Classroom Teacher Preparation

Technology 6: Digital Information Networks

Please use the following to prepare for the next SfS lesson.

Description:

This module presents the basic structure of the connections that form the World Wide Web and will help students understand what happens when they visit a webpage. Student teams compete to "load" their webpage fastest, modeling the operation of a browser: they travel through a model network to retrieve files from servers and assemble the text and images to create the finished webpage.

Lesson Objectives – SWBAT ("Students Will Be Able To…"):

6th-8th

- Model the transfer of text and image data over a network
- Describe the relationships between browsers, webpages, routers, cables, and servers

Disciplinary Core Idea (DCI):

PS4. Waves and Their Applications in Technologies for Information Transfer

- (6th-8th) *PS4.C: Information Technologies and Instrumentation* – Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa.
- (6th-8th) *PS4.C: Information Technologies and Instrumentation* – Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.

Science & Engineering Practice (SEP):

Developing and Using Models

- (6th-8th) Develop a model to describe unobservable mechanisms.

Crosscutting Concept (CCC)

Systems and System Models

- (6th-8th) Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems.
- (6th-8th) Models are limited in that they only represent certain aspects of the system under study.

Preparation:

This lesson is foundational, but students should have at least some experience using the.

Room Set Up for Activities:

There are two choices for the main activity:

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For the *Small-Classroom* version of the activity, students will work in smaller groups and play a table-top boardgame version of the network activity. They will need enough room on their desks (or on the floor) for a standard-sized boardgame.

For the *Large-Classroom* version of the activity, a large section of floor space will be required to lay out the "network" and to allow for workspace at each group's "node". In most classrooms it will be best to push all desks & chairs to the perimeter of the room and have the network be in the center. A large clear space, such as a gym, if available, would be ideal. The Large Classroom version will require two stationary adults – an instructor and you, the classroom teacher – as the two "servers", while the lead instructor moderates the activity.

Safety:

There are no safety issues, but students should not run during the activity.

Related Modules:

This lesson may be taught as part of a sequence or group of related modules on **Technology**. Modules include:

Technology 1: Binary Code, or How to Speak Computer – Students get their first taste of binary through a series of activities focusing on encoding and decoding.

Technology 3: *Conditionals in Code* – This lesson introduces conditional statements, an important element of coding, by having students act as both computers (executing written code) and coders (creating their own written code to accomplish a specific goal) in a grid-based coding game.

Technology 7: *Digital Footprint* – Older students will investigate social media profiles and search histories of several internet users to see what personal data they can infer. Younger students will create their own online gaming profiles and then perform a safety review of each other's profiles.

For other module sequences and groups, look here: www.sciencefromscientists.org/sequences

Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state: http://www.sciencefromscientists.org/standards/

Lessons are matched to both national NGSS and local state standards.

After Our Visit:

Extend this lesson by inviting students to run a real version of the webpage they assembled in class, using actual HTML code. It is assumed that students will know how to create a folder, save a file to that folder, and navigate to the folder on their operating systems.

Access this Extension activity by visiting the Classroom Post found on our website at sciencefromscientists.org/cohorts. Use the name of your school/cohort and password to log in.

To help Evaluate, check out our Open Response questions online at sciencefromscientists.org/open-response-questions. They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

Additional Resources:

- More on HTML, beyond the small number of tags used in the activity: http://www.simplehtmlguide.com/essential.php
- A more thorough tutorial and useful reference for HTML (the site has other languages as well): https://www.w3schools.com/html/default.asp
- For those interested in the history of the internet and the World Wide Web, SciShow has a series of videos: https://www.youtube.com/watch?v=1UStbvRnwmQ is episode 1.

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