National Science Teaching Association
Position Statement

Safety and School Science Instruction Position Statement

Introduction

Science activities, including hands-on investigations, explorations, and demonstrations are essential for high-quality K–12 science instruction and occur in various locations both inside and outside schools, including science classrooms, laboratories, or the field (Bass, Yumol, and Hazer 2011). These activities build student knowledge and skills in science and address the nation's critical need for high-quality education in science, technology, engineering, and mathematics (STEM) subjects. These skills are supported by the *Next Generation Science Standards* (*NGSS*) (NGSS Lead States 2013). Inherent in conducting science activities, however, is the potential for injury.

The National Science Teaching Association (NSTA) encourages K–12 school leaders and teachers to promote and support the use of science activities in science instruction and work to avoid and reduce injury. NSTA provides the following guidelines for school leaders (including principals, assistant principals, school and district science supervisors, superintendents, board of education members, and others) to develop safety programs that include the effective management of biological, chemical, and physical hazards, implement safety training for teachers and others, and create school environments that are as safe as possible.

NSTA recommends science educators—including those at the elementary level—adhere to the better professional safety practices and legal safety standards listed below and be proactive in ensuring that school and school district leaders know and are adhering to these safety expectations.

While these recommendations are geared for K–12 school systems, NSTA recommends that schools of higher education adopt similar robust guidelines. It is equally important that they provide adequate safety training for preservice teachers. NSTA recommends teachers and school leaders visit the NSTA Safety Portal for up-to-date information on safety issues and guidelines.

Declarations

Comprehensive safety programs are important tools in reducing injury during science activities. School district leaders are responsible for developing and adopting a comprehensive safety program that includes safety policies and procedures that are

consistent with better professional practices and legal safety standards. NSTA recommends school districts develop safety programs based on the following guidelines:

- Safety programs should be consistent with the Duty of Care (NSTA Safety Advisory Board 2014a) as applied to engineering controls (e.g., fume hoods, fire extinguishers, etc.), administrative procedures (e.g., chemical management policies and emergency procedures), and personal protective equipment (safety goggles, gloves, etc.).
- Safety programs should include a Chemical Hygiene Plan that allows for the proper management of hazardous chemical and biological materials (e.g., appropriate selection, storage, inventory, use, and disposal). Program procedures should meet or exceed existing standards adopted from federal government agencies, such as the Environmental Protection Agency (EPA), and Occupational Safety and Health Administration (OSHA); professional material standards associations, such as the National Fire Protection Association (NFPA), International Code Council (ICC), and the American National Standards Institute (ANSI); professional teacher associations, such as NSTA, the National Science Education Leadership Association (NSELA), and the American Chemical Society (ACS); and/or appropriate state and local agencies.
- All school employees, independent contractors, and emergency personnel should have direct access to Safety Data Sheets (SDS), or other similar updated guidelines, for all hazardous chemicals used in instruction. SDS set forth guidelines for the safer handling and use of chemicals. OSHA publishes these guidelines and has adopted a new system titled the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).
- School districts should designate one or more chemical hygiene officers, or someone equivalent who has the knowledge and training to monitor and oversee the implementation of a Chemical Hygiene Plan. NSTA encourages all school districts, including those not covered under OSHA's Laboratory Standard (OSHA 1990), to comply with this laboratory standard for a safer working and learning environment.
- School district officials, such as principals, assistant principals, science supervisors, superintendents, and board of education members, must share the responsibility of establishing, promoting, maintaining, and updating safety programs to include changes in legal safety standards and better professional practices.
- School district officials should inform teachers of the nature and limits of applicable professional liability and/or tort insurance held by the school district (NSTA 2007a).

Safety training is essential to ensure that science activities are conducted in the safest manner possible. NSTA recommends the following for safety training programs:

- All teachers and others responsible for the safety of students and other personnel should receive necessary, appropriate, and ongoing safety training related to the operation of the engineering controls, personal protective equipment, safety procedures, and all components of the chemical hygiene plan.

- School districts, as employers, have the legal responsibility to conduct districtwide science safety training for all K–12 teachers of science upon their initial assignments to classrooms, labs, or storerooms where hazardous chemicals are present and prior to assignments involving new exposure situations. In addition, training should occur on an annual basis so teachers can review, discuss, and update the safety program; share experiences and better professional practices; and receive legal updates and other information related to science instruction and safety.
- All teachers of science should have the opportunity to participate in the design and implementation of safety training programs that meet the goals set forth in the school district's overall safety program, including the Chemical Hygiene Plan.
- Safety training programs should cover the legal duty or standard of care owed by teachers to students (NSTA 2007b) and include state safety regulations and all school board policies applicable to the science classroom.
- Safety training programs should include ways to reduce risk of injury from exposure to blood-borne pathogens and other potentially infectious materials (OPIM) (OSHA 1992).
- Safety training should include strategies for accommodating students with academic, remedial, or physical needs as well as those who are English Language Learners.
- Safety training programs should help teachers learn how to understand and apply the contents of SDS or other guidelines in preparation for hazardous chemical use.

NSTA recommends the following to establish and maintain the safest environment possible for science activities:

- All schools, even if not required by law, should provide appropriate safety engineering controls (e.g., eyewash stations/showers, fume hoods, ventilation systems, and extinguishers); procedures (e.g., chemical management policies and emergency procedures); and personal protective equipment (e.g., goggles, gloves, and aprons).
- Teachers should identify, document, and notify school and district officials about existing or potential safety issues that impact the teaching and learning environment—including hazards such as class sizes in violation of occupancy load codes (ICC 2012, NFPA 2015), an insufficient number of labs, or labs of insufficient size (NSTA 2014b); practices that are contrary to safety research (West and Kennedy 2014); inadequate or defective equipment; or improper facility design (Motz, Biehle, and West 2007)—and give necessary recommendations to correct or rectify the issue.
- School leaders and teachers should consult research that identifies three safety concerns regarding overcrowding: adult supervision, individual workspace area, and occupancy load for which the space was designed. Classes containing more than 24 students engaged in science activities cannot safely be supervised by one teacher. Additionally, research data show that accidents rise dramatically as class enrollments exceed 24 students or when inadequate individual workspace is provided (West and Kennedy 2014). For more information, visit Overcrowding

in the Instructional Space and other documents located in the NSTA Safety Portal.

- Teachers should assess the safety risks (e.g., overcrowding such as surpassed occupancy load limits, inoperable engineering controls, etc.) for each proposed learning activity and make appropriate modifications when needed. Teachers should eliminate an activity if, in exercising their professional judgment, they believe the activity cannot be performed safely with modification (NSTA 2014b). The school district should not discipline the teacher for exercising such judgment in an objectively reasonable manner.
- Materials intended for human consumption, including food and/or drink, should not be permitted in any laboratory or instructional classroom space where laboratory activities will be conducted, or where hazardous chemicals or physical/biological hazards have been used.
- No science activities involving chemical or bacterial hazards should take place in cafeterias or other areas specifically designed for food consumption.
- Teachers should know and understand the "Duty or Standard of Care," which is defined as an obligation, recognized by law, requiring conformance to a certain standard of conduct to protect others against unreasonable risk (NSTA Safety Advisory Board 2014a).
- Teachers should advise students about appropriate safety precautions when using hazardous chemicals.
- School administrators should notify teachers of student health concerns that may place a student or others at risk in accordance with existing privacy legislation.
- School district leaders and teachers should send written safety acknowledgment forms to parents and guardians regarding legal safety regulations and better professional practices to be followed in science instruction (NSTA Safety Advisory Board 2013). The safety acknowledgment forms should be kept on file for the length of time required by individual state statute of limitations.
- Teachers should plan for field experiences that are as safe as possible by checking school board policy prior to the trip, making an advance visit to assess any safety hazards.
- Teachers should ensure that all substances used for any activity are appropriate for both the developmental age of students and for use in the available school science facility.

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