Unit 1: Data Tells a Story

Content Area: **Mathematics**
Course(s):
Time Period: **September**
Length: **4 weeks**
Status: **Published**

Unit Overview:

In this unit students will be introduced to data science through a reflection of their own experiences using self-generated data, an exploration of a larger dataset of people's media use, and an analysis of business data. Through these activities students will learn about the data science process, begin using data to tell stories, and think about the ethics involved in working with data. Students will make sense of the questions: What part of the story is told by data? What is variation? How is data generated? What data is gathered about themselves? During the unit, students will be learning to use CODAP and Google Sheets as they consider the ways data can be used to model the world. As students learn about data, they will be introduced to many different ways to represent data and will explore univariate, bivariate, and multivariate data. From the data visualizations they will consider what story they can tell from their data.

Essential Questions:

What are variability, data, and models? How can I use data to tell a story? What is data ethics?

Enduring Understandings:

- Identify important quantities in a practical situation and map their relationships.
- Identify, analyze, and synthesize relevant external resources to pose or solve problems.
- Interpret results in the context of a situation.

Standards/Indicators/Student Learning Objectives (SLOs):

MATH.9-12.S.ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MATH.K-12.4	Model with mathematics
MATH.9-12.S.IC.B.6	Evaluate reports based on data (e.g., interrogate study design, data sources, randomization, the way the data are analyzed and displayed, inferences drawn and methods used; identify and explain misleading uses of data; recognize when arguments based on data are flawed).

Lesson Titles:

- 1.1 What are Variability, Data and Models?
- 1.2 Data Ethics
- 1.3 Data Science Inquiry: Asking Questions of Data
- 1.4 Univariate, Bivariate and Multivariate Data
- 1.5 Creating Visual Representations
- 1.6 What is the story I can tell from this data?
- 1.7 What is Data cleaning?

Career Readiness, Life Literacies, & Key Skills:

WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.7	Plan education and career paths aligned to personal goals.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

Inter-Disciplinary Connections:

CS.9-12.8.1.12.DA.1	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
CS.9-12.8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
TECH.8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.

Equity Considerations

Holocaust Mandate

Topic:

Materials Used:

Addresses the Following Component of the Mandate:

- Bias
- Bigotry
- Bullying
- Holocaust Studies
- Prejudice

LGBTQ and Disabilities Mandate

Topic (Person and Contribution Addresses):

Materials Used:

Addresses the Following Component of the Mandate:

- Economic
- Political
- Social

Climate Change

Asian American Pacific Islander Mandate

Topic (Person and Contribution Addresses):

Karthick Ramakrishnan, Ph.D.

executive director and founder of AAPI Data

"AAPI Data is a leading research and policy organization producing accurate data to shift narratives and drive action toward enduring solutions for Asian American, Native Hawaiian and Pacific Islander communities. AAPI Data aspires to transform public and private systems to ensure that all AA and NHPI communities are recognized, valued and prioritized." - https://aapidata.com/about/

Materials Used:

Data from AAPI Data website used in discussion.

Addresses the Following Component of the Mandate:

AAPI

- Economic
- Political
- Social

Summative Assessment:

The key assignment in this unit is called “Dear Data”. In this assignment students will collect data from their own lives and represent it. They will learn that data can be represented in creative ways and will collect and represent it in their own way. Students will consider the model that represents their data, and the part of their story that the data shows. Students will also explore a large data set and find what interests them in that data set and tell a story about the large data set.

- Build a Portfolio - Unit 1 Dear Data Project

Benchmark Assessments

- Project-Based Assessment
- Skills Based Assessment

Alternative Assessment

- Journal Reflections
- Performance tasks
- Portfolios
- Presentations
- Project-based assignments

Formative Assessment:

- Data Talks/ Class Discussions
- Individual. Partner & Group Exploration Activities
- Jigsaw Assignments
- Math Journals

Resources & Materials:

This curriculum will introduce students to the main ideas in data science through free tools such as Google

Sheets, Python, Data Commons and Tableau. Students will learn to be data explorers in project-based units, through which they will develop their understanding of data analysis, sampling, correlation/causation, bias and uncertainty, probability, modeling with data, making and evaluating data-based arguments, the power of data in society, and more! At the end of the course students will have a portfolio of their data science work to showcase their newly developed abilities.

- Data Sets & Visuals
- YouCubed High School Data Science Curriculum

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

- Ask specific, original, and relevant questions to explore data
- Communicate patterns and conclusions from the data with reasonable justifications
- Create a thoughtful and detailed plan to collect and organize data
- Create visual models of univariate, bivariate and multivariate data
- Employ technology to explore patterns and create data visuals
- Provide a clear deliverable for a target audience expressing and justifying claims
- Recognize and identify variability in data
- Recognize ways in which data can be misused and misrepresented

Modifications

ELL Modifications:

- Choice of test format (multiple-choice, essay, true-false)
- Continue practicing vocabulary
- Provide study guides prior to tests
- Read directions to the student
- Read test passages aloud (for comprehension assessment)
- Vary test formats

G&T Modifications:

- Alternate assignments/enrichment assignments
- Enrichment projects
- Extension activities

- Higher-level cooperative learning activities
- Pairing direct instruction with coaching to promote self-directed learning
- Provide higher-order questioning and discussion opportunities
- Provide texts at a higher reading level
- Tiered assignments
- Tiered centers

At Risk Modifications

The possible list of modifications/accommodations identified for Special Education students can be utilized for At-Risk students. Teachers should utilize ongoing methods to provide instruction, assess student needs, and utilize modifications specific to the needs of individual students. In addition, the following may be considered:

- Additional time for assignments
- Adjusted assignment timelines
- Agenda book and checklists
- Answers to be dictated
- Assistance in maintaining uncluttered space
- Books on tape
- Concrete examples
- Extra visual and verbal cues and prompts
- Follow a routine/schedule
- Graphic organizers
- Have students restate information
- No penalty for spelling errors or sloppy handwriting
- Peer or scribe note-taking
- Personalized examples
- Preferential seating
- Provision of notes or outlines
- Reduction of distractions
- Review of directions
- Review sessions
- Space for movement or breaks
- Support auditory presentations with visuals
- Teach time management skills
- Use of a study carrel
- Use of mnemonics
- Varied reinforcement procedures
- Work in progress check

IEP & 504 Modifications:

*All teachers of students with special needs must review each student's IEP. Teachers must then select the appropriate modifications and/or accommodations necessary to enable the student to appropriately progress in the general curriculum.

Possible Modifications/Accommodations: (See listed items below):

- Allow for redos/retakes
- Assign fewer problems at one time (e.g., assign only odds or evens)
- Differentiated center-based small group instruction
- Extra time on assessments
- Highlight key directions
- If a manipulative is used during instruction, allow its use on a test
- Opportunities for cooperative partner work
- Provide reteach pages if necessary
- Provide several ways to solve a problem if possible
- Provide visual aids and anchor charts
- Test in alternative site
- Tiered lessons and assignments
- Use of a graphic organizer
- Use of concrete materials and objects (manipulatives)
- Use of word processor

Technology Materials and Standards

- Chromebooks
- CODAP
- Edublocks
- Google Colab
- Google Jamboard
- Google Sheets
- Google Slides
- Promethean Board
- Tableau

Computer Science and Design Thinking Standards

CS.6-8.DA	Data & Analysis