

Selected for national finals at the world's largest high school cyber defense competition.



CyberPatriot

By Peter Grier

When they heard in January 2011 that they had qualified for nationals the team from tiny Lakewood Christian School in McAlester, Oklahoma, was overwhelmed with emotion.

"You cannot imagine how excited we were when we learned we had made it," says Lakewood coach Sandra Marshall.

The Panthers from Franklin High—a big public school in Los Angeles—felt the same way.

"Just ecstatic," says team member Dante Maybin, a senior, when asked to describe his reaction.

What kind of competition were these squads involved in? Do they play basketball, or run indoor track?

Nope. Both competed in CyberPatriot, the world's largest high school cyber defense competition.

Managed by the Air Force Association and with support from presenting sponsor Northrop Grumman, and other firms including Boeing, SAIC, Raytheon, General Dynamics, Microsoft, and AT&T, CyberPatriot is intended to develop interest in a 21st century field of great national need. Into its third year, and growing fast, it gives teenagers a chance to learn how to protect computer systems against malware, viruses and hackers while competing virtually against their peers.

Some 650 teams entered the 2010 to 2011 CyberPatriot competition, with the top-scoring teams winning all expenses-paid trips to the national finals in Washington, D.C.

The competitive nature of CyberPatriot gives high school students who may not have even known they had interest in cyber systems a chance at the glory usually reserved for interscholastic athletes. It also pushes the members of the five-person teams to reach beyond their



Open Division competitors from Great Plains Technology Center in Lawton, Oklahoma, compete in the National finals.

information technology curriculums and learn as much as they can on their own.

"My students learned more from this than they would have in a class," says Lakewood Christian coach Sandra Marshall, who is also a computer science teacher. "They are out there looking for answers, what do we need to score higher?"

It's no secret that the US needs to find creative ways to bolster the national approach to science, technology, engineering and math (STEM) education. In recent years US students have made some gains in science and math test scores relative to peers in other nations, but they still lag significantly behind much of the rest of the world.

Lagging STEM Scores

For instance, results from the Pro-

gramme for International Student Assessment (PISA) released last December showed Asian students at the top of the international pack, with the US in the middle in science, and near the bottom in math. American educators have long used this test – given to 15 year-olds every three years – to raise alarms about the state of the nation's STEM teaching effort.

In math, Chinese students scored an average of 600 on the latest PISA test. Kids from South Korea, the top-scoring OECD (Organisation for Economic Co-operation and Development) nation, came in at an average 546. US counterparts managed an average of 487—placing them 25th among 34 participating OECD states.

The US STEM problem is so dire that it earned a mention in President Obama's

2011 State of the Union address. To compete in a new world of fast-changing technology, nations such as China and India are educating their kids earlier and longer, with a particular emphasis on math and science, Obama stated.

“We need to teach our kids that it’s not just the winner of the Super Bowl who deserves to be celebrated, but the winner of the science fair,” expressed the president.

CyberPatriot aims to do just that. The contest began as an Air Force Association educational outreach effort in 2009. The prototype event—held at an AFA symposium in Orlando that February—was won by a team of Air Force Junior Reserve Officer Training Corps (JROTC) cadets from Kissimmee, Florida’s Osceola High School.

Technical Zeal

The teens of Osceola’s “Team Spaatz”, named for Air Force pioneer Gen. Carl Spaatz, erupted in fist-bumping celebration when the results were announced. The noise was so loud that exhibitors in a nearby hall wondered what was going on.

AFA officials figured they were on to something. After the eight-team trial run, CyberPatriot was quickly expanded to a nationwide effort for the 2009 to 2010 school year. Entrants included more than 200 teams from high school JROTC and Civil Air Patrol units in 44 states.

The winner of CyberPatriot II was “Team Doolittle,” from Clearfield High School in Utah. (The team was named for World War II hero Jimmy Doolittle.)

CyberPatriot III expanded even further with an Open Division for teams that are not associated with JROTC or CAP. More than 150 teams from public, private and home schools signed up to compete.

In many high schools there just are not many opportunities for technically inclined students to join in group activities or compete in any way, said Gregory B. White, director of the Center for Infrastructure Assurance and Security at the University of Texas, San Antonio, one of the founding partners of CyberPatriot.

“There are a few events out there, like robotics competitions, but they are so expensive to get into,” said White. “CyberPatriot provides an opportunity for these students.”

Moreover, cyber defense is an area of great national need. The US has the largest economy and one of the largest militaries in the world. Both are heavily dependent on smooth operations of advanced computer systems.

Yet an assault on these networks can



NJROTC cadets from Ramona High School in Ramona, California, compete in the Semifinals of the All Service Division in Orlando, Florida.

be mounted by anyone who has enough knowledge and a high-speed connection to the Internet.

“We have to have a better-prepared population to deal with the threats that we’re handed,” said Maj. Gen. Michael Basla, Vice Commander of Air Force Space Command, in a meeting with reporters last year.

CyberPatriot is the kind of education effort that the US needs to help develop a base of computer defense scientists for the 21st century, Basla said. He noted that hundreds of teams from high schools around the country have signed up for the CyberPatriot challenge.

“That’s just great news,” he added.

Open to All

CyberPatriot is not in any way a military recruitment effort, though. Currently it is split into two parallel competitions. There is an All Service Division for JROTC and CAP teams, which ends with five teams traveling to Washington to compete for a Commander-in-Chief’s cyber defense cup. The Open Division, in contrast, is open to any high school across the country with interested teens. Competitors are limited to five per team, with an adult coach. A \$350 entry fee helps defray the cost of software provided to all teams and trips to Washington for the teams that qualify for the championship round.

CyberPatriot III’s finals took place March 31 through April 1 at the Gaylord National Convention Center at National Harbor in suburban Maryland. The finalists come from every region of the country. They range in size from tiny private schools such as Lakewood to big

urban campuses such as LA’s Franklin.

To reach the last round winners have had to survive three preliminary rounds—each virtual competitions in which students battled from home school classrooms. At the appointed time, teams downloaded identical simulated computer networks pre-configured with security problems. They then raced to patch the holes and guard against further intrusions, while a central CyberPatriot computer kept score in real time.

In essence, the students were doing the same thing that real network administrators do on a daily basis.

“The very first thing you do is protect your password. You want to make sure it’s properly encrypted,” said Daniel Hernandez, Franklin High senior and CyberPatriot team member. “Then you delete guest accounts and anything else you don’t need that could be a back door into your computer.”

Next you run anti-malware software, and then you stand guard. The virtual networks contained pop-up attacks that proved difficult to eradicate at first go-round. In the second preliminary round in December 2010, one sleeper virus resisted erasure by typical methods; the Franklin team had to shuffle through all the defense methods at their disposal before they finally got it.

“We were learning new stuff on the spot because we saw things we hadn’t seen before,” said Franklin senior and team member Dante Maybin.

That is one aspect of CyberPatriot that a number of team members and coaches repeat: it is a learning tool that stretches students because it pushes them to race



Competitors from Park Tudor School in Indianapolis, Indiana.

out and look for knowledge themselves, outside of school curriculums.

"You have to motivate yourself. You only learn as much as you want to learn," said Maybin.

Tiny Lakewood Christian's team had no choice. The school's computer classes are focused on teaching application programs. The student body is so small—about 50 high school kids—that coach Sandra Marshall knew she was not going to be able to recruit five classic teen computer geeks.

What she needed were five kids who could think outside the box so they could take a creative approach to problems.

"We can do that," Marshall said. "We may not have the greatest IT skills but we have the ability to go out and answer the question, 'what is this?'"

Oklahoma's Rose State College had sent out a letter recruiting state teams for the CyberPatriot competition, which is how Marshall heard of the competition in the first place. A computer science professor from Rose State offered some cyber defense training, which helped immensely.

The Lakewood team checked out every book in their school library remotely related to the subject. They scoured the Internet for answers to particular problems.

"The students just took it upon themselves to embrace this," said Marshall.

The fact that CyberPatriot is a competition—with a trip to Washington and prizes such as scholarship money, a trophy and bragging rights at stake—was a big motivator for many teams. CyberPatriot may not be a spectator sport. It features students sitting still and working

at computers for hours, as opposed to running up and down a court, shooting baskets. But it is still intense. During the preliminary rounds, teams exchanged trash talk, hints, and questions on the CyberPatriot Facebook page as they thrashed through their cyber defense problems.

"The competition is great. I like meeting new people. It gets you into this computer community," said Hernandez, the Franklin High senior.

It also won many kids some recognition. At Franklin, after every round the CyberPatriot team's progress was announced to the whole school on the PA. In San Antonio, Texas—which is trying to promote cyber defense as a regional economic focus—they went even further. The mayor bestowed custom leather jackets and scholarship money on the CyberPatriot team from local Alamo Academies after it won a spot in the Washington final round.

Techy Awareness

"CyberPatriot gives kids who are not often given the opportunity to demonstrate their ability a chance to do that," says Dwayne Williams, Associate Director of the Center for Infrastructure Assurance and Security at UTSA. "They're not guys on a football field. This gives them a national-level chance to compete with their peers."

And unlike football and other competitive high school sports, cyber defense

contests offer participants a greater chance at winning scholarship money or developing a professional career. A tiny sliver of the nation's high school quarterbacks ever play in the NFL. Yet given the exploding need to protect the nation's computer systems from hackers—both bored loners and organized teams of foreign intruders—pretty much every teen with CyberPatriot experience can go as far as they want.

"If they want to be involved in cyber security IT and pursue it as a career, it is totally open to them," says Williams.

Even if they are not sure they want to turn pro, participants in CyberPatriot learn practical skills that can help them as they move up the educational ladder. One of those skills is the ability to work as a team on a technical problem. As a group, they have to stop, think, and work their way through obstacles.

"It teaches you the process of, let's step this problem out and see if we can come to a solution," said Sandra Marshall of Lakewood.

The contest also forces them to expand their technical knowledge to include aspects of different generations of Windows operating systems, as well as Linux.

Hernandez says he is not sure he wants to be a cyber defense professional, though it is an option. He says he prefers creative endeavors like making programs that help movie production.

But in a world where viruses lurk behind every suspect website, "it's a really useful tool to learn to fix your own computers," he pointed out.

And Franklin High will continue to field a cyber defense team next year, after Hernandez and his fellow seniors graduate. Success in CyberPatriot has spread the word through the school, and now, according to the team's coach, Benjamin Fernandez, kids have already approached him, asking what they need to do to qualify to join.

"There is nothing bad about this. Kids get to learn about something that could possibly be a future career. They get to learn something about computers, and possibly win (scholarship money) in the process. I don't see anything downside," says Fernandez. ■

To learn more about the Air Force Association's CyberPatriot, visit www.uscyberpatriot.org.

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