Summary Report from the

Young Scholars 2008 Programs

IA/IS and Digital Forensics

Applied Research Lab, Howard County, MD
June 30- July 18th

Kenmoor Middle School, Prince George's County, MD
July 14th through 25th

ETPRO CyberWATCH Subcontract Deliverables by Year Update

YEAR 3

ETPRO delivered its *Young Scholars Program: IS/IA and Digital Forensics* at two locations in Maryland the summer of 2008. The Howard County Program took place at the Applied Research Lab, in Ellicott City, MD from June 30th through July 18th. The Prince George's County Program took place at Kenmoor Middle School from July 14th through 25th. A third program was scheduled to run at Joppatowne High School, in Harford County, however, due staff scheduling and last minute county professional development, the program was postponed. It was unfortunate as there were 14 signed up, however, as with all counties, requirements for staff support, nurse on call and other requirements made it impossible with the county's PD trumping. While we are planning ahead with Harford County, for the Summer 09 program, we are also exploring a winter short course to replace it. In addition, this year we piloted a similar program at the elementary school level, at Dayton Oaks Elementary School, in Howard County. The program ran from January 08 through May 08 on Mondays after school. The program was a great success and will continue in the Fall of 08.

The Howard and Prince George's programs focused on activities that highlighted topics in cybersecurity to illustrate the needs to operate in a secure manner and to emphasize the exciting opportunities in this field. Students engaged in hands-on computer activities and learned about digital literacy (technology fluency and applications, team building, collaboration tools, problem based critical thinking), defending against viruses, Trojan Horses, and worms; and applying basic security concepts through gaming, modeling and simulation development, while investigating exciting careers that interconnect the fields of science, math, technology, and computer security. Students also discussed and explored such topics as cryptography, system vulnerabilities, and careers in computer security and digital forensics. Tours of local labs, NSA and NIST were also conducted, and students had the opportunity to hear from a variety of speakers from state and federal agencies and local security companies.

The Cyberwatch Grant supported a total of 81 students. 18 students attended Program I at the Applied Research Lab, 40 attended Program II at Kenmoor Middle School, and 23 attended the Pilot elementary program.

Name	Grade	Gender	Ethnicity
William	11	M	African-American
George	10	M	Asian
Thomas (TJ)	11	M	White
Andre	11	M	White
Alex	11	M	White
Jordan	10	M	African-American
Ted	11	M	White
Daniel	10	M	Asian

Jon	10	M	Indian/Asian
Miles	11	M	African-American
Jerin	10	M	White
Srihari	9	M	Indian/Asian
Allan	10	M	White
Pratik	11	M	Indian/Asian
Dale	11	M	Asian
Jerusa	11	M	African-American
Jason	11	F	African-American
Jamea	12	F	African-American

Table 1: Participants at Applied Research Lab

Richard Marquart and Lee Summerville, STEM Program Co-Directors of Howard County Public Schools organized the recruitment of students and advertising through the local school system. Recruitment was done by posting summer program options on the county website http://www.hcpss.org/ and internally through schools distributing to parents. The Flyer is listed in the Appendices.

Recruitment for Program II was done through Prince George's County Schools and The Patriots Technology Training Center (PTTC), a non-profit foundation committed to promoting technology-related careers.

STUDENT	Grade	Gender	Ethnicity
Desiree	10th	F	African American
Aretha	10th	F	African American
Dewan	9th	M	African American
Jailah	10th	F	African American
Brandon	11th	M	African American
Tyronne	8th	F	African American
Maurice	11th	M	African American
Brianna	10th	F	African American
Kwamie	10th	M	African American
Marques	10th	M	African American
Antonio	10th	M	African American
Nakida	8th	F	African American
Rhashan	9th	M	African American
Marcus	11th	M	African American
Raymone	10th	M	African American
Diondre	8th	M	African American
Sean J	10th	M	African American
Miles	8th	M	African American
Sean B	8th	M	African American
Tiffany	9th	M	African American

Tyree	8th	M	African American
Latisha	10th	F	African American
Kee	10th	M	African American
Trenton	8th	M	African American
Jordon	9th	M	African American
Takeisha	10th	F	African American
Roshaun	10th	M	African American
Shaquille	8th	M	African American
Corentine	11th	F	African American
James B	9th	M	African American
BeBe	9th	M	African American
Daniel	10th	M	African American
James W	9th	M	African American
Lashanna	9th	F	African American
Laticia	10th	F	African American
Tavarius	9th	M	African American
Jariah	9th	F	African American
Dewayne	10th	M	African American
Tamarr	9th	M	African American
Nakeisha	10th	F	African American

Table 2: Participants at Kenmoor Middle School

STUDENT	Grade	Gender	Ethnicity
Patrick	4	M	White
Travis	4	M	White
Tanzer	4	M	White
Jake	5	M	White
Brandon	5	M	Asian
Sammy	5	M	Asian
Aaron	5	M	White
Jessica	5	F	White
Brent	4	M	White
Jason	5	M	White
Cailean	5	M	White
James	5	M	Asian
Ryan	4	M	Asian
Brianna	5	F	White
Richard	4	M	White
Christine	5	F	White
Chris	5	M	White
Jake	5	M	White
Silas	5	M	Indian/Asian
Allison	4	F	White
Brittany	4	F	African American

Emily	4	F	White
Kassie	5	F	African American
Zoe	5	F	African American

Table 3: Participants at Pilot Elementary Program at Dayton Oaks Elementary in Howard County

Overview

The purpose of SLT is to foster excellence in 21st century skills which will help students succeed in college/careers, and prepare themselves with the skills necessary to meet the shifting and constantly changing demands of the future workplace. The program provides a means to explore technology applications essential to college success while also focusing on career possibilities that connect engineering, science, math and technology. Critical need areas are emphasized such as IT/IA and cybersecurity/computer forensics with a special focus on exposing students to the plethora of career opportunities in cybersecurity and information assurance—a critical need area for this region.

Students participate in cutting-edge technology projects, robotic activities, and Logo-based computer learning environments in a hands-on setting, offering new technology skills, problem solving design challenges and field trips.

A number of mini-assignments and projects focused around cybersecurity issues. These included:

- Using Microworlds (a Logo based software package) to build an interactive and/or multi-media story that discusses different facets of cyberethics or cybersecurity. The final project should be "kid friendly" and interesting—while still getting "a message across".
- StarLogo — create a simulation illustrating the dangers of computer viruses on the Internet. Simulate computers with and without virus protection, and include variables such as aging of the virus protection, new viruses, and exponential growth of the viruses as they spread across the network.
- Cybersecurity "game" built in Excel
- Cryptography exercises

HOWARD PROGRAM OVERVIEW

Embedded within the three week content session were three field trips and several speaker sessions. The first field trip included a tour of the National Institute of Science and Technology (NIST), in Gaithersburg where students were first briefed by Dr. *Chris Johnson* from the *Computer Security Division* in the *Information Technology Laboratory* on Vulnerabilities and Threats and his journey in the field of Cybersecurity. Students then were split into two groups and rotated through several research labs. *Dr. Cindi Dennis, from the Metallurgy Division, Materials Science and Engineering Laboratory,* discussed Magnetism, and how it plays out with digital forensics and cybersecuirty. Students then visited beams from the NY Twin Towers. *Dr. Sammy Ho,* from the *Manufacturing Metrology Division of the Manufacturing Engineering Laboratory* shared the

connections between the Twin Towers tragedy and Information Assurance. For the second field trip students visited the National Security Agency's Cryptologic Museum organized by curator Jennifer Wilcox. The tour began with speakers discussing NSA employment and opportunities as well as additional options such as summer programs and internships. The tour then allowed students to see artifacts that sustain the history of the cryptologic profession. Students were able to hear about some of the most dramatic moments in the history of American cryptology: the people who devoted their lives to cryptology and national defense, the machines and devices they developed, the techniques they used, and the places where they worked. Student favorites included the Slave Quilt, Biometrics Exhibit, Code Talkers and the Enigma machine. A third all day field trip to the Lazarus Foundation gave students the opportunity to take apart and put back together a computer. Additional speakers in the Howard program included Sgt. John Casey from the Maryland State Police from the Computer Crimes Section/Computer Forensics Lab shared Internet safety tips as well as an overview of careers in Digital forensics. Vonda Williams from Woods Consulting in Fulton Maryland spoke to the students about career paths in Information assurance, security clearances and internships with her company.

Young Scholars Summer Program

National Institute of Standards and Technology
July 8, 2008

10:00 a.m. Meet in the Administration Building (101) lobby
Greetings by Barbara Cuddington and Sharon Seide, Public and Business Affairs

Walk to Lecture Room B

10:05 a.m. - Vulnerabilities and Threats, *Chris Johnson*, *Computer Security Division,* 10:30 a.m.
Information Technology Laboratory

The students will be split into two groups. Each group will see the same labs but in a rotating order.

Magnetism*, Cindi Dennis, Metallurgy Division, Materials Science and Engineering Laboratory*

World Class Calibration, *Sammy Ho, Manufacturing Metrology Division, Manufacturing Engineering Laboratory*

Group 1

10:30 a.m. Walk to the Materials Building (223), Room B143

10:40 a.m. Magnetism*, Cindi Dennis, Metallurgy Division, Materials Science and Engineering Laboratory*

11:05 a.m. Travel by bus to the Engineering Mechanics Building (202), Room 227

11:15 a.m.	World Class Calibration, *Sammy Ho, Manufacturing Metrology Division, Manufacturing Engineering Laboratory*
11:40 a.m.	Travel by bus to the Administration Building (101), Lecture Room A
11:50 a.m.	SURFing at NIST, *Lisa Fronczek, Manufacturing Engineering Laboratory Office*
12:00 noon	Depart NIST

Group 2

10:30 a.m.	Travel by bus to the Engineering Mechanics Building (202), Room 227
10:40 a.m.	World Class Calibration, *Sammy Ho, Manufacturing Metrology Division, Manufacturing Engineering Laboratory*
11:05 a.m.	Travel by bus to the Materials Building (223), Room B143
11:15 a.m.	Magnetism, *Cindi Dennis, Metallurgy Division, Materials Science and Engineering Laboratory*
11:40 a.m.	Walk to the Administration Building (101), Lecture Room A
11:50 a.m.	SURFing at NIST, *Lisa Fronczek, Manufacturing Engineering Laboratory Office*
12:00 noon	Depart NIST

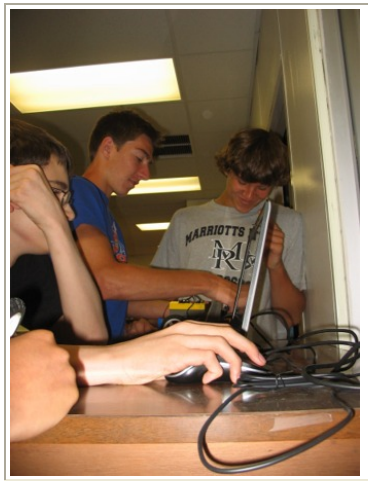
Field Trips

Can Do Challenge





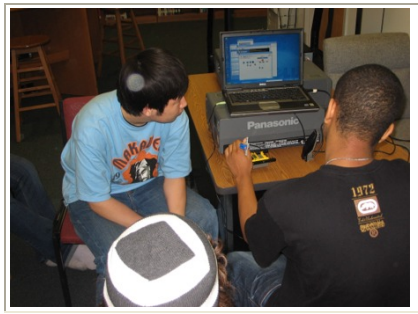


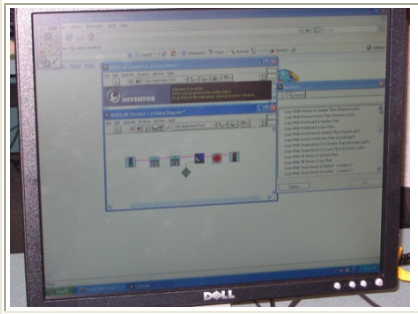









Panasonic


DELL

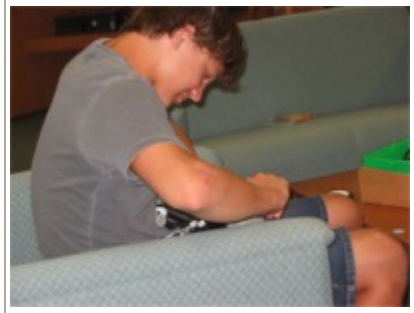


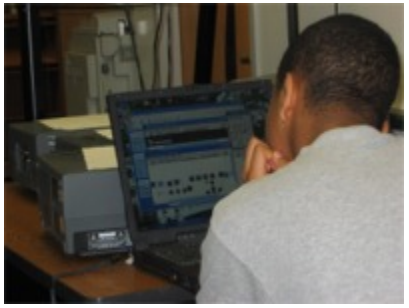


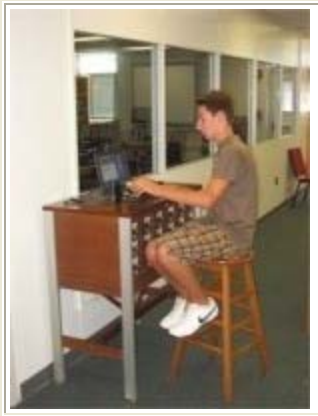




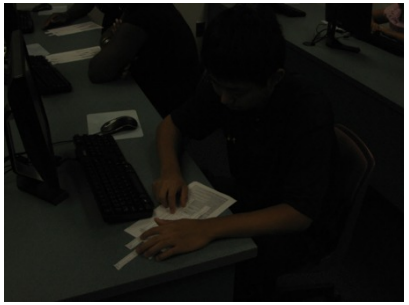


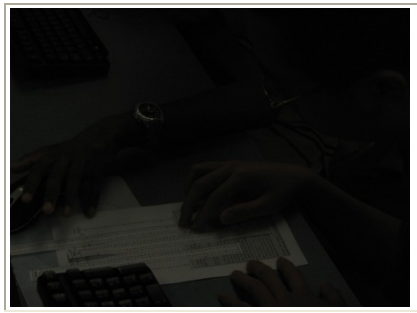



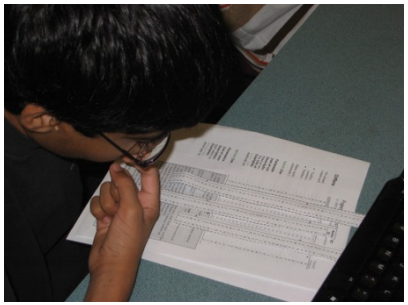



National Cryptologic Museium & Enigma Machine













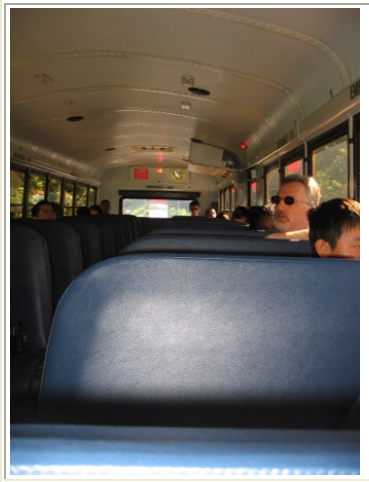
SIGNAL INTELLIGENCE SERVICE
"MAGIC"

THE BATTLE OF MIDWAY

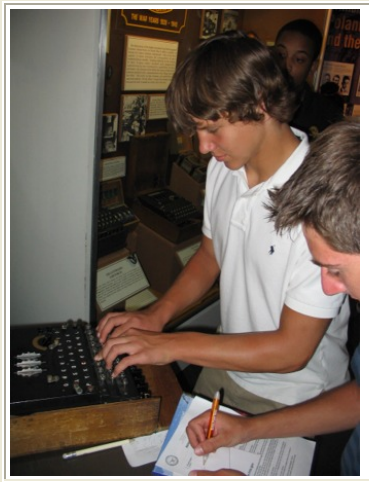
CHEOM FIELD TELEPHONE
COMMUNIST MEMORABILIA







EMERGENCY EXIT

Lazarus Foundation

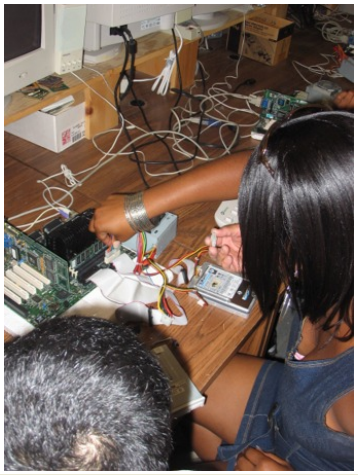
			





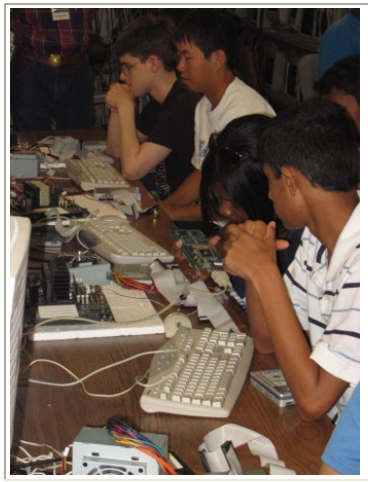


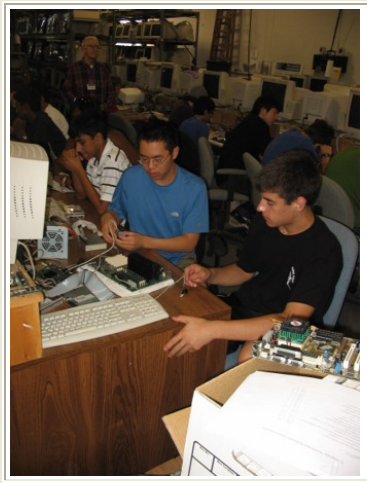
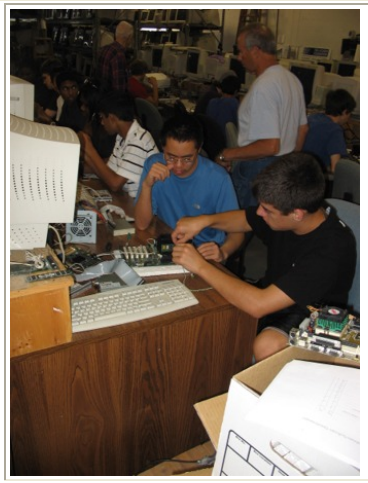




HOLLISTER

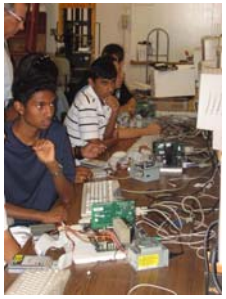
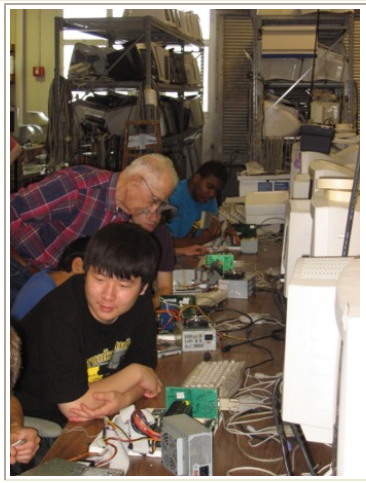
			
			

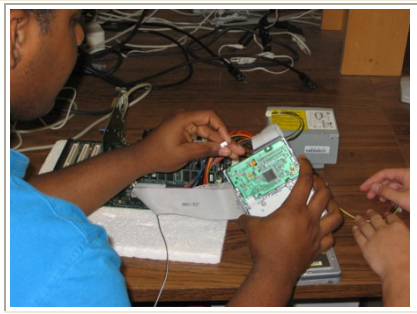
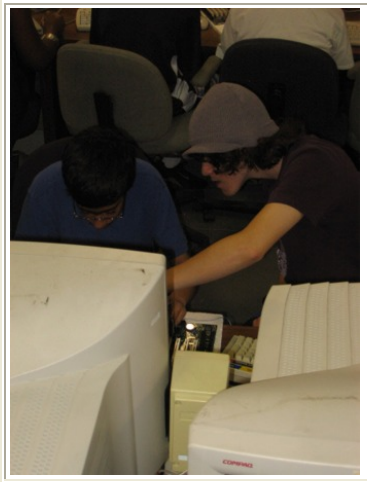
















CREATIVE





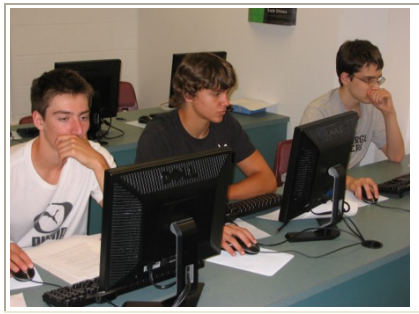


Microworlds



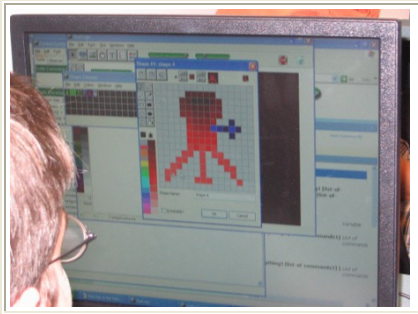
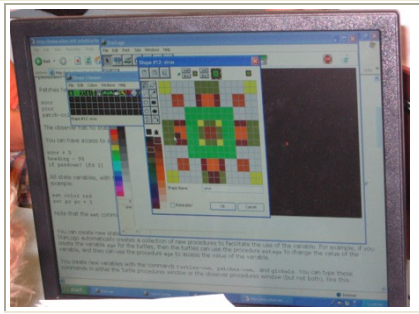
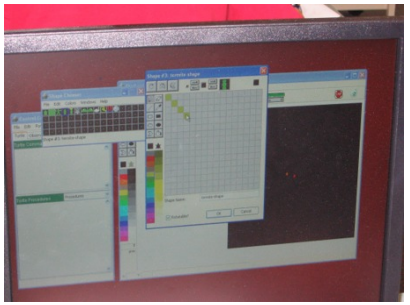






Work Cultures

Lego Robots




NIST









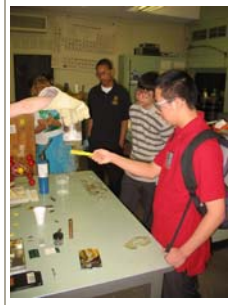






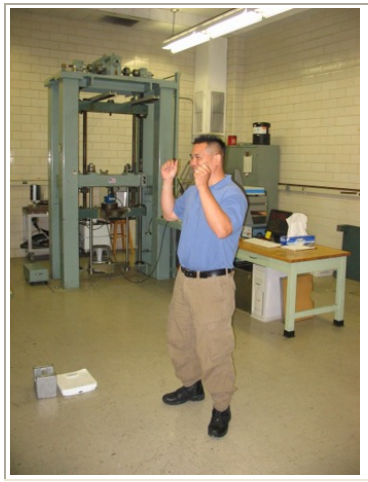






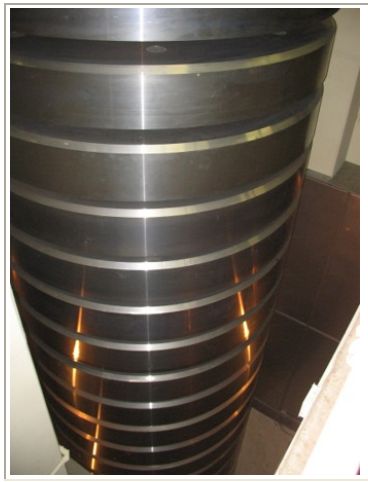




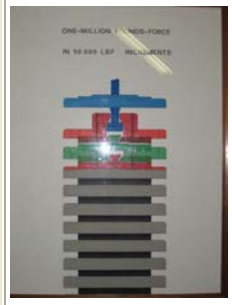








2008 Course Outline/Schedule

	Week 1	Week 2	Week 3
Monday 6/30 7/7 7/14	**Session 1:** **AM** ▪ Welcome & Logistics ▪ Overview ▪ Introduction to MicroWorlds™ for multimedia creation ▪ LOGO language: Differences between functional & imperative programming languages ▪ Lisp dialect **PM** ▪ Skill Development with MicroWorlds™	**Session 6:** **AM** ▪ Show and share MicroWorlds Products ▪ Simulations/Gaming in Excel & PPT ▪ Project Development **PM** ▪ Project Development ▪ StarLOGO Challenges	**Session 11:** AM ▪ Cryptography activities PM ▪ LEGO® Robotics challenge 1
Tuesday 7/1 7/8 7/15	**Session 2:** **AM** ▪ Logo Skills Continued ▪ Indiv/Group Animated Story **PM** ▪ 2 Task Challenges	**Session 7:** **AM** **PM** ▪ NIST Field Trip Box lunches will be provided	**Session 12:** ▪ Project development ▪ National Cryptologic Museum Field Trip 10—12:15 Box lunches will be provided
Wednesday 7/2 7/9 7/16	**Session 3:** **AM** ▪ MW Task Challenges **PM** ▪ Simulation/Game Development in MicroWorld	**Session 8:** **AM** ▪ Simulations/Gaming in Excel and PPT **PM** ▪ Introduction to Cryptography	**Session 13:** AM ▪ Robo Challenge1 & 2 ▪ *Computer 101 site visit* Lazarus Foundation PM ▪ Team Project Trial Presentations
Thursday 7/3 7/10 7/17	**Session 4:** **AM** ▪ Logo Skills Continued **PM** ▪ Introduction StarLOGO ▪ StarLOGO Challenges	**Session 9:** **AM** ▪ Cryptography Challenges **PM** ▪ *Guest Speaker Vonda Williams Woods Consulting*	**Session 14:** **AM** *Guest Speaker*- Sgt. J. Casey, Maryland State Police Computer Crimes Section/Computer Forensics Lab **PM** Open source software Robo Challenge 3 trials
Friday 7/4 7/11 7/18	**Session 5:** HOLIDAY NO CLASS	**Session 10:** **AM** ▪ Introduction to LEGO® Robotics **PM** ▪ Project Development	**Session 15:** AM Robo Challenge **Lunch for participants & guests** **PM** ▪ **Closing Activities**

Embedded within the three week content session were three field trips and several speaker sessions. The first field trip included a tour of the National Institute of Science and Technology (NIST), in Gaithersburg where students were first briefed by Dr. *Chris Johnson* from the *Computer Security Division* in the *Information Technology Laboratory* on Vulnerabilities and Threats and his journey in the field of Cybersecurity. Students then were split into two groups and rotated through

several research labs. *Dr. Cindi Dennis, from the Metallurgy Division, Materials Science and Engineering Laboratory,* discussed Magnetism, and how it plays out with digital forensics and cybersecuirty. Students then visited beams from the NY Twin Towers. *Dr. Sammy Ho,* from the *Manufacturing Metrology Division of the Manufacturing Engineering Laboratory* shared the connections between the Twin Towers tragedy and Information Assurance. For the second field trip students visited the National Security Agency's Cryptologic Museum organized by curator Jennifer Wilcox. The tour began with speakers discussing NSA employment and opportunities as well as additional options such as summer programs and internships. The tour then allowed students to see artifacts that sustain the history of the cryptologic profession. Students were able to hear about some of the most dramatic moments in the history of American cryptology: the people who devoted their lives to cryptology and national defense, the machines and devices they developed, the techniques they used, and the places where they worked. Student favorites included the Slave Quilt, Biometrics Exhibit, Code Talkers and the Enigma machine. A third all day field trip to the Lazarus Foundation gave students the opportunity to take apart and put back together a computer. Additional speakers in the Howard program included Sgt. John Casey from the Maryland State Police from the Computer Crimes Section/Computer Forensics Lab shared Internet safety tips as well as an overview of careers in Digital forensics. Vonda Williams from Woods Consulting in Fulton Maryland spoke to the students about career paths in Information assurance, security clearances and internships with her company.

KENMOOR MIDDLE SCHOOL PROGRAM

WEEK 1
July 14th through 25th

Monday, July 14, 2008
- Welcome & Logistics
- Overview
- Introduction to MicroWorlds™ for multimedia creation
- LOGO language: Differences between functional & imperative programming languages
- Lisp dialect
- Skill Development with MicroWorlds™

Tuesday, July 15, 2008
AM
- Logo Skills Continued
- Indiv/Group Animated Story

PM
2 Task Challenges

Wednesday, July 16-Thursday 17, 2008
Naval Research Warfare Center (NAVSEA) personnel worked with students to build and program rockets and robotics and develop a scientific "egg drop" experiment. Each student received a Workbook that contained a schedule and details of the daily training sessions.

The overall objective entailed a robotic challenge, rocket launch and the egg drop contest. The students were divided into teams consisting of 5-6 members that competed in these challenges.

Robotic Challenge – Students were exposed to 8 robotic challenges. The challenges occurred within an 8ft x 8ft challenge board. Two robotics kits and two computers were given to each team to complete each task. Team members were either a programmer or a builder of the robotic which performed mission challenges. Upon meeting requirements, team were awarded a mission completion card which demonstrated their ability to successfully program the robotic.

Egg Drop Experiment – Each team of students worked with the construction of a protective device to prevent an egg from cracking when it was dropped at specified heights. The winning team(s) was given the egg flag to put on the challenge board.

Friday, July 18, 2008
Students participated in a training session on "How to Conduct Research Using the Internet". Students were instructed on how to use search engines, narrowing a search using queries, how to cite information from the internet to avoid plagiarism and synthesizing information to compile a report.

Students were able to navigate the internet in order to retrieve specific information and filter essential information and develop language that indicates original thought in order to create a document that informs the target audiences. The topic was researching engineering and computer science programs. Question prompts included: what different type programs are there? what different degree programs and opportunities are there? how can a student prepare? what scholarships are available? Students also researched and explored the site locations where they would be visiting and job shadowing the following week.

WEEK 2
July 21- July 25th, 2008
During the second week of the YSP high school students experienced three days of job shadowing at various IT and security business locations. These included APPTIS, Convergence, INGENIUM Corporation, The National Academies, US Department of Transportation, BAE Systems, US Department of Energy, and Solvern Innovations. Middle school students worked on specific Digital Fluency activities including working with animations, sounds and video in PPT, Excel spreadsheet, gaming with Excel and utilizing open source software NetLogo and StarLogo.

The last two days of week two all students participated in cryptography exercises. Students used both a cipher wheel and an "paper" enigma to both encode and decode a variety of exercises. Students were introduced to the field of "intelligence" and information insurance and the role of crytpgraphy in IT.

Lessons Learned

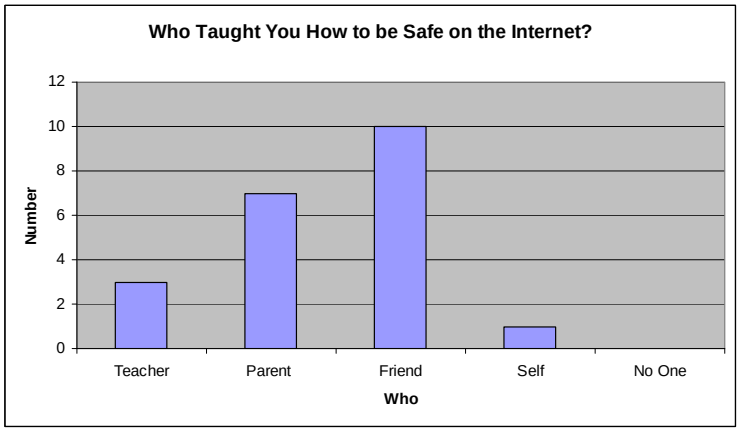
The program in Howard County was highly successful with support from both the school system (central office and the newly formed STEM office) and parental support. Efforts are underway to place a few up-coming seniors from the Howard program into internships for the 2009 summer.

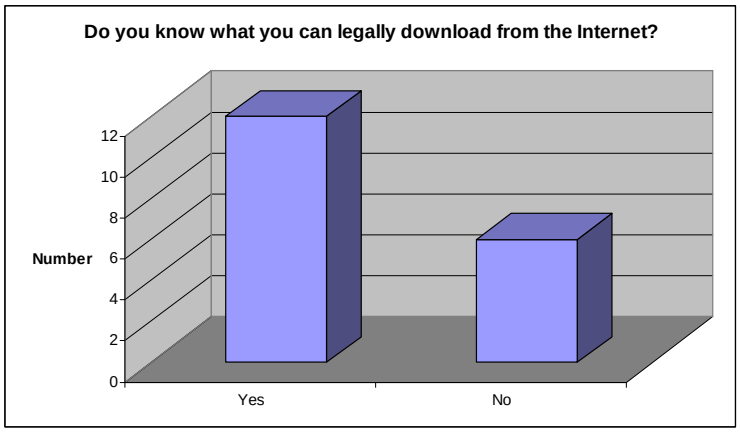
While in-roads were made with Harford county regarding the awareness and understanding about "what" IA/IS and Digital Forensics includes, Harford has only one point person to handle STEM activities and programs. Additional efforts and help regarding recruitment and logistics in terms of open calendar dates will be needed from our group in order to move the program forward in the future.

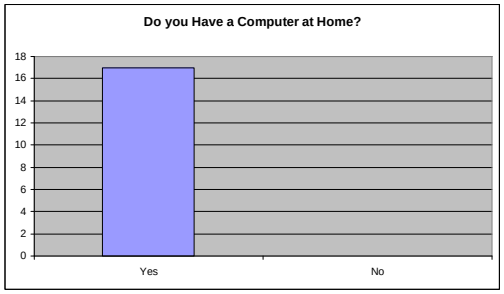
Several lessons learned from 2007 were applied to the 2008 Prince George's program. The program again proved to be invaluable in reaching a larger number of minority students. At the same time, a continued concern surfaces regarding the large number of students at one time and the wide age groups. Arrangements were to be put into place with the partnering group, to hire additionally staff to help monitor the students. Staff were to briefed beforehand regarding the CW content. The idea was to break the larger groups into small sub-groups, by ages, and rotate through a variety of activities. We were surprised to find out a week prior to the program - only 1 staff member had been hired to monitor the 40 students. ETPRO therefore, had to quickly hire additional GA's to deliver the program content.

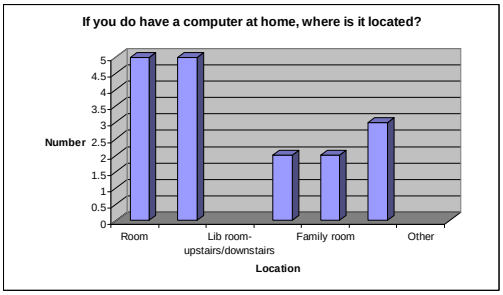
Summary Evaluations from the Attendees

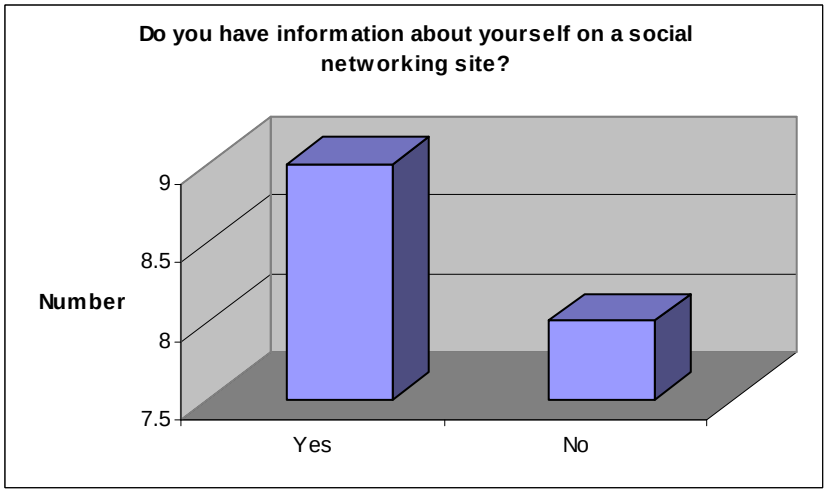
Lazarus Cybersafety-Cyberethics Questionnaire

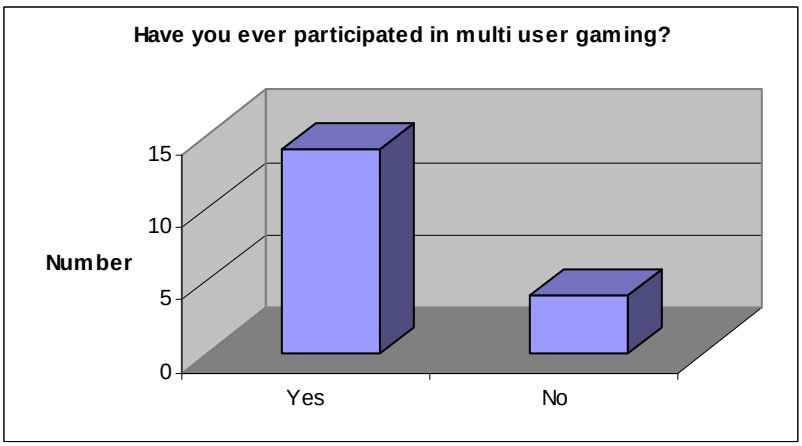


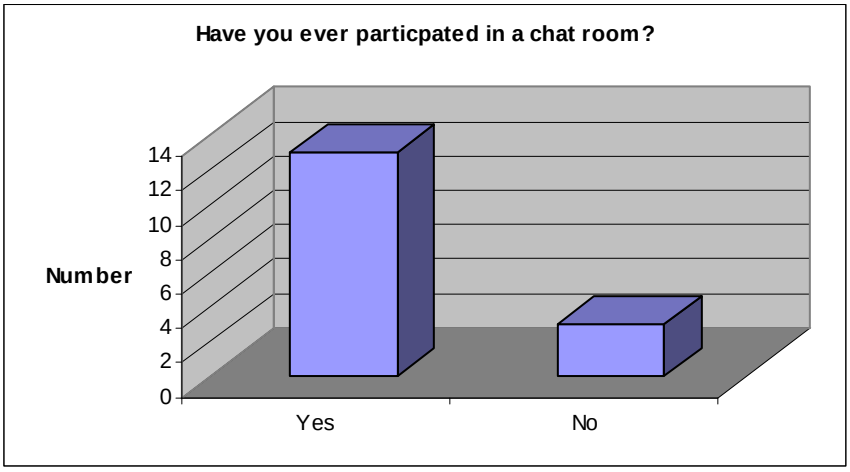

Do you know what you can legally download from the Internet?
Number
12
10
8
6
4
2
0
Yes
No

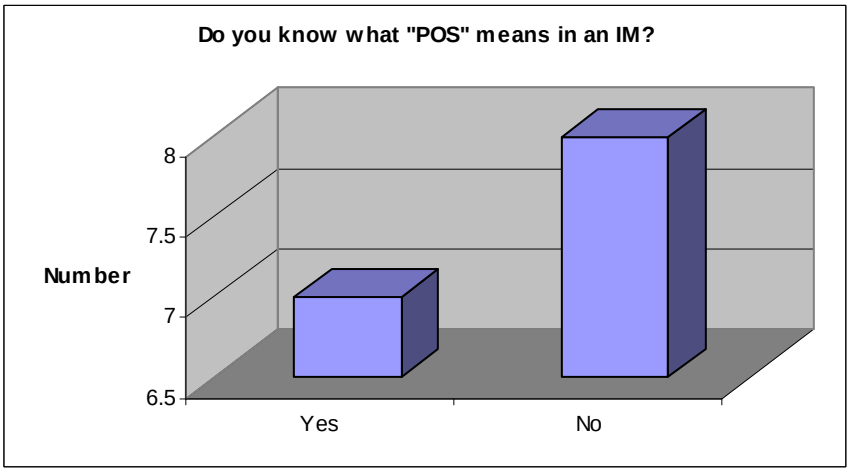

Do you Have a Computer at Home?
18
16
14
12
10
8
6
4
2
0
Yes
No

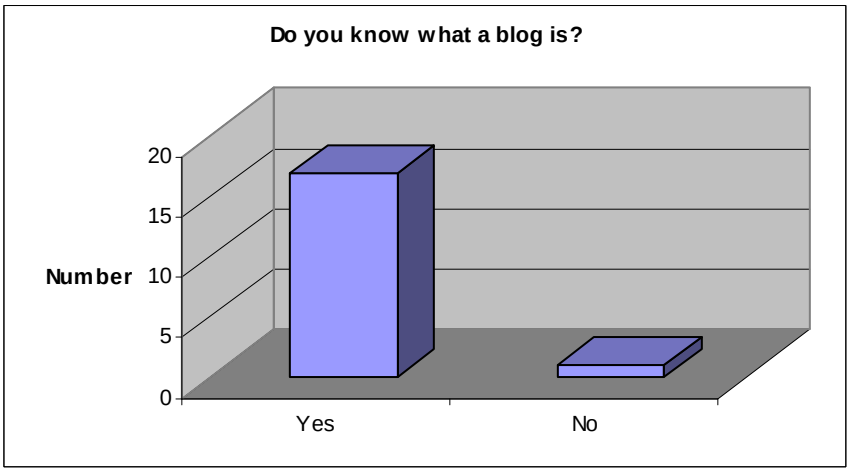

If you do have a computer at home, where is it located?
Number
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Room
Lib room-upstairs/downstairs
Family room
Other
Location

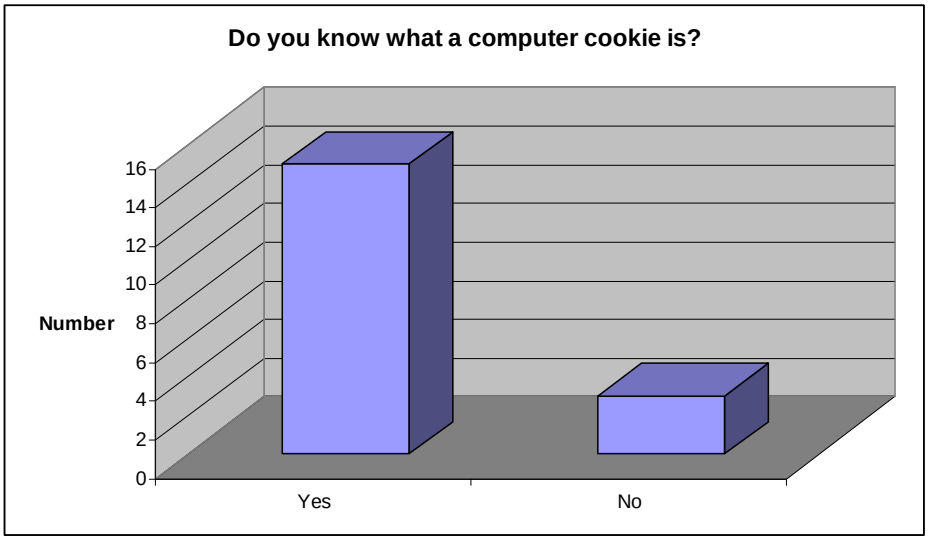

Do you have information about yourself on a social networking site?
Number
9
8.5
8
7.5
Yes
No

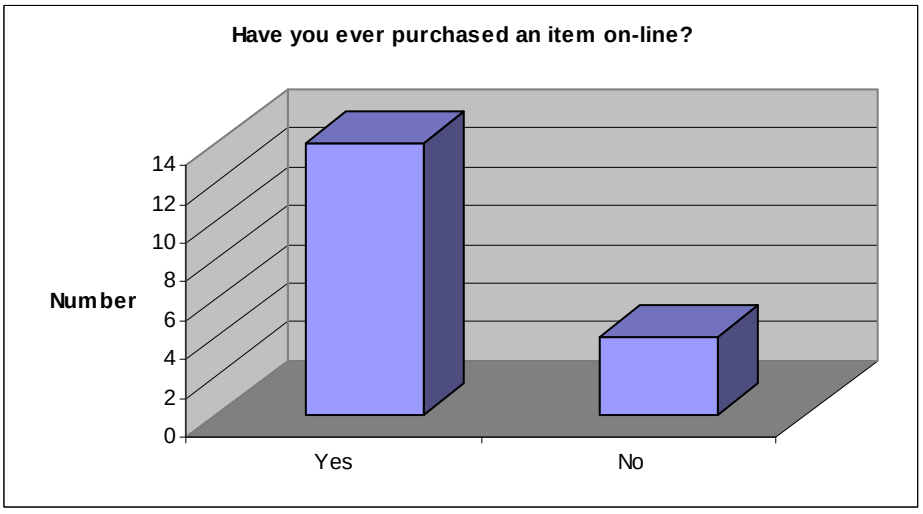

Have you ever participated in multi user gaming?
Number
15
10
5
0
Yes
No

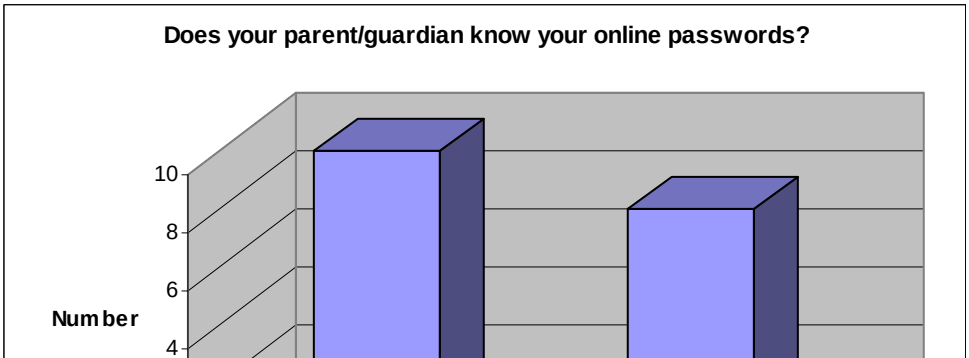

Have you ever particpated in a chat room?
Number
14
12
10
8
6
4
2
0
Yes
No

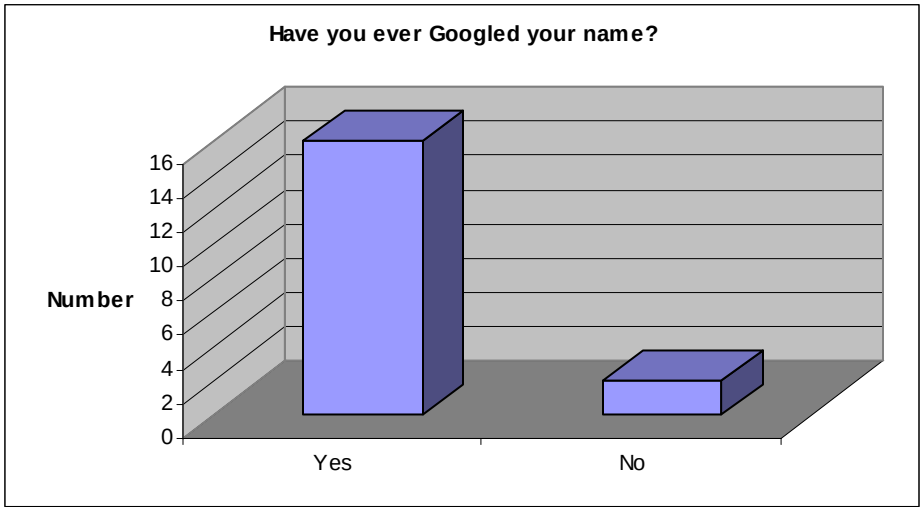

Do you know what "POS" means in an IM?
Number
8
7.5
7
6.5
Yes
No

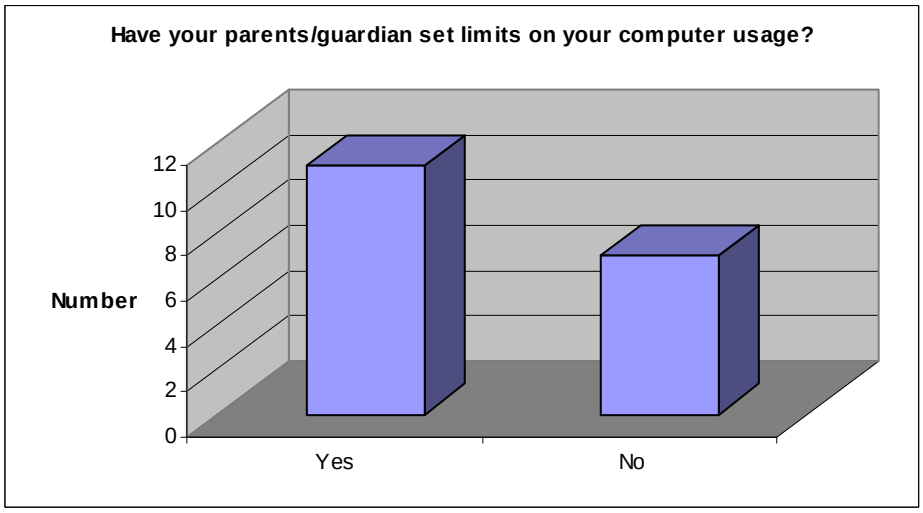

Do you know what a blog is?
Number
20
15
10
5
0
Yes
No

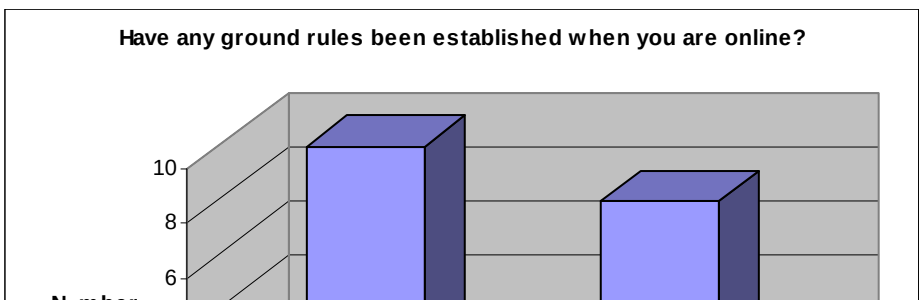

Do you know what a computer cookie is?
Number
16
14
12
10
8
6
4
2
0
Yes
No


Have you ever purchased an item on-line?
Number
14
12
10
8
6
4
2
0
Yes
No

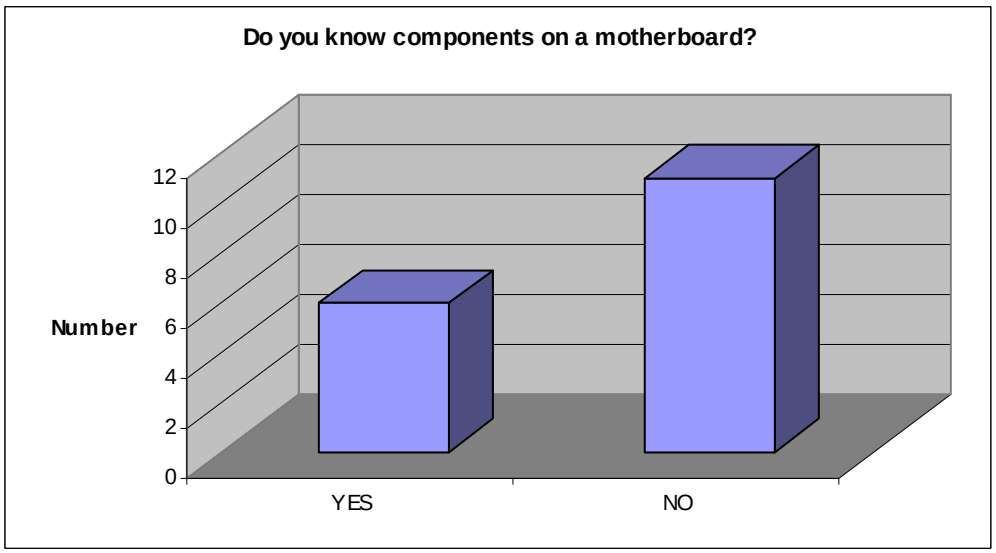

Does your parent/guardian know your online passwords?
Number
10
8
6
4

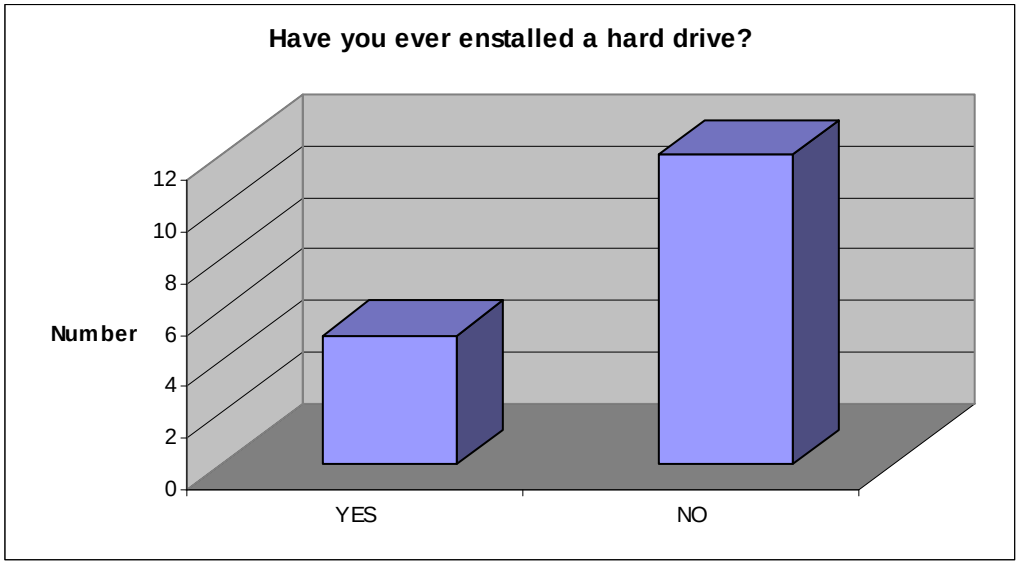

Have you ever Googled your name?
Number
16
14
12
10
8
6
4
2
0
Yes
No

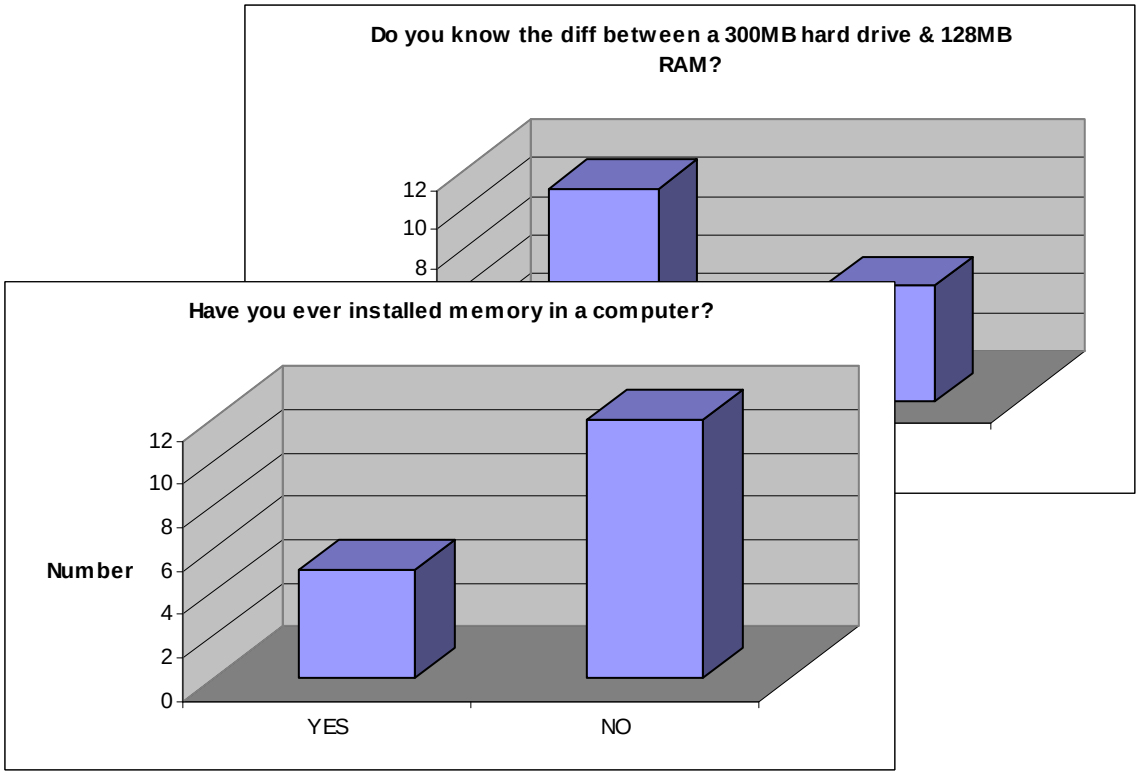

Have your parents/guardian set limits on your computer usage?
Number
12
10
8
6
4
2
0
Yes
No

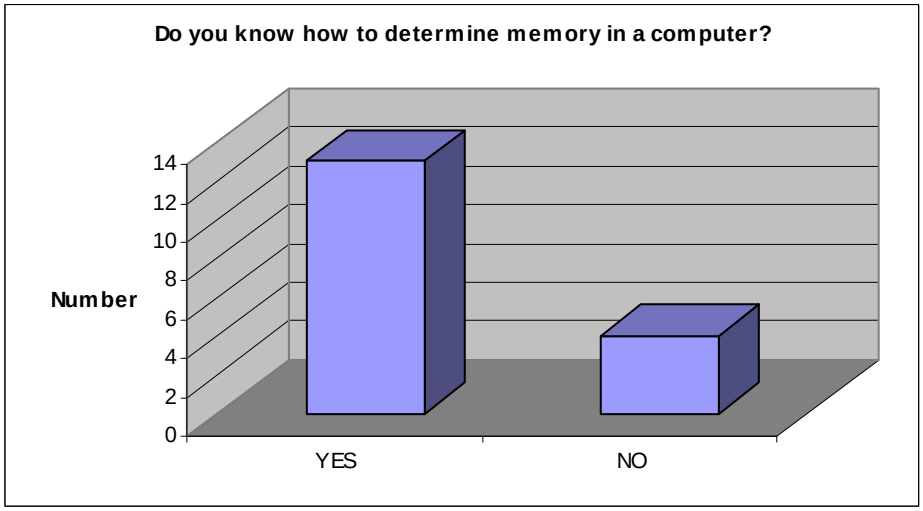

Have any ground rules been established when you are online?
10
8
6

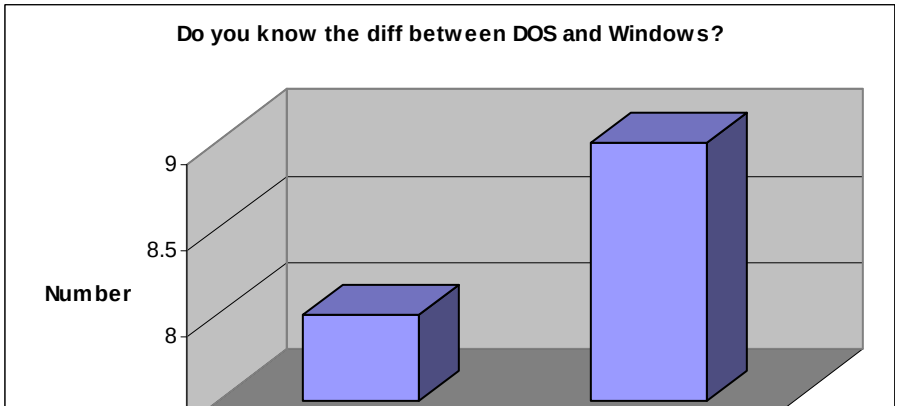
Hardware/ Software Knowledge profile

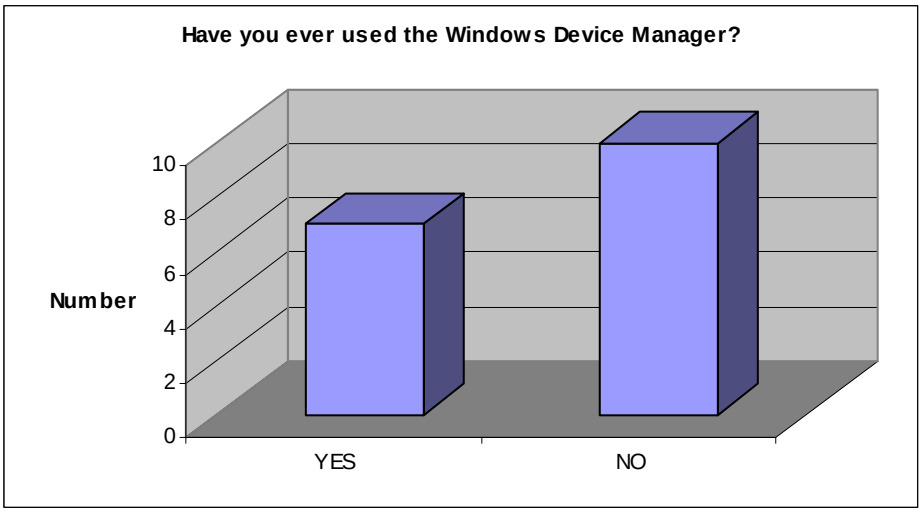


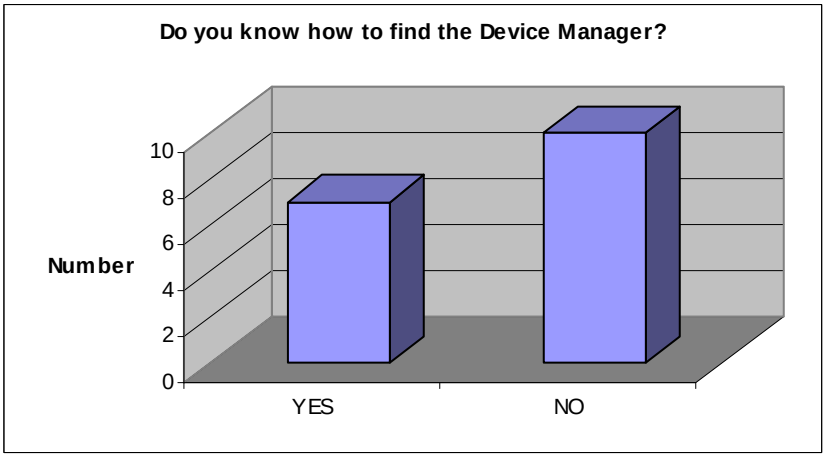


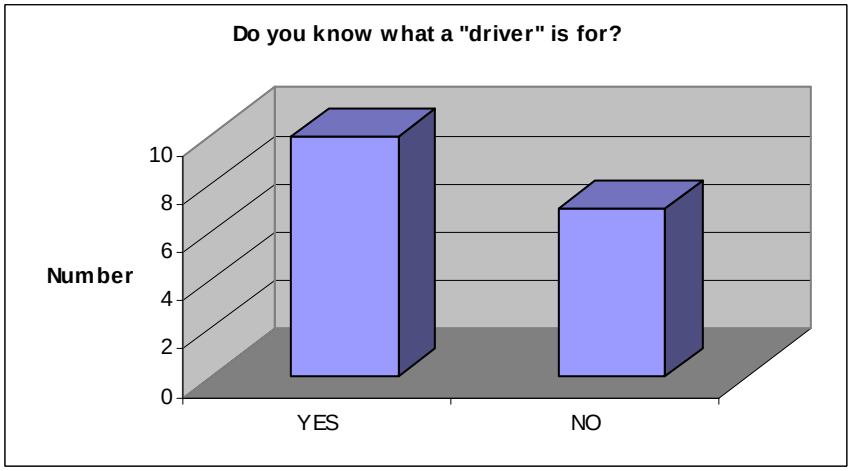

Do you know the diff between a 300MB hard drive & 128MB RAM?
12
10
8
Have you ever installed memory in a computer?
Number
12
10
8
6
4
2
0
YES
NO

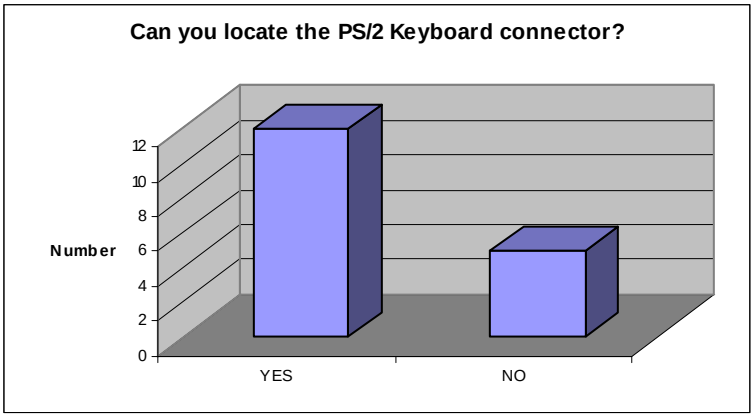

Do you know how to determine memory in a computer?
Number
14
12
10
8
6
4
2
0
YES
NO

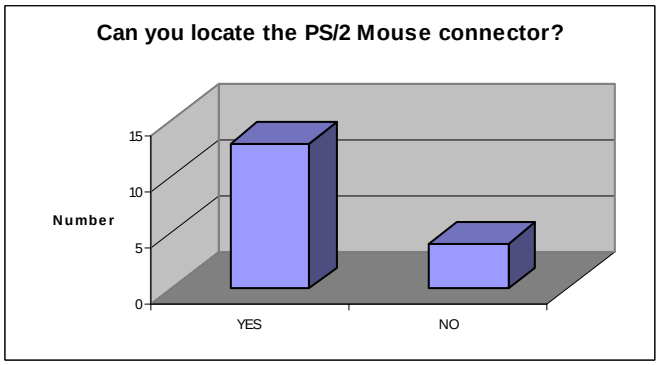

Do you know the diff between DOS and Windows?
Number
9
8.5
8

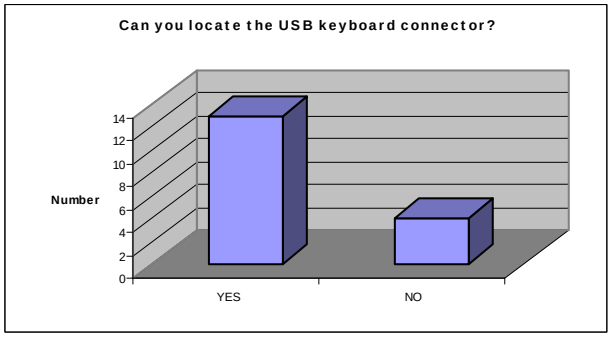

Have you ever used the Windows Device Manager?
Number
10
8
6
4
2
0
YES
NO

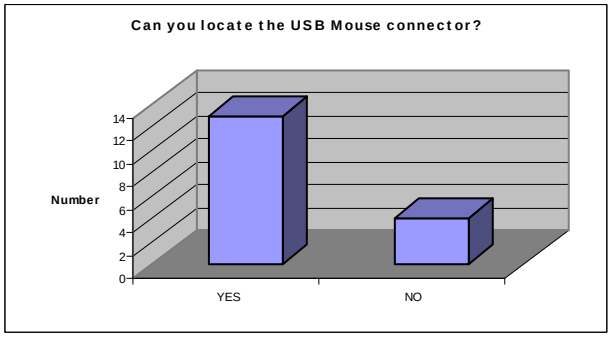

Do you know how to find the Device Manager?
Number
10
8
6
4
2
0
YES
NO


Do you know what a "driver" is for?
Number
10
8
6
4
2
0
YES
NO


Can you locate the PS/2 Keyboard connector?
Number
12
10
8
6
4
2
0
YES
NO


Can you locate the PS/2 Mouse connector?
Number
15
10
5
0
YES
NO


Can you locate the USB keyboard connector?
Number
14
12
10
8
6
4
2
0
YES
NO


Can you locate the USB Mouse connector?
Number
14
12
10
8
6
4
2
0
YES
NO

Evaluation and Feedback (0-4) 4 being the highest	
General Questions	**Average**
The course objectives were clear.	3.8
The length of the course was sufficient to cover the subject matter	2.5
Overall, the course instructors and speakers were effective.	3.8
I learned new information in this course.	4.0
I'd like to learn more about IT/IA and Cybersecurity	3.2
I may consider Cybersecurity as a career choice	3.5
Speaker's Presentations	
0 - 4 scale, with 4 being strongly agree	**Average**
Howard County Program	
Chris Johnson, Computer Security Division (NIST)	3.4
Cindi Dennis, Materials Science and Engineering Lab (NIST)	3.5
Sammy Ho, Manufacturing Metrology (NIST)	2.9
SURFing at NIST	3.2
Vonda Williams (Woods Consulting)	3.2
Jennifer Wilcox, NSA Cryptologic Museum briefing and internship/career opportunities	3.8
NSA Cryptologic Museum tour	3.9
Lazarus Foundation Tour	3.8
John Casey, Digital Crime and Digital Forensics	3.9

Howard County Program Speaker's Presentations Average	**3.51**
Kenmoor Middle School Program	
History of Medicine, National Institute of Health (NIH) CSI history	3.5
Katherine Powell, NIH, interactive forensics science	3.8
Navel Research Warfare Center (NAVSEA) activities	4.0
Ajay Gupta, Cyber Security Services and GSecurity, Inc.	3.0
Jennifer Wilcox, NSA Cryptologic Museum briefing and internship/career opportunities	2.9
NSA Cryptologic Museum tour	2.8
Walker Mill Program Speaker's Presentations Average	**3.33**
Both Program Presentations Average	**3.42**