

Delaware: Inspiring the next generation of cybersecurity experts



A report detailing Delaware's leadership in finding, motivating, and developing the cyber-capable workforce in the United States.

Dear Governor Carney,

Your insight and leadership in bringing CyberStart to the students of Delaware is already paying dividends for them in the form of learning and scholarships, and it can lead to future job growth and improved cybersecurity in Delaware. Results of the CyberStart pilot program, are summarized below. But before you dig into the numbers and see the lists of high-performing Delaware students, please turn to the back cover and last page of this booklet to enjoy personal notes that participating students wrote specifically for you.

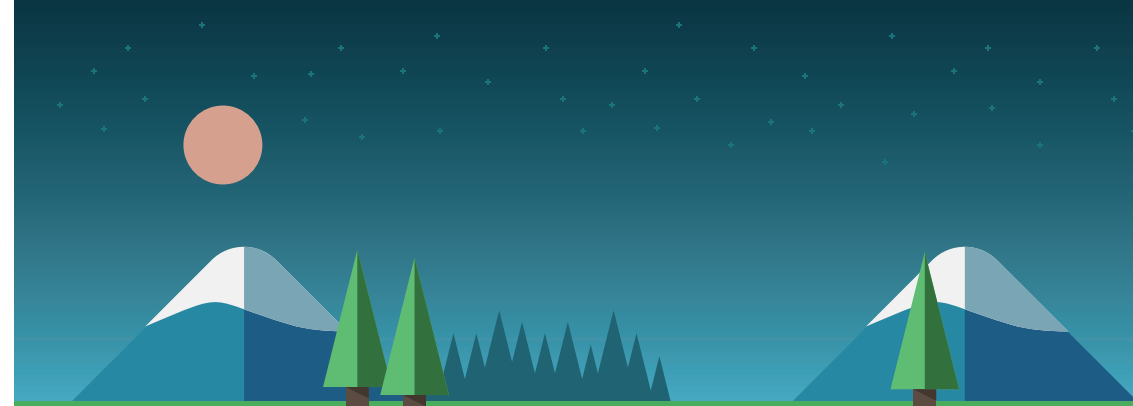
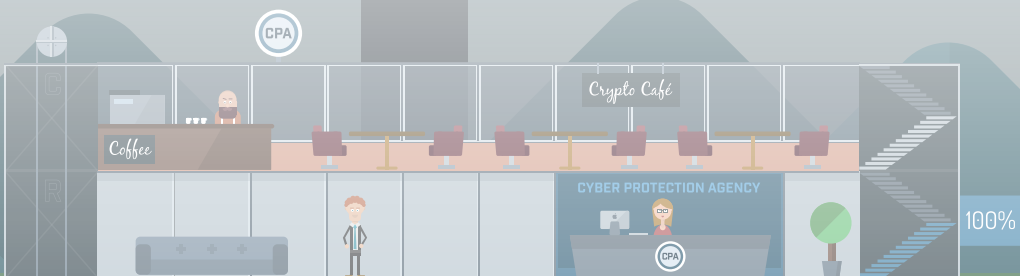
Program Highlights:

- In just two weeks in July, your communications team was able to sign up 359 Delaware students.
- Nearly 75% of them solved at least one of the assessment challenges and 47% solved enough to be invited to test their cyber aptitude on the 250+ challenges of the full CyberStart program, which they did during August 2017. At the same time your fellow governors in six states signed up a total of nearly 3,300 students.
- Four Delaware high school and college students were in the top 50 nationally, and a total of 20 Delaware students won CyberStart scholarships for more advanced education in cybersecurity.
- The state of Delaware excelled in the Headquarters base being above average in 5 out of the 7 topics covered. Topics included: Linux, web application, forensics and cryptography.
- As you might guess from the students' notes, they liked CyberStart:
 - 92% rated the game either excellent or very good (and this is a tough crowd!)
 - 96% are considering further cybersecurity training after the program

Please let me know if there is anything I can do to help as you continue to identify talent and grow the next generation of cybersecurity experts in Delaware.

Sincerely,
Alan Paller

SANS Institute
Director of Research
apaller@sans.org



359 students initially registered to see how well they could do on CyberStart Assess, the program's qualifying exam.

267 students got one or more answers correct in CyberStart Assess.

47%

170 students qualified for the CyberStart Game.

38 students reached the elite levels (7+) in the HQ base of the program.

Scholarships

20

Delaware's next
cybersecurity
professionals.





Program Introduction

CyberStart is a forward-thinking skills program designed to supply specialist cybersecurity education to young people across the United States. Using a suite of online challenges, tools and games it aims to inspire the next generation of cybersecurity professionals while identifying the best and most talented young Americans.

We are facing a significant shortage of trained and skilled cybersecurity professionals at a time when online technologies continue to evolve, and cybercriminals are becoming more sophisticated. The only way to solve this problem is to introduce, develop and help young people in high school and college pursue a career in this sector.

Phases

CyberStart Assess is a set of 8 questions that test a student's aptitude and existing knowledge of computer security. Based on identifiable, measurable key skills and traits, it works to find young people who possess the innate qualities of an effective security practitioner. Questions look for traits such as problem solving, logical extrapolation and attention to detail, all of which have been proven to be crucial to succeed in a security career.

CyberStart Game is where students become exposed to specialist cybersecurity education. Using a suite of online tools, challenges and games, players attempt to solve more than 250 challenges, all of which are realistic examples of tests and threats faced by practicing cybersecurity engineers in their day-to-day lives. The CyberStart Game enables students to start studying security with challenges written by experts who practice these skills in the real world.

Goals

- Supply specialist cybersecurity education for 16+ year olds.
- Inspire the next generation of cybersecurity experts.
- Grow the U.S. cyber capable workforce.
- Identify the most elite young talent.

What Do Players Learn?

The CyberStart Game has over 300 hours of content and covers 14 main topic areas. There are two "bases" that make up the game, each containing several levels and challenges that candidates move through: the Headquarters Base and the Moon Base.

Bases

The **Headquarters Base** forms the main part of the game. Players take on the role of a junior agent in the Cyber Protection Agency, where they deploy their forensics and offensive skills to sleuth through challenges and tackle various online cyber criminal gangs. As they work their way up through the organization, their training develops each of the security disciplines.

The HQ Base teaches students skills in:

- Binary
- Cryptography
- Forensics
- Linux
- Open-source intelligence
- Programming
- Web application

The **Moon Base** is where players learn how to program. Players go through a series of challenges, building up progressively, to write their own programs in Python. The aim of the Moon Base is for players to use all the skills they have learned to stop an alien invasion. The Moon Base has three training levels that are step by step guides to the basics of programming.

Later levels teach students skills in:

- Programming cryptography
- Debugging
- Files
- Functions
- Loops
- Sockets
- Strings

CyberStart Players in Delaware

Key	
**	In the top 100 and awarded a scholarship
*	Awarded a scholarship

Last Name	First Name	School	Top 100/ Scholarship
Allison	Josh	Mercer University	*
Ambrose	Allison	Delaware State University	
Andaya	Lorenzo	Caesar Rodney High School	
Armour	Shane	Charter School of Wilmington	
Armstrong	Nitin	Charter School of Wilmington	
Baione	Stephen	Polytech High School of Kent County	*
Banning	Calvin	University of Delaware	
Barrett	Andrew	University of Delaware	
Barto	Adam	Wilmington University	*
Bell	Kyle	University of Maryland	
Bennett	Tiffany	Western Governors University	
Bian	Rui	University of Delaware	**
Bishara	Diana	Delaware Technology Community College	
Bray	Shannon	University of Delaware	**
Brown	Destiny	Delaware State University	
Bufano	Audrey	Charter School of Wilmington	
Bullock	Drew	Strayer University	
Butler	Leeza	Delaware Technical Community College	

Last Name	First Name	School	Top 100/ Scholarship
Chang	Ethan	Charter School of Wilmington	*
Choi	Younghoon	Charter School of Wilmington	
Choi	Youngkyu	Charter School of Wilmington	
Clark	Ben	University of Delaware	*
Cohen	Aesia	Delaware State University	
Conrad	Benjamin	University of Delaware	
Cook	Markus	Delaware Military Academy	
Cronin	Patrick	University of Delaware	**
D'Souza	Ashish	Polytech High School	
Dash	Steven	Delaware State University	
Dunn	Stephanie	University of Delaware	*
Fedetz	Vincent	University of Delaware	
Ferrier	Alexander	Delaware Technical Community College	
Flowers	Kaitlyn	MOT Charter High School	
Fulton	Richard	Wilmington University	
Garcia	James	Carnegie Mellon University	
Geron-Neubauer	David	University of Delaware	
Ghoryani	Eqbal	Delaware Technical Community College	**
Gouveia	Jeremy	University of Delaware	
Haffaney	Konstance	Delaware State University	
Hawkins	Neil Julian	Wilmington University	**
Henry	Tymere	Wilmington University	*
Hewlett	Chris	Al Dupont High School	
Hoban	Danielle	Charter School of Wilmington	

Last Name	First Name	School	Top 100/ Scholarship
Hogan	Patrick	Charter School of Wilmington	
Houle	Tyler	Salesianum High School	
Houston	Collier	Mount Sophia Academy	
Howell	Tim	Delaware Technical Community College	
Jansen	Garrett	Wilmington University	
Johnson	Davante	Delaware State University	
Jones	Cameron	Lake Forest High School	
Jones	Marc	Wilmington University	
Kasat	Ishan	Charter School of Wilmington	
Kasat	Vinay	University of Pennsylvania	
Kim	Christina	Charter School of Wilmington	
Kim	Soohan	Dover High School	**
King	Jay	Cape Henlopen High School	
Kuykendall	Addison	Charter School of Wilmington	
Lehman	Patricia	University of Delaware	
Lenges	Klara	Wilmington Friends School	
Leung	Anthony	University of Delaware	
Li	Jesse	Charter School Of Wilmington	**
Li	Yunzhi	University of Delaware	
Lombardi	Grace	Mount Sophia Academy	
Lu	Grant	Charter School of Wilmington	
Lugo	Jaimes	Wilmington University	
Martin	Erik	Wilmington University	
Mashburn	Keely	University of Delaware - AHC	
McFarland	David	Delaware Technical Community College	

Last Name	First Name	School	Top 100/ Scholarship
Morel	Jacob	Caesar Rodney High School	
Morris	Audric	Caesar Rodney High School	
Narayanan	Anirudh	Carnegie Mellon University	
Nebrao	Alexia	University of Delaware	
Parsells	John	Charter School of Wilmington	
Patel	Shree	Wilmington University	
Patel	Vasmi	Delmar High School	
Patino	Jose Antonio	Delaware State University	
Perkins	Priscilla	Delaware Technical Community College	
Perrine	Matthew	Smyrna High School	
Peters	Matthew	University of Delaware	*
Plum	Cole	Charter School of Wilmington	*
Randolph	Luke	Charter School of Wilmington	
Reap	Jaydon	Charter School of Wilmington	
Roberts	John	University of Delaware	
Robinson	Jared	Caesar Rodney High School	
Ruebush	Elliott	Charter School of Wilmington	
Shajpaul	Arya	Charter School of Wilmington	*
Shalk	Alec	Smyrna High School	
Shute	Christopher	Virginia Tech	**
Sobolesky	Jacob	William Penn High School	
Subramanian	Vedant	Charter School of Wilmington	
Swaim	William	Caesar Rodney High School	
Tayal	Arushi	Charter School of Wilmington	
Taylor	Bradley	Charter School of Wilmington	

Last Name	First Name	School	Top 100/ Scholarship
Teixeira	Ron	University of Delaware	
Thongvong	Katina	Dover High School	*
Tran	Brandon	Charter School of Wilmington	
Trunfio	Patrick	Middletown High School	
Wala	Fatema Bannat	University of Delaware	
Walker	Marcus	Cape Henlopen High School	
Wang	Haoda	Charter School of Wilmington	**
Zhang	Jonathan	Charter School of Wilmington	
Zingo	Pasquale	University of Delaware	
	Boris	University of Delaware	
	Brittany	Wilmington University	
	Bryan	Delaware Technical Community College	
	Dell	Wilmington University	
	Dylan	Cape Henlopen High School	
	Jacob	Charter school of Wilmington	
	James	Cape Henlopen High School	
	Jason	Polytech High School	
	Jordan	Appoquinimink High School	
	Kolawole	Delaware Technical Community College	
	Mark	Sussex Technical High School	
	Mohammed	William Penn High School	
	Rebekah	University of Delaware	
	Roshitha	Delaware State University	
	Silvana	Caesar Rodney High School	

Strengths & Weaknesses

Strengths	
Headquarters Base	Moon Base
Forensics	Strings
Cryptography	Sockets
Open-source intelligence	Functions

Weaknesses	
Headquarters Base	Moon Base
Binary	Loops
Programming	Cryptography
Linux	Files

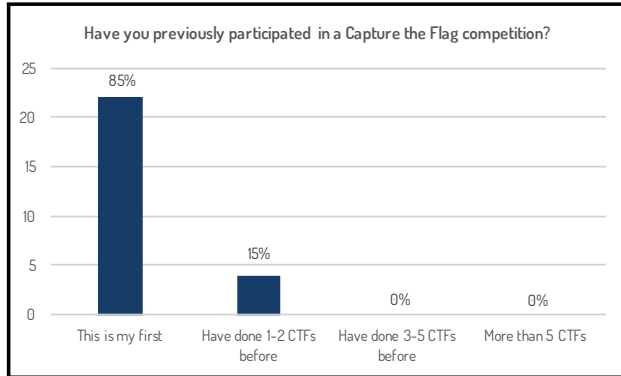
When looking into the types of challenges students in Delaware completed in CyberStart, we can see where their strengths' and weaknesses lie. The above tables show that Delaware students were strongest at forensics in the Headquarters Base and strings in the Moon Base.

There are opportunities to further develop programming skills, such as loops and cryptography, which were weaker in Delaware. The weakest topic in the Headquarters Base was binary however there are already some very developed capabilities that are applicable to security roles. Note that weaker areas do not imply under achievement, merely that those areas provide opportunities to further develop.



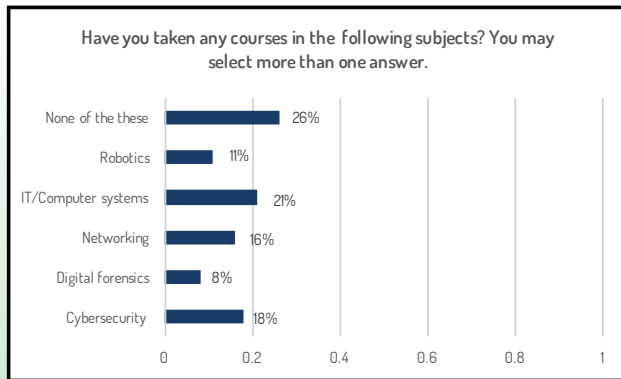
Student Feedback - Previous Knowledge

A survey sent to everyone who played the CyberStart Game asked players for feedback on their previous knowledge, what they had learned, and what they enjoyed most about the program.



These charts demonstrate that most students who played CyberStart Game in Delaware had never been exposed to a Capture the Flag style teaching method. Furthermore, 26% of students had never taken any courses in relevant cybersecurity subject areas.

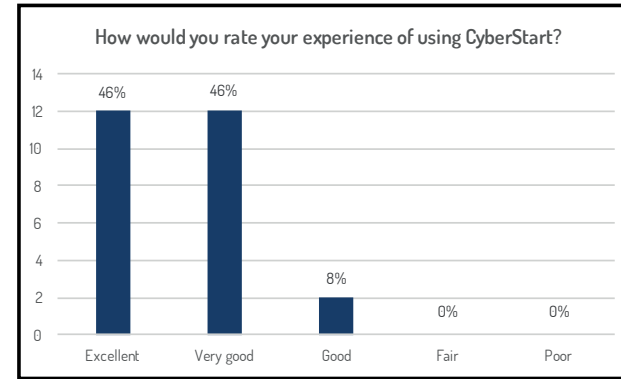
Knowing this, it is encouraging that 47% of players made it through to the CyberStart Game. The program has found very talented students within a group of people that had very little previous exposure to the industry. These encouraging results show the importance of opening the door to as many people as possible.



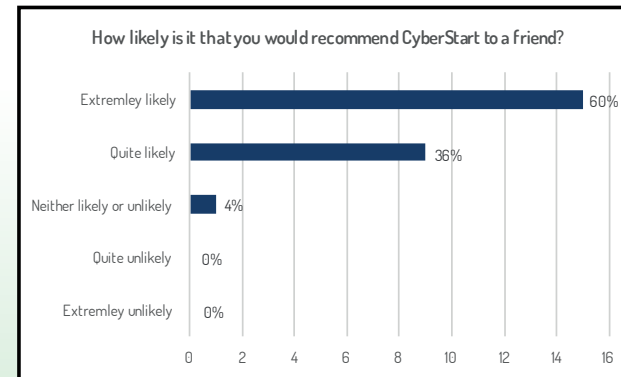
Example Majors of CyberStart Participants:

- Computer science
- Computer and network security
- Economics
- Math
- Engineering
- Physics

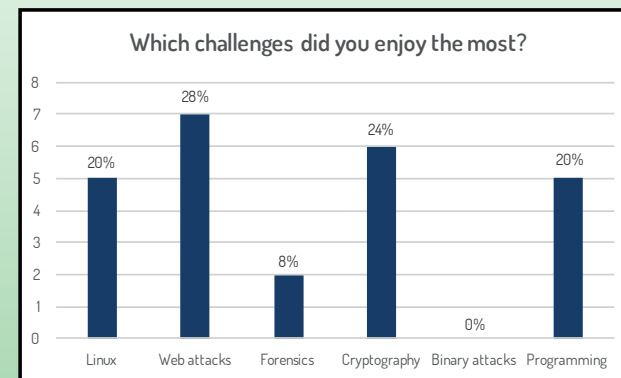
Student Feedback on CyberStart



The response to the tool has shown that the training and teaching in CyberStart has engaged the instinctive ways people learn and identified those who naturally think like a cybersecurity practitioner. These encouraging results reflect the enormous success of the program in engaging with a variety of ages, genders and skill level.

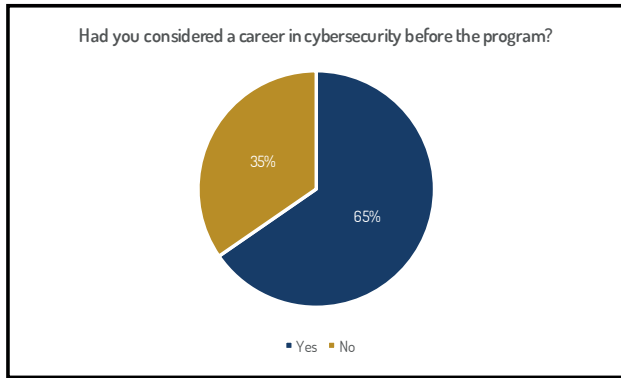


The students' response to the game has been exciting: 92% of students rated the game either "excellent" or "very good," and 96% said they would recommend the program to a friend. Not a single player rated the game "fair" or "poor" or said it was unlikely they would recommend it to a friend.

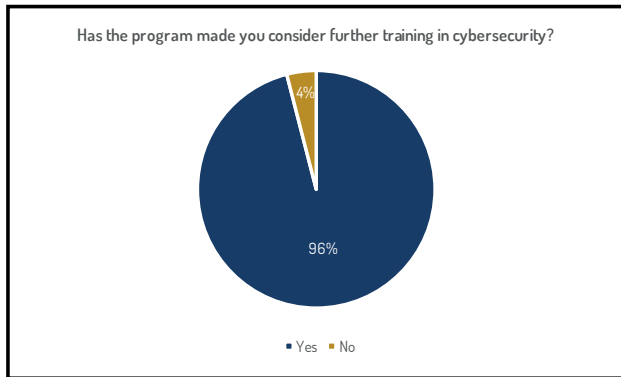


Students in Delaware were most engaged with web attack and cryptography challenges.

Student Feedback on Career Impact

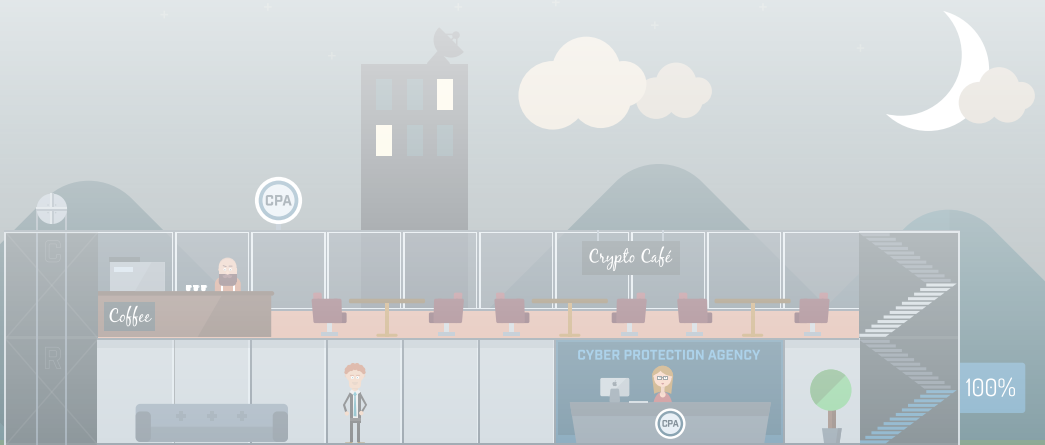


78% of students that answered “no” to considering a career in cybersecurity in the past are now considering further training.



The aim of the CyberStart program is to grow Delaware’s cyber-capable workforce and promote cybersecurity as an exciting and recognized career. These charts support our mission and present a group of young people who are now on the right path to a cybersecurity career.

35% of students had never considered a career in cybersecurity before playing the CyberStart Game. After completing challenges in a variety of cybersecurity disciplines, 96% of students are now considering further training in the area. This is an exciting program result that shows a real step change in reducing the skills gap in Delaware.



Is there anything you would like to say to the governor sponsoring the program?



“Thank you very much for providing an opportunity for students to learn about something that is very important in society. With a more technical world comes a need to develop a more secure world, and this helps with that.”
Anirudh Narayanan, Carnegie Mellon University, College Freshman



“Thank you so much for introducing me to such an interesting realm of computer science.”
Stephen Baione, Polytech High School of Kent County, Grade 12



“I really enjoy what you are doing with this program. I believe it is a great idea to get younger people involved in cyber security. Honestly, when I started this program I did not believe that I would make it as far as I did with only a background in python. My problem solving skills have given me an edge in this competition and I really hope to meet you soon when I make the top 100.”
Allison Ambrose, Delaware State University, College Sophomore



“Thank you for the opportunity to participate in this program! I had no knowledge of the cybersecurity field but I wanted to learn. This program helped me do so.”
Alec Shalk, Smyrna High School, Grade 12



“This is a great program and I hope it helps people now and in the future. I know it helped me a lot!”
Tyler Houle, Salesianum High School, Grade 12



"Thank you thank you thank you! I am so happy that there are opportunities like CyberStart in existence. I am very grateful to have taken a part in this to help further my education."

Tymere Henry, Wilmington University, College Senior

"Thank you so much for sponsoring Cyber Start. This truly was an incredible experience that allowed me to learn so much. I am definitely considering a career in cybersecurity because of this program."

Soochan Kim, Dover High School, Grade 12



"Honestly, I enjoyed it so much I forced my boyfriend to join in on this as well. Hands down I wouldn't change a thing!"

Tymere Henry, Wilmington University, College Senior

"Thank you for this opportunity in giving me a better immersion. I am now very strongly considering cybersecurity as a career path and it is probably my #1 choice right now, so thank you for that."

Shane Armour, Charter School of Wilmington, Grade 11



"CyberStart presents an excellent opportunity for us interested in CyberSecurity to showcase our skills and present what we work so hard to learn in school and on our own. This has been the best CTF I have participated in and definitely hope to get opportunities to play in the future."

Neil Julian Hawkins, Wilmington University, College Junior

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