Science On a Sphere®
2024-25 Evaluation Brief: Active Learning and Props



Physical objects or processes "off of the sphere": using a marble or toy satellite to show relative scale (images 1, 3) or having a learner carry an "Earth on a stick" around the Sun to show planetary movement (image 2)

How data are collected: showing an actual buoy with an SOS visualization of the location of ocean buoys (image 4)

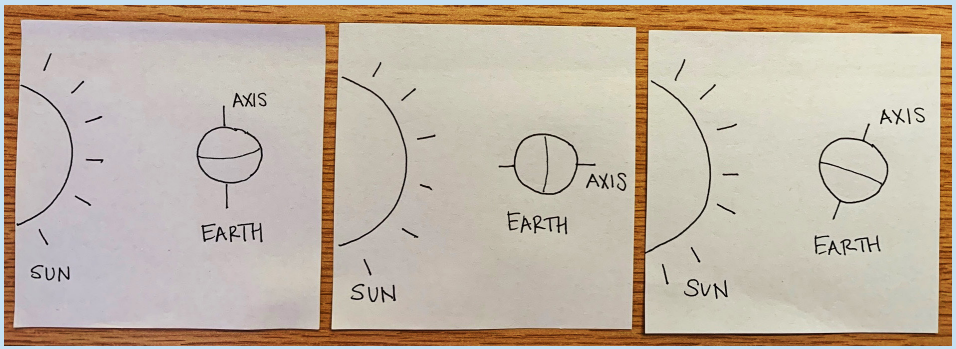
Abstract ideas or processes: using pool noodle arrows to represent gravitational forces around the Earth (image 5)

Props can be used to help learners visualize dimensions that can't be displayed with a spherical projection. For example, if you are displaying the Sun on SOS and want to show how the Earth moves around it, you could put an Earth on a stick and move it around the SOS. Further, props can make abstract, often spatial, concepts concrete. For example, props can be used to show relative scale, as well as motion. Many science disciplines require an accurate understanding of scale over time and space. Research on spatial and math cognition suggests that adding concrete manipulatives, or physical props that learners can touch, boosts spatial and math learning.

DID YOU KNOW?

Drawing as a tool for conceptual learning

When we learn, we develop explanatory mental models – representations of the world. Asking learners to draw a concept sketch allows an instructor to see learners' explanatory models, address misconceptions, and provide feedback (e.g., Harris & Gold, 2018). For learners, sketching "enhances engagement, deepens understanding, requires reasoning, forces ideas to be made explicit, and supports communication in work groups" (Newcombe, 2013). Many studies have found that sketching can help science learners, especially when there are spatial features to be learned (for a review, see Gagnier & Fisher, 2020).

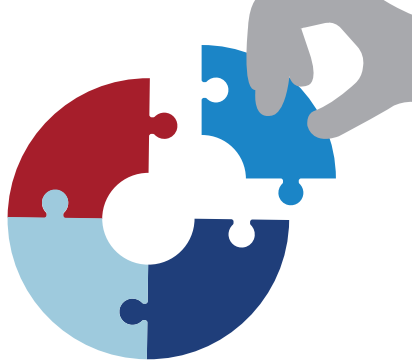


A series of concept sketches that could be used with SOS to scaffold students' learning of how the tilt of Earth's axis impacts our climate.

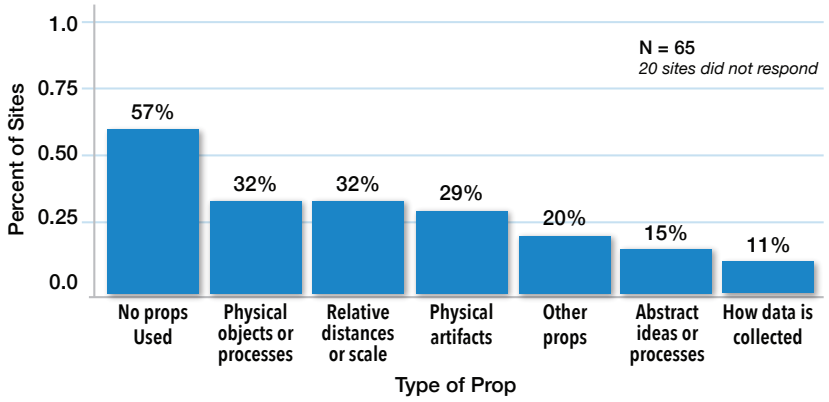
Report prepared by Grace Bennett-Pierre, Beth Russell, Hilary Peddicord, Shilpi Gupta, Anne Gold, Carrie McDougall & Ami Nacu-Schmidt – 2026

ACTIVE LEARNING

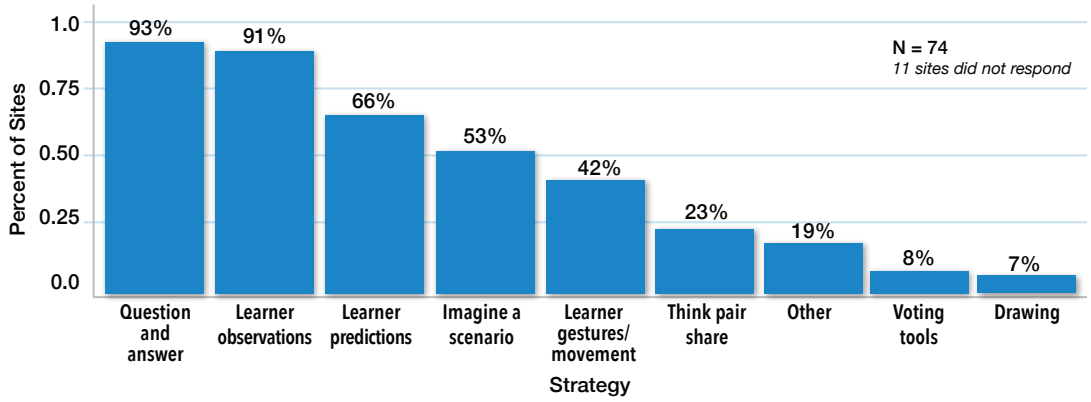
Active learning describes situations where instructors and activities give learners agency. Clicker questions, open question and answer, think-pair-share, or making predictions are all practices that allow facilitators to tailor learning experiences and give learners the opportunity to construct conceptual knowledge. Evidence-based spatializing practices - sketching, gesture, spatial comparison (or analogy), and spatial language – can be used in conjunction with visualizations to enhance science learning. In undergraduate STEM courses, active learning increased student exam scores, passing rates, and conceptual understanding compared to traditional lecture. However, questions remain about how to define active learning and test which practices are most effective, in which contexts, and with which learners.



SOS Sites' Use of Props (2026 Evaluation)



SOS Sites' Use of Active Learning Strategies (2026 Evaluation)



Let's Discuss!

- Do you use active learning techniques or props when you present with SOS/SOSx?
- When and why do you use these techniques?
- If there are ones you don't use, why? If you wanted to use these, what would help you do so?

Tell us about it! Contact the SOS team at sos.contact@noaa.gov

DID YOU KNOW?

THE POWER OF SPATIAL GESTURE

Gestures, or moving your hands or head to communicate an idea, support spatial reasoning and science learning (for a review, see Gagnier & Fisher, 2020; Goldin-Meadow, 2011).



Transform or Lateral Faults



Divergent or Spreading Faults



Convergent or Colliding Faults

Have learners do the "plate tectonics dance" with their hands to learn about fault movement. Image 1: Place your hands flat, parallel, and touching along your pointer fingers, then move them forward and backward to represent transform or lateral faults; image 2: make two fists with your thumbs pointing out, then move your fists towards and away from one another to represent divergent or spreading faults; image 3: hold your hands flat with your fingertips touching one another, then allow one hand to slide under the other to represent converging or colliding faults.

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Want to learn more?
Read the full 2026 Evaluation Report here!

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