

TRB³

Elementary Science Teacher Resource Book

A PROFESSIONAL DEVELOPMENT
RESOURCE FOR TEACHING
CORE CURRICULUM

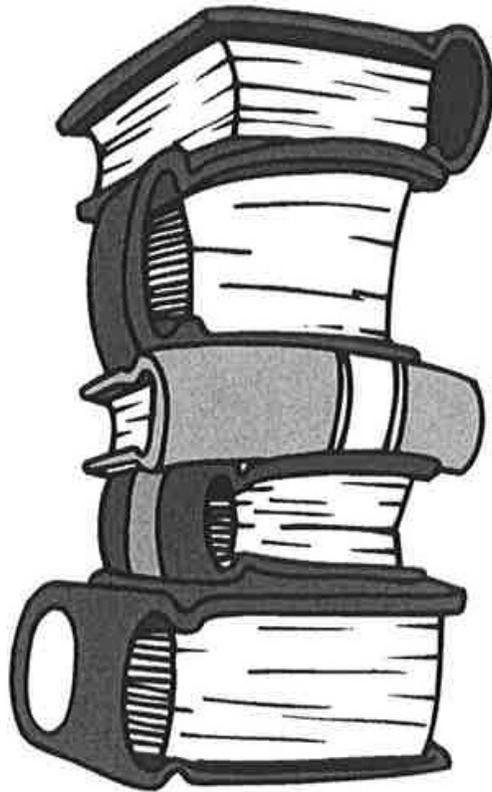
GRADE 5

LITERACY -- STRATEGIES – ASSESSMENT

Utah State Office of Education

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3. Fifth Grade Science Core Curriculum



Fifth Grade Science Core Curriculum

In the Fifth Grade students begin to understand concepts of **Change and Cause and Effect**. Students will learn about the constantly changing Earth's surface. They will investigate physical and chemical changes in matter. They will begin to relate causes for changes with their effects. Students will have opportunity to investigate the effects of various forces, such as magnetism and electricity upon materials. They will begin to learn how traits passed from parent organisms to their offspring affect their survival.

Students should learn to value the scientific processes as means of obtaining knowledge. They should be encouraged to maintain an open and questioning mind and should be helped and encouraged to pose their own questions about objects, events, processes and results. Fifth graders should have the opportunity to plan and conduct their own experiments and come to their own conclusions as they read, observe, compare, describe, infer and draw conclusions.

Good science instruction requires hands-on science investigations in which student inquiry is an important goal. Teachers should provide opportunities for all students to explore many things. Fifth graders should have sufficient understanding of Earth Science to point out an interesting landform to others and hypothesize its origin; feel the success of connecting batteries and wire to make the lights come on; learn about chemical change as they mix baking soda and vinegar and test changes in acidity of liquids using the juice of red cabbage leaves. They should come to enjoy science as a process of learning about their world. They should have opportunities to read about science and write their reflections and findings. They should have opportunities to have feedback on their science understanding as they progress (assessment).

Science Core concepts should be integrated with concepts and skills from other curriculum areas. Reading, writing and mathematics skills should be emphasized as integral to the instruction of science. Technology issues and the nature of science are significant components of this Core. Personal relevance of science in students' lives is always an important part of helping students to value science and should be emphasized at this grade level.

This Core was designed using the American Association for the Advancement of Science's Project 2061: Benchmarks For Science Literacy and the National Academy of Science's National Science Education Standards as guides to determine appropriate content and skills.

- The theme for the fifth grade Science Core curriculum is *Change and Cause and Effect*.



The fifth grade Science Core has three online resources designed to help with classroom instruction. They include: Teacher Resource Book (TRB³), a set of lesson plans, assessment items and science information specific to fifth grade; Sci-ber-Text, an electronic science textbook specific to the Utah Core, and the science text item pool. This pool includes multiple-choice questions, performance tasks, and interpretive items aligned to the standards and objectives of the fifth grade Science Core. These resources are all available on the Utah Science Home Page at: <http://www.usoe.k12.ut.us/curr/science>.

SAFETY PRECAUTIONS:

The hands-on nature of this science curriculum increases the need for teachers to use appropriate precautions in the classroom and field. Teachers must adhere to the published guidelines for the proper use of animals, equipment, and chemicals in the classroom. These guidelines are available on the Utah Science Home Page.

Science Benchmark

The weight of an object is always equal to the sum of its parts, regardless of how it is assembled. In a chemical reaction or physical change, matter is neither created nor destroyed. When two or more materials are combined, either a chemical reaction or physical change may occur. Chemical reactions are indicated when materials heat or cool, give off light, give off gas, or change colors. In a chemical reaction, the materials are changed into new substances. In a physical change a new substance is not formed.

STANDARD I

Students will understand that chemical and physical changes occur in matter.

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Objective 1: Describe that matter is neither created nor destroyed even though it may undergo change.

- Compare the total weight of an object to the weight of its individual parts after being disassembled.
- Compare the weight of a specified quantity of matter before and after it undergoes melting or freezing.
- Investigate the results of the combined weights of a liquid and a solid after the solid has been dissolved and then recovered from the liquid (e.g., salt dissolved in water then water evaporates).
- Investigate chemical reactions in which the total weight of the materials before and after reaction is the same (e.g., cream and vinegar before and after mixing, borax and glue mixed to make a new substance).

Objective 2: Evaluate evidence that indicates a physical change has occurred.

- Identify the physical properties of matter (e.g., hard, soft, liquid, gas).
- Compare changes in substances that indicate a physical change has occurred.
- Describe the appearance of a substance before and after a Physical change.

Objective 3: Investigate evidence for changes in matter that occur during a Chemical reaction.

- Identify observable evidence of a chemical reaction (e.g., color change, heat or light given off, heat absorbed, gas given off.)
- Explain why the measured weight of a remaining product is less than its reactants when a gas is produced.
- Cite examples of chemical reactions in daily life.
- Compare a physical change to a chemical change.
- Hypothesize how changing one of the materials in a chemical



Science language students should use:

Heat, substance, chemical change, dissolve, physical change, matter, product, reactants, solid, liquid, weight.

STANDARD II

Students will understand that volcanoes, earthquakes, uplift, weathering, and erosion reshape Earth's surface.

Science Benchmark

The Earth's surface is constantly changing. Some changes happen very slowly over long periods of time, such as weather, erosion, and uplift. Other changes happen abruptly, such as landslides, volcanic eruptions, and earthquakes. All around us, we see the visible effects of the building up and breaking down of the Earth's surface.

STANDARD II: Students will understand that volcanoes, earthquakes, uplift, weathering and erosion reshape the Earth's surface.

Objective 1: Describe how weathering and erosion change Earth's surface.

- a. Identify the objects, processes, or forces that weather and erode Earth's surface (e.g., ice, plants, animals, abrasion, gravity, water, wind).
- b. Describe how geological features (e.g., valleys, canyons, buttes, arches) are changed through erosion (e.g., waves, wind, glaciers, gravity, running water).
- c. Explain the relationship between time and specific geological changes.

Objective 2: Explain how volcanoes, earthquakes, and uplift affect Earth's surface.

- a. Identify specific geological features created by volcanoes, earthquakes, and uplift.
- b. Give examples of different landforms that are formed by volcanoes, earthquakes, and uplift (e.g., mountains, valleys, new lakes and canyons).
- c. Describe how volcanoes, earthquakes, and uplift change landforms.
- d. Cite examples of how technology is used to predict volcanoes and earthquakes.

Objective 3: Relate the building up and breaking down of Earth's surface over time to the various physical land features.

- a. Explain how layers of exposed rock, such as those observed in the Grand Canyon, are the result of natural processes acting over long periods of time.
- b. Describe the role of deposition in the processes that change Earth's surface.
- c. Use a time line to identify the sequence and time required for building and breaking down of geologic features on Earth.
- d. Describe and justify how the surface of Earth would appear if there were no mountain uplift, weathering, or erosion.

Science language students should use:

Earthquakes, erode, erosion, faults, uplift, volcanoes, weathering, buttes, arches, glaciers, geological, deposition.

Science Benchmark

Earth and some Earth materials are magnetic. Without touching them, a magnet attracts things made of iron and either pushes or pulls on other magnets.

STANDARD III

Students will understand that magnetism can be observed when there is an interaction between the magnetic fields of magnets or between a magnet and materials made of iron.

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Objective 1: Investigate and compare the behavior of magnetism using magnets.

- a. Compare various types of magnets (e.g., permanent, temporary, and natural magnets) and their abilities to push or pull iron objects they are not touching.
- b. Investigate how magnets will both attract and repel other magnets.
- c. Compare permanent magnets and electromagnets.
- d. Research and report the use of magnets that is supported by sound and scientific properties.

Objective 2: Describe how the magnetic field of Earth and a magnet are similar.

- a. Compare the magnetic fields of various types of magnets (e.g., bar magnet, disk magnet, horseshoe magnet).
- b. Compare Earth's magnetic field to the magnetic field of a magnet.
- c. Construct a compass and explain how it works.
- d. Investigate the effects of magnets on the needle of a compass and compare this to the effects of Earth's magnetic field on the needle of a compass (e.g., magnets affect the needle only at close distances, Earth's magnetic field affects the needle at great distances, magnets close to a compass override the Earth's effect on the needle).



Science language students should use:

Attract, compass, electromagnetism, magnetic force, magnetic field, natural magnet, permanent magnet, properties, repel, temporary magnet

STANDARD IV:

Students will understand features of static and current electricity.

Science Benchmark

Electricity is a form of energy. Current electricity can be generated and transmitted through pathways. Some materials are capable of carrying electricity more effectively than other materials. Static electricity is a result of objects being electrically charged. Without touching them, materials that are electrically charged may either push or pull other charged materials.

STANDARD IV: Students will understand features of static and current electricity.

Objective 1: Describe the behavior of static electricity as observed in nature and everyday occurrences.

- a. List several occurrences of static electricity that happen in every day life.
- b. Describe the relationship between static electricity and lightning.
- c. Describe the behavior of objects charged with static electricity in attracting or repelling without touching.
- d. Compare the amount of static charge produced by rubbing various materials together (e.g., rubbing fur on a glass rod produces a greater charge than rubbing the fur with a metal rod, the static charge produced when a balloon is rubbed on hair is greater than when a plastic bag is rubbed on hair).
- e. Investigate how various materials react differently to statically charged objects.

Objective 2: Analyze the behavior of current electricity.

- a. Draw and label the components of a complete electrical circuit that includes switches and loads (e.g., light bulb, bell, speaker, motor).
- b. Predict the effect of changing one or more of the components (e.g., battery, load, wires) in an electrical circuit.
- c. Generalize the properties of materials that carry the flow of Electricity using data by testing different materials.
- d. Investigate materials that prevent the flow of electricity.
- e. Make a working model of a complete circuit using a power Source, switch, bell or light, and a conductor for a pathway.



Science language students should use:

Battery, complete circuit, incomplete circuit, current, conductor, insulator, pathway, power source, attract, repel, static electricity, switch, load

Science Benchmark

All living things inherit a set of characteristics or traits from their parents. Members of any given species transfer traits from one generation to the next. The passing of traits from parent to offspring is called heredity and causes the offspring to resemble the parent. Some traits differ among members of a population, and these variations may help a particular species to survive better in a given environment in getting food, finding shelter, protecting itself, and reproducing. These variations give the individual a survival advantage over other individuals of the same species.

STANDARD V:

Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

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Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

Objective 1 Using supporting evidence, show that traits are transferred From parent organism to its offspring.

- a. Make a chart and collect data identifying various traits among a given population (e.g., the hand span of students in the classroom, the color and texture of different apples, the number of petals of a given flower).
- b. Identify similar physical traits of a parent organism and its offspring (e.g., trees and sapling, leopards and cubs, chickens and chicks)
- c. Compare various examples of offspring that do not initially resemble the parent organism but mature to become similar to the parent organism (e.g., mealworms and darkling beetles, tad poles and frogs, seedlings and vegetables, caterpillars and butterflies).
- d. Contrast inherited traits with traits and behaviors that are not inherited but may be learned or induced by environmental factors (e.g., cat purring to cat meowing to be let out of the house; the round shape of a willow is inherited, while leaning away from the prevailing wind is induced).
- e. Investigate variations and similarities in plants grown from seeds of a parent plant (e.g., how seeds from the same plant species can produce different colored flowers or identical flowers).



Objective 2:

Describe how some characteristics could give a species a survival advantage in a particular environment.

- a. Compare the traits of similar species for physical abilities, instinctual behaviors, and specialized body structures that increase the survival of one species in a specific environment over another species (e.g., difference between the feet of snowshoe hare and cottontail rabbit, differences in leaves of plants growing at different altitudes, differences between the feathers of an owl and a hummingbird, differences in parental behavior among various fish).
- b. Identify that some environments give one species a survival advantage over another (e.g., warm water favors fish such as carp, cold water favors fish such as trout, environments that burn regularly favor grasses, environments that do not often burn favor trees).
- c. Describe how a particular physical attribute may provide an advantage for survival in one environment but not in another (e.g., heavy fur in arctic climates keep animals warm whereas in hot desert climates it would cause overheating; flippers on such animals as sea lions and seals provide excellent swimming structures in the water but become clumsy and awkward on land; cacti retain the right amount of water in arid regions but would develop root rot in a more temperate region; fish gills have the ability to absorb oxygen in water but not on land).
- d. Research a specific plant or animal and report how specific physical attributes provide an advantage for survival in a specific environment.

Science language students should use:

Inherited, environment, species, offspring, traits, variations, survival, instincts, population, specialized structure, organism, life cycle, parent organism, learned behavior