

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

providing all students with an environment that stimulates students to ask their own scientific questions within the context of the curriculum, and assisting them as they design, carry out, analyze, and communicate findings from their own investigations.



Physical Science

providing opportunities for all students to move from understandings about the properties of objects to the characteristic properties of the substances from which objects are made. Basic concepts of force, motion, and energy transfer are introduced and explored.



Life Science

developing a basic understanding of the organization of living systems and an awareness of the diversity and interdependence among organisms.



Earth and Space Science

developing a basic understanding of the components of the earth system and the movement of objects in the solar system.



Science and Technology

establishing an awareness of the distinctions between science and technology and increasing students' abilities in design, using familiar science contexts.



Science in Personal and Social Perspectives

providing opportunities for all students to develop a more conceptual understanding of science-related social issues, make connections, and engage in actions related to science and personal and social challenges in their community.



History and Nature of Science

providing all students opportunities to understand the nature of science by examining their own inquiry investigations and historical examples.

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

providing all students with opportunities to participate in full and partial inquiry activities which challenge them to apply their science knowledge, understandings, and abilities as they carry out more complex investigations and communicate results.



Physical Science

providing opportunities for all students to develop an operational understanding of elements and compounds and characteristic properties of common substances. The concepts of force, motion, and energy are developed through a variety of quantitative experiences.



Life Science

developing an understanding of human biology, recognizing patterns in ecosystems and basic understandings about the cellular dimensions of living systems.



Earth and Space Science

developing an understanding of the dynamic nature of the earth system, its evolution, and its relationship to the solar system.



Science and Technology

developing all students' understandings about similarities and differences between science and technology and using their abilities of technological design to solve problems in a variety of contexts.



Science in Personal and Social Perspectives

developing a scientific understanding of health and enabling students to make reasoned decisions and take relevant actions in personal and community challenges related to science, technology, and society.



History and Nature of Science

using student investigations, case studies, and historical examples from a variety of cultures to help students understand scientific inquiry, the nature of scientific knowledge, and interactions between science and society.

Science for Intermediate & Middle Learners

Students at this age find scientific explorations fascinating, especially when problems on which they are working are meaningful, relevant, and challenging. Science content learned through inquiry investigations which center on questions that interest students, enables them to develop positive attitudes about science as they learn significant science content. All 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, should be included in the 5-8 curriculum.

Intermediate and middle-level students engage in full and partial scientific inquiries where they begin with a question, design an investigation, gather evidence, formulate an answer to the original question, and communicate the investigation process and results. Middle-level students develop the ability to think about and solve problems in their heads which allows them to manipulate objects symbolically. However, they still need concrete experiences and inquiry activities should build on the students' prior experiences, capture the students' interest, and include as much interdisciplinary work as possible to help students see how science is integrated with other subject areas and the applications of science in their lives.

Middle-level teachers must avoid the pressure to teach a science curriculum which only prepares students for high school science courses. When middle-level science curriculum becomes a "watered-down" high school science curriculum, the needs of students are not met. While the common justification for this is that students will better understand material at the high-school level if they have "seen it before," research shows that this "preparation ethic" is not justified. It is far more important for students to leave grades 5-8 interested in science and able to understand and use important science concepts and the abilities of inquiry.

Students begin to perceive relationships between objects and events in their environments as they observe interactions, dependencies, and reason about cause and effect. However, their adolescent egocentrism and self-absorption can interfere with their understanding. They are able to recognize the relationship between explanation and evidence, but may choose to focus on evidence that confirms current beliefs and personal explanations, and may ignore evidence that is counter to their own perceptions.

Science instruction should be a part of each student's program throughout the intermediate and middle-level school years. The National Science Teachers' Association recommends that there be a minimum of two and one-half hours per week of science instruction required for all students in grades five and six, and a minimum of one period per day of science instruction be required for all students in grades seven and eight.