

Supplement A.4: NSES Standards Met

Science Education Standards (NSES) Addressed in the PTEI

Outreach Education Manual: The utilization of the manual contents adheres to and promotes:

Science Teaching Standards

Standard A: Science teachers plan an inquiry-based science program for their students. They do this by: 1) the development of a framework of long and short-term goals for students 2) the selection of content and the modification of current curricula to meet the interests, knowledge, understanding, abilities, and experiences of students 3) the selection of teaching and assessment strategies that support the development of student understanding and that nurtures a community of science learners 4) the working together of colleagues within and across disciplines and grade levels.

Standard B: Teachers of science guide and facilitate learning. Examples addressed in the manual: 1) focus and support inquiries while interacting with students 2) encourage and model skills of scientific inquiry, as well as the curiosity, openness, to new ideas and data, and skepticism that characterizes science.

Standard C: Teachers of science engage in ongoing assessment of their teaching and of student learning. Example addressed in the manual: guide students in self-assessment.

Standard D: Teachers of science design and manage learning environments that provide students with the time, space, and resources needed for learning science. Examples addressed in the manual: 1) make the available science tools, materials, media, and technological resources accessible to students 2) identify and use resources outside the school.

Standard E: Teachers of science develop communities of science learners that reflect the intellectual rigor of scientific inquiry and the attitudes and social values conducive to science learning. Examples addressed in the manual: enable students to have a significant voice in decisions about the content and context of their work and require students to take responsibility for the learning of all members of the community 2) nurture collaboration among students.

Standard F: Teachers of science actively participate in the ongoing planning and development of the school science program. Example addressed in the manual: participate fully in planning and implementing professional growth and development strategies for themselves and their colleagues.

Professional Development Standards for Teachers of Science

Standard A: Professional development for science teachers requires learning essential science content through the perspectives and methods of inquiry. Examples addressed in the manual: 1) address issues, events, problems, or topics significant in science and of interest to participants 2) build on the teacher's current science understanding, ability, and attitudes.

Standard B: Professional development for science teachers requires integrating knowledge of science, learning, pedagogy, and students; it also requires applying that knowledge to science teaching. Example addressed in the manual: address teacher's needs as learners and build on their current knowledge of sciences content, teaching, and learning.

Standard C: Professional development for science teachers requires building understanding and ability for lifelong learning. Example addressed in the manual: provide opportunities to learn and use the skills of research to generate new knowledge about science and the teaching and learning of science.

Assessment in Science Education

Standard A: Assessments must be consistent with the decisions they are designed to inform. Examples addressed in the manual: 1) assessments have explicitly stated purposes 2) the relationship between the decisions is clear.

Standard B: Achievements and opportunity to learn science must be assessed. Example addressed in the manual: achievement data collected focus on the science content that is most important for students to learn.

Standard C: The technical quality of the data collected is well matched to the decisions and actions taken on the basis of their interpretation. Examples addressed in the manual: 1) assessment tasks are authentic 2) students have adequate opportunity to demonstrate their achievements.

Standard D: Assessment practices must be fair. Example addressed in the manual: assessment tasks must be set in a variety of contexts, be engaging to students with different interests and experiences, and must not assume the perspective or experience of a particular gender, racial, or ethnic group.

Science Content Standards: 5-8

Standard A: Science as Inquiry: As a result of activities on grades 5-8, all students should develop abilities necessary to do scientific inquiry and understandings about scientific inquiry. Examples addressed in the manual: 1) identify questions that can be answered through scientific investigations 2) design and conduct a scientific investigation 3) use appropriate tools and techniques to gather, analyze, and interpret data 4) develop descriptions, explanations, predictions, and models using evidence 5) think critically and logically to make the relationships between evidence and explanations 6) recognize and analyze alternative explanations and

predications 7) communicate scientific procedures and explanations 8) use mathematics in all aspects of scientific inquiry.

Standard B: Physical Science: As a result of activities in grades 5-8, all students should develop an understanding of properties and changes of properties in matter, motions and forces, and transfer of energy. Example addressed in the manual: transfer of energy.

Standard C: Life Science: As a result of activities in grades 5-8, all students should develop an understanding of structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems, and diversity and adaptations of organisms. Examples addressed in the manual: 1) structure and function in living systems 2) reproduction and heredity.

Standard E: Science and Technology: As a result of activities in grades 5-8, all students should develop abilities of technological design and understandings about science and technology. Examples addressed in the manual: 1) identify appropriate problems for technological design 2) design a solution or product 3) implement a proposed design 4) evaluate completed technological designs or products 5) communicate the process of technological design. Examples: 1-5.

Standard F: Science in Personal and Social Perspectives: As a result of activities in grades 5-8, all students should develop an understanding of personal health, populations, resources, and environments, natural hazards, risks and benefits, and science and technology in society. Examples addressed in the manual: Personal health, risks and benefits, and science and technology in society.

Standards G: History and Nature of Science: As a result of activities in grades 5-8, all students should develop an understanding of science as a human endeavor, the nature of science, and the history of science. Examples addressed in the manual: nature of science and science as a human endeavor.

Science Content Standards: 9-12

Standard A: Science as Inquiry: As a result of activities in grades 9-12, all students should develop an understanding of structure of atoms, structure and properties of matter, chemical reactions, motions and forces, conservation of energy and increase in disorder, interactions of energy and matter. Examples addressed in the manual: 1) motions and forces 2) structures and properties of matter.

Standard C: Life Science: As a result of activities in grades 9-12, all students should develop an understanding of the cell; molecular basis of heredity; biological evolution, interdependence of organisms; matter, energy, and organization in living systems; behavior of organisms. Examples addresses in the manual: 1) the cell 2) molecular basis of heredity, matter, energy, and organization in living systems.

Standard E: Science and Technology: As a result of activities in grades 9-12, all students should develop abilities of technological design and understanding about science and technology.

Example addressed in the manual: 1) identify a problem or design an opportunity 2) propose designs and choose between alternative solutions 3) implement a propose solution 4) evaluate the solution and its consequences 5) communicate the problem, process, and solution. Examples: 1-5.

Standard F: Science in Personal and Social Perspectives: As a result of activities in grades 9-12, all students should develop an understanding of personal and community health; population growth; natural resources; environmental quality; natural and human-induced hazards; science and technology in local, national, and global challenges. Examples addressed in the manual: 1) personal and community health 2) science and technology in local, national, and global challenges.

Standard G: History and Nature of Science: As a result of activities in grades 9-12, all students should develop and understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives. Examples addressed in the manual: 1) nature of scientific knowledge 2) science as a human endeavor.

Science Education Program Standards

Standard B: The program of study in science should be developmentally appropriate, interesting, and relevant to students' lives; emphasize student understanding through inquiry; and be connected with other school subjects. Examples addressed in the manual: 1) the program of study must emphasize student understanding through inquiry 2) the program of study in science should connect to other school subjects 3) science content appropriate, interesting, and relevant to students' lives.

Standard E: All students in the k-12 science program must have equitable access to opportunities to achieve the National Science Education Standards.