Unit #1: Digital Information

Content Area: **Template**
Course(s):
Time Period:
Length:
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Unit #1: Digital Information

Learning Objectives

- Artists will be able to represent images using sampling.
- Artists will discover lossy compression is useful when file size needs to be minimized, but lossless is important when its vital to be able to reconstruct the original image
- Artists will explore how copyright policies impact the world around us and observe who benefits and who is harmed in particular copyright situations.
- Artists will lay the foundation for understanding how complex information is represented in computers using a combination of bits.
- Artists will learn about the practical aspects of using a binary system to represent numbers in a computing device
- Artists will think about the ways in which they might be able to solve some problems relevant to their lives with technological innovations.
- Artists will understand how bits are used to represent digital images.
- Artists will understand that lossless compression uses less data and still lets them re-create the original information.
- Artists will understand the relationship between binary and decimal numbers and the concept of place value.
- Artists will understand the ways the most common types of information, text and numbers are stored using binary. More importantly they should understand the challenges or principles that led to the creation of these systems and that these systems are somewhat arbitrarily created to solve a shared problem.
- Students will evaluate the personal, ethical, social, economic, and cultural impacts of video games on society.

Essential Skills

- Analyze an article about information digitization to determine the information being digitized and the initial goal or purpose.
- Analyze patterns in data to determine compression strategies
- Argue if current copyright laws are helping or harming society using evidence from an article
- Argue whether the digitization of information has broadly speaking improved or damaged society
- Communicate with classmates about computing innovations in their lives.
- Create lossless compressions of text files
- Create lossless compressions of text files
- Critical thinking and analysis • Effective communication • Research and writing • Collaboration and discussion
- Describe how to include fractions in the binary number system.
- Describe positive and negative effects of computing innovations
- Describe the challenges in representing text when using a fixed number of bits for each character
- Develop a system for using numbers to represent text
- Examine articles to identify the social benefits and harms caused by information digitization
- Examine the effects of lossy compression on text & images
- Explain how bits are grouped to represent abstractions like numbers and text.
- Explain how bits can be used to represent the individual pixels of a black and white image
- Explain how bits can be used to represent the individual pixels of a color image
- Explain how copyright and Creative Commons Licenses can be applied to digital works of creativity
- Explain how digital data is used to approximate real-world analog data
- Explain how sampling is used to create a digital form of an analog image
- Explain how the position of each binary digit determines its place value and numeric value
- Explain how the same piece of information can be represented in a variety of different ways.
- Explain the challenges of creating a clear set of rules for ordering patterns
- Follow a set of rules for ordering sets of patterns
- Given a piece of media, decide whether to use lossy or lossless compression based on the needs of a situation
- Represent binary numbers using combinations of decimal (base 10) digits 0-9
- Represent decimal numbers using combinations of binary (base 2) digits 0 and 1
- Understand that overflow and roundoff errors result from real-world limitations in representing place value.
- Use a device to represent different pieces of information
- Use patterns to represent information
- Weigh social benefits or harms from a specific instance of information digitization

Standards

CS.9-12.8.1.12.AP.8	Evaluate and refine computational artifacts to make them more usable and accessible.
CS.9-12.8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.

CS.9-12.8.1.12.CS.3	Compare the functions of application software, system software, and hardware.
CS.9-12.8.1.12.DA.2	Describe the trade-offs in how and where data is organized and stored.
CS.9-12.8.1.12.DA.3	Translate between decimal numbers and binary numbers.
CS.9-12.8.1.12.DA.4	Explain the relationship between binary numbers and the storage and use of data in a computing device.
CS.9-12.8.1.12.DA.6	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
CS.9-12.8.1.12.IC.1	Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
CS.9-12.8.2.12.EC.1	Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made.

Instructional Tasks/Activities

- Classroom Discussions
- Debugging
- Digital Information Dilemmas Project
- Exploration/Widget Activities
- Formative Assessments
- Journaling
- Pair Programming
- Peer Feedback
- Worksheets

Assessment Procedure

- Classroom Total Participation Technique
- Classwork
- DBQ
- electronic active responders
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- identify the error problems
- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project

- Quiz
- response and analysis questions
- Rubric
- Teacher Collected Data
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Code Studio
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Slides
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Pixelation Widget
- Quiziz
- Screencastify
- Text Compression
- Widget

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning

- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Resources

- code.org