Unit IV: Networks and the Internet

Content Area: **Business**
Course(s): **Introduction to Computer Science and Programing**
Time Period: **4 weeks**
Length: **Weeks**
Status: **Published**

Unit Overview

In this unit, students will learn how networks and the Internet work, explore ways to solve problems involving encoding and transmitting data, create webpages using the languages powering the web, HTML and CSS, and examine the appropriate use of the Internet.

Transfer

Students will be able to independently use their learning to...

- explain the difference between LAN and WAN networks, and explain some of the features of the Internet
- explain key concepts such as Internet Protocol (IP), routers, packets, DNS, and HTTP
- apply their knowledge of the binary number system to explain in some detail how computers transmit data
- explain how binary can be used to encode arbitrary information that computers process
- use HTML and CSS to create or modify a website
- analyze ethical issues regarding the Internet, including the concepts of intellectual property, net neutrality and internet censorship

Meaning

Understandings

Students will understand that...

- The Internet and other networks use various strategies to enhance reliability of data transmission
- In order for computers to transmit any type of data (e.g., images or text), it must be encoded in binary.
- HTML specifies the content and layout of a website while CSS specifies the style and formatting.
- Issues such as intellectual property rights, net neutrality and internet censorship are important topics for consideration of all citizens.

Essential Questions

Students will keep considering...

- How does data physically get from one computer to another?
- Are the ways computers represent and transmit data laws of nature or mere conventions?
- How can text communicate content and structure on a web page?
- Why do people create websites?
- How can I incorporate content I find online into my own webpage?
- How do I modify the appearance and style of my web pages?
- How do I safely and appropriately make use of the content published on the Internet?

Application of Knowledge and Skill

Students will know...

Students will know...

- The Internet and other networks use various strategies to enhance reliability of data transmission
- In order for computers to transmit any type of data (e.g., images or text), it must be encoded in binary.
- HTML specifies the content and layout of a website while CSS specifies the style and formatting.
- Issues such as intellectual property rights, net neutrality and internet censorship are important topics for consideration by all citizens.

Students will be skilled at...

Students will be skilled at...

- explaining the need for the various strategies the Internet and other networks use for enhancing reliability of data transmission
- analyzing protocols for encoding various types of information in binary
- using HTML and CSS to customize and create websites
- analyzing intellectual property rights, net neutrality and internet censorship issues

Academic Vocabulary

- Website
- LAN
- WAN
- Internet
- Ethernet
- Wifi
- Internet Protocol
- IP Address
- Routers
- Packets
- DNS
- HTTP
- URL
- HTML, HTML Element, HTML Tag
- Hyperlink
- CSS
- Bandwidth, bit rate
- Latency
- Net neutrality
- Intellectual Property
- Internet Censorship

Learning Goal 1

Students will understand how networks and the systems of the Internet function

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.

Target 1

Students will compare and contrast the different types of networks (LAN, WAN, and the Internet) and transmission technologies (Ethernet and Wifi)

Target 2

Students will understand the key concepts of Internet Protocol (IP), routers, packets, DNS, and HTTP.

Learning Goal 2

Students will explore and develop with languages powering the web, HTML and CSS.

CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.12.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.2.12.C.1	Explain how open source technologies follow the design process.
TECH.8.2.12.C.7	Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.
TECH.8.2.12.E	Computational Thinking: Programming: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

Target 1

Students will understand the role of HTML and Cascading Style Sheets (CSS) in the World-Wide Web

Target 2

Students will examine and experiment with the source code behind websites and build a webpage using HTML and CSS

Learning Goal 3

Students will analyze ethical issues pertaining to the Internet

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
TECH.8.1.12.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.12.D.1	Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
TECH.8.1.12.D.3	Compare and contrast policies on filtering and censorship both locally and globally.
TECH.8.1.12.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.12.E.2	Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.
TECH.8.2.12.B.3	Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.

Target 1

Students will analyze issues pertaining to Intellectual Property, Net Neutrality or Internet Censorship.

Summative Assessment

- Quizzes & Tests
- Applied Projects
- Classroom Survey

Formative Assessment and Performance Opportunities

- Applied Activities/Projects
- Guided Practice
- Peer Review
- Reflective Discussion
- Teacher Observation
- Oral Questioning

Accommodations/Modifications

- Application problems for extra practice
- Scenarios for critical thinking
- Optional additional features to add to student webpages (e.g. add videos, multiple linked .html pages)

Unit Resources

Internet Resources

- Code.org's WebLab
- Code.org's Computer Science Discoveries-Units 2 and 5
- Code.org's Computer Science Principles-Unit 1
    - *Some of the language in the Learning Goals, Targets and Essential Questions in these units borrows from or has been adapted from Code.org's curricula for its Computer Science Discoveries and Computer Science Principles courses, which are licensed via a Creative Commons license (Attribution-NonCommercial-ShareAlike 4.0 International-CC BY-NC-SA 4.0).*

Technology Software & Hardware

- Desktop computers
- Python programming language and IDE (Integrated Development Environment)
- Code.org's Internet simulator

Textbooks (Online, pdf or print)

- Downey, Allen. *Think Python: How to Think Like a Computer Scientist* (2nd Edition). Needham, Massachusetts: Green Tea Press, 2015. http://www.thinkpython2.com.
- Abelson, Hal et al. *Blown to Bits: Your Life, Liberty and Happiness after the Digital Explosion.* Upper Saddle River, NJ: Addison-Wesley, 2008. http://www.bitsbook.com/excerpts

Relevant Videos

- Code.org's video library

Interdisciplinary Connections

LA.WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LA.WHST.11-12.6	Use technology, including the Internet, to produce, share, and update writing products in response to ongoing feedback, including new arguments or information.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.