Grade 5: Cited CCCs and their Bullets

PATTERNS In grades 3-5, students identify similarities and differences in order to sort and classify natural objects and designed products. They identify patterns related to time, including simple rates of change and cycles, and use these patterns to make predictions.

- **Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2)**

CAUSE AND EFFECT In grades 3-5, students routinely identify and test causal relationships and use these relationships to explain change. They understand events that occur together with regularity might or might not signify a cause and effect relationship.

- **Cause and effect relationships are routinely identified and used to explain change.** (3-LS2-1), (3-LS3-2), (3-LS4-2), (3-LS4-3), (4-ESS3-1), **(5-PS2-1)**
- **Cause and effect relationships are routinely identified, tested, and used to explain change.** (3-ESS3-1), (3-PS2-3), (4-ESS2-1), (4-ESS3-2), **(5-PS1-4)**

SCALE, PROPORTION, AND QUANTITY In grades 3-5, students recognize that natural objects and observable phenomena exist from the very small to the immensely large. They use standard units to measure and describe physical quantities such as weight, time, temperature, and volume.

- **Natural objects exist from the very small to the immensely large. (5-PS1-1), (5-ESS1-1)**
- **Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-ESS2-2), (5-PS1-2), (5-PS1-3)**

SYSTEMS AND SYSTEM MODELS In grades 3-5, students understand that a system is a group of related parts that make up a whole and carry out functions its individual parts cannot. They can also describe a system in terms of its parts and their interactions.

- **A system can be described in terms of its components and their interactions.** (3-LS4-4), (4-LS1-1), (4-LS1-2), **(5-LS2-1), (5-ESS2-1), (5-ESS3-1)**

ENERGY AND MATTER In grades 3-5, students learn matter is made of particles and that energy can be transferred in various ways and between objects. Students observe the conservation of matter by tracking matter flows and cycles before and after processes and by recognizing that the total weight of substances does not change.

- **Matter is transported into, out of, and within systems. (5-LS1-1)**
- **Energy can be transferred in various ways and between objects.** (4-PS3-1), (4-PS3-2), (4-PS3-3), (4-PS3-4), **(5-PS3-1)**

Dr. Art's Recommendations re CCCs in Grade 5

NOTE: Please read the Dr. Art recommendations for the entire Grade 3-5 Span before reading the recommendation for this grade level.

Grade 5 initiates a transition away from a CCC emphasis on **Patterns** and **Cause and Effect**. More than 75% of the citations are for other CCCs. The one **Patterns** citation extends the classifying and sorting of natural phenomena to include analyzing and communicating simple rates of change such as daily changes in length and direction of shadows, day and night, and the seasonal appearance of stars in the night sky (5-ESS1-2).

The main **Cause and Effect** CCC bullet in Grades 3-5 states: "Cause and effect relationships are routinely identified, tested, and used to explain change." In one of the two cited Grade 5 instances the cited bullet omits the word "tested." The longer complete statement provides the goal for the grade and grade span. There is one important Grade 3-5 **Cause and Effect** CCC bullet that is not cited at all in the grade span. It states that "events that occur together with regularity might or might not be a cause and effect relationship." Grade 5 should include differentiating between causation and correlation (see discussion in the recommendations for the Grade 3-5 span).

Grade 5 extends the use of **Systems and System Models** to develop models that describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact (5-ESS2-1). This kind of system analysis is absolutely essential for analyzing and understanding environmental issues and how planet Earth works.

Grade 4 introduced a strong focus (four citations) on energy transfers related to the CCC of **Energy and Matter**. Grade 5 has one citation with respect to energy transformations (uses of energy in animal food and its origin in plant capture of sunlight: 5-PS3-1). Grade 5 also uses the contexts of photosynthesis and food webs to focus on the flows of matter into, within and out of systems (5-LS2-1). These contexts provide important opportunities to connect the CCC of **Systems and System Models** with flows of **Energy and Matter**.

There is one important Grade 3-5 **Systems and System Models** CCC bullet that is not cited at all in the grade span. It states that "a system is a group of related parts that make up a whole and can carry out functions its individual parts cannot." Grade 5 instruction and learning can include Earth System examples and ecosystem examples that illustrate how a system has functions and properties that none of its individual parts have (see discussion in the recommendations for the Grade 3-5 span).

