Content and Instruction

Science as Inquiry

The abilities to conduct scientific inquiry and the development of understandings about scientific inquiry.

Physical Science

Facts, concepts, principles, theories, and models that are fundamental to understanding and using the physical sciences.

Life Science

Facts, concepts, principles, theories, and models that are fundamental to understanding and using the life sciences.

Earth & Space Science

Facts, concepts, principles, theories, and models that are fundamental to understanding and using earth and space science.

Science & Technology

The abilities associated with technological design and understandings about the connections between science and technology.

Science in Personal & Social Perspectives

Understandings which are a foundation on which to base personal and social decisions.

History & Nature of Science

Science as an ongoing, changing human enterprise, and an appreciation of the role of science throughout history and in many cultures.

The focus of instruction early in this grade range is on:

Unifying Concepts and Processes

Systems, order and organization; Evidence, models and explanation; Constancy, change, and measurement; Evolution and equilibrium; Form and function

Science as Inquiry

engaging all students in teacher guided experiences that develop the ability to ask questions, make observations, use simple tools to investigate, collect data and communicate their findings.

Physical Science

providing opportunities for all students to develop an awareness and understanding of the characteristics of objects and materials that they encounter daily through observation, manipulation, and classification.

Life Science

building understandings of biological concepts through direct experiences with living things, their life cycles, and their habitats.

Earth and Space Science

providing opportunities for all students to observe earth materials, their properties, and how they change over time.

Science and Technology

providing opportunities for all students to investigate designed products and begin to develop the ability to design a solution to a problem.

Science in Personal and Social Perspectives

providing opportunities for all students to develop initial understandings about the relationships between science, personal health and the environment.

History and Nature of Science

developing an awareness that science is something that students do and relating that to what scientists do.

The focus of instruction later in this grade range is on:

Unifying Concepts and Processes

Systems, order and organization; Evidence, models and explanation; Constancy, change, and measurement; Evolution and equilibrium; Form and function

Science as Inquiry

engaging all students in teacher-guided experiences that develop the ability to ask scientific questions, design and construct simple experiments, and communicate reasonable explanations.

Physical Science

providing opportunities for all students to observe, describe, and measure properties of objects, the way they change over time, and changes that occur when objects interact.

Life Science

providing opportunities to explore and expand their understandings of molecular genetics, biological evolution and interactions, the structure and function of living systems, natural ecosystems and apply their understandings in a variety of situations.

Earth and Space Science

providing opportunities for all students to observe and describe objects in the sky and changes in the earth and sky as they identify sequences, look for patterns, and develop possible explanations of phenomena in the earth system.

Science and Technology

providing all students opportunities that continue to develop the abilities to design solutions to problems using situations and materials the students encounter in their daily lives.

Science in Personal and Social Perspectives

providing opportunities for all students to develop understandings about science-related personal and societal challenges and engage in some personal actions in local challenges related to science and technology.

History and Nature of Science

developing an understanding that science is an ongoing process and that many men and women are involved in the advancement of scientific understandings.

Science for Young Learners

K-4 students are curious and learn through active experiences. They are eager to know more about the world and are developing strategies for learning about it. Educators can capitalize on and nurture the natural curiosity of students in the classroom. Through the study of science, young learners can expand their learning strategies as they develop an appreciation for science and begin to develop an understanding of fundamental science concepts.

All K-4 students should have active science experiences that include all of the content areas, including inquiry, physical science, life science, earth and space science, science in personal and social perspectives, science and technology, and the history and nature of science. As they participate in explorations of the world around them, they learn basic skills and gain understanding through systematic investigations of familiar materials and objects.

During the elementary years, science should be a frequent and meaningful part of the academic experience of all students. Science concepts can be woven into the curriculum (see Chapter 4: Connections). When students read fiction and nonfiction literature, write about their scientific encounters, and draw and graph what they observe and measure, science concepts can be reinforced and clarified and connections made between what they are learning in other subjects and everyday life.

It is essential that the science taught to children in grades K-4 is developmentally appropriate. The content, instruction and assessments must meet the student at his/her developmental level. This *Framework*, along with the *Minnesota Graduation Standards* and the *National Science Education Standards* provides guidance for making these decisions.

Because K-4 students are building a picture of how the natural world works, they need to have multiple opportunities to observe, compare, categorize, order, record, and communicate. Using their senses and simple tools, students can recognize characteristics of objects and the environment and describe them in pictures, words, and with actions. They also compare and contrast their observations about these objects and the environment with what they already know about the world. K-4 students can focus their attention, use logical reasoning, and understand and use language as a tool for communicating in science.

Direct experience is essential for elementary students and the classroom is a busy place where their curiosity is met with an array of materials to explore and discuss. But science must be more than just a collection of "hands-on" activities. Science experiences should relate to the standards, make connections with the student's world, and be developmentally appropriate. Students need time to talk and think about their work. Doing alone is not enough. Through these experiences students learn to relate their ideas to evidence, gain an understanding of science concepts, and experience the excitement of an "Aha!" in learning.