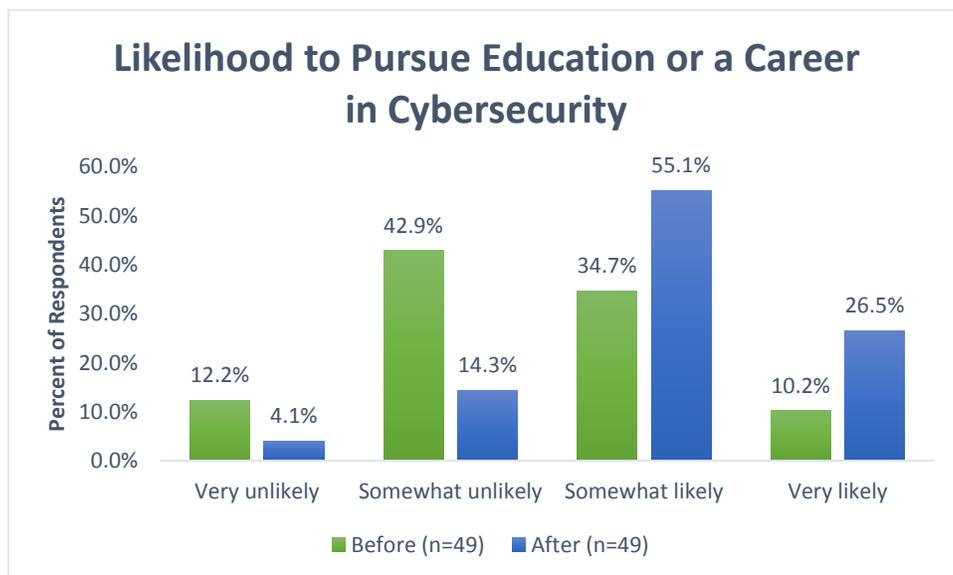


Likelihood of Pursuing an Education or Career in Cybersecurity

Prior to the CyberPatriot program, 44.9% of participants perceived themselves as somewhat likely or very likely to pursue education or a career in cybersecurity. This percentage grew to 81.6% after competing in CyberPatriot, a 36.7% gain.

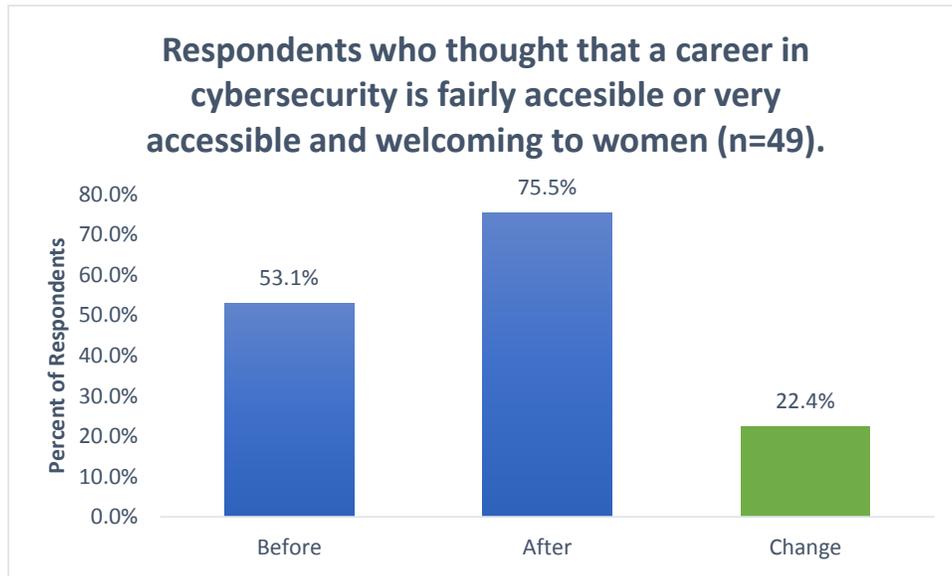


Specific percentages for each response on this item are shown in the bar graph below. Students were asked to rate their likelihood of pursuing an education or career in cybersecurity both before and after the CyberPatriot season.

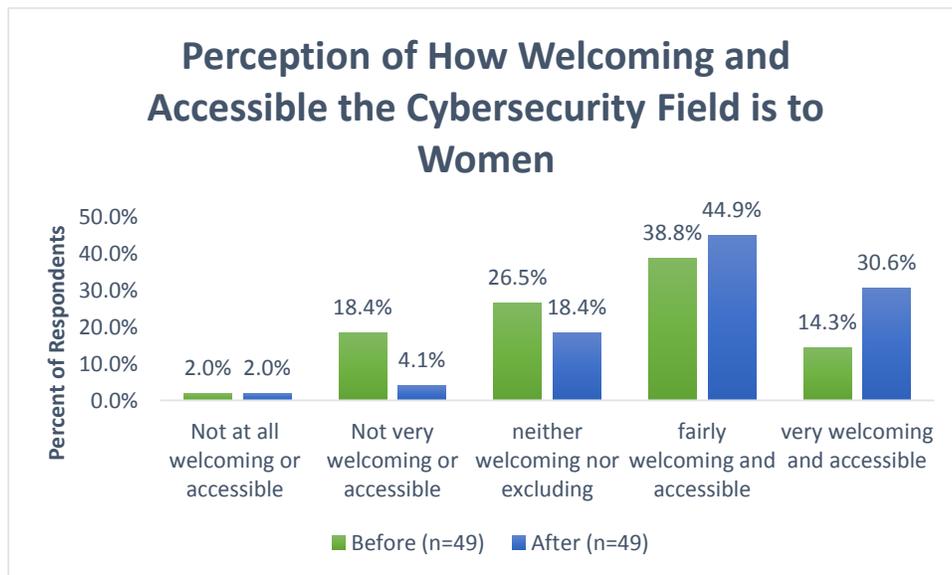


Perception of Cybersecurity Field Being Welcoming to Females

Prior to the CyberPatriot program, 53.1% of participants thought that a career in cybersecurity is very accessible and welcoming to women. This percentage grew to 75.5% after competing in CyberPatriot, a 22.4% gain.

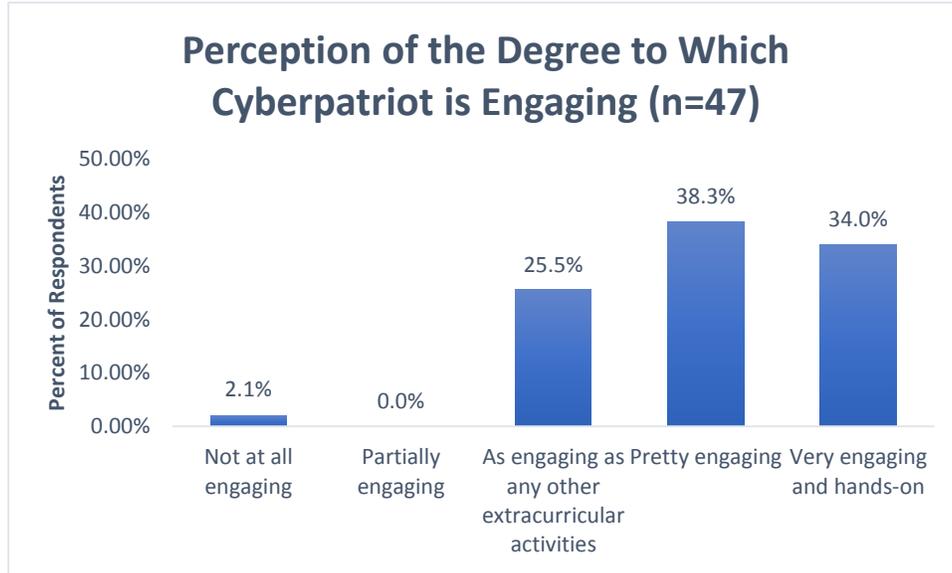


Specific percentages for each response on this item are shown in the bar graph below. Students were asked to rate their perceptions of the cybersecurity field as being welcoming to women both before and after the CyberPatriot season.



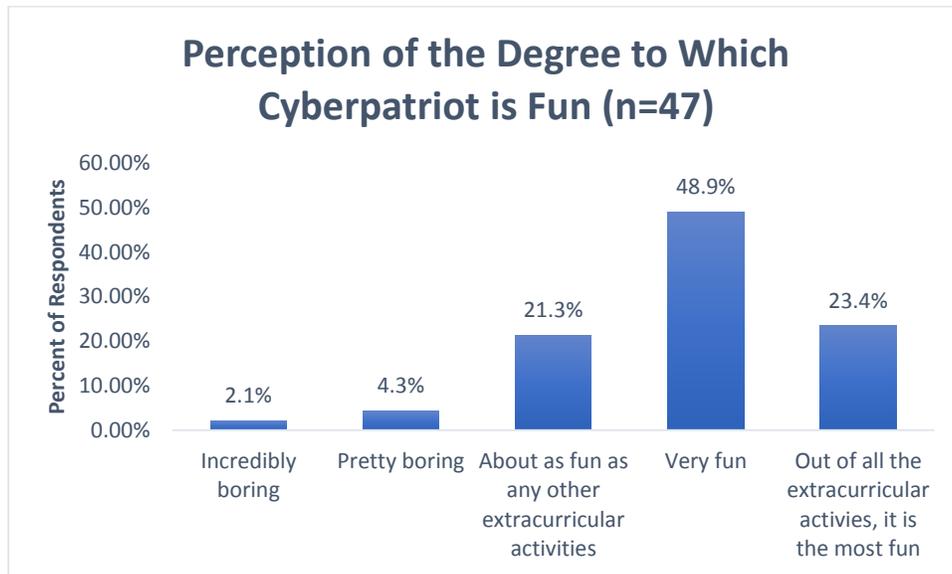
Perception of the Degree to Which CyberPatriot is Engaging

Students were asked if CyberPatriot was engaging, that is, if it is an activity that draws and keeps their attention. More than seventy-two percent (72.3%) of respondents said it was pretty engaging (38.3%) or very engaging (34.0%). Only 2.1% found it “not at all engaging.”



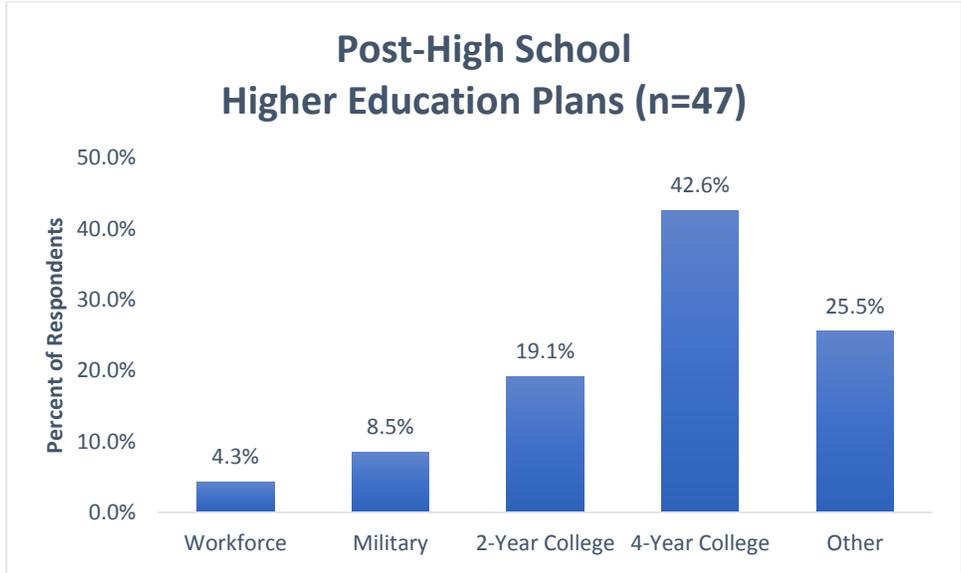
Perception of the Degree to Which CyberPatriot is Fun

Students were asked if CyberPatriot was enjoyable or fun. More than seventy-two percent (72.3%) of respondents said it was very fun (48.9%) or the most fun of all extra-curricular activities in which they had participated (23.4%). Only 2.1% found it “incredibly boring.”

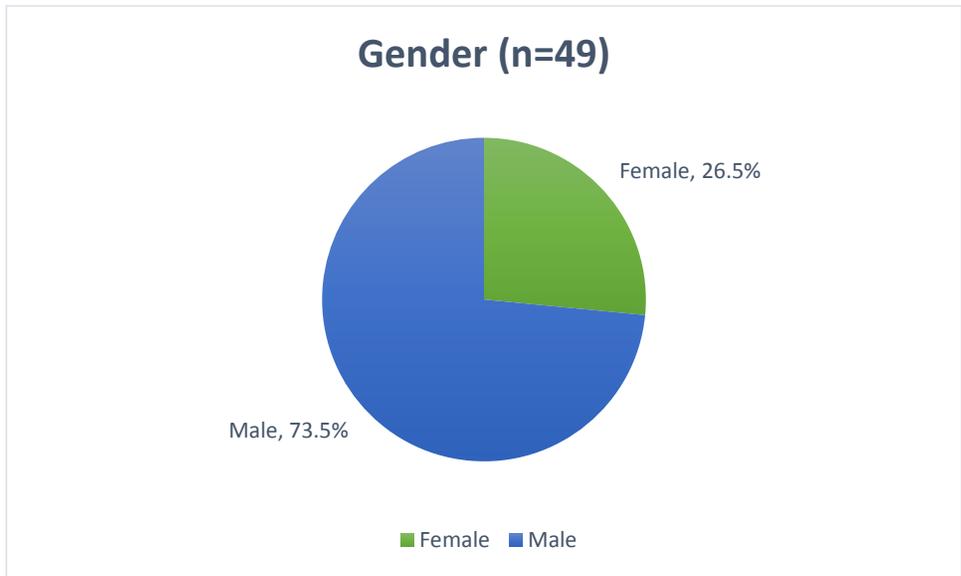


Plans After High School

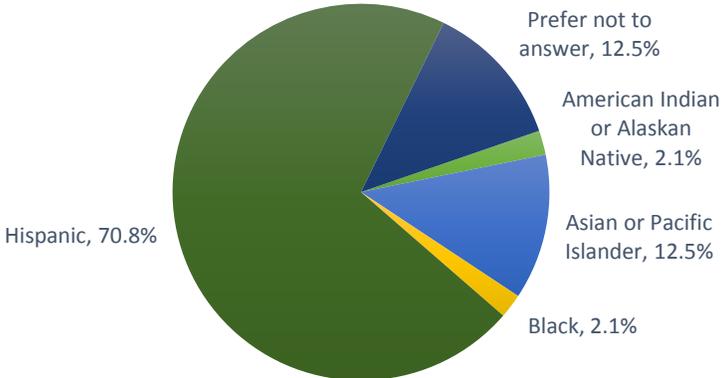
Students were asked to state their plans following high school. A majority (61.7%) had plans to attend college, with 42.6% planning to enroll in a 4-year degree program and 19.1% planning to enroll in a 2-year degree program. More than eight percent (8.5%) planned to join the military and 5.9% planned to enter the workforce.



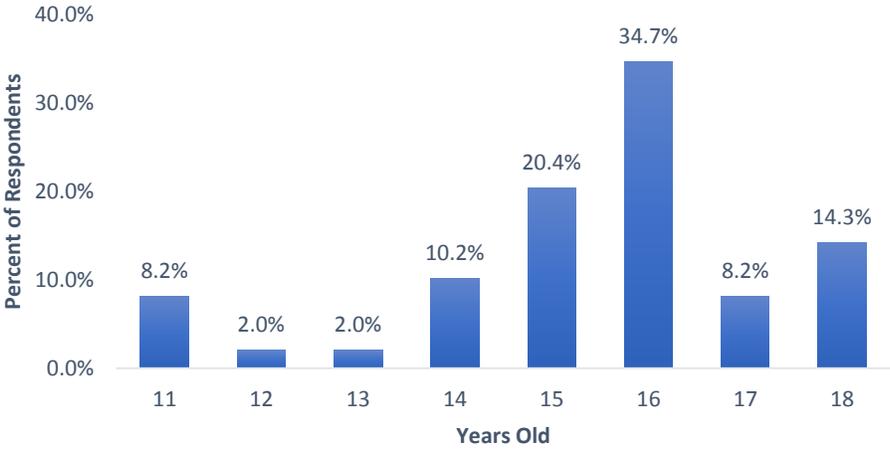
Respondent Characteristics



Ethnicity (n=48)



Age (n=49)



Beyond the Bell CyberPatriot Program

Introduction

During April and May of 2015, focus groups were conducted by ERC at six high schools with CyberPatriot programs in various stages of development. Three of the high schools are considered to have advanced level CyberPatriot programs: Franklin, North Hollywood, and Robert F. Kennedy. Two are considered to have intermediate level programs: Downtown Magnets and Huntington Park. One was considered to have a beginning level program: Canoga Park.

The purpose of conducting student focus groups was to determine how students were attracted to the program, the impact of the program on students' knowledge of cybersecurity principles, career opportunities in cybersecurity, college and career aspirations, and career preparation. Question topics also included gender equity, highlights of the program, and ways the program could be improved. A total of 23 students participated in the six focus groups, of which 13 were male and 10 were female.

Summary of Findings

Focus group summaries from individual schools are included in the report. Below is a summary of findings across schools, organized by topic.

1. How students first heard about the program

Students first heard about the CyberPatriot program in a variety of ways. The most common way students heard about the program was from other students such as classmates, friends, or siblings. The second most common way was from the coach, either by being recruited directly or listening to a classroom presentation. Other ways students heard about the program included P.A. announcements, school assemblies recognizing the CyberPatriot team, or by seeing an ad posted on campus.

2. What interested students the most or caused them to join

By far, the most common motivator for students to join the CyberPatriot program was an interest in learning more about computers. Many students initially joined to learn how to fix their own computer or protect their computer from viruses. Other common motivators for joining were an interest in cybersecurity, or to get involved in an extra-curricular or competitive activity related to computers. In many cases, a social factor played a role in attracting student interest, such as a peer on campus or the CyberPatriot coach sharing information about the program or influencing students to join.

3. Impact of the program on students' knowledge of cybersecurity principles

Very few students were familiar with cybersecurity principles prior to joining the program, except that passwords are needed for security, and that hacking and viruses pose a threat.

The depth of cybersecurity knowledge obtained in the program varied by program level. Students in advanced level programs more commonly reported in-depth learning which included using Linux, familiarity with multiple operating systems, how to set policies, add exceptions to firewalls, detect viruses and write scripts to kill viruses. Students on advanced level teams were more descriptive about what they had learned and reported learning a greater variety of topics related to cybersecurity.

Students in intermediate level programs were somewhat less likely to report these types of in-depth learning. Those who did also reported having entered the program with some cybersecurity background. For example, a student at Downtown Magnets had studied cyber defense and computer analytics on his own before entering the program said that he learned encryption protocols (AES and DES) in the program. Students in intermediate level programs did report learning how to set policies, protect against network attacks, viruses, and use Linux, and work with Cisco systems.

By contrast, students in the Canoga Park program (beginning level) reported less varied and more basic learning, such as how to make user accounts or take intruders out of the account.

4. Impact of the program on students' knowledge of cybersecurity careers

Most students entered the CyberPatriot program with limited knowledge of the cybersecurity industry. Those who knew that the field existed had vague notions of specific career opportunities. Others had misperceived a career in cybersecurity to be limited to fixing computer viruses part-time, or for an hourly wage, or to be "like working for the Geek Squad." Participation in the CyberPatriot program broadened students' understanding of the cybersecurity field, leading them to realize the vast number of career opportunities and that cybersecurity professionals are needed in nearly every industry, as well as the military. Many students learned about specific job positions within the cybersecurity field. Others learned about the job security and salary potential.

5. Impact of the program on college and career aspirations

In general, students entered the CyberPatriot program with aspirations to attend college. The program impacted the future plans of most students in the focus groups, usually in the selection of a college major or career goal. For students already interested in computer-related fields, participation in CyberPatriot helped them narrow their goals to a more specific major or field. Students who participated in the national competition were most influenced to pursue careers related to cybersecurity. One student said that standing on stage in Washington D.C. was a turning point for him. He said, "I realized that I am good at cybersecurity, and that it is a non-programming job related to computers that pays very well."

For other students, the program influenced them to consider a computer-related career for the first time, opening up a variety of new career possibilities. A few students realized the connections between cybersecurity and previously-selected career goals. For example, a student planning to major in criminology and pursue a career as a police detective saw how learning cybersecurity principles would help in this career. Another student interested in a career in social welfare, now plans to double major in social welfare and cybersecurity. Another student who was planning to pursue a career in biomechanical engineering to make artificial organs realized the connection between cybersecurity and security of pacemakers.

6. Career preparation

An emerging theme throughout the focus groups was that participation in CyberPatriot taught students skills in teamwork and collaboration that are applicable to most careers. Students interested in technology or cybersecurity benefitted from the opportunity to network with industry professionals from companies such as Aerospace, Cisco, and Northrop Grumman, with some receiving internships while still in high school.

7. Gender equity

The conversation around gender equity varied among the schools. Most students, male and female, agreed that the program is welcoming to females. At one school, the females said that how welcoming the program is to females depends upon the attitudes and behavior of the males participating. At another schools, the females said that if too many males join the program then females are discouraged from participating. However, at this school they have a female CyberPatriot coach and described the males as viewing females as equals, which helped create a female-friendly program.

Females at two schools said that it depends on the attitudes or perceptions of the females, and either directly stated or implied that if the females are not intimidated by computers or by the males in the group – then gender is not an issue.

One all-male focus group from an all-male team said that their team would welcome females but that females are by nature less interested in computer-related fields. They explained that there are only two females taking computer science at their school, and that CyberPatriot is mostly promoted in computer science classes.

The CyberGirlz competition was noted as encouraging female participation.

8. Students' favorite things about CyberPatriot

Responses included:

- Traveling to Washington D.C. for the first time.
- Being on a plane for the first time.
- Meeting “cool people” like Air Force generals.
- Building relationships with team members.
- Feelings of accomplishment after being chosen to compete at nationals,
- Competing in general.
- Learning from specialists in the industry.

9. How the program could be improved

Students from *advanced and intermediate level programs* suggested:

- A core curriculum could be created and taught within all CyberPatriot programs. Although students perceive the value of looking up information on their own, a more specific and detailed curriculum would save time since competitions last only six hours. Some students view the material taught at Cal Poly training events as “too basic.” In the words of one student, “we need a set of curriculum that covers more.”

Students who participated in *advanced level programs* (at Franklin, North Hollywood, and Robert F. Kennedy) suggested:

- More detailed feedback is needed at CyberPatriot competitions. Students would like to know specifically what they missed on an image as opposed to the broader more categorical feedback given.
- More recognition is needed for CyberPatriot competitions. Students would like to see more medals, trophies, or recognition at assemblies for teams that place well in competitions – equivalent to recognition received for sports or academic decathlon participants at their school. For example, the students at Franklin High School mentioned that they placed third in Los Angeles and sixth nationally but have no medals or trophies to show, and that more visible awards and recognition might encourage more students to join.
- More specialists more often to help teams prepare for competition at the school site.
- More opportunity for interaction with other teams from other schools to get to know each other and share ideas.

Students in an *intermediate level program* (Downtown Magnets) gave suggestions on how to make the competition at Cal Poly more fair:

- Test on security issues only (this team said they were tested on non-security issues they didn't know to prepare for).
- Make time limits clear (this team said they were still working while unaware the time limit was up).
- Don't reset a team's score two hours into a competition – this team said they had to start over because their hashtag got mixed up with another team.

Students in a *beginning level program* (Canoga Park) suggested more promotion of the program on campus.

Student Focus Groups

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CyberPatriot Focus Group - Spring 2015

Canoga Park High School

Number of students:	2
Number of males:	0
Number of females:	2
Ethnic distribution of the group:	Not recorded
CyberPatriot VII competition record:	Not recorded

Student Responses:

- 1. How did you first hear about the CyberPatriot Program?**
 - From a friend.
 - From a friend.
 - The coach (who tutored us) recruited us.
- 2. What interested you the most and/or caused you to join?**
 - The way the coach explained what the program was about. We wanted to learn about viruses and the coach is a good coach.
- 3. When you first entered the program, how much did you know about cybersecurity principles?**
 - Nothing.
- 4. How much did you learn about cybersecurity principles as a result of the program?**
What specifically did you learn?
 - We are just starting, just beginning.
 - How to make another user account.
 - How to take intruders out of the account.
- 5. Before joining the program, were you aware of career opportunities related to cybersecurity?**
 - No.

- 6. By participating in CyberPatriot, what, specifically, did you learn about career opportunities in cybersecurity?**
- The coach talked about careers working with police doing background checks on people.
 - Camera security and background checks.
 - People that help to get rid of viruses.
- 7. What do you plan on doing after graduating from high school? What are your goals for the future?**
- Going to college to study criminology. I want to be a detective. After community college I plan on going to UCLA.
 - Going to college to study pre-med. I am considering being a pediatrician. After college I will go to medical school.
- 8. What did you learn in CyberPatriot that might help you reach your future goals?**
- About keeping hackers out of computers.
 - How to prevent hackers and viruses.
- 9. Did participating in CyberPatriot influence your goals for the future? If so, how?**
- Yes, the security of computers relates to detective work.
 - Yes, makes me well rounded.
- 10. Are you more likely to choose a major or career related to science, engineering, or technology after participating in CyberPatriot? Why or why not?**
- Yes, technology to help me with being a detective.
 - Yes, science to help me with medicine.
- 11. Do you feel like your CyberPatriot team was welcoming to female students? Why or why not? If not, what changes would make the program more inviting to females?**
- Yes (the two students present were both females).
- 12. What was your favorite thing about participating in CyberPatriot?**
- Did not ask.
- 13. How could the program be improved?**
- Make P.A. announcements to get more students.
 - More advertisements.

CyberPatriot Focus Group – Spring 2015

Downtown Magnets High School

Number of students: 3

Number of males: 3

Number of females: 0

Ethnic distribution of the group: Not recorded

CyberPatriot VII competition record: One student competed for two seasons. Another competed for one full year and three tournaments during a second year. One student was just starting this spring.

Student Responses:

1. How did you first hear about the CyberPatriot Program?

- One student saw an ad in the student union and asked the CyberPatriot coach if he could join.
- Another responded to a P.A. announcement two years ago. Then this year he saw the coach tutoring in a class and overheard him talking about Cyber Patriot starting again this year.
- The after school site coordinator from EduCare recommended another student to join CyberPatriot.

2. What interested you the most and/or caused you to join?

- One student joined because of a natural interest in computers and cyber defense.
- Another joined because he needed help managing his own computer problems and wanted to become at least intermediate or advanced in doing so. He liked competition aspect.

3. When you first entered the program, how much did you know about cybersecurity principles?

- One student knew some cybersecurity principles and was teaching himself how to do “white hat” stuff. (“White hat” means hacking for a good cause, which is to show where a network is vulnerable so it can be fixed). He had studied some cyber defense and computer analytics principles on his own.
- The other two were unfamiliar with cybersecurity principles prior to the program.

4. How much did you learn about cybersecurity principles as a result of the program?

What specifically did you learn?

- The CyberPatriot program showed me how insecure my computer is and how easy someone could get my personal information.
- I learned to secure my computer with a complex password. I learned to change my passwords every 2-3 months.
- I learned how to protect against network attacks, work with Cisco systems, and do command lines with Linux.
- I learned encryption protocols like AES and DES, when and where they should be used, and how computers work in general.

5. Before joining the program, were you aware of career opportunities related to cybersecurity?

- One student was pretty aware of career opportunities.
- One was not aware.
- Another knew it was a career field but was not aware there were so many possibilities.

6. By participating in CyberPatriot, what, specifically, did you learn about career opportunities in cybersecurity?

- Students learned that the cybersecurity field is more complex and is more than just a couple of positions like being an IT.
- They learned that an Internet security consultant can earn \$80,000 to \$120,000 a year and work for businesses, Internet security firms, or the military.
- They learned they can work as a private contractor in this field.

7. What do you plan on doing after graduating from high school? What are your goals for the future?

- I am planning to pursue the medical field as a neurosurgeon.
- I am planning to get a computer science degree and go into data analytics or cybersecurity.
- I am planning to go to college but not sure about what career field I want to pursue. CyberPatriot did open up new possibilities about what I think I can do and what I know I can do.

8. What did you learn in CyberPatriot that might help you reach your future goals?

- Already described under #4.

9. Did participating in CyberPatriot influence your goals for the future? If so, how?

- Two students said yes.
- Yes, the program made me see there are more careers than being a doctor, dentist, or lawyer, and that computer security is a valid field.
- Yes, the program helped me narrow things down and made computer security a more enticing field – I was already interested.
- No, the program didn't influence my career goals and I am not planning to pursue a career in cybersecurity. I don't have the passion to be a computer scientist or technician. (This was the student who is planning to be a neurosurgeon and just joined the program this spring).

10. Are you more likely to choose a major or career related to science, engineering, or technology after participating in CyberPatriot? Why or why not?

- All three students are interested in pursuing a career related to STEM as described above.
- One student was already sold on a computer-related field.
- Another said this program made computer security more enticing.
- A third student is planning to be a neurosurgeon and this program has not impacted this career goal.

11. Do you feel like your CyberPatriot team was welcoming to female students? Why or why not? If not, what changes would make the program more inviting to females?

- These were three males interviewed and all felt that females are by nature less interested in computer-related fields.
- They explained that there are only two female students taking computer science at their school and this is where the CyberPatriot team comes from.
- The CyberPatriot team was formed word-of-mouth through computer science and was not announced on the P.A. system.

12. What was your favorite thing about participating in CyberPatriot?

- I liked the intellectual competition and I liked studying for CyberPatriot so much that it got in the way of my other homework at times.
- I liked spending time with the team and being in close knit community that felt like a family.
- I liked the bonding, the feeling of family, and I learned about defending my computer.

13. How could the program be improved?

- Slow down – we were given lots of information all at once.
- You can't learn what you really need from the program materials. We need a set curriculum that covers more.
- We were tested on non-security issues at the last competition ("superfetch" which just makes a computer slower).
- Our scores got reset in the middle of the competition after two hours of work (because hashtags got mixed up with another team).
- Time limits were unclear for adding points in competition. We were still working and did not know the time limit was up.

CyberPatriot Focus Group - Spring 2015

Franklin High School

Number of students: 5

Number of males: 3

Number of females: 2

Ethnic distribution of the group: Not recorded.

CyberPatriot VII competition record:

This team competed in the national competition and placed sixth.

Student Responses:

1. How did you first hear about the CyberPatriot Program?

- Two of the students were brother and sister. They heard of the program from older siblings that had participated in previous years.
- Two students heard about the program from friends.
- One heard about the program when he saw the CyberPatriot team introduced and recognized at a school assembly.

2. What interested you the most and/or caused you to join?

- One male student joined the program to learn more about computers in general.
- Another male had heard about hacking problems and wanted to learn to stop them.
- Another male joined to open doors for a future career.
- One female joined to learn how to get rid of viruses on her own computer.
- The other female joined because she wanted to learn about computers and participate on a competitive team.

3. When you first entered the program, how much did you know about cybersecurity principles?

- These students knew almost nothing about cybersecurity principles prior to the program, except for needing passwords to secure information on the web.

4. How much did you learn about cybersecurity principles as a result of the program?

What specifically did you learn?

- Built-in programs that can be modified to secure your computer against exploitation – some that are free.
- Adding exceptions to firewalls.
- Setting policies correctly.
- Administration practices.
- Besides cybersecurity, students learned about communication, teamwork, and cooperation.
- One student mentioned that he learned critical thinking, to think through how to work around a situation or solve a problem.
- One student said that he learned that technology is bigger than he thought, that the world of networks and operating systems is vast.
- Students also learned that learning how to hack leads to being able to protect and defend, and that technology has vast potential to help or harm society, and can be used for good or maliciously on a large scale.

5. Before joining the program, were you aware of career opportunities related to cybersecurity?

- The general consensus was that students didn't know about the jobs available in cybersecurity before participating in the program.
- They perceived cybersecurity jobs to be part-time, debugging personal computers like the Geek Squad.
- One student said that he found rogue software on his computer desktop and learned how to fix it, but had no idea this could be a career.

6. By participating in CyberPatriot, what, specifically, did you learn about career opportunities in cybersecurity?

- After participating in CyberPatriot, these students learned that some companies hire penetration testers to test security of their networks. These are “white hackers” who find vulnerabilities for the purpose of mitigating them. This is an in-demand job with a good salary.
- The students also learned about grey hackers who do ethical hacking without permission in order to show a company they are vulnerable.
- Students learned that every company needs cybersecurity and with these skills you can work anywhere. Many companies fail to set basic security policies that would keep their passwords secure.
- Students also learned about jobs in computer networking.

7. What do you plan on doing after graduating from high school? What are your goals for the future?

- All five students plan to go to a four-year college after graduation.
- One plans to major in Computer Science and join a CCDC Team (College Cyber Defense Competition), or start one on his new campus.
- One female said she plans to major in engineering and take courses in Cyber security.
- Another student plans to double major in natural sciences, aerospace engineering and chemistry.
- Another said computer science major with a minor in cybersecurity or engineering.
- One student says he is not sure about a major but wants it to be computer-related and plans to participate in CCDC.

8. What did you learn in CyberPatriot that might help you reach your future goals?

- At the national finals, the students were shown a presentation by Northrop Grumman and learned different ways to create the interpersonal connections needed to get a technology job.
- The students learned about the cool technology that is still in development and not yet public. For example, a satellite camera that can look at an entire campus but also focus in on someone's freckles.
- Students said that CyberPatriot will help them get job because of the program's connections with industry. They can get internships or jobs with Cisco, Aerospace, or Northrop Grumman.
- There was a presentation in Washington D.C. where industry representative expressed interest in hiring CyberPatriot students.

9. Did participating in CyberPatriot influence your goals for the future? If so, how?

- All five students said that CyberPatriot influenced their future goals. None were considering STEM majors before. One was not even considering college.

10. Are you more likely to choose a major or career related to science, engineering, or technology after participating in CyberPatriot? Why or why not?

- Yes, see #9.

11. Do you feel like your CyberPatriot team was welcoming to female students? Why or why not? If not, what changes would make the program more inviting to females?

- Students, including the females agreed that CyberPatriot is welcoming to females and females are encouraged to join.

- The females did say that if a program has too many guys it can make girls not want to come, but this was not the case at Franklin.
- The students do not perceive CyberPatriot as a gender-based activity.
- At Franklin, The CyberPatriot coach, Missy, is a female, which helped attract girls.
- Males in this group said they view females as equals.

12. What was your favorite thing about participating in CyberPatriot?

- Seeing the Northrop Grumman headquarters in Washington D.C.
- Traveling to Washington D.C. For all students this was their first trip to Washington D.C. or the east coast.
- The feelings of accomplishment from being one of the teams to make nationals.
- One student said her favorite moment was getting 100% on her image finally after three years of competing, and the exhilarating feeling of finding that last missing piece.
- The moment of finding out the team was going to nationals.
- Being on a plane for the first time, and “seeing where my intelligence can take me.

13. How could the program be improved?

- Create a more detailed, specific curriculum for training at Cal Poly events. Student described the training as too basic. They said they can look up anything they need on their own but more detailed training would save time since competitions only last six hours.
- Students would also like to know what they specifically missed on a image rather than being given broad, categorical feedback. They said they spend too much time trying to figure out what they missed after a competition and would like a more direct, detailed debriefing.
- The students would also like to see more medals, trophies, and recognition for Cyber Patriot competitions – equivalent to sports or academic decathlon. They said academic decathlon team members get a trophy for every step of competition. This team placed third in LA and sixth nationally but has no medals or trophies to show. The students feel like more visible awards would help other students want to join. They could influence more students to join if there was a trophy in the school trophy case or if they had CyberPatriot trophies to show at home. Also more recognition at school assemblies would give the program visibility.

CyberPatriot Focus Group - Spring 2015

Huntington Park High School

Number of students: 5

Number of males: 4

Number of females: 1

Ethnic distribution of the group: All Hispanic. Grades 10-12.

CyberPatriot VII competition record:

Per the coach: 35th statewide- Team in place for four years and Mr. B has been here for three. At the moment, they were preparing for competition at Cal Poly Pomona on April 11th.

Student Responses:

1. How did you first hear about the CyberPatriot Program?

- One student said: We were having a club fair in the 9th grade and I saw the coach. He explained what the program was about. It caught my interest.
- Another student said: I got into it because of my friend and then I heard from the coach. I was really interested in it.
- A third student said: I heard about it from my friends as they were in this class every Tuesday and Thursday.

2. What interested you the most and/or caused you to join?

- Female said: It opens the door to many opportunities such as summer programs in cyber defense. We are moving into the era of cyber technology and it is evolving.
- A boy said: One of the biggest reasons was I needed major help with computers. I did not know how to fix them. Recently I joined to learn more about computers and to learn what I could do with them. It had so much and I did not know. I have the power to control a computer.

3. When you first entered the program, how much did you know about cybersecurity principles?

- One boy said: When I first joined, I knew very little. I did not know how to protect the computer.
- Another boy said: I knew about some because my family is full of computers and usually we would have our uncle, if he knew you used computers, he could log into your computer from his home. We had to figure out how to block him out and he would say congratulations.
- A third student said: I don't know a lot and I developed a recent interest.

4. How much did you learn about cybersecurity principles as a result of the program? What specifically did you learn?

- One student said: A whole lot, specifically, policies. A lot are cool as I did not know you could lock people out. There was so much I did not know. Really I was uneducated and I learned way more than I thought I would.
- Another student said: I did not have a laptop for 6-7 year and I knew nothing. There is a lot I did not know. I can hide files using numbers. There was a competition based around this. I thought I would just learn about viruses and hackers, but I met a lot of people at the competitions.

5. Before joining the program, were you aware of career opportunities related to cybersecurity?

- A student said: I knew about that. Some careers I knew and I learned about others.
- A few other students said the same thing.

6. By participating in CyberPatriot, what, specifically, did you learn about career opportunities in cybersecurity?

- One student said: I learned that there are a lot of jobs including businesses that want to enforce their cyber walls and build up their cybersecurity with codes to allow only certain people to join.
- Another student said: This is an area that is growing and there are more jobs out there for people who know about cybersecurity.

7. What do you plan on doing after graduating from high school? What are your goals for the future?

- A student said: After graduation, university. I did ask Mr. B (coach) if there were internships with this. I thought of doing both.
- A second student said: I plan to go to university to get computer skills up and maybe working robotics, security.
- Another student said: I have not discovered what I want to do with my life after-school. I am trying to broaden my horizons.
- The female said: After grad, I want to go to NYU and major in Journalism and minor in Computers.
- A student said: After high school, I am going to a university in Maryland to study aerospace engineering and also minor in computers.

8. What did you learn in CyberPatriot that might help you reach your future goals?

- A student said: Inside CP, as we went along with competitions, it is more in depth than I thought it would be. I thought it was just between schools and then I found out it was nationwide and global.
- A student said: I made friends and looked forward to seeing them. A lot of students like this activity. The coach, Mr. B, really helped us think about our future.

9. Did participating in CyberPatriot influence your goals for the future? If so, how?

- A student said: We have networked a lot with Cisco. We started last year. It is a program online and it tells you how to manage or protect a system. It also gives us an opportunity to go to an internship. What we have learned we can apply online so employers can see them. We can find out sooner if we have an internship or job.

10. Are you more likely to choose a major or career related to science, engineering, or technology after participating in CyberPatriot? Why or why not?

- A student said: Yes, I would more likely go into one of those careers. After the competition is done, we don't mainly focus on protecting, but we do projects on versions of video games. We program. That helped me learn that it was not very hard. By doing that and practice, I can get a career in one of those fields.

11. Do you feel like your CyberPatriot team was welcoming to female students? Why or why not? If not, what changes would make the program more inviting to females?

- The female said: I felt pretty normal. It all depends on the girl. I am not very interactive with the others. I am with them for competition. We do support each other. I tell them to get their game on.
- A student gave some suggestions: I feel that it is not anyone's fault, but it is preferences. I like to do this out of curiosity. Maybe some females don't share the same curiosity.
- The female said: I agree. Sometimes they feel like there are a bunch of guys and they are in their cliques. Usually you see less girls at the competitions. The competition has one for just girls.
- Another student said: I think that when most people join, it is about friends. When it is someone we don't know, they feel left out. Since random people join, then it is not welcoming. We did not know one guy who came and when he did, we helped him out. He is now a best friend in the group.

12. What was your favorite thing about participating in CyberPatriot?

- A student said: Going to competition.
- Another student said: During my first year, I met a lot of interesting people. My 9th grade year was my first year. That is my second favorite year. I got to know people at the competitions. We learned how they teach and what they do that is different from us.
- A student said: Working with others and communicating with others.
- A student said: Being open minded, I like to try new things with my friends. They teach me.
- One last student said: Sheer teamwork. I know a lot of things about teamwork because I played football for three years. I found a relaxed environment here in comparison to football.

13. How could the program be improved?

- The first response was hesitation and someone said: Can it???
- Another student said: It can improve, but I will say that Mr. B as a teacher would be here to teach us. But as we moved on, he became a friend and not a teacher. It cannot get better due to Mr. B.
- Another student said: Better computers!

CyberPatriot Focus Group - Spring 2015

North Hollywood High School

Number of students: 4

Number of males: 2

Number of females: 2

Ethnic distribution of the group:

Both females were Asian (Korean). One male was Asian (Korean), the other white.

CyberPatriot VII competition record:

This team competed at the nationals and placed second. (They placed first last year).

Student Responses:

1. How did you first hear about the CyberPatriot Program?

- These students heard about the CybePatriot Program when Mr. Gehringer (facilitator) made an announcement over the P.A. system at school.

2. What interested you the most and/or caused you to join?

- One student (male) joined because he was looking for an extra-curricular activity that was related to computers. He had friends joining and he joined with them.
- Another student (male) wanted to be in competition with his friends in something computer-oriented. He already had a curiosity about Cyber Security.

3. When you first entered the program, how much did you know about cybersecurity principles?

- These students knew almost nothing about cybersecurity principles prior to the program. They knew that cybersecurity, as a field, existed.
- One student had concerns about the ethics of hacking.

4. How much did you learn about cybersecurity principles as a result of the program?

What specifically did you learn?

- These students learned the major things to do to prevent hacking, especially password security principles.
- They learned where to look on a computer for viruses, including hidden settings, and how to use work-arounds or write scripts to kill an infected program.
- One student learned that you don't have to start with a high level of tech knowledge to get good at cybersecurity.

5. Before joining the program, were you aware of career opportunities related to cybersecurity?

- None of the students were aware of career opportunities in cybersecurity at all before joining the program.

6. By participating in CyberPatriot, what, specifically, did you learn about career opportunities in cybersecurity?

- After participating in CyberPatriot, these students learned that there is a need for cybersecurity in almost every company, that it is an in-demand field, pays well, and has high job security.
- That it is a viable field with job security that will not be going away.
- One student got a summer position at Aerospace but could not share the details of the internship because he “did not have a security clearance.”
- The students also learned that all branches of the military have a need for cybersecurity, and deal with technology that involve cybersecurity and computers in general.

7. What do you plan on doing after graduating from high school? What are your goals for the future?

- One student plans on majoring in infrastructure assurance at San Antonio which is a top school for cybersecurity.
- Another is planning to be a computer science major and minor in cybersecurity in college.
- Another is planning to major in computer science and has been accepted at UCSD and UC Davis.
- Another is planning to apply for college and double major in cybersecurity and social welfare, and is considering joining the military.

8. What did you learn in CyberPatriot that might help you reach your future goals?

- One student learned how to use a computer and was not good at doing anything with a computer prior to the program. Her computer knowledge will help her major in cybersecurity and pursue the military.
- Students learned Windows security, Linux security and internals which will help them in cybersecurity careers.
- Students also mentioned learning teamwork and cooperation which will help them in any job setting.

- One student said that cybersecurity is not something you do individually. We delegated the work, and rotated positions to get more than one perspective on an issue.

9. Did participating in CyberPatriot influence your goals for the future? If so, how?

- All four students said that CyberPatriot influenced their goals for the future, and their plans after high school.
- One student said that before CyberPatriot she never thought she would even be interested in computers or a computer-related field but now she is.

10. Are you more likely to choose a major or career related to science, engineering, or technology after participating in CyberPatriot? Why or why not?

- Yes, all four students are choosing to major in computer science or cybersecurity and pursue related careers.
- Why? One student says that standing on stage in Washington D.C. was a turning point. He realized that he was good at cybersecurity and that it was a non-programming job related to computers that pays very well.
- Another student realized that this could be a career during semi-finals, when he saw how good he was.

11. Do you feel like your CyberPatriot team was welcoming to female students? Why or why not? If not, what changes would make the program more inviting to females?

- All four students agreed that CyberPatriot, at least at their school, is welcoming to females. They mentioned the CyberGirlz competition to promote female participation.
- The females in the group said that how welcoming the program is to females will depend upon the males participating. If the males respect the females then it will be a welcoming environment.

12. What was your favorite thing about participating in CyberPatriot?

- Competing.
- Having fun with friends.
- Meeting cool people like two and three star Air Force generals in Washington D.C.
- Building relationships with team members. The two girls in the group said they became very close through the experience.

13. How could the program be improved?

- The students had no suggestions to improve the program.
- One student described CyberPatriot as a strong program that is getting better year by year already.

CyberPatriot Focus Group - Spring 2015

Robert F. Kennedy Community Schools

Number of students: 4

Number of males: 1

Number of females: 3

Ethnic distribution of the group: Not recorded.

CyberPatriot VII competition record:

The team had made it to Round 3 at Cal Poly Pomona this year.

Student Responses:

1. How did you first hear about the CyberPatriot Program?

- The instructor presented in my class on the first day of school.
- I heard about it from a classmate.
- I heard about it at a school assembly.

2. What interested you the most and/or caused you to join?

- I was interested in the computer aspect. I had fixed computers as a kid and wanted to learn more.
- An older member showed us what they do in competition to increase our interest. Our interest kept increasing the more we came (the females said this).

3. When you first entered the program, how much did you know about cybersecurity principles?

- Nothing. I knew what the internet was and was aware of hacking.
- I knew cybersecurity was an issue. I knew about viruses and how to defend against them but the program increased my knowledge.

4. How much did you learn about cybersecurity principles as a result of the program?

What specifically did you learn?

- The male student said, "I learned how to use Linux and terminal (within Linux), also about virtual machines."
- The females said, "I learned about different operating systems and different settings in Microsoft."

- 5. Before joining the program, were you aware of career opportunities related to cybersecurity?**
- As a kid I wanted to go into computer engineering (male).
 - I knew technology careers were growing (female).
 - I knew about computer science and engineering majors (female).
- 6. By participating in CyberPatriot, what, specifically, did you learn about career opportunities in cybersecurity?**
- The male said, "I was able to network with industry people at competitions."
 - One female said, "You need to use computers in most fields. Now I see security as a huge aspect. I learned about coding and how much time and effort it takes to code. I got to meet people from Cisco that shared about the exams which were the first steps in their careers. I also learned about editing in Linux."
 - Another female said, "I learned you can get jobs in cybersecurity with big companies."
- 7. What do you plan on doing after graduating from high school? What are your goals for the future?**
- A female student said, "I want to go to college, study computer science, learn to do research on networks, and do research on networks for a major company."
 - Another female said, "I am still deciding but I have an urge to go into biomechanical engineering. I am interested in making artificial organs and pacemakers and am interested in increasing the security for pacemakers which can be hacked. My eyes have been opened to all the applications of cybersecurity, for example your car's brakes can be hacked if they are connected to a computer network. I realized that cybersecurity can save physical lives."
 - Another female said, "I want to go to college and major in engineering."
- 8. What did you learn in CyberPatriot that might help you reach your future goals?**
- I learned how cybersecurity connects with other fields.
 - I learned how to study independently and manage time.
 - I learned how to network with people in industry, how to get internships.
 - I gained an understanding of the job world in cybersecurity.

9. Did participating in CyberPatriot influence your goals for the future? If so, how?

- Three females said yes.
- The male said he already had an interest in computers and engineering and the program gave him the knowledge to narrow his options (he is considering nano or bio-technology).

10. Are you more likely to choose a major or career related to science, engineering, or technology after participating in CyberPatriot? Why or why not?

- These students had already set goals for going to college and pursuing science or technology fields prior to CyberPatriot.

11. Do you feel like your CyberPatriot team was welcoming to female students? Why or why not? If not, what changes would make the program more inviting to females?

- The girls in this group said they are not intimidated by computers and do not see gender as an issue when working on a network. There were more females than males at this school in CyberPatriot. They said the instructor was very welcoming to all students, male or female, and has the same expectations for everyone. They said CyberPatriot, in general, is welcoming to females and appreciated the CyberGirlz event where they played capture the flag against teachers on Facebook.

12. What was your favorite thing about participating in CyberPatriot?

- I liked the community aspect, the support of the instructor and classmates, sharing what I like about computer science and discussing issues.
- I have a love-hate relationship with network, but my favorite part is when a network problem is solved.
- I like the challenge of competition.
- I like working with specialists who came from Cal Poly and industry to work with us at our school. Someone from Cal Poly taught us about networking. Someone from Netforce taught us about Windows. We learn a lot from specialists like this, and they know a lot.

13. How could the program be improved?

- These students would like have more specialists in more areas visit their school more often.
- More events for teams from all schools to come together to learn and compete.
- More interaction with teams from other schools so we know who we are competing against, can share notes, and get to know each other so we might pursue similar opportunities like attend the same college.
- A suggestion was to have competitions where students from different schools are assigned to teams based on area of knowledge, to learn to work with students from other schools we don't know.