

Computational Thinking Boosters: Data & Analysis in 3-8

Date: Nov. 17, 2020

[Link to recording](#)



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Introductions



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Agenda

What: 30min CT Boosters(3-8)

Plan for today:

- 5 minutes: **Introduction & Vocabulary**
- 5 minutes: **Using 10 X 2**
- 10 minutes: **Using EarthTime data visualization of Las Vegas, Lake Meade and Dubai**
- 5 minutes: **Data Repository**
- 5 minutes: **Q & A**



Technology & Computer Science in KY



7 Big Ideas of Technology

- Global Collaborator
- Computational Thinker
- Creative Communicator
- Empowered Learner
- Digital Citizen
- Knowledge Constructor
- Innovative Designer

5 Key Concepts of CS

- Networks & the Internet
- Using Algorithms & Programming
- Data Analysis
- Computing Systems
- Impacts of Computing

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Kentucky Academic Standards (KAS) for Computer Science



- Storage: E-DA-01: Appropriately store and modify digital files.
- Storage: M-DA-01: Store data using multiple encoding methods.
- Collection, Visualization & Transformation: E-DA-02: Standard 2: Collect and visually display data using appropriate applications.
- Collection, Visualization & Transformation: E-DA-03: Standard 3: Analyzing data for trends and relationships



Kentucky Academic Standards (KAS) for Technology



Concept: Computational Thinker

standard: CT1. Develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.

Learning Priority: A. Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.

Indicator(s) for grades 3-5:

1. Plan and implement a design process in which they explore solutions to a problem and use digital tools to analyze data, create models, and represent collected data in a way that can be shared with others, with guidance. (ex.: spreadsheets, graphs, charts, tables, presentations, infographics, etc.).

Learning Priority: B. Collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.

Indicator(s) for grades 3-5:

1. Select and utilize an age-appropriate digital tool to represent data (ex.: spreadsheets, digital graphs/charts, etc.), with guidance and support from adults
2. Use this data to discuss findings and share conclusions with others (ex.: presentation apps/website).

Guiding Question:

How do we **collect**, **analyze**, and **store data** to understand relationships in Intermediate and Middle Grades?

- visualize
- useful data
- encode
- trends
- models





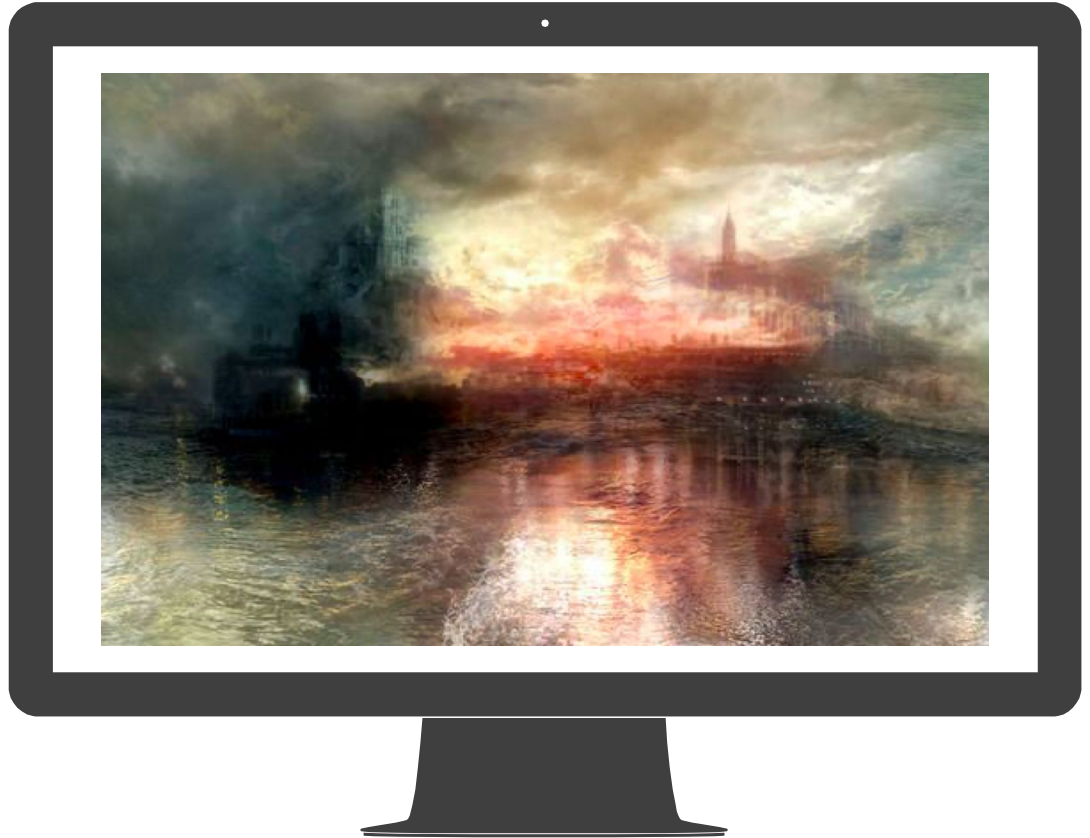
Vocabulary: Data & Analysis



Looking: Ten Times Two Activity

Grab a blank piece of paper!

1. Look at the image quietly for at least 30 seconds. Let your eyes wander.
2. List 10 words or phrases about any aspect of the picture.
3. Repeat Steps 1 & 2: Look at the image again and try to add 10 more words or phrases to your list.



4. Earth's Systems: Processes that Shape the Earth

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Students who demonstrate understanding can:

- 4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.** [Clarification Statement: Examples of evidence from patterns could include rock layers with shell fossils above rock layers with plant fossils and no shells, indicating a change from water to land over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]
- 4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.** [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]
- 4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features.** [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]
- 4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*** [Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Disciplinary Core Ideas

Crosscutting Concepts

Looking: Ten Times Two Activity

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EarthTime (Las Vegas)

What: The CREATE Lab has technology that provides interactive and visual representations of large data sets which reveal patterns that encourage discovery and facilitate communication.

Why: Data is important. We aim to create data visualizations based on the needs of everyone, including global leaders, educators, and community members.



Question 1: What years are shown?

Question 2: Watch the images a few times and slow down the speed. What do you notice in Las Vegas and the surrounding areas? (Hint: It may be useful to hone in on certain areas. Don't look at the map as a whole but instead look at small areas.)

Question 3: As you analyzed the area of Las Vegas, you most likely had questions popping up in your mind. What questions do you have?

EarthTime (Lake Mead)

[National Park Service](#)



Question 4: Research Lake Mead. Describe the history and geography.

Question 5: In Earthtime, watch the time lapse. What is happening to Lake Mead as time passes?

Question 6: Concentrate on two areas where you see a significant change. Include gifs of those areas in the space below. In addition to the gifs, describe the changes.

Question 7: Research: What are the contributing factors happening in the surrounding areas to see a significant change in Lake Mead?

EarthTime (Dubai)



Question 1: What years are shown?

Question 2: Click the play button and watch the change. List a few of the changes you notice. (Remember to notice the small details.)

Question 3: What year or years do you see significant changes? Research why these changes happened.

Question 4: What are some of the manmade feature you notice?

Question 5: Notice the changes in the color of the water. Research the pollution in Dubai. Is there a connection?

What is a data repository?

A data repository can be defined as a place that holds data, makes data available to use, and organizes data in a logical manner. A data repository may also be defined as an appropriate, subject-specific location where researchers can submit their data.

- [data.gov](#) (Links to an external site.)
- [US Census Bureau](#) (Links to an external site.)
- [Western Pennsylvania Regional Data Center](#) (Links to an external site.)
- [HealthData.gov](#) (Links to an external site.)
- [Google Trends](#) (Links to an external site.)
- [data.world](#) (Links to an external site.)
- [Kaggle](#) (Links to an external site.)
- [FiveThirtyEight](#) (Links to an external site.)
- [USGS](#) (Links to an external site.)
- [Harvard Dataverse](#) (Links to an external site.)

Micro-credentials:

- Data and Analysis
 - Analyzing and Communicating with Data
 - Collecting and Structuring Data
- Algorithms
 - Creating Algorithms



Data and Analysis



Analyzing and
Communicating with Data



Collecting and Structuring
Data

CS Standards for K-8

Data & Analysis

Storage

E-DA-01: Appropriately store and modify digital files.

Collection, Visualization & Transformation

E-DA-02: Standard 2: Collect and visually display data using appropriate applications.

Inference & Models

E-DA-03: Standard 3: Analyzing data for trends and relationships

Impacts of Computing

Safety, Law and Ethics

E-IC-04: Standard 4: Understand the importance of proper use of data and information in a computing society.



Resources:

[Civic Online Reasoning \(COR\) Video Library](#) - Library of videos that explain the importance of finding accurate data and strategies for analyzing online data sources. Appropriate for students in grades 7-12 or teachers of any grade.