

Explore the Computer Science Standards Network and The Internet



Kansas leads the world in the success of each student.

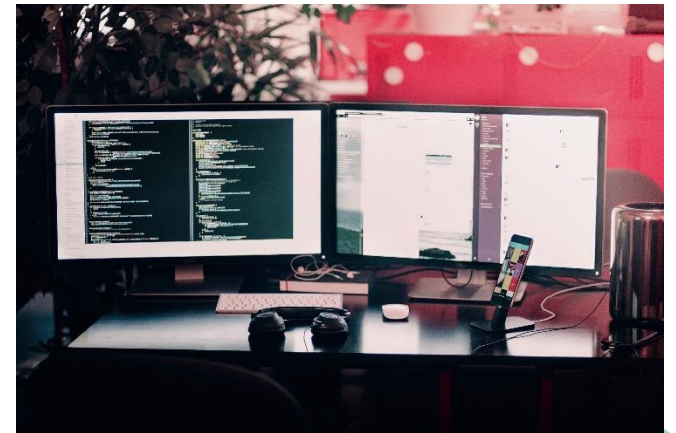
Introductions

Stephen King, PhD PMP is the Computer Science Education Program Consultant for the Kansas State Department of Education. With a doctorate in education and a masters in telecommunications management, he has over twenty years of experience leading and teaching IT and computer science to high school and college students.

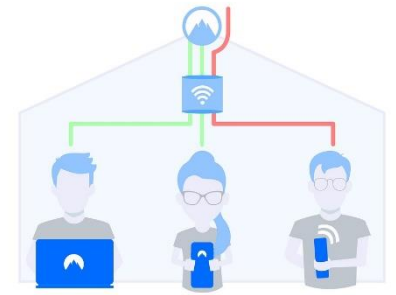


What Will Our Takeaways Be Today?

- Understand each of the standards in the Network and Internet category (Network Communication & Organization and Cybersecurity)
- Become familiar with how the standards scaffold
- Know what each standard looks like in the classroom
- Share ideas for activities
- Share ideas for interdisciplinary activities and opportunities



NCO – Primary Grades



- PK.NI.NCO.01 Recognize that computing devices are connected via wired or wireless networks so that they can communicate with each other.
- K.NI.NCO.01 Recognize and use computing devices to connect with people or other devices using a network to communicate, access, and share information as a class (e.g. the internet, video conferencing, email, file transfer).
- 1.NI.NCO.01 Recognize that by connecting computing devices together they can share information using a network (e.g. wired or wireless network).
- 2.NI.NCO.01 Use computing devices to share information and communicate with others using a network.
- 3.NI.NCO.01 Model how a device on a network sends and receives information.
- 4.NI.NCO,01 Explain how information is sent and received across physical or wireless paths.
- 5.NI.NCO.01 Model how information is broken down into smaller pieces and transmitted through multiple devices over networks and the internet, and how these pieces are assembled at the destination.



NCO – Middle and Secondary



- MG.NI.NCO.01 Explain protocols and their importance to data transmission; model how packets are broken down into smaller pieces and how they are delivered.
- L1.NI.NCO.01 Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.
- L1.NI.NCO.02 Compare various security measures, considering tradeoffs between the usability and security of a computing system.
- L2.NI.NCO.01 Describe the issues that impact network functionality (e.g., bandwidth, load, delay, topology).
- L2.NI.NCO.02 Give examples to illustrate how sensitive data can be affected by malware and other attacks.



NCO - Practical application



- Early grades
 - Describe how computing devices are connected
 - Demonstrate connecting/disconnecting a device
 - Explain wired vs wireless connections in basic terms
 - Draw a model of a network packet
 - Use a device to program a drone
- Middle
 - Simulate network traffic using bulbs or flashlights
 - Describe what a protocol is
- Secondary
 - Draw a topology model of the school network
 - Field trip to examine security measures of school network
 - L2: Bandwidth analysis
 - L2: Describe examples of malware attacks and local countermeasures



NCO - Interdisciplinary opportunities

- Science: discuss how voltages are used on wired networks to carry signals, and how protocols are used to interpret signals.
- Engineering: create a circuit to turn on a bulb to simulate network traffic
- Math: compare MAC, IPv4, and IPv6 addresses in binary, hexadecimal, and decimal
- ELA: Research presentation on development of network topologies/technologies (e.g., Alohanet, Ethernet, Token Ring, etc.)
- Hour of Code activities in math, science, or engineering topics
- Other ideas in Chat



Cybersecurity – Primary Grades



- PK.NI.C.01 Recognize that passwords are private and should be kept secret.
- K.NI.C.01 Use a form of secure access to protect private information and discuss the effects of password misuse (e.g. logging into a device, educational websites, authentication, thumbprint recognition).
- 1.NI.C.01 Identify what authentication methods (passwords) are; explain why they are not shared; and discuss what makes a password strong. Independently, use passwords to access technological devices, apps, etc.
- 2.NI.C.01 Demonstrate use of strong authentication methods to access and protect devices and data. Understand the effects of retaining password privacy.
- 3.NI.C.01 Identify problems that relate to inappropriate use of computing devices and networks.
- 4.NI.C.01 Identify and explain issues related to responsible use of technology and information, and describe personal consequences of inappropriate use.
- 5.NI.C.01 Discuss real-world cybersecurity problems and identify strategies for how personal information can be protected.



Cybersecurity – MG and HS



- MG.NI.C.01 Evaluate physical and digital procedures that could be implemented to protect electronic data/information; explain the impacts of hacking, ransomware, scams, fake scans, and ethical/legal concerns.
- L1.NI.C.01 Recommend security measures to address various scenarios based on factors such as efficiency, feasibility, and ethical impacts.
- L2.NI.C.01 Compare ways software developers protect devices and information from unauthorized access.
- MG.NI.C.02 Compare the advantages and disadvantages of multiple methods of encryption to model the secure transmission of information.
- L1.NI.C.02 Explain tradeoffs when selecting and implementing cybersecurity recommendations.
- L2.NI.C.02 Use encryption and decryption algorithms to transmit/ receive an encrypted message.



Cybersecurity – Practical Application

- Early Grades
 - Successfully authenticate
 - Come up with examples of strong vs weak passwords
 - Identify anti-malware practices and anti-virus software
- Middle Grades
 - Model school network firewall and related cybersecurity system
 - Practice using Caesar and other cypher techniques to pass coded messages
- High School L1
 - Matching exercise joining threats to protection measures
 - Research and compare cost of various protection measures
 - Practice justifying purchase
- High School L2
 - Research password strength concerns
 - Use a network sniffer to capture packets on a classroom wireless network
 - Describe or compare encryption algorithms (e.g., Diffie-Hellman vs RSA)



Cybersecurity - Interdisciplinary opportunities

- Practice writing and/or speaking to executive team to justify cybersecurity purchase
- Write draft security protocol for the school
- Math: investigate/describe differences between/among encryption algorithms (symmetric key, asymmetrical key, DHM, RSA, etc)
- Research presentation on codebreakers of WWII
- Math: YouTube Zach Star “This completely changed the way I see numbers” 16:15 (<https://www.youtube.com/watch?v=Ij3CD9M3nEQ>)
- Other ideas in Chat



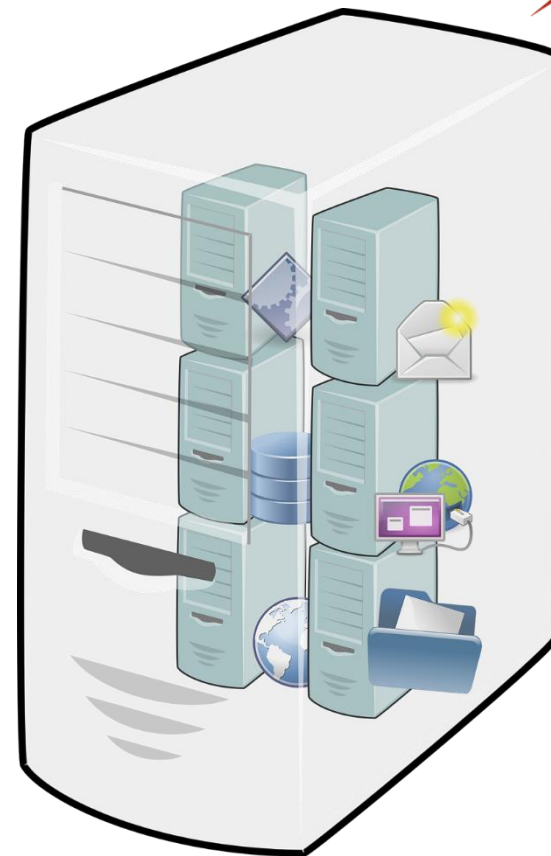


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Let's DO THIS!





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