Safety and Health in the Technical Classroom and Laboratory: Part 1

By Charles E. Backes and Corey M. Nawolski

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The safety and health of students in engineering, technology and industrial classrooms/laboratories is of utmost importance. Often in the workplace, worker safety is balanced with product output, with allowances made for relatively risky procedures in order to maximize productivity to a point of acceptable profit, with the idea "As fast as safety allows!" in mind. Unlike many of the industries which we are training our students for, there is no price that can be placed on safety. The safety and health of our students must be our highest level of priority.

Without question, the provision of a safe and healthy learning/working environment is the responsibility of numerous individuals, including the instructor, school-level administrators, district-level administrators and even students in the program. However, on a day-to-day basis, this task most directly falls on the shoulders of the instructor who is responsible for the class.

A Model for Ensuring Safety and Health

It is fitting therefore, that safety instruction is a major component of our curriculum and our instructional efforts. These efforts include a variety of activities and competencies that must all be utilized in a continual, organized approach, with the primary goal of zero incidents. In order to explain and visualize this approach, we have developed a model for implementation (Figure 1). The model includes seven critical components. The model is interactive, rather than linear, with "Awareness" at the core. Each component takes place simultaneously throughout the instructional cycle. Each component is described in detail, along with numerous activities that may be used to support the process.

The remainder of this article will focus on three aspects of the model, Awareness, Instruction, and Testing and Evaluation. A follow-up article will appear in next month's *Techniques* that will discuss the remaining components.

Awareness

As previously mentioned, "Awareness" is at the core of the model. This illustrates that the instructor must continually be cognizant of the need to provide and maintain a safe learning and working environment for all students and for all who enter the environment. Awareness requires several things from an instructor. First, the instructor must recognize the importance of putting safety above all other aspects of the instructional laboratory. Other functions of the classroom and laboratory, like productivity, acquisition of content and assessment, are certainly critical to successful teaching and learning, but they must be accomplished in a "safety first" environment. The instructor must be vigilant to ensure a safe learning environment. In the manner of a well-trained watchdog, the instructor must be

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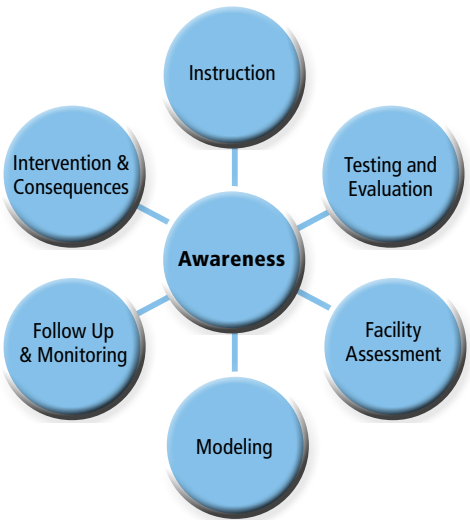
keen to every sound, smell and sight that occurs in the instructional setting.

Second, the instructor must recognize that this responsibility to ensure a safe working environment cannot be waived or transferred out of the instructional domain. The insurance of safety and safe work practices are ultimately the responsibility of the instructor. The use of liability waivers, parental notification of hazards and other similar practices may be effective communication tools, but seldom do they provide any insulation from liability. They certainly do not relieve instructors from the professional and moral responsibility of maintaining a safe classroom and laboratory.

Third, inevitably, the effective instructor must coordinate simultaneous activities. In today's technical classrooms and laboratories, it is not unheard of for an instructor to have several students enrolled in different concentrations within the same class. Further, if a class consists of one concentration, it is nearly impossible for every student within a class to work on the same project. One would assume that it is unacceptable for safety to take a back seat to production; however, students entering the classroom mid-semester will have missed many of the important safety-related lectures and demonstrations. While safety instruction is ongoing, it is likely that some instructors will not provide safety instruction that is as thorough as their initial lesson. The learning environment is a community of learners interacting together to enhance each other's safety. It is critical that the instructor creates an environment in which the students are empowered to stop any action by a student, visitor or instructor when they believe that an unsafe practice is taking place or if they believe the potential for an unsafe practice exists.

Figure 1: Backes and Nawolski Safety and Health Model



Instruction

Instruction in safety procedures, work practices and attitudes is a critical component of an effective safety program. Annually, industry spends millions of dollars providing training to workers in all aspects of the industry related to a safe and

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healthy working environment. In industry, as in the classroom, knowledge and skills related to safety and health consist of "earned knowledge" and "learned knowledge." Earned knowledge comes from the School of Hard Knocks. We earn this knowledge through life experiences and as a reaction based on instinctive behaviors. One of the first knowledge sets that we "earn" as young children relates to hot and cold. Once we touch a hot surface like a stove or oven door, we know not to touch it again. In a sense, we earn the meaning of hot and cold by experiencing the consequences. It is critical that students learn safety knowledge for the workplace, rather than earning it through unsafe practices due to the severe and potentially life-altering consequences that may result from failing to assess the dangers.

As technical instructors, we must insure the quality and timeliness of safety and health instruction. There are numerous factors that must be insured. First of all, instruction must be accurate and up to date. As advances in research and applied practice uncover new and safer ways of performing tasks, safety content should be modified to include these new concepts and procedures. Secondly, instruction should be comprehensive and include topics related to general classroom and laboratory safety, as well as those that are specific to the particular learning environment. General classroom topics may deal with issues such as horseplay, use of protective safety equipment and clean-up procedures. Specific topics relate to the particular tools, procedures, machinery and materials found in the particular setting. Both general and specific safety and health instruction should be implemented throughout the program and not simply taught at the beginning of the year or semester. Finally, instruction should be based on best practices, not simply common practices, taking into account

that the environment is a student-centered setting, with the primary goal to be a learning laboratory, rather than a production shop.

Testing and Evaluation

In order to ensure student learning and application of safety practices, a systematic assessment system must be in place that includes accurate and timely testing and evaluation. A well-developed assessment system incorporates a variety of written and performance assessments. Assessment should be administered at fixed intervals, as well as continuously throughout the instructional learning period.

Generally, written assessments are used as broad initial assessments and are often a gateway into the actual laboratory. A standard benchmark for entering the laboratory phase of a technical course is the ability to score 100 percent on a written general laboratory safety exam. Exams are also used prior to granting licensure to use particular equipment or to perform certain procedures. Written exams provide documentation of cognitive knowledge related to procedures. This documentation may prove to be a valuable legal document in the event of an accident that occurs when a student violates safe working procedures. Therefore, it is critical to ensure that students perform well on written assessments prior to being allowed to enter or work in the laboratory.

Performance assessments often include demonstrative skill examinations, as well as visual assessments. These are generally geared primarily at the psychomotor and affective domains of learning. It is at this stage that authentic assessment takes place. Performance assessment should be continuous and documentation of safe working procedures should be maintained using rubrics, task check-off sheets and other written documentation.

Next month's issue of *Techniques* will include the second part of this two-part series. In the follow-up article, the authors will discuss the remaining components of the model: facility assessment, modeling, follow-up and monitoring, and intervention and consequences. T

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