Mixture

Physical Science | Lesson Guide

1st Grade

Photo Description

This picture shows concrete with lots of small rocks and pebbles stuck inside it. The rocks are many different colors like brown, red, yellow, and black. Some rocks are big and some are very tiny.

Scientific Phenomena

The anchoring phenomenon here is composite material formation - specifically how concrete is made by mixing cement paste with aggregate materials (rocks, sand, gravel) that harden together. This demonstrates how different materials can be combined to create something new with different properties than the original parts. The cement acts as a binder that holds all the rock pieces together, creating a strong, durable surface through a chemical process called hydration.

Core Science Concepts

1. Materials and Their Properties: Different rocks have different colors, sizes, and shapes, but when combined with cement, they create a new material with different properties.

2. Mixtures: Concrete is a mixture of cement, water, sand, and rocks that can be observed as separate parts even after they're combined.

3. Changes in Materials: When cement and water mix with the rocks, a chemical change happens that makes the mixture hard and strong.

4. Observable Characteristics: We can use our senses to observe and describe the different colors, sizes, and textures of materials.

Pedagogical Tip:

Have students practice being "material scientists" by using magnifying glasses to examine different textures and colors in the concrete. This builds observation skills while making science feel like detective work.

UDL Suggestions:

Provide various ways for students to record observations - drawing, verbal descriptions, or using simple charts with pictures. Some students may benefit from touching different textured materials to understand the concept of "rough" versus "smooth."

Zoom In / Zoom Out

1. Zoom In: At the microscopic level, cement crystals are growing around each rock particle, creating tiny bridges that lock everything together like a puzzle that can't be taken apart.

2. Zoom Out: This concrete is part of larger human-built structures like sidewalks, buildings, and roads that help create our communities and connect different places together.

Discussion Questions

1. What do you notice about the different rocks in the concrete? (Bloom's: Observe | DOK: 1)
2. How do you think all these rocks got stuck together so tightly? (Bloom's: Analyze | DOK: 2)
3. What would happen if we tried to build a sidewalk with just rocks and no cement? (Bloom's: Evaluate | DOK: 3)
4. Where else have you seen concrete like this in your neighborhood? (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

1. Misconception: "The rocks were always stuck together naturally."
   Reality: Humans made concrete by mixing separate materials together on purpose.

2. Misconception: "All the rocks are the same, just different colors."
   Reality: These are actually different types of rocks with different properties, not just different colored versions of the same rock.

3. Misconception: "You can easily separate the rocks from the concrete."
   Reality: Once concrete hardens, the materials are permanently stuck together through chemical bonds.

Cross-Curricular Ideas

1. Math - Sorting and Counting: Have students sort pictures of different rocks by color or size, then count how many rocks are in each group. They can create simple bar graphs showing which color appears most often in the concrete sample.

2. ELA - Descriptive Writing: Students can dictate or write simple sentences describing what they observe in the concrete using sensory words like "bumpy," "colorful," "hard," and "smooth." Create a class book titled "Our Concrete Discovery" with each student contributing one illustrated page.

3. Social Studies - Community Helpers: Discuss the different workers who help build concrete structures in our communities (construction workers, engineers, truck drivers). Take a neighborhood walk to identify concrete in sidewalks, roads, and buildings, then create a class map showing where concrete is used nearby.

4. Art - Mixed Media Collage: Students create their own "concrete" artwork by gluing small pebbles, sand, and torn paper onto a poster board to mimic the concrete mixture. This helps them understand how different materials combine to make something new while developing fine motor skills.

STEM Career Connection

1. Construction Worker: Construction workers use concrete to build sidewalks, roads, and buildings in our communities. They mix the concrete ingredients together and pour it into shapes to create strong structures that people use every day. Average Salary: $48,000-$55,000 per year

2. Civil Engineer: Civil engineers design and plan where concrete structures like roads, bridges, and buildings should be built. They figure out how much concrete is needed and make sure it's safe and strong enough for people to use. Average Salary: $87,000-$95,000 per year

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3. Materials Scientist: Materials scientists study different rocks, cement, and other materials to understand their properties and create better, stronger mixtures for building. They test new combinations to make concrete that lasts longer and works better. Average Salary: $65,000-$75,000 per year

NGSS Connections

- Performance Expectation: 1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
- Disciplinary Core Ideas: 2-PS1.A (Different kinds of matter exist and many of them can be either solid or liquid)
- Crosscutting Concepts: Patterns (Patterns in the natural and human designed world can be observed and used as evidence)

Science Vocabulary

* Concrete: A hard material made by mixing cement, water, sand, and rocks together.
* Mixture: When two or more different things are combined together but keep their own properties.
* Material: What something is made of, like wood, metal, or rock.
* Properties: How something looks, feels, or acts, like being hard, soft, smooth, or rough.
* Observe: To look carefully at something and notice details about it.

External Resources

Children's Books:
- Building a House by Byron Barton
- Roadwork by Sally Sutton
- The Three Little Pigs (various authors - focus on building materials)

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