Science: I've scanned the Scope & Sequence and Ongoing Learner Goals of our adopted science curriculum, highlighting areas the garden program is used to address. These include seeds, plants, habitats, recycling, weather, seasons, water cycle, erosion, and soils. These gardens also provide a wonderful environment for scientific observation.

Reading/Writing: Narrative and descriptive writing, scientific writing. Librarians have also been using the gardens as a high interest entry point for nonfiction reading.

Social Studies/Economics: Communities - the roles and responsibilities of individuals within a group. Students work with members of the community to develop and maintain the gardens as well as to sell the produce at the end of the season. 6th graders have the opportunity to work, caring for the gardens during the summer, gaining work skills experience. This also provides career awareness in future agricultural careers. Several school host a community party/harvest festival at the end of the season, recognizing all the members of the community who provided support for their gardens.

Health: Nutrition is taught through the gardens. Healthy eating habits, fresh vs processed foods, vitamin and mineral content, and the food pyramid are taught at appropriate levels.

Math/Economics: Real-world math skills are used to develop and maintain the gardens: patterns in nature (develops algebraic thinking) basic operations, area and perimeter, measurement, money, etc.

All the areas listed above are part of our curriculum.

Peggy Carlson
Executive Director for Curriculum
Fairbanks North Star Borough School District

SCOPE AND SEQUENCE

	KINDERGARTEN	FIRST GRADE	SECOND GRADE
Life Science	• Different types of living and non-living things exist on earth.	• Some plants come from seeds and others grow from roots of the parent plant. Seeds are transported by air, water and animals. • Plants (terrestrial, aquatic and marine) are the beginning of the food web.	• Some organisms are producers and some are consumers. • Plants and animals are found in a particular habitat to which they have adapted.
Physical Science	• Properties of materials can be observed, measured and predicted.	• Heat can be produced and transferred in many ways from one object to another. • Light travels in a straight line until it strikes an object. Light can be split into colors.	• Sound is produced by vibrating objects and travels in waves. • Motion is created by force and the transfer of energy.
Earth and Space Science	• Earth is composed of land, air, and water which can all be affected by human activity. • Weather changes both daily and with the seasons; affecting Earth and its inhabitants.	• Many observable factors affect the weather. • Air, land and water have weight and take up space. They are associated with forces which shape and influence the earth.	• Earth's seasons are determined by its constant tilt and position in orbit relative to the sun. • Day and night are caused by Earth's rotation.
GRADE LEVEL SCIENTISTS			
	• John Muir • Susan La Flesche Picotte • Jonas Salk	• George Washington Carver • Orville & Wilbur Wright • Louis Pasteur	• Alexander Graham Bell • Jane Goodall • Nicolaus Copernicus

SCOPE AND SEQUENCE

THIRD GRADE	FOURTH GRADE	FIFTH GRADE	SIXTH GRADE
• Terrestrial and some aquatic plants are made up of roots, stems, flowers, and leaves: each part has its own unique function.	• Insects have observable characteristics and behaviors. • Extinct organisms leave identifiable fossil evidence. • Alaskan plants have developed unique adaptations to accommodate their ecological niche in the habitat.	• Cells are the basic building blocks of life. • The human body is composed of systems (e.g. circulatory, respiratory, reproductive, nervous, muscular, immune, excretory, digestive and skeletal systems) with unique structures and functions that work together.	• All organisms are scientifically classified by their structure. • An ecosystem can be a network of mutual relationships between organisms and their environment.
• Lever, pulley, wedge, wheel and axle, screw and inclined plane are simple machines that help us do work. • Complex machines are made from many simple machines. • Electricity can be used to produce light, heat and motion.	• The common states of matter are solids, liquids and gases. • Effective environmental practices include reducing, reusing and recycling waste materials to conserve energy and resources.	• All matter has mass, weight, volume and density which can be measured and compared. Matter can undergo physical and chemical changes. • Light can be reflected, refracted, or absorbed. The pitch of a sound depends on the frequency of the vibration producing it. These vibrations move at different speeds through different mediums and different temperatures.	• Elements and their combinations account for the varied types of matter in the world. • An electric current is the flow of electrons.
• The water in the biosphere is constantly being recycled through evaporation and condensation. • Erosion is a primary process of the natural patterns of change of the earth. • Soils differ in color, texture, capacity to retain water and the ability to support the growth of many kinds of plants, and, therefore, animals.	• Rocks and minerals are formed by the rock cycle and are classified by their observable characteristics. • The cosmos includes our solar system and various celestial bodies which have distinguishable characteristics.	• Features on Earth's surface are constantly changing (e.g. volcanoes, plate tectonics, earthquakes, glaciers). • Oceans have their own unique properties, forces and ecosystems.	• Gravity is the force that causes two particles to pull towards each other. • Energy from the sun heats Earth unevenly, which causes air movements that result in changing weather patterns.
GRADE LEVEL SCIENTISTS			
• Elizabeth Britton • Thomas Edison • Elijah McCoy	• Mary Leakey • Carl Sagan • Rachel Carson	• Jacques Cousteau • Alfred Wegener • Anton Van Leeuwenhoek **or** Fridtjof Nansen	• Leonardo da Vinci • Marie & Pierre Curie • Sir Isaac Newton **or** Michael Faraday

ONGOING LEARNER GOALS
K-6

Students will:

- utilize the scientific process skills: observing, classifying, measuring, interpreting data, inferring, communicating, controlling variables, developing models and theories, hypothesizing, predicting and experimenting (S.A.1)
- integrate reading, writing, technology and mathematics with science inquiry (S.E.1, LA, M)
- understand that science includes the process of asking and refining questions so they can be tested (S.G.2, S.A.2)
- understand that scientists use different kinds of investigations depending on the questions they are trying to answer (S.A.1, S.E.2)
- understand that an experiment must be repeated many times and yield consistent results before the results are accepted as valid (S.A.1)
- use appropriate tools and follow procedures safely
- communicate scientific procedures and explanations based on evidence (S.A.2, LA)
- develop critical thinking, decision making, and problem solving skills (S.A.1, S.A.2)
- develop an awareness that society, culture, history and environment contribute to the development of scientific knowledge (S.A.3, S.E.3)
- recognize scientific contributions from scientists representing a diversity of cultures, ethnicities and genders (S.G.1, S.F)
- understand that science is ongoing and subject to change as new evidence becomes available (S.G.3)
- recognize that advances in science depend on curiosity, creativity, imagination and a broad knowledge base (S.G.4)
- recognize that the processes of science require integrity, skepticism, openness and peer review (S.A.2)
- utilize and/or render statistics in order to make reasoned descriptions, judgments, inferences and opinions about data

Sheila Peterson

From: Herman, Marcy J (EED) [marcy.herman@alaska.gov]
Sent: Tuesday, February 15, 2011 3:36 PM
To: Sheila Peterson
Subject: Gardening Content Standards Citations
Attachments: Gardening content standards citations 2.15.11.pdf; Gardening Content Standards Science 2.15.11.pdf

Sheila,

Attached are the areas in which we found gardening in the content standards. Also included is an explanation of the information that was found by our program staff.

I have reviewed all of the Alaska Standards and the most substantive connections between HB 93 and our standards falls under Science Standards. (I looked closely at our Health Standards and contacted Child Nutrition and DHSS to inquire about nutrition standards and didn't find anything noteworthy under either).

Alaska's Content Standards for Science (A) Science as Inquiry and Process, (B) Physical Science, (C) Life Science, and (D) Earth Science, and (F) Cultural, Social, Personal Perspectives, and Science all highlight that students should develop an understanding of concepts like energy transference, genetics, heredity, natural selection, life cycles, the relationships between organisms in the physical environment, cyclical changes controlled by the Earth's position, etc. These are concepts that could be taught/advanced through farming/gardening activities.

Additionally, Alaska's Performance Standards for Science have references to plants across the grade levels ranging from simple observation of plant life, to the sorting of plants by physical characteristics, to energy transference via photosynthesis that could be advanced via farms, gardens, or greenhouses. The Cultural, Social, Personal Perspectives, and Science Performance Standards specifically mention gardens and state students should be able to describe the scientific principles involved in a subsistence activity (e.g., hunting, fishing, gardening).

Citation highlights from the Science Performance Standards (3) SA3.1, (3) SC1.1, (3) SC2.1, (6) SC3.1, (9) SC3.1, (9)SF1.1

As always, please let me know if you have related questions. See you in the a.m.

Marcy Herman

Special Assistant

Office of the Commissioner

Alaska Department of Education & Early Development

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SCIENCE

A

Science as Inquiry and Process

A student should understand and be able to apply the processes and applications of scientific inquiry.

A student who meets the content standard should:

1) develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments;

2) develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review; and

3) develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues.

B

Concepts of Physical Science

A student should understand and be able to apply the concepts, models, theories, universal principles, and facts that explain the physical world.

A student who meets the content standard should:

1) develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior;

2) develop an understanding that energy appears in different forms, can be transformed from one form to another, can be transferred or moved from one place or system to another, may be unavailable for use, and is ultimately conserved;

3) develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems; and

4) develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.

C

Concepts of Life Science

A student should understand and be able to apply the concepts, models, theories, facts, evidence, systems, and processes of life science.

A student who meets the content standard should:

1) develop an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution;

2) develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms; and

3) develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

D

Concepts of Earth Science

A student should understand and be able to apply the concepts, processes, theories, models, evidence, and systems of earth and space sciences.

A student who meets the content standard should:

1) develop an understanding of Earth's geochemical cycles;
2) develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth;
3) develop an understanding of the cyclical changes controlled by energy from the sun and by Earth's position and motion in our solar system; and
4) develop an understanding of the theories regarding the origin and evolution of the universe.

E

Science and Technology

A student should understand the relationships among science, technology, and society.

A student who meets the content standard should:

1) develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events;
2) develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits; and
3) develop an understanding of how scientific discoveries and technological innovations affect and are affected by our lives and cultures

F

Cultural, Social, Personal Perspectives and Science

A student should understand the dynamic relationships among scientific, cultural, social, and personal perspectives.

A student who meets the content standard should:

1) develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology;
2) develop an understanding that some individuals, cultures, and societies use other beliefs and methods in addition to scientific methods to describe and understand the world; and
3) develop an understanding of the importance of recording and validating cultural knowledge.

G

History and Nature of Science

A student should understand the history and nature of science.

A student who meets the content standard should:

1) develop an understanding that historical perspectives of scientific explanations demonstrate that scientific knowledge changes over time, building on prior knowledge;
2) develop an understanding that the advancement of scientific knowledge embraces innovation and requires empirical evidence, repeatable investigations, logical arguments, and critical review in striving for the best possible explanations of the natural world;
3) develop an understanding that scientific knowledge is ongoing and subject to change as new evidence becomes available through experimental and/or observational confirmation(s); and
4) develop an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base.