

Teacher Resources

Steve Morrill, Director of Technology & Cyber Science, Loyola Blakefield – Towson MD

LifeJourney Day of STEM:

- <https://dayofstem.com.au/>
- Day Of STEM is a national initiative designed to build awareness and inspire Australia's STEM/CYBER generation.
- Free, self-guided, interactive, virtual, mentoring experience for students, teachers, parents and schools.
- Challenge sets, dictionary of terms, and lessons included in the teacher experience.
- Designed for students Year 7 - University.
- Enables students to test-drive their futures by living a day in the life of Australia's STEM mentors.
- The Day of STEM consists of 8 uniquely themed programs that are designed to be completed within 60 minutes in school or outside the classroom.
- Day of STEM is implemented by LifeJourney, a U.S. based technology company with a growing Australia team.

Cyber Security In-Class Conversation Starter Lesson

All of our students participate in/on an internet connected network in some way shape or form as they continue to hold their title of *Digital Native*. Not many of them however stop to think about the enormity of what it takes to make that seemingly simple device in their hand actually work.

A global community of students that has never not had access to a search engine to find any piece of information they may be curious about. What a great opportunity, and responsibility, we have to help educate students what it means to participate and use a globally connected network. There are endless amounts of technical and cultural problems to solve under the general umbrella of Cyber Science. Many of the limitations of the physical world had are now gone. That being said Cyber has added an entire new dimension to the physical world.

Some of the issues are actually not new concepts at all, but how they manifest themselves can be. Many of the technologies and devices are new and need qualified trustworthy individuals to design and oversee their implementations to help inspire trust in the systems that are used every day.

Have your students consider the following for a class discussion/debate:

1. How many internet connected devices do you use each day?
2. What connected tools do they use in their daily lives? (everything from social media, to Google, to Uber)
3. Have these tools made your life easier or more difficult? Why?
4. What possibilities has this new reality of connected devices opened up to individuals?
5. Identify some potential problems that have arisen, or may arise, with our new connected reality.
6. Who should be responsible for keeping cyber safe?

Industrial Control System Emulation Lab

For this exercise students will need to draw on knowledge accumulated in several different academic disciplines including programming, graphic design, electronics, math, operating systems, and cyber.

The basic premise behind any ICS (Industrial Control System) is automation of some process. Examples could include, HVAC Control Systems, water pumping stations, traffic control, electrical grid, farming, etc.

Students will use the materials listed below to design, build, program, secure, and maintain a lab ICS. At this point of a student's Cyber Science journey they have taken several classes and have a solid foundation. However, there is no one way to complete this assignment. Students will use a wide variety of internet resources to research how to implement the sensors they would like to use. Some of the code required is published to the internet, but much of it needs to be modified or created to complete the final product.

Student Materials used:

Raspberry Pi 3 Kit

<https://www.canakit.com/raspberry-pi-3-starter-kit.html>

SunFounder Sensor Module Kit for Raspberry Pi (includes GPIO board)

<https://www.sunfounder.com/rpi2-sensorv2.html>

For the example pictured in the presentation students selected to use:

- Light Sensor – To look for changes in the environment and alert on certain conditions. Possible use in a solar energy generation facility.
- Temperature Sensor – Environment changes – trigger alarms based on thresholds and take actions (notifications, fans, etc.)
- Buzzer – If motion is detected take action
- Motion Sensor – Detect unauthorized activity in a certain area
- Camera – Live feed from area where ICS is contained. Configured for live feed, but also to snapshot a photo and send if motion detected
- Air Pressure – Added for environmental monitoring – weather station inspired
- Laser – installed for fun at this point

Students needed perform the following actions:

- Load the operating system software on the Raspberry Pi and run any needed updates

- Plan out what sensors they would want to implement as part of their ICS. What are we monitoring and why?
- Research the correct pin-outs and modules/code needed to record data from the sensors
- Connect sensors to GPIO board
- Add code and test to see if data was being collected
- Add the webserver front end (Apache)
- Plan out ICS info display
- Website framework is in HTML
- Other languages needed to construct buttons, data feeds, actions
 - JavaScript
 - Python
 - PHP

Once the ICS is online and functioning we have our older students conduct a pen test to see if the system is secure. If operating system or module updates have been missed, services misconfigured, or bad user account controls have been utilized the system will quickly become comprised. The comprised system may be altered to provide false data/actions, or be completely taken offline.

This is a fun hands on project for students to help understand how many ICS systems are in use around them every day. Furthermore it helps them to understand the seriousness of what could happen if a bad actor finds a vulnerable ICS attached to critical infrastructure (power, water, gas, etc.) and what the implications could be.

Students typically spend 10 to 15 hours on this project. They will continue to add tweaks and enhancements as they learn different skills and meet different professionals in the industry. Some have installed ICS systems in their homes that automatically control lights and water their gardens using the same sensor kit.

Industry Certification Resources for Teachers and Students

CompTIA is the internationally recognized body for IT industry certifications. Recommended certs for Cyber Science Teachers and Students:

CompTIA Cyber Teacher Certification:

Free Certification available through Day of STEM platform / Cyber Security Experience

<https://dayofstem.com.au/>

Network +:

<https://certification.comptia.org/certifications/network>

Security +:

<https://certification.comptia.org/certifications/security>

CSA+ (Cybersecurity Analyst):

<https://certification.comptia.org/certifications/cybersecurity-analyst>

Collaborative Assignments

Below is a collection of collaborative assignments that have a cyber theme, but were assigned in English, History, and Theology classes.

Assignments submitted by:

Andrew Stehman (Loyola Blakefield – Towson MD, USA)

British Experience

(English Class – Year 11 & 12)

Search Terms: Cyber, English, Creative Writing, Analytical writing, collaboration

Opening Paragraph

When sitting down to watch the news, you cannot go through an entire six o'clock broadcast without hearing the word "cyber" or "hack". The country has been bombarded with news about the internet and nation-state hacking for months. Back in September of this past year, Yahoo suffered the largest data breach in the internet's history. Over five-hundred million accounts were compromised including those of government employees. Other private information including financial information were leaked and sold on the dark web. Although the data breach occurred in 2014, Yahoo failed to disclose its breach until late 2016. It was not until this past March that more information about the hacking rose to the headlines. Possible ties to Russian interference were found and later confirmed. The Yahoo data breach was the most impactful data compromise the world has seen to date due to the size of the hack, Russian intrusion, and the time it occurred.

Analytical Writing

The hacking of Yahoo was a large concern for a few days back in November, but recently, it has sparked interest yet again in the headlines. This time, the Yahoo breach has been suspected to be tied Russian hackers. As these claims have been validated by press conferences, the concern begins to rise. Firstly, this news comes at a very interesting, influential time. Currently, the FBI is investigating Russian meddling in the United States election. The Russian hackers were indeed linked to the hacking in our elections. Now, the reason that the link to the Yahoo hacking comes at an interesting time is because with this newly discovered information, more evidence is there to possibly conclude that Russia is engaging to seriously compromise United States National security. No one would really be shocked if this were to be the case, as it has been suspected for months. And not a single person should be surprised that Russia has been suspected of such activity multiple times. It is common knowledge in the computer industry that these things have been going on, it only now comes out as a Russian hack because there is definitive proof. Everyone should find it reasonable that Russia would hack us to gain intelligence, and even the United States engages in offensive hacking to obtain intelligence about other nations. It is only in the news because Russia can be definitively proved that there has been interference. It is just that the United States has been able to hide their hackings, unlike the Russians. Due to this Yahoo hack coming around the same time that the election investigation occurs, the news may very well be filled with every new hack being tied to Russia. It is due to the timing of this Yahoo breach that makes this such a hot topic in the news. This hack will be referenced for time to come as evidence that, since Russia has previously targeted the United States, that they may be trying to target the United States again. It gives the media a tool to use to plot more interference against the Russians.

Creative Writing

The largest data breach
It remains to be much more
Than many series of ones and zeros
Complications involve nation states
And large corporations alike
Raising much larger questions
Than simply “What did they want”
The real problem lies with
“How did this happen”
“How can this be prevented”
It starts with the employee
A carbon figure
Each must be educated
To think like a hacker
So they can defend against a hacker
Employees need training
To mitigate company risk
Security can be tighter
Than a noose; nevertheless
None of this matters
If the carbon figure establishes
No understanding of consequences of actions
Of their own
The act of not knowing is the largest security issue
Say the carbon figure is one
That is unaware
The carbon figure goes about daily tasks
When suddenly, upon receiving an email
Clicking the link to the cat video

May as well have activated
A self-destruct button
The noose-like security makes not a difference
When the user allows the connection in
And to the moral of the story
Educate those who work for you
It may just save your job one day
Otherwise
You may end up like Yahoo
On the news
With the largest security breach in history
Having Russia snuck in
Like a sneaky Grendel stalks the halls
Of the glorious Heorot Hall
Waiting for the perfect opportunity
One that causes mass destruction
And will surely be back again

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Burrows, Emma, and Tim Lister. "**Who Are the Russians Who Allegedly Hacked Yahoo?**" CNN. Cable News Network, 15 Mar. 2017. Web. 15 Mar. 2017.

<http://www.cnn.com/2017/03/15/europe/who-are-russians-behind-yahoo-hack/index.html>

This source is relevant because it was the first report of the Yahoo hack being associated with Russia. 2 Spies were involved, allegedly sponsored by Russia. This rekindled the Yahoo hack as the main headline in the news

Larson, Selena. "**Hackers Are Selling Yahoo Data on the Dark Web.**" CNNMoney. Cable News Network, 16 Dec. 2016. Web. 15 Mar. 2017.

<http://money.cnn.com/2016/12/16/technology/yahoo-for-sale-data-dark-web/>

This provides information on how leaked data is being handled. The data is being sold on the dark web. From there it is bought in large chunks to obtain account credentials.

Fiegerman, Seth. "**Yahoo Stock Pops on Reports of New Deal with Verizon.**" CNNMoney. Cable News Network, 15 Feb. 2017. Web. 22 May 2017.

<http://money.cnn.com/2017/02/15/technology/yahoo-verizon-deal/>

Verizon was in the process of buying Yahoo before the hack broke headlines. Deals then broke down between the companies. This article shows that Verizon was still interested but for about 300 million dollars less.

Smith, Rich. "**Verizon Stock Downgraded: What You Need to Know.**" The Motley Fool. The Motley Fool, 23 Jan. 2017. Web. 22 Mar. 2017.

<https://www.fool.com/investing/2017/01/23/verizon-stock-downgraded-what-you-need-to-know.aspx>

Verizon's stock declined around the same time that Yahoo deals were nearing a closing, before Russians were complicated in the hacking. I suspected that Verizon stockholders may be wearing of buying Yahoo. However, Verizon's stock declined due to companies like T-Mobile offering unlimited data.

Pagilery, Jose. "**The Deep Web You Don't Know about.**" CNNMoney. Cable News Network, n.d. Web. 22 May 2017.

<http://money.cnn.com/2014/03/10/technology/deep-web/index.html>

Yahoo's data was being sold to the dark web, where account information was bought. The article describes what the Dark Web is due to its fairly unknown nature. It gives background knowledge to what happened to the data.

Newman, Lily Hay. "**Hack Brief: Hackers Breach a Billion Yahoo Accounts. A Billion.**" Wired. Conde Nast, 14 Dec. 2016. Web. 22 May 2017.

<https://www.wired.com/2016/12/yahoo-hack-billion-users/>

The article gives a second source to what the hack was. It also goes into detail with how those involved should be concerned. The article sets the big picture of what the magnitude of the breach was.

McGoogan, Cara. "**Yahoo Hack: What You Need to Know about the Biggest Data Breach in History.**"

The Telegraph. Telegraph Media Group, 15 Dec. 2016. Web. 22 May 2017.

<http://www.telegraph.co.uk/technology/2016/12/15/yahoo-hack-need-know-biggest-data-breach-history/>

It helps legitimize the other two articles that give a consistent story about the hack. The article gives a piece on what to do now. It also helps people choose a stronger password for future reference.

"**How Did Yahoo Get Breached? Employee Got Spear Phished, FBI Suggests.**" Ars Technica. ArsTechnica, 15 Mar. 2017. Web. 22 May 2017.

<https://arstechnica.com/tech-policy/2017/03/fbi-hints-that-hack-of-semi-privileged-yahoo-employee-led-to-massive-breach/>

The article describes how Yahoo may have been hacked. The FBI suggests that Yahoo was not really hacked, rather manipulated. It is suggested that a user clicked on a malicious link to allow the hacker entry.

Bischoff, Paul. "**Is Torrenting Safe? Is It Illegal? Are You Likely to Be Caught?**" Comparitech.N.p., 18 Mar. 2017. Web. 22 May 2017.

<https://www.comparitech.com/blog/vpn-privacy/is-torrenting-safe-illegal-will-you-be-caught/>

Data was sold on the dark web, and the article shows how. It describes the processes needed to access it. It also provides links and instructions to download software to access it, but does not recommend it.

Barrett, Brian. "**Security News This Week: Yahoo Got Hacked Again. No, Seriously.**" Wired. Conde Nast, 18 Feb. 2017. Web. 22 May 2017.

<https://www.wired.com/2017/02/security-news-week-yahoo-got-hacked-no-seriously/>

Yahoo was yet again hacked, and this provides information on it again. This did not make headlines; however, it is still important. It raises the question of how safe and trustable Yahoo still is, even though the intrusion was much more limited this time.

<http://www.cnn.com/2017/03/15/europe/who-are-russians-behind-yahoo-hack/index.html>

<http://money.cnn.com/2016/12/16/technology/yahoo-for-sale-data-dark-web/>

<http://money.cnn.com/2014/03/10/technology/deep-web/index.html>

<http://money.cnn.com/2017/02/15/technology/yahoo-verizon-deal/>

<https://www.fool.com/investing/2017/01/23/verizon-stock-downgraded-what-you-need-to-know.aspx>

<https://www.wired.com/2016/12/yahoo-hack-billion-users/>

<http://www.telegraph.co.uk/technology/2016/12/15/yahoo-hack-need-know-biggest-data-breach-history/>

<https://arstechnica.com/tech-policy/2017/03/fbi-hints-that-hack-of-semi-privileged-yahoo-employee-led-to-massive-breach/>

<https://www.comparitech.com/blog/vpn-privacy/is-torrenting-safe-illegal-will-you-be-caught/>

<https://www.wired.com/2017/02/security-news-week-yahoo-got-hacked-no-seriously/>

History Research paper assignment for an American Government class – Year 11.

Inventions from 1945-2000

Science has enabled us to further our knowledge and invent things never before imagined. The things that society has been able to discover has revolutionized the world we live in today. Inventions from 1945-2000 began to and still have a large impact on people's everyday lives. The way that people handle themselves in situations has been immensely altered by these inventions. The technology and inventions during 1945-2000, including the inventions like the microwave, the credit card, and the transistor, have greatly impacted the United States socially and economically by enabling people to spend more money more easily, to have more free time, and to create the entire new industry of technology that affects us every day.

The inventions that have changed the world are the ones that have transformed the way we spend money and influence the economy, most notably the credit card. The credit card was first brought about in 1950 for people to pay for their dinner. It originally was only available from a company named Diner's Club, and its original purpose was for people to have one method of payment that was not cash or check for use at restaurants that agreed to join. While only available to purchase a meal, the concept spread like wildfire. The company started with two-hundred users initially, but by the end of the first year twenty-thousand people were paying for food with credit. Even in its first year, the company experienced exponential growth while having a seven percent interest rate and a three-dollar annual membership fee. In their second year, the company expanded to France and Canada. The rapid growth in the use of credit cards flawlessly displays the appeal of the "Buy Now, Pay Later" mentality that consumers had. The credit card enabled people to spend their money on food more easily, and allowed lenders, the credit card companies, to earn a profit. This allows the restaurants to have more business and when the credit card later expanded into the rest of the market, it allowed all businesses to have more revenue. Businesses with more revenue flow causes a boom in their success and allows for the businesses to prosper. With businesses profiting, they are able to expand and more often than not are able to hire more workers. So, credit cards had inadvertently created more jobs "Over the decade ...unemployment dropped to 4.1 percent" (1950's Economics). Less than a decade after credit cards had come into the market, the unemployment rate dropped about two percent. It is clear that credit cards are to attribute the success to because businesses were able to make more money and hire more workers, driving unemployment down. When all these businesses can prosper due to people spending more money on their credit cards, it is evident that the economy prospers as a result.

However, credit cards did not only impact the economics of the United States, but they also affected the social aspect of America too. The way in which people went about buying products and goods changed. Many people changed the way they viewed their purchases too. This is because with a credit card in your wallet, it is easier to just say yes to making a purchase. This is because consumers in the 1950's were influenced by conformity. Conformity is when people want to have what everyone else wants; if you come home and see your neighbors with something you don't have, odds are that you will buy it. Credit cards enable conformity because people do not have to think of the repercussions of their actions. If they want bikes for their kids or a new car for their wife, just put it on credit, you can deal with it later. This was the mindset many in the 50's had. Although, this mentality was not secluded to

the 1950's. It extended throughout the 1900's and even into today. My mother had as experience in college with credit card trouble "My sister and her friends were going to Hawaii, but one of them didn't have the money at the time, so they put it on credit" (Stehman). The trip to Hawaii was a graduation celebration for my aunt graduating college, and back then, she said the trip was "only five-hundred dollars". This shows that the credit card facilitates the reckless spending of money. Had my aunt's friend not had a credit card, she could not have been on their Hawaii trip. But, because of credit, she did not need to have cash up front. This shows that credit cards have changed social situations and have allowed Consumer culture to thrive and put pressure on people to buy things they otherwise would have not have bought or what they could not otherwise afford. It shows that credit cards allow people to spend more money with greater ease.

Inventions have also made people's lives much easier. The inventions that have come about have made it so that people have much more free time. The inventions that are most famous for being time savers are the washer-dryer, the microwave, and vacuum cleaners. With these inventions, the housewives during the 1950's were able to make everything they needed to do like preparing food and doing chores around the house a breeze. When the washer dryer was invented, accomplishing this previously burdensome task became no sweat. A task that was dreaded prior to the invention became no more than a simple task that anyone could do. This allows the traditional housewife of the 1950's to have more time to take care of the children and to prepare food. But even when it came to preparing food, even that task became simpler. With the invention of the microwave, food could be cooked in a significantly shorter period of time. And when it came to cleaning the house, the vacuum cleaner made it easy to clean large spaces that would have previously been cleaned by hand. All of these inventions made the lives of families less stressful. The social impact is that families had more time on their hands. At night they could spend more time together, and if they wanted to, they could go see a movie or go to some other activity with their newly found free time. With more time available at night, families that spent more time together became happier families. Families could sit down together and watch television while eating dinner together. The social benefit to families is substantial from these inventions, but the economic impact is nothing to dismiss either. With all of these appliances in the market, the Consumer Conformity in the 1950's wanted to have them all. Like previously stated, each household had to have what their neighbors did. When families began to buy televisions, they bought them because their neighbors did. On television during the day advertisements would be shown that were geared towards household products. Ads would most likely include microwaves, vacuum cleaners, and washer dryers because it would be most beneficial to the presumed household wife. Appliances being bought like this allowed for businesses that sold products to thrive. Not only did the businesses thrive, but since families had much more free time, communities also thrived. Communities had more revenue caused by the free time that families had. If someone wanted to spend time with their family that night, they could go around town and see a movie, or get some ice cream (Brandt). This also allows for families to go on more vacations due to their excessive amounts of leisure time. With people spending more money on leisure and their household items, the economy prospered from the great flow of money.

Lastly, but far from last, the transistor had a profound impact on society. Without going into too much depth, the transistor is the basic building block of every piece of electronics. From circuit boards

to computers and cell phones, they all contain transistors. Technology is by far the largest impact that any invention has had on history. Looking at the 1960 Presidential election, it contained the first televised debates. This was one of the most significant events that technology has affected. The debate was broadcasted on both radio and television. People had never before seen their presidential candidates. Television allowed people to see an image of both candidates. However, the people listening on radio could only interpret the candidates voices and their responses. It created an astonishing response from each audience. The majority of people who listened to the radio said the debate seemed about even. However, television audience believed otherwise “I thought JFK won when I was watching” (Brandt). My grandfather was able to recall exactly where he was when he watched the debate. He said the above quote with an assured voice. There was no doubt in his mind that John F. Kennedy was the sure winner over Richard Nixon. It shows that the radio and television were huge impact on the 1960 election. The influence of the transistor also spread to the economy. The transistor was in every electronic device. Every radio and television was made of many transistors and due to the Conformity of the 1950’s, they were widespread and by the end of the 1960’s nearly every household had a television. Technological appliances helped spur on the economy. People saw their neighbors with televisions and wanted to have one too. The economic impact does not end there however; technology would develop into its own industry that begun with the invention of the personal computer. Ever since then, the technology industry has been one of the most profitable and sought after fields. From then on, the world we knew was changed, and the rest is history.

The technology and inventions during 1945-2000, including the inventions like the microwave, the credit card, and the transistor, have greatly impacted the United States socially and economically by enabling people to spend more money more easily, to have more free time, and to create the entire new industry of technology that affects us every day. Without a doubt, the inventions the largest impact in the three previously mentioned ways. The ways society has been changed by inventions and technology completely morphed America into a new place. The country has been revolutionized by these creations for the better. With these scientific discoveries, we have been able to expand horizons into areas not possible before, shaping the world as we know it today.

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- <http://fiftiesweb.com/pop/info-family/>
- <http://www.shmoop.com/1950s/culture.html>

Ethics Assignment – In Class Debate/Discussion Year 12 Students

Search Terms: Ethics, Cyber, Debate, Snowden, Responsibility, Theology

Based on the two videos we will have an in class discussion /debate if former NSA contractor Edward Snowden is a traitor or a patriot. At a minimum please watch both videos below that cover the Snowden incident from two different perspectives. Feel free to conduct additional research to form an opinion for our discussion.

<https://www.youtube.com/watch?v=FlEj-73VLW8>

<https://www.youtube.com/watch?v=0hLjuVyllrs>

While watching and conducting other research on this topic you should consider:

Were his actions ethical?

Were his actions legal?

Should he face any consequences for his actions?

What would you have done in his situation?

Do you consider Snowden a patriot or a traitor?

This assignment can also be adapted for an ethics paper, in class discussion, or research paper.