Alignment with Utah's Science Standards

This document evaluates the state's Education Standards for Science to determine alignment with content found in Cogno board games. Grades 3-8 were analyzed.

Highlighting Key
Indicates a significant amount of material addresses the standard
Indicates a moderate amount of material is present to develop student understanding of the standard

The main intent of science instruction in Utah is that students will value and use science as a process of obtaining knowledge based upon observable evidence.

By the end of third grade students will be able to:

1. Use Science Process and Thinking Skills
   1. Observe simple objects and patterns and report their observations.
   2. Sort and sequence data according to a given criterion.
   3. Make simple predictions and inferences based upon observations.
   4. Compare things and events.
   7. Develop and use simple classification systems.
   8. Use observations to construct a reasonable explanation.

2. Manifest Scientific Attitudes and Interests
   1. Demonstrate a sense of curiosity about nature.
   2. Voluntarily read or look at books and other materials about science.
   3. Pose questions about objects, events, and processes.

3. Understand Science Concepts and Principles
   1. Know and explain science information specified for the grade level.
   3. Explain science concepts and principles using their own words and explanations.

4. Communicate Effectively Using Science Language and Reasoning
   3. Use scientific language appropriate to grade level in oral and written communication.
   4. Use available reference sources to obtain information.

Core Standards of the Course

Standard 1
Students will understand that the shape of Earth and the moon are spherical and that Earth rotates on its axis to produce the appearance of the sun and moon moving through the sky.

Objective 1 Describe the appearance of Earth and the moon.
   1. Describe the shape of Earth and the moon as spherical.

2. Explain that the sun is the source of light that lights the moon.
3. List the differences in the physical appearance of Earth and the moon as viewed from space.

Standard 2
Students will understand that organisms depend on living and nonliving things within their environment.

Objective 1: Classify living and nonliving things in an environment.
1. Identify characteristics of living things (i.e., growth, movement, reproduction).
2. Identify characteristics of nonliving things.
3. Classify living and nonliving things in an environment.

Objective 2: Describe the interactions between living and nonliving things in a small environment.
2. Predict the effects of changes in the environment (e.g., temperature, light, moisture) on a living organism.
4. Compare a small–scale environment to a larger environment (e.g., aquarium to a pond, terrarium to a forest).
5. Pose a question about the interaction between living and nonliving things in the environment that could be investigated by observation.

Standard 3
Students will understand the relationship between the force applied to an object and resulting motion of the object.

Objective 1: Demonstrate how forces cause changes in speed or direction of objects.
1. Show that objects at rest will not move unless a force is applied to them.
2. Compare the forces of pushing and pulling.

Objective 2: Demonstrate that the greater the force applied to an object, the greater the change in speed or direction of the object.
1. Predict and observe what happens when a force is applied to an object (e.g., wind, flowing water).
2. Compare and chart the relative effects of a force of the same strength on objects of different weight (e.g., the breeze from a fan will move a piece of paper but may not move a piece of cardboard).
3. Compare the relative effects of forces of different strengths on an object (e.g., strong wind affects an object differently than a breeze).

Standard 4
Students will understand that objects near Earth are pulled toward Earth by gravity.

Objective 1 Demonstrate that gravity is a force.
1. Demonstrate that a force is required to overcome gravity.
2. Use measurement to demonstrate that heavier objects require more force than lighter ones to overcome gravity.

Objective 2 Describe the effects of gravity on the motion of an object.
3. Pose questions about gravity and forces.

Standard 5

Students will understand that the sun is the main source of heat and light for things living on Earth. They will also understand that the motion of rubbing objects together may produce heat.

Objective 1 Provide evidence showing that the sun is the source of heat and light for Earth.
3. Provide examples of how sunlight affects people and animals by providing heat and light.

By the end of fourth grade students will be able to:

1. Use Science Process and Thinking Skills
1. Observe simple objects and patterns and report their observations.
3. Make simple predictions and inferences based upon observations.
4. Compare things and events.
7. Develop and use simple classification systems.
8. Use observations to construct a reasonable explanation.

2. Manifest Scientific Attitudes and Interests
1. Demonstrate a sense of curiosity about nature.
2. Voluntarily read or look at books and other materials about science.
3. Pose questions about objects, events, and processes.

3. Understand Science Concepts and Principles
1. Know and explain science information specified for the grade level.
3. Explain science concepts and principles using their own words and explanations.

4. Communicate Effectively Using Science Language and Reasoning
3. Use scientific language appropriate to grade level in oral and written communication.
4. Use available reference sources to obtain information.

Core Standards of the Course

Standard 2
Students will understand that the elements of weather can be observed, measured, and recorded to make predictions and determine simple weather patterns.

Objective 1 Observe, measure, and record the basic elements of weather.
3. Investigate evidence that air is a substance (e.g., takes up space, moves as wind, temperature can be measured).

Standard 5
Students will understand the physical characteristics of Utah's wetlands, forests, and deserts and identify common organisms for each environment.

Objective 3 Use a simple scheme to classify Utah plants and animals.
1. Explain how scientists use classification schemes.

By the end of fifth grade students will be able to:

1. Use Science Process and Thinking Skills
1. Observe simple objects, patterns, and events and report their observations.

2. Sort and sequence data according to criteria given.
4. Compare things, processes, and events.
5. Use classification systems.
7. Formulate simple research questions.
8. Predict results of investigations based on prior data.
9. Use data to construct a reasonable conclusion.

2. Manifest Scientific Attitudes and Interests
1. Demonstrate a sense of curiosity about nature.
2. Voluntarily read and look at books and other materials about science.
3. Pose science questions about objects, events, and processes.
4. Maintain an open and questioning mind toward new ideas and alternative points of view.
5. Seek and weigh evidence before drawing conclusions.

3. Understand Science Concepts and Principles
1. Know and explain science information specified for the grade level.
3. Solve problems appropriate to grade level by applying science principles and procedures.

4. Communicate Effectively Using Science Language and Reasoning
2. Describe or explain observations carefully and report with pictures, sentences, and models.
3. Use scientific language in oral and written communication.
4. Use reference sources to obtain information and cite the source.
5. Use mathematical reasoning to communicate information.

5. Demonstrate Awareness of Social and Historical Aspects of Science
1. Cite examples of how science affects life.
2. Understand the cumulative nature of science knowledge.

6. Understand the Nature of Science
1. Science is a way of knowing that is used by many people not just scientists.
2. Understand that science investigations use a variety of methods and do not always use the same set of procedures; understand that there is not just one "scientific method."
3. Science findings are based upon evidence.

Core Standards of the Course

Standard 1
Students will understand that chemical and physical changes occur in matter.

Objective 1 Describe that matter is neither created nor destroyed even though it may undergo change.
1. Compare the total weight of an object to the weight of its individual parts after being disassembled.

Standard 2
Students will understand that volcanoes, earthquakes, uplift, weathering, and erosion reshape Earth's surface.

Objective 1 Describe how weathering and erosion change Earth’s surface.
3. Explain the relationship between time and specific geological changes.

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

4. Describe and justify how the surface of Earth would appear if there were no mountain uplift, weathering, or erosion.

Standard 3
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.

Standard 5
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 2 Describe how some characteristics could give a species a survival advantage in a particular environment.

By the end of sixth grade students will be able to:

1. Use Science Process and Thinking Skills
   1. Observe simple objects, patterns, and events, and report their observations.
   2. Sort and sequence data according to criteria given.
   4. Compare things, processes, and events.
   5. Use classification systems.
   7. Formulate simple research questions.
   8. Predict results of investigations based on prior data.
   9. Use data to construct a reasonable conclusion.

2. Manifest Scientific Attitudes and Interests
   1. Demonstrate a sense of curiosity about nature.
   2. Voluntarily read and look at books and other materials about science.
   3. Pose science questions about objects, events, and processes.
   4. Maintain an open and questioning mind toward new ideas and alternative points of view.
   5. Seek and weigh evidence before drawing conclusions.

3. Understand Science Concepts and Principles
   1. Know and explain science information specified for the grade level.
   3. Solve problems appropriate to grade level by applying science principles and procedures.

4. Communicate Effectively Using Science Language and Reasoning
   2. Describe or explain observations carefully and report with pictures, sentences, and models.
   3. Use scientific language in oral and written communication.
   4. Use reference sources to obtain information and cite the source.
   5. Use mathematical reasoning to communicate information.

5. Demonstrate Awareness of Social and Historical Aspects of Science
   1. Cite examples of how science affects life.
   2. Understand the cumulative nature of science knowledge.

6. Understand the Nature of Science
   1. Science is a way of knowing that is used by many people not just scientists.
   2. Understand that science investigations use a variety of methods and do not always use the same set of procedures; understand that there is not just one "scientific method."
   3. Science findings are based upon evidence.

Core Standards of the Course

Standard 3
Students will understand the relationship and attributes of objects in the solar system.

Objective 1 Describe and compare the components of the solar system.
2. Using references, compare the physical properties of the planets (e.g., size, solid or gaseous).
4. Describe the characteristics of comets, asteroids, and meteors.
5. Research and report on the use of manmade satellites orbiting Earth and various planets.

Objective 2 Describe the use of technology to observe objects in the solar system and relate this to science's understanding of the solar system.
1. Describe the use of instruments to observe and explore the moon and planets.
2. Describe the role of computers in understanding the solar system (e.g., collecting and interpreting data from observations, predicting motion of objects, operating space probes).
3. Relate science's understanding of the solar system to the technology used to investigate it.
4. Find and report on ways technology has been and is being used to investigate the solar system.

Objective 3 Describe the forces that keep objects in orbit in the solar system.
1. Describe the forces holding Earth in orbit around the sun, and the moon in orbit around Earth.
2. Relate a celestial object's mass to its gravitational force on other objects.
3. Identify the role gravity plays in the structure of the solar system.

Standard 4
Students will understand the scale of size, distance between objects, movement, and apparent motion (due to Earth's rotation) of objects in the universe and how cultures have understood, related to and used these objects in the night sky.

Objective 1 Compare the size and distance of objects within systems in the universe.
1. Use the speed of light as a measuring standard to describe the relative distances to objects in the universe (e.g., 4.4 light years to star Alpha Centauri; 0.00002 light years to the sun).
2. Compare distances between objects in the solar system.
3. Compare the size of the Solar System to the size of the Milky Way galaxy.
4. Compare the size of the Milky Way galaxy to the size of the known universe.

Standard 5
Students will understand that microorganisms range from simple to complex, are found almost everywhere, and are both helpful and harmful.

Objective 1 Observe and summarize information about microorganisms.
1. Examine and illustrate size, shape, and structure of organisms found in an environment such as pond water.

Standard 6
Students will understand properties and behavior of heat, light, and sound.

Objective 2 Describe how light can be produced, reflected, refracted, and separated into visible light of various colors.
1. Compare light from various sources (e.g., intensity, direction, color).
2. Compare the reflection of light from various surfaces (e.g., loss of light, angle of reflection, reflected color).

Objective 3 Describe the production of sound in terms of vibration of objects that create vibrations in other materials.

1. Describe how sound is made from vibration and moves in all directions from the source in waves.
2. Explain the relationship of the size and shape of a vibrating object to the pitch of the sound produced.
3. Relate the volume of a sound to the amount of energy used to create the vibration of the object producing the sound.

By the end of seventh and eight grades students will be able to:

1. Use Science Process and Thinking Skills
    1. Observe objects and events for patterns and record both qualitative and quantitative information.
    2. Sort and sequence data according to a given criterion.
    3. Develop and use categories to classify subjects studied.
    5. When given a problem, plan and conduct experiments in which they:
        * Form research questions.
        * Discuss possible outcomes of investigations.
        * Analyze data and construct reasonable conclusions.
        * Prepare written and oral reports of their investigation.
    6. Distinguish between factual statements and inferences.

2. Manifest Scientific Attitudes and Interests
    1. Read and look at books and other science materials voluntarily.
    2. Raise questions about objects, events, and processes that can be answered through scientific investigation.
    3. Maintain an open and questioning mind toward ideas and alternative points of view.
    5. Accept and use scientific evidence to help resolve ecological problems.

3. Demonstrate Understanding of Science Concepts and Principles
    1. Know and explain science information specified for their grade level.
    2. Distinguish between examples and non examples of concepts that have been taught.
    4. Solve problems appropriate to grade level by applying scientific principles and procedures.

4. Communicate Effectively Using Science Language and Reasoning
    1. Provide relevant data to support their inferences and conclusions.
    4. Use reference sources to obtain information and cite the sources.
    5. Use mathematical reasoning to communicate information.

5. Demonstrate Awareness of Social and Historical Aspects of Science
    1. Cite examples of how science affects life.
    2. Give instances of how technological advances have influenced the progress of science and how science has influenced advances in technology.
    3. Understand the cumulative nature of the development of science knowledge.

6. Demonstrate Understanding of the Nature of Science
    1. Science is a way of knowing that is used by many people, not just scientists.
    2. Understand that science investigations use a variety of methods and do not always use the same set of procedures; understand that there is not just one "scientific method."
    3. Science findings are based upon evidence.
    4. Understand that science conclusions are tentative and therefore never final. Understandings based upon these conclusions are subject to revision in light of new evidence.

5. Understand that scientific conclusions are based on the assumption that natural laws operate today as they did in the past and that they will continue to do so in the future.
6. Understand that various disciplines of science are interrelated and share common rules of evidence to explain phenomena in the natural world.

7th grade Integrated Science Core Curriculum
Core Standards of the Course

Standard 1
Students will understand the structure of matter.

Objective 1 Describe the structure of matter in terms of atoms and molecules.
1. Recognize that atoms are too small to see.

Objective 2 Relate the adaptability of organisms in an environment to their inherited traits and structures.
2. Cite examples of traits that provide an advantage for survival in one environment but not other environments.

Standard 5
Students will understand that structure is used to develop classification systems.

Objective 1 Classify based on observable properties.
1. Categorize nonliving objects based on external structures (e.g., hard, soft).
2. Compare living, once living, and nonliving things.
3. Defend the importance of observation in scientific classification.
4. Demonstrate that there are many ways to classify things.

Objective 2 Use and develop a simple classification system.
1. Using a provided classification scheme, classify things (e.g., shells, leaves, rocks, bones, fossils, weather, clouds, stars, planets).
2. Develop a classification system based on observed structural characteristics.
5. Recognize that classification is a tool made by science to describe perceived patterns in nature.

Eighth Grade Integrated Science Core Curriculum
Core Standards of the Course

Standard 2
Students will understand that energy from sunlight is changed to chemical energy in plants, transfers between living organisms, and that changing the environment may alter the amount of energy provided to living organisms.

Objective 1 Compare ways that plants and animals obtain and use energy.
1. Recognize the importance of photosynthesis in using light energy as part of the chemical process that builds plant materials.

Standard 4
Students will understand the relationships among energy, force, and motion.

Objective 1 Investigate the transfer of energy through various materials.
1. Relate the energy of a wave to wavelength.

5. Demonstrate how white light can be separated into the visible color spectrum.

Objective 2 Examine the force exerted on objects by gravity

1. Distinguish between mass and weight.
2. Cite examples of how Earth's gravitational force on an object depends upon the mass of the object.
3. Describe how Earth's gravitational force on an object depends upon the distance of the object from Earth.

Objective 4 Analyze various forms of energy and how living organisms sense and respond to energy.

1. Analyze the cyclic nature of potential and kinetic energy (e.g., a bouncing ball, a pendulum).