ENVISION 21

Deep Learning

SCIENCE STANDARD

GRADES K-12

CATALINA FOOTHILLS SCHOOL DISTRICT

A 21st Century Learning Community

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SCIENCE STANDARD

INTRODUCTION

Students are naturally curious about the world and their place in it. Sustaining this curiosity and giving it a scientific foundation is a high priority in the Catalina Foothills School District (CFSD). Application of scientific thinking enables our students to strengthen skills that people need and use every day: solving problems creatively, thinking critically, making decisions, working cooperatively in teams, using technology effectively, and valuing lifelong learning. An understanding of science and the processes of science contribute in an essential way to these skills.

Not all students will become scientists or engineers. But science and technology occupy ever-expanding places in our everyday lives. As citizens, we are asked to make decisions about social issues that involve science and technology. As workers, we have occupations that increasingly involve science and technology. In the 21st century, adults need to be comfortable and competent in a complex, scientific and technological world. Schools have the responsibility of preparing students for their future. CFSD must prepare all students – regardless of their future aspirations – to be scientifically literate.

Therefore, all graduates of the Catalina Foothills School District must be knowledgeable about the important concepts and theories of the major domains of scientific study: Life Science, Physical Science, and Earth and Space Science. They must be able to (1) think scientifically and use scientific knowledge to make decisions about real-world problems; (2) construct new knowledge for themselves through research, reading, and discussion; (3) make informed judgments on statements and debates claiming to have a scientific basis; and (4) reflect in an informed way on the role of science in society.

The CFSD Science Standard is set with the expectation that science instruction occurs at all grade levels – beginning in early grades with simple exploration, progressing to increasingly organized and sophisticated science investigations in higher grades. Scientific Inquiry establishes the basis for students' learning in science. Students use scientific processes: generating questions, predicting and hypothesizing, designing investigations, observation and data collection, analysis, conclusion, and communicating results as a basis for developing the ability to think and act in ways associated with inquiry in each domain of science. To that end, identified inquiry processes have been assigned to each K-5 grade level to build the foundational skills necessary for investigations and inquiry at the secondary level.

The Science Standard is designed so that students achieve proficiency in a continuum of K-12 articulated benchmarks. These rigorous benchmarks, organized by measurement topics, are the intended results we envision for our graduates. Students make continuous progress toward meeting the standard at each grade level. The benchmarks are established to designate clearly what students are expected to know and be able to do by the end of each grade level and high school course.

The skills and content of the science measurement topics align with the Arizona Science Standard, National Science Education Standards, and integrate CFSD's deep learning proficiencies (previously named 21st century skills; e.g., scientific inquiry, systems thinking, critical thinking and problem solving, collaboration).

The measurement topics and benchmarks have been coded so that the district can easily refer to them in curriculum, instruction, assessment, and professional development activities. The numbering system begins with the subject area/course. Science is assigned the code SC (high school course codes will vary). The first numeral in the code indicates the grade level (K-8). The second numeral identifies the measurement topic. The last numeral indicates the benchmark. When applying the benchmarks, all "required" items must be taught. "For example" is used to indicate possible examples for teaching content and skills within the benchmarks.

Science Measurement Topics

1. Scientific Inquiry

The inquiry process establishes the basis for students' learning in science. Students use scientific processes: questioning, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, and communicating results. The measurement topics included in Scientific Inquiry are as follows:

- 1a. Generating Scientific Questions
- 1b. Predicting and Hypothesizing
- 1c. Designing Investigations
- 1d. Observation and Data Collection
- 1e. Analysis and Conclusion

2. Interaction of Science and Society

Scientific investigation grows from the contributions of many people. The importance of the inclusion of historical perspectives and the advances that each new development brings to technology and human knowledge are emphasized. The impact of science and technology on human activity and the environment is emphasized and students develop the ability to design a solution to a problem.

3. Systems Thinking

Systems Thinking is a vantage point from which one sees a whole, a web of relationships, rather than focusing only on the detail of any particular piece. Events are seen in the larger context of a pattern that is unfolding over time. Systems thinking provides students with a more effective way of interpreting the complexities of the world in which they live—a world that is increasingly dynamic, global, and complex. The systems thinking concepts/strategies to be emphasized are as follows:

- 3a. Change Over Time
- 3b. Interdependencies
- 3c. Leverage

4 – 5. Life Science

Life science expands students' biological understanding of life by focusing on the characteristics of living things, the diversity of life, how organisms and populations change over time in terms of biological life cycles, interrelationships of matter and energy in living organisms, and the interactions of living organisms with their environment. The measurement topics included in Life Science are as follows:

- 4. Characteristics of Living Things
- 5. Interdependence of Living Things and Their Environment

6 – 8. Physical Science

Physical science affords students the opportunity to increase their understanding of the characteristics of objects and materials they encounter daily. Students gain an understanding of the nature of matter and energy, including their forms, the changes they undergo, and their interactions. By studying objects and the forces that act upon them, students develop an understanding of the fundamental laws of motion, knowledge of the various ways energy is stored in a system, and the processes by which energy is transferred between systems and surroundings. The measurement topics included in Physical Science are as follows:

- 6. Structure and Properties of Matter
- 7. Interactions of Matter

- 8. Conservation and Transformation of Energy

9 – 10. Earth and Space Science

Earth and Space science provides the foundation for students to develop an understanding of the Earth, its history, composition, and formative processes, and an understanding of the solar system and the universe. Students study the regularities of the interrelated systems of the natural world. In doing so, they develop understandings of the basic laws, theories, and models that explain the world. By studying the Earth from both a historical and current time frame, students make informed decisions about issues affecting the planet on which they live. The measurement topics included in Earth and Space science are as follows:

- 9. Structure and Processes of the Earth
- 10. Structure and Processes of Objects in Space