ANNUAL REPORT
2020

CYBERPATRIOT
National Youth Cyber Education Program
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Dear CyberPatriot Stakeholder,

Thank you for your interest in and support of CyberPatriot—the Air Force Association’s National Youth Cyber Education Program.

When AFA’s Aerospace Education Council conceived this program just a few years ago, its members had no reason to expect it to evolve into the comprehensive and globally prominent program it has become. AFA’s CyberPatriot program is now recognized internationally as being a critical component of the cybersecurity workforce “ecosystem,” and it is frequently recognized as one of our nation’s most successful STEM programs. The reason is clear: you.

To our coaches, mentors, and team assistants, thank you for the countless hours you continue to contribute to preparing the next generation of cyber defenders and scientists, technologists, engineers, and mathematicians.

To our sponsors, led by our Presenting Sponsor the Northrop Grumman Foundation, please know that we know, it is only through your continuing support that any of our work is possible. Northrop Grumman has been with us since we began, and we are ever mindful that without their profound generosity, this program would be incapable of reaching the (literally) tens of thousands of students from all backgrounds we have inspired. We similarly recognize our top “Cyber Diamond”-tier sponsors AT&T, the Boeing Company, Cisco, the U.S. Department of Homeland Security, and Microsoft Azure for their kind support. And this year we are particularly pleased to acknowledge AT&T’s exceptional support enabling a dramatic expansion of our CyberGenerations program, helping protect senior citizens from online exploitation.

To the hundreds of AFA Field leaders and volunteers, thank you for your selfless work in promoting CyberPatriot and AFA’s other aerospace education programs.

In it all, thank you for the students who participate in the CyberPatriot National Youth Cyber Defense Competition and in AFA CyberCamps. Our nation and its friends are counting on you to lead the technical workforce of tomorrow.

I now invite you to peruse this report and help us celebrate what you have made possible. I draw your attention in particular to the section describing our successful adaptation to the sad realities of the COVID-19 pandemic. I also hope you can take the time to read through the inspiring profiles of just a handful of our many successful alumni in the section titled “CyberPatriot’s Impact on STEM…In Their Own Words.”

Sincerely,

Bernie Skoch
CyberPatriot National Commissioner
The Air Force Association
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Program Background

CyberPatriot was introduced in 2009 by the non-profit 501(c)(3) Air Force Association (AFA) to address a critical national need: Drawing more young women and young men to education and careers in cybersecurity and other science, technology, engineering and mathematics (STEM) fields as an effort to meet the needs of an increasingly technical workforce.

At the center of the program is the National Youth Cyber Defense Competition. What was initially CyberPatriot’s only offering and available only to high school students, is now a year-round event for both high school and middle school students. In this competition, students compete in a virtual environment to see who can best harden a variety of computer networks against cyber-attack.

Beyond the competition, CyberPatriot offers four additional programs for individuals of varying ages:

In 2014, the AFA CyberCamp program was piloted, offering structured cybersecurity-focused summer activities for 6-12 grade students through a five-day 20-hour program. From three deployed camps in 2014, the program quickly grew to 26 camps in its sophomore year, and in the summer of 2020 reached nearly 350 camps from coast-to-coast.

In the summer of 2015, CyberPatriot fielded a major nationwide cyber education program targeted specifically at elementary-school students in grades K-6. CyberPatriot’s Elementary School Cyber Education Initiative (ESCEI, pronounced “Ess-Key”) employs colorful and entertaining game-like modules to teach even the youngest students the basics of cyber safety and cyber hygiene. Version 2.0 of ESCEI was released in July 2016, providing increased functionality and MacOS compatibility. Over 9,500 ESCEI packages have been deployed in the U.S. and abroad, reaching an estimated 55,000 students. The program is made available to any school or family at no charge.

In keeping with reaching a younger audience, CyberPatriot developed its Cyber Education Literature Series in 2017, publishing a cybersecurity-themed children’s book titled Sarah the Cyber Hero. The story is supplemented with an activity booklet that goes beyond the story in introducing topics of cyber safety and cybersecurity to the youngest users of technology. In March of 2020, a second book – Ben the Cyber Defender – was added to the series.

On the opposite end of the spectrum, CyberPatriot most recently developed CyberGenerations, a free program that covers basic topics of cybersecurity and provides additional resources which can help senior citizens identify and prevent potential cyberattacks directed at them or their loved ones. The program can be presented as a workshop or done as an individual, self-paced initiative.
Programmatic Growth

The National Youth Cyber Defense Competition

Through the generous support of program sponsors, CyberPatriot’s growth has been strong, allowing the program to reach each year an increasing number of students in every aspect of the program.

The competition growth has been astounding since its initial launch in 2009, growing from eight teams to nearly 6,800 teams. Geographically, the competition has grown from a single state (Florida) to all 50 U.S. states, Canada, and beyond.

The competition includes a diverse mix of public and private schools in all socioeconomic strata and in urban and rural areas.
AFA CyberCamps

AFA CyberCamps have grown from an initial deployment of three camps in the summer of 2014 to nearly 350 camps in 2020. An estimated 30,000 students have participated in AFA CyberCamps since their inception in 2014.

Pre- and post-camp surveys for student participants have been redesigned to increase response rate and better track the effectiveness of the program. Additionally, post-camp instructor surveys have been adjusted and sent directly to camp coordinators and instructors to encourage completion. A feedback report will be used to make improvements to the 2021 camp sessions.

Elementary School Cyber Education Initiative

CyberPatriot’s Elementary School Cyber Education Initiative has continued to see expansion in that number of students reached. In the past year, the program saw nearly 2,000 downloads, bringing the total downloads to 9,500 and participant reach to 55,000 students.

A new version of ESCEI is expected in the coming year. The current version (2.0) consists of the following games:

Security Showdown 2

Strangers are asking about you, but is it safe to share with them? Learn the basics of sharing personal information with family, friends, and strangers in this simple point-and-click game. Will you share your information correctly and win the security showdown certificate? Featuring charming voxel graphics, simple game mechanics, and voice-overs in both English and Spanish, this game is highly accessible and great for young players.
JeffOS
Join Jeff, your helpful sidekick, as he guides you through his operating system and covers everything from basic computer skills to dealing with complex issues like phishing and malware. JeffOS delivers actionable advice for safer computing in the real world and breaks down advanced topics into digestible pieces, all while providing players with fun, interesting interaction. Players will walk away from JeffOS with a more developed set of computer skills and a grasp on the importance of cybersecurity in their everyday lives.

Packet Protector
Build a computer network to mine for cryptocurrency and use this money to expand and secure your network! Watch how your decisions affect the security and effectiveness of a network in this educational simulation. Along the way, you will learn about some basic networking components, malware, and security software, and discover some of the ways you can protect your network from cyber threats.

Cyber Education Literature Series

Ben the Cyber Defender
In the spring of 2020, CyberPatriot published a new children’s book, *Ben the Cyber Defender*. This is the second book in the literature series and complements the original *Sarah the Cyber Hero* story published in 2017.

Ben is a typical kid with a not-so-typical passion for cybersecurity and helping others. His skills are put to the test when his cousin, Ethan, accidentally releases a virus that is set to ruin devices all over town. Can Ben stop the cyberattack in time and prove that he is ready to be a true cyber defender?

Sarah the Cyber Hero
Thanks to support from CyberPatriot sponsors BNY Mellon, Capital One, and the USAA Foundation, 1,000 copies of *Sarah the Cyber Hero* were distributed to libraries and elementary schools across the country. To date, nearly 1,500 copies have been distributed.
CyberGenerations

Through the generous support of AT&T, a new and improved version of CyberGenerations arrived in May of 2020. Over 300 copies of the self-paced guide or workshop were downloaded within the first month of its release.

CyberGenerations – the Senior Citizens’ Cyber Safety Initiative – is designed to equip senior citizens with the knowledge needed to stay protected from cyber-crimes. The program can be hosted as a workshop for small or large groups, or it can be completed individually through the use of a self-paced guide.

Beyond the United States, individuals from Brazil, Canada, India, and several countries in Africa have participated in the program.

Adaptability around COVID-19

National Youth Cyber Defense Competition: For the first time in program history, the in-person CyberPatriot National Finals Competition was canceled as a result of the global COVID-19 pandemic. Typically held in March, the event was rescheduled to a virtual (in-home) competition that took place in early May.

Prior to the start of the competition, an Opening Ceremony was streamed to teams and interested parties across the country. AFA President, Lt Gen Bruce "Orville" Wright, USAF (Ret) and representatives from CyberPatriot sponsors welcomed competitors and wished them “good luck” in the competition they worked so hard to reach.

Following the steam of the Opening Ceremony, the competition began. Students competed from the safety of their individual homes, and to maintain the integrity of the competition an on-site adult proctor was assigned to each student to ensure all rules were being followed. Connecting through a Virtual Private Network to CyberPatriot servers, teams had 3 ½ hours to find and fix as many security issues as they could in seven Windows or Linux operating systems. A Red Team of cybersecurity professionals was tasked with infiltrating the competitors’ systems to test their security. The challenge also included an AT&T component inject, requiring teams to complete a difficult but essential cybersecurity task while protecting their systems. A live (but anonymous) scoreboard was available during the competition.

After a short break following the Network Security Master Challenge, teams were faced with 90-minute Cisco NetAcad Challenge. What would normally be a hard-wired event was turned into a virtual event using the Cisco Packet Tracer network simulation tool.

The in-home National Finals Competition concluded the following evening with a live stream of the Award Ceremony to announce the winners.
AFA CyberCamps: Because of gathering restrictions resulting from COVID-19, the typical CyberCamp model was reworked to allow for virtual hosting. Additional online course materials were made available to students, along with a virtualization instruction sheet to assist camp hosts in successfully transitioning the lessons to a virtual platform.

The 2020 CyberCamps are still in progress and will continue through mid-August. Feedback has been positive thus far.

Cyber Education Literature Series: Recorded readings of both books are available on YouTube thanks to The Alliance for Fort Gordon, a CyberPatriot Center of Excellence.

Sarah the Cyber Hero: https://www.youtube.com/watch?v=TB8gK86JjY4
Ben the Cyber Defender: https://www.youtube.com/watch?v=jat9EHuazDM

CyberGenerations: A virtual version of the workshop was recorded by CyberPatriot staff and made available to any interested individual free of charge. The virtual workshop walks attendees through the entire program lesson by lesson and can be completed at one’s own pace.

Visibility

CyberPatriot is drawing strong national recognition. The annual springtime National Finals Competition attracts the “best of the best” for a three-day-long series of events, attracting Congressional principals, other government officials, and industry dignitaries who are present to recognize the top 28 teams who have earned their way to the nationally recognized event.

Media coverage of the program has been strong. Local and regional media coverage of team participation continues to increase. Those advancing to the National Finals Competition have attracted high-profile print and national broadcast coverage. CyberPatriot teams have even been featured on CBS Sunday Morning and NBC’s TODAY show, and in the Wall Street Journal.

Why Your Support Matters

CyberPatriot is operated as a program of the non-profit 501(c)(3) Air Force Association. Contributions to CyberPatriot are restricted exclusively to the program to reach even more schools, more youth organizations, and more students.

CyberPatriot sponsors are visibly recognized in program collateral materials, on its website, and at the in-person National Finals Competition in the spring of each year in Bethesda, Maryland. Sponsors are invited to National Finals Competition where they may personally present to the very best of the best of self-identified students why their enterprise presents good STEM opportunities.

CyberPatriot sponsorship communicates unmistakably that a company or organization is supporting a program that has demonstrable impact on attracting students to STEM education and careers, and on giving strong career opportunities to students who might otherwise not receive them.
CyberPatriot’s Impact on STEM

In their own words…

Monica Saraf  
CP-VII through CP-XI

“I am currently a consultant with a cybersecurity firm in Sterling, VA, and interned at NASA’s Goddard Space Flight Center this past summer with a cloud cybersecurity research project. I presented in front of major directors within the Space Communications and Navigations division. I will be majoring in cybersecurity for my undergrad as well but am still deciding where I will go.

“Originally didn’t think that I would be very interested in cybersecurity, but after I tried CyberPatriot in 7th grade, it became something I wanted to do for the rest of my life. I founded the club at my school with another fellow CyberPatriot competitor. I still work to train others and teach them everything that I’ve learned over the years. I think it’s very important to spread knowledge and encourage others. It’s made a huge difference for me and all the experiences I’ve had over the past six years.”

Tyler Morris  
CP-IV through CP-VI

“After my first year of competing in CyberPatriot, I was offered a summer internship at Sandia National Labs as a sophomore in high school. That summer internship allowed me to work with amazing students from around the country and I quickly realized that cybersecurity could be so much more than just a hobby. This internship continued for six years as I progressed through high school and as I earned a degree in cybersecurity at Embry-Riddle Aeronautical University. I now work full time at Sandia National Labs on cyber education initiatives related to forensics and phishing (DOE’s TracerFIRE, Cyber FIRE, CyberForce). I’ve also recently applied to Georgia Tech’s cybersecurity master’s program to study energy systems.

“I would have never imagined that participating in CyberPatriot would have such a profound impact on my life. The program helped me land a once in a lifetime internship at Sandia National Labs, it helped me get into and pay for college, and it helped me build leadership and technical experience. I now give back to current CyberPatriot participants as a mentor in the Albuquerque area.”
Gretchen Arnold  
CP-VII and CP-VIII

“I graduated from Mexico Academy in June of 2016 and in August of 2016 started at SUNY Polytechnic Institute as a computer and information systems major. I will be graduating in May with my undergraduate degree and then plan on going to graduate school to complete a master’s degree in network and computer security, also at SUNY Polytechnic. I have a project I am working on with a Florida based company to update their database and am using this for my capstone project.

“Without CyberPatriot and the STEM camps I participated in as a cadet, I would not have the knowledge I needed to be as successful as I am in my program. I am extremely thankful to CyberPatriot for giving me the opportunity to learn more about securing systems in high school which allowed me to find out that I love doing that type of work.”

James Brahm  
CP-V through CP-VII

“After second and first place finishes in CyberPatriot VI and VII, I attended the Air Force Academy, where I studied computer science, nuclear weapons, and Chinese. I was on the Air Force Cyber Competition Team and did an internship at a Silicon Valley startup where I patented an algorithm for mapping equations onto quantum processors. I am commissioned as a cyberspace operations officer at graduation. Right now, I am reading for a Master of Computer Science degree at Oxford as a Rhodes Scholar.

“CyberPatriot got me to where I am today. It sparked my interest in cybersecurity and seeing how important cyber could be inspired me to seek military service.”

Brandon Garcia  
CP-V and CP-VI

“I dropped out of college to pursue my own career route. I was a windows administrator at Rackspace in San Antonio, TX. I progressed as an engineer and took only five years to achieve a six-figure salary in Dallas, TX without a degree. I’m now a consultant for Cervello and I have utter confidence in my job security. I don’t see how I could ever go without good work. I hold AWS Certified Solutions Architect & DevOps Professional accreditation, and I’m only getting my feet wet in the industry!

“CyberPatriot was great to bring my nerdier interests to a group of involved people. I was quite withdrawn from normal school activities, but I enjoyed spending many after-hours in the lab because it felt no different than the study I committed to on my own time. Looking back, it was an awesome experience to feel like a part of the collective group of nerds that inhabit the planet. Too often we lock ourselves up out of passion, but the more we socialize these topics we will enjoy new levels of community.”
Alumni Survey

Every two years, the CyberPatriot program office collects information from competition participants to assess the program’s success in attracting students to STEM education.

Post-graduation plans for students currently enrolled in middle or high school

2,377 of the 2,662 respondents were still enrolled in middle or high school (or an equivalent program) at the time of the survey. In total, 2,109 (89%) of these students indicated their intention to pursue a 2-year or 4-year higher education program after receiving their high school diploma.

By comparison, according to the National Center for Education Statistics\(^1\), 70% of American students who graduated high school in 2018 entered college. Of those students, 44% enrolled in 4-year institutions and 26% enrolled in 2-year institutions.

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Desired field of study for students currently enrolled in middle or high school

1,642 of the 2,109 students who indicated they will pursue a 2-year or 4-year education program plan to study a STEM field (75%). The remaining 25% of respondents were undecided or planned to study a non-STEM field.

Academic field of study for alumni enrolled in or graduated from college

Of the survey’s 2,662 respondents, 285 are enrolled in college or have earned a college degree. Of these individuals, 84% of them selected a STEM program as their field of study.
According to the most recent National Center for Education Statistics report\(^2\), computer and information sciences degrees only represented 3% of associate degrees and 4% of bachelor’s degrees awarded nationally in 2017-2018. Including computer and information sciences, degrees in STEM fields accounted for only 8% of associate degrees and 20% of bachelor’s degrees conferred nationally in 2017-2018.

Impact of Participation

When asked the degree to which CyberPatriot impacted career or education goals, 85% of the 2,662 respondents indicated that the program did play a positive role in their decisions.

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Sponsors
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