NOAA SOS Explorer's Quest Toward Creating a Data Visualization Toolbox for Teachers

National Science Foundation Discovery Research K-12

BUILDING INSIGHTS THROUGH OBSERVATION

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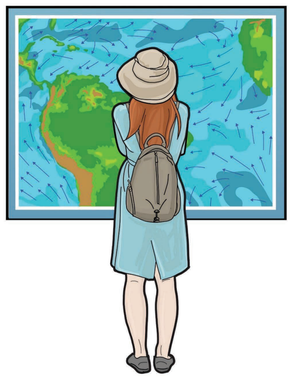


OBJECTIVE

What do you see that makes you say that?

A new approach to teaching with data visualizations, Building Insights Through Observation, aims to help middle school teachers improve data literacy with research that seeks to understand how arts-based instructional methods and geospatial data visualization can be successfully applied.

PROCESS

Over 4 years beginning July 2021:

YEAR 1
- Select teachers for cohort 1
- Collect control data with teachers and students on ease and familiarity with data visualization interpretation & instruction
- Summer professional development workshop. Co-develop methods and iterate on critical elements.

YEAR 2
- Annual observations, interviews, and collaborative reflection with teachers
- Select teachers for cohort 2
- Summer PD workshop with cohort 1 & 2. Co-develop methods

YEAR 3
- Annual observations, interviews, and collaborative reflection with teachers
- Collect post-PD research data with teachers and students to measure gains

YEAR 4
- Widely release data visualization toolbox for educators
- Publish research findings

DATA VISUALIZATION TOOL USED IN STUDY

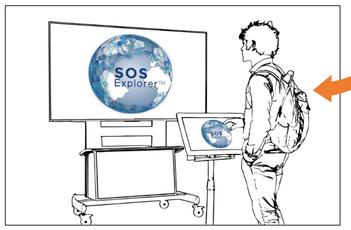
NOAA's SOS Explorerfree mobile app

We started here

SCIENCE ON A SPHERE

SOS EXPLORER FREE MOBILE APP

Then created this



SOS EXPLORER

Finally this!

ARTS-BASED INSTRUCTIONAL METHODS USED IN STUDY

Visual Thinking Strategies

- Learner-centered facilitation method creating inclusive and thoughtful group discussions
- Begins with one minute of silent observation (of art or data visualization), then uses three questions:
  - What is going on in this picture?
  - What do you see that makes you say…
  - What more can we find?

Design Thinking Process

- Solution-based approach to solving problems 5 stages:
  - Empathize
  - Define
  - Ideate
  - Prototype
  - Test

CRITICAL COMPONENTS OF METHOD

(early iteration)

- **Independent looking/silent observation** time supports different types of learners and slows the pace.
- **Group discussions** reinforce learning within the community by hearing others' insights. Student perspectives are all equally valid.
- **Use of both art and SOS data, with art first.** Using art first helps with empathy, confidence, and reinforces the idea that there is no singular conclusion.
- **Group environment integrity is a safe**, messy, open group observation/discussion container where everyone feels their perspective matters.
- **VTS questions are used as is.** They were developed through years of careful research.
- **Critical thinking** skills are the end goal in this method, not necessarily content knowledge.
- **Sprinkling** the methods throughout the year is suggested for best results.
- **Creating helps cement understanding** – kinesthetic practices increase learning by giving students time to explore independently.

END PRODUCTS

Publish and promote an adaptive toolbox that can be used by educators of STEM disciplines in teaching with SOSx app or any other data visualizations from maps to graphs and infographics.

The toolbox will be a website that includes video tutorials, a framework outline, repository of example lessons, and an e-book that explains the context of the arts-based approach.

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