



COVID-19 Precautions for the Science Classroom

Hands-on activities are integral to science education. Continuing to provide these valuable learning experiences in these uncertain times poses several unique challenges and obstacles that the safety-minded science teacher must overcome.

Challenges include:

- Social distancing must be maintained, as per school board guidelines.
- Everything that is touched during an activity must be cleaned and sanitized. This includes surfaces, materials, and equipment.
- Sanitization protocols change as our understanding evolves. It is important to follow your school board's protocols (e.g.: which products are permitted, how should they be used, SDS availability).
- Making additional lab stations because students cannot share materials and equipment.
- Limited teacher time for prep and cleaning/sanitizing.
- In some boards, students may be choosing not to attend classes in person but still need to complete a differentiated or a virtual version of the activity.

Selecting and modifying appropriate hands-on activities

Maintaining safety when providing rich learning activities remains an essential priority.

Remember, teacher time is precious so choose wisely when selecting activities. Suggestions include:

- Ensure that the activity can be safely supervised following the guidelines set out by your board. In the event that you need to move among the students, wear appropriate personal protective equipment (PPE), including a face shield.
- If you are unable to circulate throughout the classroom, position the activity stations in areas where you can provide adequate supervision.
- Keep lab activities manageable, safe, and easy to sanitize (e.g.: given a choice of two possible activities, select the one that involves fewer materials and teacher prep).
- Modify activities to allow for social distancing (e.g.: smaller groups or individuals: equipment for each group or student; half the class does the lab while the other half does seat work).
- Replace a group activity with an individual activity (e.g.: students build their own electroscopes using materials provided in a paper bag).
- Select activities that can easily be adapted to an online version for students who are choosing not to attend in person (e.g.: photographs of the results of an activity can be posted for students to analyze at home).
- Modify existing activities to minimize the amount of equipment required.
- Use disposable equipment where possible, e.g.:
 - replace glass rods with coffee stir sticks.
 - replace beakers with plastic cups for activities involving water or food grade substances like vinegar, salt, and sugar. Always check for compatibility. Instruct students to write “CAUTION – DO NOT DRINK” on all plastic cups to ensure that no one accidentally drinks from them.
- Longer, more in-depth lab activities might now be more meaningful because they encompass a broader range of skills but require the same amount of clean up as shorter labs.
- Consider alternative formats for activities where appropriate (e.g.: replace a class activity with a teacher demonstration or online simulation).

Organizing Hands-On Activities Suggestions:

- Follow guidelines set by your board for student seating. If students are permitted to work at lab benches, keep a written record of where students are working (e.g.: a lab bench seating plan).
- Limit the movement of students around the classroom (e.g.: board protocols may require students to only work at their assigned seat).
- Avoid students having to complete a makeup lab by capturing activity observations by video or camera. Ask a reliable group to capture their observations and share them with you so that you have a visual backup for use by students who are absent.
- All equipment must be cleaned and sanitized prior to use. Only use equipment that can be easily cleaned/sanitized between student uses. See specific “Cleaning and Sanitizing” suggestions below.
- When prepping for activities, sanitize your hands prior to assembling or distributing materials. Modelling this for students normalizes the behaviour and encourages them to do the same.
- Distribute equipment/materials to lab stations prior to students arriving in class. This allows you to create lab stations that follow the appropriate social distancing guidelines and prevents students from gathering to collect equipment/materials.
- Provide clear safety guidelines prior to beginning any activity that includes any special precautions that must be followed (e.g.: sanitizing equipment at certain points in activity; clean up instructions; social distancing: the more reminders the better). By setting expectations at the beginning of the activity, it is much easier to remind students throughout.
- Train students on how to clean and sanitize their equipment both prior to and after use, so that it becomes everyone's responsibility.
- Plan so that the same set of chemicals can be used for more than one activity.
- Minimize or eliminate the sharing of equipment among students (see Personal Protective Equipment (PPE) suggestions below).
- Organize materials into self-contained kits prior to the activity (e.g.: in a sealable plastic tub or paper bag). This saves class time, reduces student movement, and eliminates sharing.

- If possible, seal and store lab kits for 2-3 days to decrease the likelihood of the virus remaining on surfaces (e.g.: do the activity on a Friday and repeat it with another group on Monday). This strategy is also useful for goggles and lab aprons if quantities permit.
- Have additional clean equipment available in case a piece becomes unsanitary or ceases to function during the activity.
- In some cases, the distribution of paper can be minimized (e.g.: simple procedures can be provided in a video, or on a board diagram).
- Assign students specific tasks during activities (e.g.: collection of materials, recording data, performing a portion of the activity). Switch roles when appropriate to give everyone a chance to try the activity. This helps keep everyone engaged while maintaining social distancing and minimizing the sharing of equipment.

Cleaning and Sanitizing

Cleaning removes chemical, physical, and some biological hazards from materials and surfaces. Sanitizing/disinfecting removes biological hazards. Always ensure your cleaning/sanitizing routines are consistent with your school board protocols. Also, coordinate with custodial staff to avoid duplication of these routines.

Specific suggestions include:

- Follow your board's Health and Safety guidelines and protocols when it comes to cleaning, sanitizing, and disinfecting. Only use board approved materials. Board protocols supersede recommendations in this document.
- Use soap and warm water rather than hand sanitizers to wash hands.
- Clean and sanitize all equipment and lab surfaces between users. When in doubt, clean and sanitize.
- Maintain the use of PPE (e.g.: chemical splash goggles and nitrile gloves), social distancing, and adequate ventilation during cleaning and disinfection.
- Check the Safety Data Sheets (SDS) of the sanitizers/disinfectants prior to use. Ensure these documents remain readily available.
- Use warm soapy water where possible on general glassware and equipment. If permitted, use the Lysol® Dip disinfection method recommended by Flinn Scientific Canada¹ (see recipe below). Some boards permit the use of a 10% chlorine bleach

solution (10 mL bleach in 1 L of water) for disinfection. These solutions should be used within a day or two to ensure they remain potent. Some boards have banned the use of chlorine bleaches due to incompatibility with other chemicals. Always check your board's protocols.

- Avoid using spray bottles of disinfectants to clean surfaces because spraying may create aerosols. Instead, use disinfectant wipes or a paper towel soaked with disinfectant. ⁱⁱ
- **Do Not** use alcohol-based disinfectants (e.g.: ethyl alcohol or isopropyl alcohol) on hot surfaces or equipment (e.g.: hot plate). Alcohols are flammable.
- Wash hands thoroughly with warm water and soap after removing PPE. In the event that students touch materials or equipment that has been touched by others, have them sanitize the materials or equipment, and then wash their hands as soon as possible.

The Lysol® Dip Method

Disinfection is Key this School Year

Lysol® Disinfectant added to warm water is incredibly effective in cleaning lab instruments or apparatus. Let equipment air-dry.

Safety glasses can be disinfected in a **Lysol® Dip Method**:

- 1-1/4 oz Lysol with one gallon of soft or DI water
- Dip goggles for 15 minutes
- Rinse with water
- Allow to air dry

Using this method there is absolutely no damage or discoloration to any of the products. Water spots remaining on the lenses are easily removed using lens paper or a paper towel and leave no scratches or marks. By using a UV-C goggle sterilizer cabinet afterwards, you have provided 99.99% disinfection.

Source: COVID-19 Science Classroom Safety Guidelines & Learning Solutions. Flinn Scientific

Note: "1-1/4 oz" = 35.5 mL; "one gallon (U.S.)" = 3.8 L; "one gallon (Imp)" = 4.56 L

Cleaning and Disinfecting Delicate Equipment (e.g.: computers, electronics, probeware, microscopes)

- All equipment must be sanitized before, and after, each user. Consult with the manufacturer for specific advice.
- Power off the device. Unplug the power cord.
- Use paper towel, cloth containing disinfectant, or 70% alcohol wipes. Single use disinfectant wipes may also be used. Use one wipe per item to avoid cross contamination.
- Allow time for the surface to dry before use. Air drying is preferred to using paper towels because it minimizes handling.
- Spraying disinfectant is not recommended because liquid can enter equipment openings.
- Do not use harsh disinfectants like bleach unless required.

Personal Protective Equipment (PPE) Suggestions:

- Everyone in the lab must wear appropriate PPE when conducting or prepping a lab.
- Safety goggles must be worn until the last student has completed the activity. Some schools find it useful to sell goggles to students at cost. As a result, students take greater ownership of the care of the goggles while eliminating the need for sharing. Sanitizing solutions should still be made available for student-owned goggles.
- Teachers should wear appropriate goggles and face shields during any student activity in which distancing of 2m might not be possible.
- Goggles must be cleaned before and after use using an approved liquid disinfectant (e.g.: Lysol® Dip Method and ideally in a UV-C sterilizerⁱⁱⁱ).
- Disposable gloves are for one-time use only and must be taken off and discarded in an appropriate manner. Train students how to take off gloves correctly to avoid contamination.
- Disposable gloves are not a replacement for proper hand hygiene. Students should be encouraged to wash hands frequently with soap and warm water or to sanitize regularly.

These suggestions were compiled by the members of the STAO Safety Committee and other STAO colleagues.

References

ⁱ *COVID-19 Science Classroom Safety Guidelines & Learning Solutions*, Flinn Scientific. Found at <https://www.flinnsci.com/api/library/Download/8b0e66d672af4f6f8fb1fd620325669a> (accessed Nov 8, 2020)

ⁱⁱ *COVID-19: Sanitizing Lab PPE and More*, NSTA Safety Blog. Found at <https://www.nsta.org/blog/covid-19-sanitizing-lab-ppe-and-more> (accessed Nov 8, 2020)

ⁱⁱⁱ *COVID-19 Science Classroom Safety Guidelines & Learning Solutions*, Flinn Scientific. Found at <https://www.flinnsci.com/api/library/Download/8b0e66d672af4f6f8fb1fd620325669a> (accessed Nov 8, 2020)

Disclaimer

School boards, as employers, must comply with all Acts and Regulations (e.g., Occupational Health and Safety Act and WHMIS). Teachers, as employees, must comply with school board policies and safety protocols. Teachers should also make their school administrative team and Joint Health and Safety Committee representative aware of safety concerns so that these concerns are dealt with promptly. In some cases, consultations with the staff union representative may also be prudent. If the teacher feels that a given activity cannot be done safely, the teacher must modify their program accordingly to ensure the safety of students and staff.

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