VERMONT
AGENCY OF EDUCATION

1 National Life Drive, Davis 5, Montpelier, VT 05620-2501
(p) 802-828-1130 | (f) 802-828-6430 | education.vermont.gov

Strong and Healthy Start:
Guidance for K-12 Science Laboratory Safety

Purpose

The purpose of this document is to provide guidance for laboratory safety in classroom settings during the 2020-2021 school year. Laboratories present unique challenges to COVID-19 safety procedures due to the collaborative nature of science and the sharing of laboratory equipment and materials. The following guidelines consider how to deliver safe and effective three-dimensional inquiry projects and experiments.

Introduction

As students return to school for the 2020-2021 school year, it is important to ensure that student safety and well-being are accounted for in all learning environments. The nature of science relies on students problem-solving by gathering information, gaining understanding via reasoning and critical thinking, and communicating conclusions and arguments about the phenomena that make up the world around them. COVID-19 school closures created challenges for science educators as many three-dimensional laboratory activities require in-classroom, specialized equipment and resources.

The Education Quality Standards (EQS) require the teaching of science in all Vermont schools. The use of three-dimensional inquiry-based activities is a good way to engage all student populations as science inquiry provides equitable learning experiences that enhance student performance.

A Strong and Healthy Start: Safety and Health Guidance for Vermont Schools indicates that schools will be able to start the 2020-2021 school year using in-person instruction with enhanced physical distancing measures (Step II), with the potential to move to using in-person instruction with distancing measures (Step III). Therefore, due to the collaborative nature of three-dimensional inquiry-based activities, health and safety concerns related to COVID-19 are requiring schools to re-evaluate their laboratory safety protocols.

General Guidance

In addition to practicing standard laboratory safety, all science classrooms should perform site and activity-specific risk assessments to determine the most appropriate safety measure to implement for particular circumstances, including access to food and drink. Learning environments should adhere to SU/SD policies and procedures related to COVID-19.

Contact Information:

If you have questions about this document or would like additional information please contact: Margaret Carrera-Bly, Student Pathways Division, at Margaret.Carrera-Bly@vermont.gov

Risk Assessment Considerations

- Analyze the number of students that will be participating in the science activity. Determine if the classroom space can realistically and safely accommodate students while maintaining social distancing.
- Assess the flow of traffic in the classroom. Where possible, design one-way paths for students to walk around the laboratory space.
- Assess procedures for cleaning and sanitizing commonly shared equipment and areas to ensure clean surfaces and equipment for all users.
- Reinforce proper handwashing practices and other routine infection control precautions.
- Ensure that students have access to soap, water, and drying materials for handwashing or alcohol-based hand sanitizers that contain at least 60% ethanol or 70% isopropanol.
- Consider who is responsible for disinfecting the lab. If students will be part of the disinfection process, leverage lab safety lessons to include tutorials on lab-specific cleaning techniques and how to use disinfectants safely.

Social Distancing

To adhere to social distancing recommendations to the best extent possible, identify laboratory tasks and activities that can be performed with reduced or no face-to-face interactions. This may include limiting face-to-face collaborative work to data collection only while leveraging remote collaboration tools (such as video, etc.) for student discourse.

Social Distancing Considerations

- Ensure that masks are worn at all times within the learning environment, especially during times in which students are collaborating with each other.
- Reconfigure workspaces and locations of shared equipment to reduce crowding.
    - Teachers and students should maintain social-distancing recommendations in accordance to the Health and Safety Guidance, including recommendations regarding brief periods of closer contact for teacher-to-student and student-to-student interactions.
    - In cases where students and teachers are within close proximity to each other, teachers and students should be positioned side-by-side rather than face to face.
- Create one-directional paths and workflows.
- Declutter workspaces and dispose of unnecessary items to help with reconfiguration.
- Consider placing barriers (plexiglass, partitions, plastic, etc.) between workstations, desks or equipment.
- Determine whether all students in a laboratory group must handle each piece of equipment or material necessary for the science activity. Consider assigning specific roles or tasks to students for collaborative work.
- Minimize interactions by limiting visits from other school staff and students.

Hygiene and Disinfection Safety

In addition to traditional laboratory safety, new considerations should be addressed for the 2020-2021 school year. The usage of visual reminders -- such as graphic posters -- should be displayed throughout the classroom to emphasize the importance of regular hand washing and

PPE usage. When soap and water are not available, hand sanitizer containing at least 60% ethanol or 70% isopropanol can be used.

Additional Laboratory Safety Considerations

- Upon entering and prior to leaving the classroom or science laboratory, students should immediately wash their hands with soap and water for at least 20 seconds, if available. If not available, hand sanitizer containing at least 60% ethanol or 70% isopropanol can be used.
- A new face covering (classroom provided, or student provided) should be worn during the science activity (for example handling glassware or equipment, etc.,) to reduce risk of contamination.
- Science equipment, including electronics such as computers, laptops and tablets, should be disinfected before and after each use.
- High-touch areas, such as benches and lab tabletops, drawer and cabinet handles, faucet handles and sprayer grips, etc., should be washed with soap and water prior to disinfecting to remove any dirt or debris.

Disinfecting Considerations

- Consider setting up containers to hold clean or used equipment and glassware to easily determine what will need to be disinfected.
- For hard (non-porous) surfaces such as equipment handles and latches, the outside of shared chemical bottles and caps, hand tools, etc.:
    - Most common EPA-approved household disinfectants are effective to use against COVID-19. Follow the manufacturer's instructions for cleaning and disinfection procedures, including disinfectant contact time. Do not assume that the disinfectant works on contact.
    - Diluted household bleach solutions are also approved for use.
        - A 2% bleach solution is recommended by the CDC.
        - Bleach may be irritating and should not be used extensively in areas with poor ventilation.
        - **DO NOT MIX bleach with ethanol or other cleaners as it may cause harmful byproducts**.
        - Surfaces should be wiped down with clean water following disinfection with bleach.

Disinfecting delicate surfaces or electronics

- Avoid spraying disinfectants directly onto surfaces and getting liquid into equipment openings.
- Consider the use of 70% ethanol or 70% isopropyl alcohol on a soft cloth or pre-moistened wipes.
- Avoid using harsher disinfectants, like bleach.
- Consider using wipeable covers on computers, electronics, instruments, keyboards, microscopes, screens and tablets when feasible.
    - Consider the type of electronic and whether external cables, cords and power sources need to be unplugged.

- Gently wipe the surface until visibly wet. Allow to evaporate.

References

- Guidance for General Laboratory Safety Practices during the COVID-19 Pandemic (CDC)
- Interim Laboratory Biosafety Guidelines for Handling and Processing Specimens Associated with Coronavirus Disease 2019 (COVID-19) (CDC)
- Lab Cleaning and Disinfection COVID-19 Guidance (PennState)
- COVID-19 guidelines for disinfecting laboratory equipment and surfaces (Arizona State University)
- American Biological Safety Association (ABSA) SARS-CoV-2/COVID-19 Toolbox
- Cleaning Guidelines for Laboratories and Resource Centers (The Rockefeller University)
- Transitioning from Scientific Inquiry to Three-Dimensional Teaching and Learning (NSTA)
- How to focus students' engineering design projects on science learning (STEMTeachingTools)
- Why focus on science and engineering practices—and not "inquiry?" Why is "the scientific method" mistaken? (STEMTeachingtools)
- #Going3D w/GRC (Phenomenal GRC Lessons)