

National School Science Safety Indexing Project: A BEGINNING

*Developing a national indexing
system to evaluate secondary school
facilities and safety practices*

————— **Jack A. Gerlovich, Dennis McElroy,**
Rahul Parsa, and Brian Wazlaw —————



There is extensive agreement within the science profession that the “hands-on, minds-on” approach to teaching and learning science described within the *National Science Education Standards* creates a more effective learning environment. However, inquiry can pose serious safety challenges for teachers and students in old and poorly equipped or maintained facilities and where safety training is deficient or nonexistent.

Past studies reveal that science safety in our nation’s schools needs significant attention (Gerlovich and Parsa 2002; Gerlovich et al. 2002; Gerlovich, Wilson, and Parsa 1998; and Young 1972). These studies have focused on individual states and the issues and hazards specific to those states. A comprehensive study is needed to identify and address science safety issues and hazards common to the entire nation. The authors of the National Science Safety Indexing Project (Gerlovich, Parsa, and McElroy), in collaboration with Council of State Science Supervisors (CSSS) and the National Science Teachers Association (NSTA), have designed a three-year study—the National School Science Safety Indexing Project—to develop a science safety indexing system to evaluate facilities and safety practices.

Past safety studies

Science professionals understand the importance of inquiry, but issues arise regarding the safety guidelines that must accompany inquiry. The *National Science Education Standards* state that:

Safety is a fundamental concern in all experiential science. Teachers of science must know and apply the necessary safety regulations in the storage, use, and care of the materials used by students. They adhere to safety rules and guidelines that are established by national organizations such as the American Chemical Society and the Occupational Safety and Health Administration, as well as by local and state regulatory agencies. They work with the school and district to ensure implementation and use of safety guidelines for which they (school and district) are responsible, such as the presence of safety equipment and an appropriate class size. Teachers also teach students how to engage safely in investigations inside and outside the classroom (NRC 1996, p. 44).

But are these safety guidelines being implemented? According to recent surveys, there is reason for concern. During the fall 2000, members of NSTA were surveyed via the association's website (Gerlovich and Parsa 2002). Survey questions were organized into four general categories: general information about the participants, facilities, equipment, and procedures. A total of 302 secondary science teachers representing 47 states and 3 United States territories responded to the survey.

These responses indicated the existence of potentially serious safety concerns in our nation's schools. A large percentage of the teachers who responded were unaware of the applicable laws, codes, and standards addressing safety issues; their lab facilities and equipment were substandard or nonexistent; and chemical storerooms were in very poor condition or in disarray. Another past study of science accidents in Iowa schools revealed that as schools moved from traditional textbook-based science programs to inquiry-based science, the accident rates and resulting legal complications also increased (Gerlovich, Wilson, and Parsa 1998).

Presently, studies of 15 states have confirmed the aforementioned findings (Gerlovich and Parsa 2002; Gerlovich et al. 2004; Gerlovich et al. 2005; Gerlovich et al. 2002; and Gerlovich, Wilson, and Parsa 1998). However, the studies were primarily conducted in response to specific requests for safety assistance and therefore carried out in isolation. Similar studies on the topic of safety issues and concerns were also conducted in isolation (Biehl, Motz, West 1999; West et al. 2001; Young 1972). Because the studies were conducted in isolation, different methods were used to gather data, and the variables in the studies were not controlled.

Although the methods of obtaining data differed among the studies, the results were clearly similar—science safety in our nation's schools needs significant, immediate attention. To address this concern, a comprehensive, reliable study must be conducted of all U.S. schools to identify science safety issues common to the nation while still addressing individual school and state needs.

Proposed study

The National Science Safety Indexing committee—comprised of education, industry, and government professionals—has designed a three-year-long Indexing Project to ultimately form a National Science Safety Index. The resulting Index will be used for year-to-year comparisons to document safety status by individual schools, states, and the nation. The primary goal of the Indexing committee is to assess the status of science safety in secondary schools and make safety a priority in science classrooms. Over the course of three years, the study will

- ◆ identify the key safety issues (questions) important to science education in the United States;
- ◆ compile the questions into cohorts or categories that can be molded into an Index;
- ◆ design and implement a science safety indexing system applicable to all schools, states, and the nation;
- ◆ enable targeting of solutions at the national level and within individual states; and
- ◆ make schools safer, better insurance risks, ideally lowering premiums.

Attaining these objectives requires a step-by-step process. A survey must be conducted to collect data for the Index. To design the survey, the Indexing committee will collaborate with the NSTA Safety Advisory Board to identify the essential safety questions (key issues) that are common to the nation and also unique to individual states. A series of electronic exchanges among science educators across the nation will verify the reliability and perceived importance of the questions.

After questions are selected for the survey, the issues will next be clustered according to relationship and weight of perceived importance. The identification of the key issues that go into the Index, and the corresponding importance (weight) of these issues, is the most difficult part of the indexing process.

The weights assigned to the questions will result in a weighted-average, or Science Safety Index number, for documenting safety status by individual schools, states, and the nation. The Index will be used for year-to-year safety status comparisons against an ideal. This method of index development is widely used in many professions and the index numbers are used

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in several different ways. For example, *US News and World Report* uses an indexing system to rank colleges and universities; another well-known index is Dow Jones Industrial average, which is used to assess the status of the stock market.

The bulk of the resulting Index will be used to assess individual school safety; however, it will be sufficiently flexible to address unique state needs. Using the Index, schools will undertake a process of identifying and addressing high priority safety concerns, resulting in an improved Index score and the creation of a safer environment for their classrooms and students. Schools then continue to adhere to the high priority safety criteria while moving their focus to lower priority safety concerns.

A collaborative effort

At their respective national meetings in 2003, The NSTA Safety Committee, the NSTA Executive Committee, and CSSS gave unanimous support for National School Science Safety Indexing Project and recommended that the project proceed as soon as possible. Pending financial support from various government agencies, the project will begin this fall (2005). The organizations also agreed to assist in the development and implementation of the survey; the eventual development of the Indexing system; the development of tools customized to the laws, codes, and standards of each state; and training in the application of these tools.

Research will be conducted regarding critical science safety parameters, their weighting, and how to address each throughout the three-year research program. An Index score for each state will be delineated, published, and shared with the teachers, administrators, and government in that state. From the individual state scores, a National Science Safety Index will be calculated and communicated back to the science-teaching profession and the major insurance underwriters in the nation.

Efforts will be made to get educational administrative groups to endorse and support the project within each science setting across the nation. Ideally, a national (and potentially state) Index score will be reported quarterly, but at least annually. Lower insurance costs will ideally

result from the efforts. It is anticipated that the savings realized from insurance companies would be funneled back into addressing science safety issues within school science settings throughout the nation. Equally important, the information gathered for the Index can be used to target and create solutions for specifically identified safety needs. ■

Jack A. Gerlovich (e-mail: jack.gerlovich@drake.edu) is co-chair of the NSTA Safety Advisory Committee and a professor of science education/safety at Drake University, 3206 University Avenue, Des Moines, IA 50311; Dennis McElroy (e-mail: dmcElroy@graceland.edu) is an assistant professor of science education at Graceland University, 1 University Place, Lamoni, IA 50140; Rahul Parsa (e-mail: rahul.parsa@drake.edu) is a professor of statistics at Drake University, 324 Aliber Hall, Aliber College of Business and Public Administration, Des Moines, IA 50311; and Brian Wazlaw (e-mail: briwazlaw@aol.com) is a science teacher at Exeter High School, Exeter Region Cooperative School District, 24 Front Street, Exeter, NH 03833.

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