Anchoring phenomenon: How well do the materials in "world building" online simulations match real materials on Earth?

POGIL® Activities that support the anchoring phenomenon:

PSActivity 1 – Building Blocks of the Stuff Around Us
Define, draw, and extend models of particles in molecules, including crystals.

PSActivity 2 – How Are Particles Arranged in Solids, Liquids, and Gases?
Exploring, analyzing, and modeling the spacing and orderliness of particles in solids, liquids, and gases.

ESSActivity 1 – You Rock! How Are Different Kinds of Rocks Made?
Processes and materials of the rock cycle are analyzed and a model created.

ESSActivity 2 – Earth's Layered Structure
Density, sinking ,and floating are concepts used to help students interact with and accurately diagram a model of the Earth's layers.

POGIL® Activity	NGSS Performance Expectation	Learning Outcomes
PS Activity 1	**MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.	1. I can define the term "molecule." 2. I can draw particle models of simple molecules if I know their formulas. My models will contain the correct types of atoms and the correct number of each type of atom in the molecule. 3. I can extend a model of a simple crystal substance from a drawing of its structure. Note: We are <u>not</u> defining the term "ions" in this activity. You do not need to introduce the concept as part of the student learning. If students ask about the meaning of the word, you can just tell them that it is one kind of tiny particle that can combine to make larger particles.
PSActivity 2	**MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	1. I can analyze a model to describe how the spacing and orderliness of water particles change when the water is in the solid, liquid, or gas state. 2. I can create models that accurately show how the spacing and orderliness of water particles change when the water is in the solid, liquid, or gas state.
ESSActivity 1	**MS-ESS2-1** Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.	1. I can use a rock cycle diagram to describe how different types of rocks are created from existing materials. 2. I can draw a labeled model to show what happens to rock when various physical processes occur.

ESActivity 2	**MS-ESS1-3** Analyze and interpret data to determine scale properties of objects in the solar system.	1. I can draw and label an accurate diagram that shows the three main layers of the Earth, including each layer's two parts. [includes the terms continental crust, oceanic crust, upper mantle, lower mantle, outer core, and inner core] 2. I can describe how the density of different substances affects each substance's floating and sinking behavior. [using descriptions of relative densities - not numerical density values] 3. I can describe how the density of Earth's materials changes as you travel from the surface of the Earth to the center of the Earth. [finding patterns in numerical density values of Earth's layers; relating those patterns to position relative to the Earths' surface and center] The concepts developed in this activity (density/sinking/floating/structure of the Earth) are the foundation for students to develop the concepts of plate tectonics, mantle rock convection, boundary collisions, subduction, uplift, etc.)