

Safety

Although student safety is a priority in every science classroom, accomplished teachers are exemplary in their efforts to ensure safety for all students before, during, and after investigative activities. Accomplished teachers continuously teach and model proper laboratory procedures, including the appropriate use of materials and equipment. They scrupulously maintain safety equipment and teach their students how to use it. Teachers ensure that their students know emergency procedures, and teachers continually monitor their students' compliance with safety practices. Teachers ensure that all students and their guardians have signed safety contracts, and teachers use the contracts as an instructional and motivational tool in order to maintain a safe learning environment.

Accomplished science teachers realize that careful planning is crucial to safety and that safety considerations must be key when they are planning instruction. These teachers determine what laboratory activities are feasible based on students'

abilities and access to safety equipment. They ensure that the acquisition, storage, and disposal of chemicals and other materials meet all state and federal guidelines. They ensure that students dress and move appropriately in laboratory environments because they are intensely aware of the safety issues raised by the active nature and frequent transitions typical of a science classroom.

Accomplished science teachers realize that fostering a safe and inviting emotional climate is as important as ensuring students' physical safety. Teachers understand that establishing a safe emotional climate encourages students to take intellectual risks and allows them to become part of the culture of science. Accomplished teachers create and maintain a sense of community by encouraging students to show concern for others, demonstrating high expectations for all, involving all students in the practice of science, and dealing swiftly and constructively with inappropriate behavior, such as bullying. The resultant sense of community encourages students to more actively collaborate in the processes of science and to respect all ideas, familiar or not.

Accomplished science teachers lay the groundwork for emotional safety by involving students in setting behavioral expectations and boundaries. As a result, students are invested in the norms of the classroom. Problems are less likely to arise, and when they do occur, students are more likely to be a part of the solution. Teachers handle behavioral issues fairly and respectfully, de-escalating confrontations and minimizing disruptions to the learning process.

Accomplished science teachers realize that promoting respect and emotional safety is especially important when dealing with potentially sensitive topics in science. Teachers are aware of topics that may be distressing to individual students. For example, lessons on genetics need to take into account students with limited family information or a background of genetic disorders. Accomplished teachers model respectful and sensitive discussion questions and responses with students, ensuring the emotional safety of all students. For example, if an accomplished science teacher were to present a lesson on genetics, the teacher would model how to conduct the discussion in a respectful way. Creating a family tree can provide interesting links between the science of genetics and real life but may also raise unforeseen personal issues. Therefore, an accomplished teacher might provide a fictional case history from which students could design a family tree.

Accomplished science teachers understand that myriad opportunities for science learning exist outside the science laboratory. They encourage students to take advantage of varied learning experiences, but they are careful to research safety guidelines and prepare students before utilizing outside venues. Accomplished teachers model respect for nature, and they ensure that students venturing beyond the classroom are aware of possible dangers. Accomplished teachers realize that the need for safety in science extends to all outside learning activities, including outdoor lessons, field trips, or independent home projects; when it is appropriate to do so, teachers educate parents and other chaperones and advisors in safety concerns related to field trips or home learning. In addition, accomplished teachers verify that

adult chaperones assisting with field trips have appropriate backgrounds and are present in sufficient number to ensure the security of the students. Accomplished science teachers also teach students skills to ensure their safety while researching or discussing science in digital or virtual spaces.