

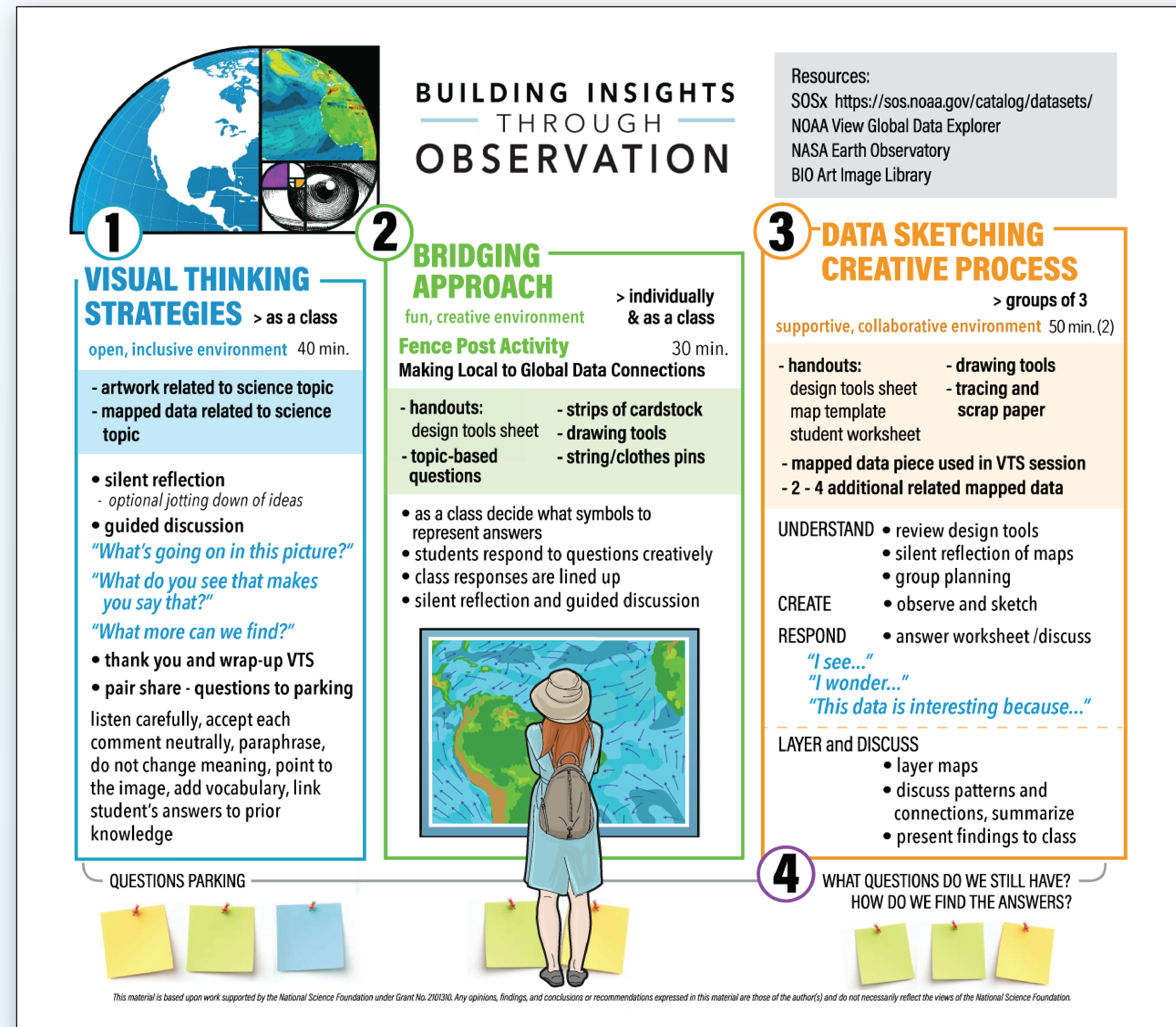
Using Art to Build Insights about Geospatial Visualizations for Data Literacy

**BUILDING INSIGHTS
THROUGH
OBSERVATION**

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Overview of the Building Insights through Observation Framework:



What is Building Insights through Observation?

A four-year design-based research process to iteratively develop, test, and refine a cross-disciplinary instructional framework and professional development model with middle school science teachers ...

...using their classrooms to examine how these practices support students’ data literacy and reasoning skills, and to explore specific areas in which the approach shows greatest promise.

Based on:

1. Visual Thinking Strategies

Learner-centered facilitation method creating inclusive and thoughtful group discussions.

2. Design Thinking Process

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

Set the Environment

- This is a safe place for reflection and all voices are welcome
- Everyone’s observations are equally important
- Step up, step back
- Be respectful and considerate when others are speaking
- You will be doing most of the work in groups
- It is critical to pay attention (listen!) and work together
- Be open to new experiences and approaches and have patience when you don’t understand

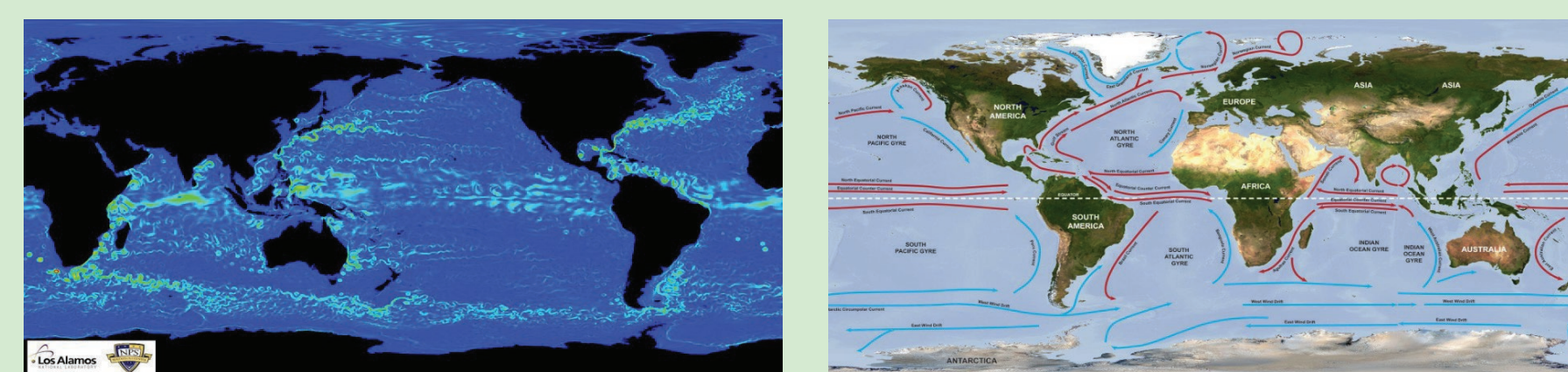
1 Sample artwork and dataset used in Visual Thinking Strategies (framework component #1)



Thomas Hart Benton - The Menemsha Hurricane [1954]

Hurricanes 1950-2020 Cumulative (SCIENCE ON A SPHERE®)

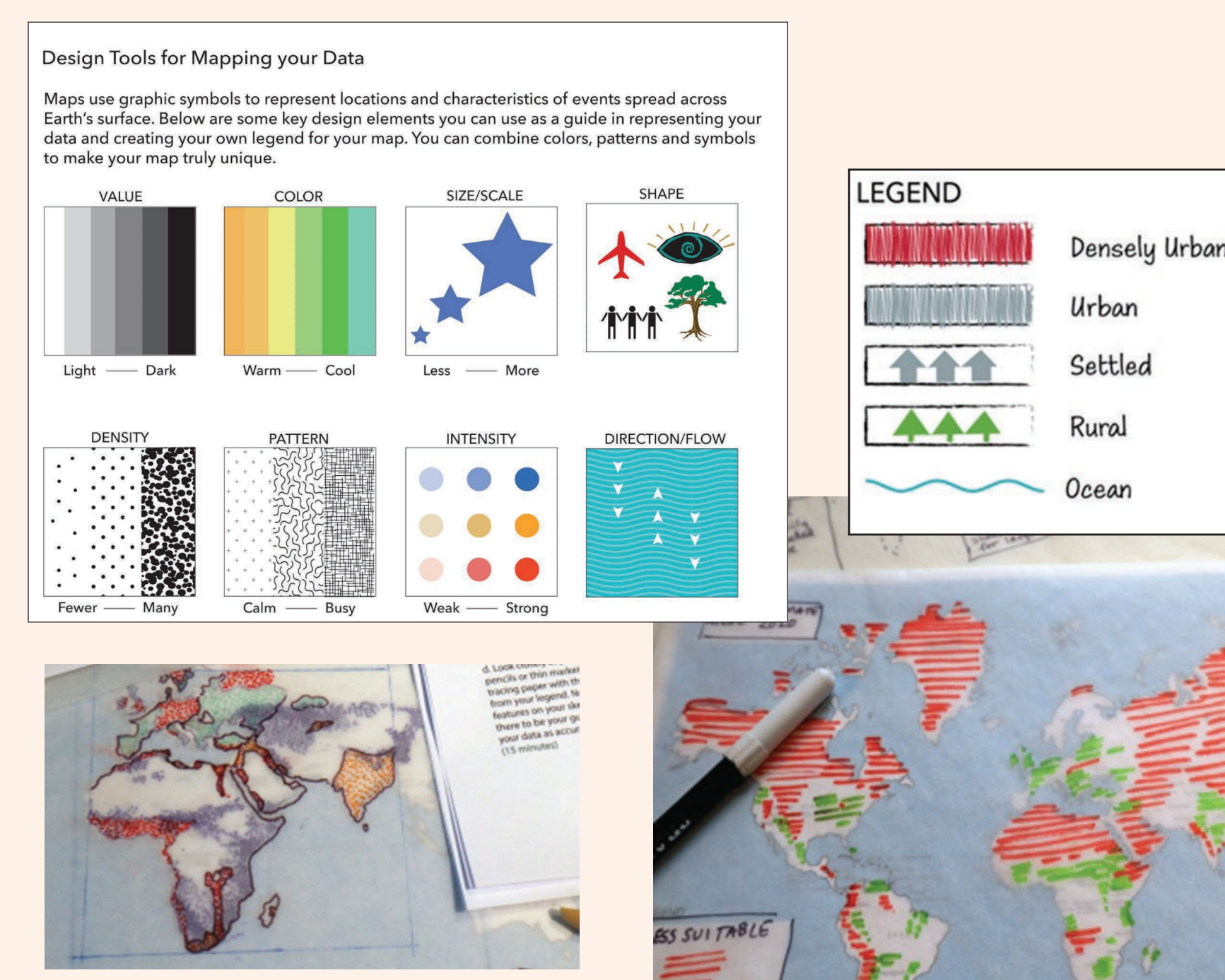
2 Different representations of ocean currents (framework component #2 - Mapping)



Fence Post Activity (framework component #2 - Global to Local Connections)



3 Sketching of mapped data (framework component #3 - Data Sketches)



Methods

Approach

- 2 Cohorts of 5 middle school science teachers from across the country
- Professional development workshops each summer, followed by teacher-led implementation in classrooms
- Reflections, evaluation, and feedback help refine the approach
- Iterative, adaptive

Critical Components

- 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.
- Use of both art and SOS data, with art first. Using art first helps with empathy, confidence.
- Group environment integrity is a safe, open group observation/discussion container where everyone feels their perspective matters.

Outcomes

- ▶ An adaptive toolbox that can be used by educators of STEM disciplines for teaching data visualizations from maps to graphs and infographics.
- ▶ Website that includes video tutorials, a framework outline, repository of example lessons, and an e-book that explains the approach.
- ▶ 10 trained middle school science teachers across the country that helped iteratively test and refine the model
- ▶ Research findings about the effectiveness of the approach in helping improve data literacy



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