Science Safety

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Perhaps one of the biggest concerns facing science educators in Trinidad and Tobago is the rapid deterioration of school facilities, particularly the science laboratories. Due to the very nature of the discipline, science classrooms and laboratories are among the most potentially hazardous instructional areas in schools. With the increasing emphasis on hands-on learning, science teachers are faced with the challenge of producing inquiry-oriented learning environments and experiences for their students, despite a severe lack of facilities and technical support.

Science classes with 35 students are not unusual, and when faced with the challenge of having to provide students with opportunities to explore, test, experiment, and hypothesise, teachers must be fully aware of the inherent safety issues that will inevitably arise. While there are many creative teachers who attempt to compensate for the lack of facilities by improvising and using what might be "relatively safe" substitutes like styrofoam cups, strings, and popsicle sticks in their classrooms, there are some scientific principles that are best learned in the laboratory through the use of chemicals and by the hands-on manipulation of science equipment.

Laboratory safety may not have been a big issue when classrooms were more lecture-oriented, rote-learning environments limited to short one-hour sessions. However, with curriculum improvements and new insights into what constitutes meaningful learning, many schools now have block scheduling—double periods and triple periods—especially in the science disciplines, so that ample time and opportunity is provided for students to perform investigations and conduct experiments. In view of this, safety has now taken a higher profile in the science laboratory than in the past, and so the obvious questions that arise are: What does a teacher do when facilities are inadequate and, in many cases, plain dangerous? How does a teacher go ahead and teach science in a meaningful way in an unsafe environment?

In the local context, mainly because of these safety concerns and, to a lesser extent, available laboratory space and timetabling constraints, many teachers choose not to engage their students in hands-on activities on a regular basis, for fear of exposing them to safety risks. For those teachers who strongly believe that the practical exposure is critical to the completeness of science learning, the activities are usually simple, teacher-led demonstrations or short verification-type investigations limited to very little manipulation and "real" experimentation. In fact, because of the combined influence of these concerns (safety, space, and timetabling), many Forms 1, 2, and 3 science students in Trinidad and Tobago may visit the science lab once or twice a term, if at all. Laboratory preference is often given to those students at the upper

levels who teachers believe are more mature, less likely to cause chaos in the lab, and who, because they have to complete School-Based Assessment (SBA) requirements, will perhaps attend to the practical activities with more seriousness and focus and less playfulness, thus reducing the chances of accidents occurring.

Bureaucrats, planners, and engineers with responsibility for designing and constructing schools ought to give primary consideration to the fact that in any typical science lab, a variety of exploratory activities can occur. Therefore, if safety is to be maintained as a fundamental concern in experimental science, careful planning and design with regard to fire safety, accident prevention, and first aid must be considered. Workstations, desktops, sinks, and fume cupboards should be located and/or arranged in a student-friendly manner for comfort, safety, ease of access, usability, and maintenance.

As science teachers we must, at all times, do our best within the constraints of the circumstances to be as diligent about safety as we can. We must know how to apply necessary safety regulations in the storage, use, and care of materials handled by students. Science teachers must be trained to administer basic first aid, and in the actions that must be taken should an emergency arise in the laboratory. Above all, however, close supervision and facilitation of students must be top priority whenever students are engaged in activities. Science students, too, must assume some responsibility for safety in the laboratory, so they should be sensitised to the rules to be observed, the accepted behaviours, and the personal protective measures to be practised when in the laboratory. Students should unequivocally know that these can in no way be compromised without serious consequences.

The point therefore is that ensuring safety in the science lab is not a one-time job; it is a continuous process requiring constant monitoring of the safety issues mentioned. Adopting a “better safe than sorry” attitude in all instances, given the weak infrastructure in many schools, is perhaps a good precautionary measure, but the fact remains that until facilities are improved, science teachers and students will continue to be placed in a precarious position where science safety is concerned.

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