Welcome

Web Seminar:
Lab Safety Considerations for Pre-Service Elementary Science/STEM Teachers

February 13, 2023
Introduction to Zoom begins at 6:40 PM ET
Program begins at 7:00 PM ET

Transforming science education to benefit all through professional learning, partnerships and advocacy.

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About Today's Web Seminar

This interactive web seminar will begin with an overview of safety protocols specific for doing elementary level safer science/STEM classroom/laboratory activities with Dr. Ken Roy, NSTA and NSELA Safety Compliance Advisor/specialist and, Director of Environmental Health & Safety, Glastonbury Public Schools (CT). In addition, Dr. Kevin Doyle of Morris Hills Regional School District, NSTA Safety Advisory Board Chairperson will also be presenting.

Critical related topics for science/STEM pre-service elementary teachers addressed include legal safety standards and better professional safety practices, engineering controls, standard operating procedures, personal protective equipment, duty or standard of care and more. Time permitting, individual questions will be answered by the presenters near the end of the program.

All participants receive a certificate and 100 NSTA activity points for attending and completing the post-program evaluation. An archive and presentation slides will be available after the program.

Presenters:
- **Ken Roy**
- **Kevin Doyle**

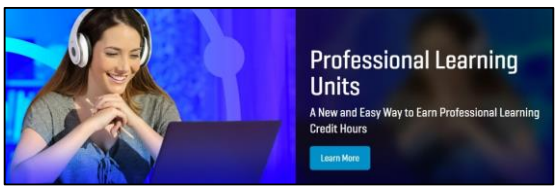
NSTA is Here to Help!

https://www.nsta.org

Daily Do Lesson Plans

https://www.nsta.org/daily-do

Professional Learning Units



Topics include:
Social Justice | 3D Learning & Sensemaking | Phenomena | Science and Engineering Practices | Technology & Sensemaking | STEM Engineering

https://www.nsta.org/plu

Professional Journals

https://www.nsta.org/types/journals

NSTA Membership

https://www.nsta.org/membership

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Web Seminar:
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February 13, 2023
Introduction to Zoom and Program Details
Program begins at 7:00 PM ET

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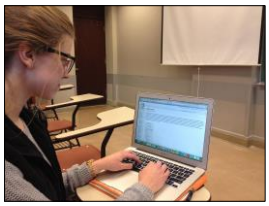
Agenda

- Meet and Greet
- Tech Details
- NSTA Opportunities
- About Today's Seminar:
  - Presentation
  - Survey
  - Q&A w/Presenters



Meet and Greet

Web seminars provide a great opportunity to grow your network!

Tell us about you:
- Your role as educator?
- Your institution?

Tech Details: Meet the Tech Coordinator

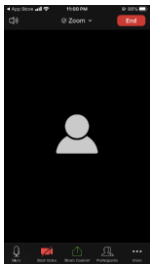
For tech help call:

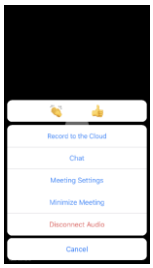
Zoom Customer Support

888-799-9666 Ext. 2

Or contact **Don Boonstra** from NSTA via the chat window

Tech Details: Zoom for Mobile Devices





Tech Details: Zoom for Computers

Audio Settings
Check speakers
Adjust volume

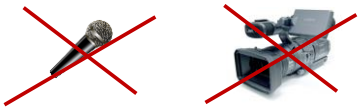
Participants Window
Names of hosts and participants

Chat
Ask questions to the group or specific participants

Tech Details: Microphone and Camera

Possible distractions for fellow web seminar participants and presenters

Your microphone and web camera have been disabled to avoid possible distractions.



Tech Details: Using the Chat Window

- Share questions and ideas
- Interact with the learning community
- Keep chat relevant to the topic *(chat included in the program recording)*

Additional guidance regarding norms will be shared after the program begins

NSTA Vision and Mission

NSTA Opportunities: Web Seminars

Science Update: From Apollo to Artemis: NASA's Return to the Moon
February 16, 7:00 PM ET

Web Seminar: WI23: Lab Safety Considerations for Pre-Service Secondary Science/STEM Teachers
February 27, 7:00 PM ET

Science Update: Food Agriculture – The Plant Scientist's Toolbox
March 9, 7:00 PM ET

Transforming Science Learning: Teaching NSTA Daily Do Lessons in the Middle School Classroom
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Science Update: An Eclipse 'Double-Header' is Coming this School Year!
August 31, 7:00 PM ET

Transforming SCIENCE LEARNING

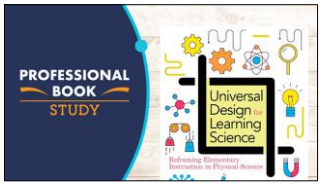
SCIENCE UPDATE

https://www.nsta.org/webseminars

NSTA Opportunities: Conferences

https://www.nsta.org/conferences-and-events

Upcoming Book Study



Universal Design for Learning Science: Reframing Elementary Instruction in Physical Science: Professional Book Study for K-5 Teachers

February 15, 22, March 1, 8, 2023
7:00 – 8:30 PM ET

***Register today*: Preservice teachers pay only $12!**

https://www.nsta.org/webseminars

About Today's Web Seminar

The presentation will last 75 minutes including time for questions. The program will be recorded. All registered participants will receive an email message with the direct link to the archive.

We value your feedback. Please complete the post-program survey available at the end of the presentation. For attending the program and completing the survey, you will receive a certificate from NSTA.

A collection of resources is available for this program. The collection includes the presentation's slides as PDF.

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NSTA Virtual Program Norms

The National Science Teaching Association strongly supports diversity, equity and inclusion in the classroom, and in all of our programs. We are committed to providing a welcoming, safe, productive, harassment-free environment for all participants of our events and programs, regardless of their gender, gender identity, sexual orientation, ability, ethnicity, race, color, age, marital status, veteran status, socioeconomic status or religion.

We ask that all attendees be mindful of their surroundings and of their fellow participants. All participants are expected to exercise consideration and respect in their speech and actions, and to refrain from demeaning, discriminatory, or harassing behavior and speech.

NSTA does not allow promotion of other products in our chats during web seminars. We ask that attendees keep the conversation on topic, use positive language and remain courteous of others throughout the event, and allow everyone time to participate in the chat.

Meet Today's Presenters…

Ken Roy
Chief Safety Compliance Officer/Safety Blogger - NSTA

Kevin Doyle
District Supervisor of Science – Morris Hills Regional District, NJ

SAFER ELEMENTARY SCIENCE/STEM!
NSTA Pre-Service Elementary Teachers of Science
13 February 2023

*Presenter!

Dr. Ken Roy Safersci@gmail.com

ON STAFF AT Glastonbury Public Schools (CT)
- Director of Environmental Health & Safety
- Safety Compliance Officer
- Chemical Hygiene Officer

PRIVATE SAFETY PRACTICE
- National Safety Consultants, LLC – General Manager
- Trained as Authorized OSHA Instructor;
- National Science Teaching Association (NSTA)
- Chief Science Safety Compliance Adviser and Blogger
- National Science Education Leadership Association (NSELA) Safety Compliance Officer
- International Council of Associations for Science Education (ICASE) Safety Committee Member
- Author of over 13 safety books and over 800 Professional Journal Articles on Safety
- Safety Researcher at Pennsylvania State University

Getting Up-to-date Safety News

NSTA Safety Blogger – Ken Roy
https://www.nsta.org/topics/safety#tab-safety-blog

Tweet Dr. Ken
Twitter@drroysafersci

Presenter!

Dr. Kevin S. Doyle @KSDoyle1

District Supervisor of Science Instruction, Morris Hills Regional District
- Coordinator of the Math and Science Magnet Program at MHRD
- Coordinator of the Aviation and Aerospace Program at MHRD
- Safety Advisory Board Chairman, National Science Teaching Association

Kevin Doyle Consulting, Science Safety Presenter
- NJ Science Convention
- New Jersey Science Education Leadership Association
- National Science Teaching Association

What Will We Focus On Today?

• Intro:	Doing Safer Science/STEM
• I.	Legal Standards & Better Professional Practices
• II.	Engineering Controls
• III.	Standard Operating Procedures
• IV.	Personal Protective Equipment
• V.	Duty of Care
• VI.	Resources

COVID SCIENCE/STEM Lab Protocols

If CDC Recommends to Keep appropriate social/physical distance, what does this mean to me and my classes?

- Think outside the box when doing labs
- Wear gloves when sharing materials (Demonstrate how to take off gloves)
- Have groups of two work at lab stations and other students working at their desks.
- Virtual Labs
  - Remember there is a learning loss associated with lab skills and techniques.
- Practice frequent hand washing for 20 seconds.
- Only use hand sanitizer/disinfectant if soap and water are not available.
- Clean first; Disinfect second
- Stay home if you are sick and avoid anyone who appear sick.
- Safety over Standards
- For additional updated/current CDC protocols, see the following: Guidance for COVID-19 Prevention in K-12 Schools:

https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/k-12-guidance.html

BEST WAY TO LEARN SCIENCE/STEM!

- Hands-on, Process, & Inquiry-based science/STEM!
- Doing science/STEM NOT Reading about science/STEM
- Have Fun with Safety!!

Doing Science & Safety – Balance!

- "Doing" elementary science/STEM successfully can be a balancing act between instructional activities and safety!
- This can be done in a manner that is fun, not scary.
  - Be the Fireman!!

OBJECTIVES FOR SAFER ELEMENTARY SCIENCE/STEM!

- Teachers need to be aware of potential safety hazards in the elementary science instructional space.
  - Only perform labs that avoid these dangers
- Teachers need to make and keep their instructional space organized to help reduce the chance of a safety incident.
- Teachers need to better plan for a safer learning environment.
- Teachers need to make students aware of safety in science/STEM.
  - Make it fun

I. Standard Operating Procedures for a Safer Laboratory: Based on Legal Safety Standards

The Big Three

- **29 CFR 1910.1450 Occupational Exposure to Hazardous Chemicals in Laboratories**
- **29 CFR 1910.1200 OSHA's HazCom Standard**
- **NFPA Life Safety Code 101**

There is a lot to learn, it is an ongoing process.

Better Professional Safety Practices

nsta National Science Teaching Association

ITEEA Technology and Engineering bring STEM to Life! International Technology and Engineering Educators Association www.iteea.org

Approved American National Standard ANSI

ISEA International Safety Equipment Association

ACS Chemistry for Life® American Chemical Society

I. A. The OSHA Hazard Communication Standard (HCS) or HazCom (Subpart Z, Toxic and Hazardous Substances, 29 CFR 1910.1200)

- Purpose
- Scope and Application
- Definitions
- Hazard Determination
- Written Hazard Communication Program
- Labels And Other Forms of Warning
- Safety Data Sheets
- Employee Information and Training
- Trade Secrets
- Effective Dates

Anything wrong with this photo safety wise?

THREE ELEMENTS OF ELEMENTARY SCIENCE/STEM SAFETY!

To control teacher and student exposure to chemicals and other hazards in the science/STEM lab or field, three general principles apply as a hierarchy of defense:

1. **Engineering Controls**
2. **Administrative Controls** ***(work practices or Standard Operating Procedures - SOPs)***
3. **Personal Protective Equipment (PPE)**

There are a lot of terms that you may not have heard of before. That is why we are here. The guiding ***principle*** *should be can I do this lab and keep my students safer!*

II. ENGINEERING CONTROLS!

Preferred method to deal with hazards.

Definition: Controls which remove or reduce exposure to a chemical or physical hazard by using or substituting engineered machinery or equipment.

Examples of Engineering Controls:

- Fire extinguisher
- Eyewash
- Shower
- GFCI electrical protection
- Ventilation
- Room Footprint
- Goggle Sanitizer

IIA. Eyewash – Engineering Controls

- Used to irrigate eye(s) if a chemical or particle lands in it.
- 10 second access
- 15-minute irrigation
- Tepid water 60 -100 F
- Activated weekly/logged
- Check before the activity

IIB. GFCI Engineering Control

- Ground-fault interrupter = GFI
- GFI "breaks" the circuit when an object or water shorts the circuit or attempts to ground – prevents electrocution!

IIC. Goggle Sanitizer Cabinet

- Biologicals vs. Chemicals vs. Physicals!
- Goggle sanitizer cabinet kills bacteria and other life forms.
- Alternatives – alcohol wipes, antibacterial dish detergent.

IIE. PROVIDE ACCESS FOR STUDENTS WITH DISABILITIES

- Tables
- Sinks
- Eyewash
- Wheelchair space

IIF. GENERAL STORAGE

- Keep it Clean
- Keep it Neat
- Keep it Organized
- Keep it Safe


III. STANDARD OPERATING PROCEDURES (SOPs) !

- SOPs or Work Practices involve changes in work procedures to better protect students and teachers.
- Examples include housekeeping, animal care, student behavior, and more.

IIIA. Chemical Hygiene – No Food or Drink in the science/STEM classroom or laboratory!

IIIB. Appropriate Chemical Storage

IIIC. Chemicals To Be Recycled

IIID. Labeling of Hazardous Chemicals

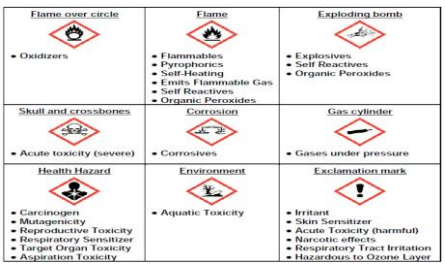
NFPA Labeling

Sample GHS Label

Relabeling!

- Current commercial labels in your storage inventory are grandfathered and need not be updated.
- When moving the hazardous chemical to another container, the following information must appear on the new label:
  a. Chemical Name
  b. Concentration
  c. Date Prepared
  d. Hazard Information

GHS Hazard Communication - Pictograms



IIIE. Safety Data Sheet or SDS Format: 16 headings

1. Identification	9. Physical and chemical properties
2. Hazard(s) identification	10. Stability and reactivity
3. Composition/information on ingredients	11. Toxicological information
4. First-aid measures	12. Ecological information
5. Fire-fighting measures	13. Disposal considerations
6. Accidental release measures	14. Transport information
7. Handling and storage	15. Regulatory information
8. Exposure control/personal protection	16. Other information

SDS Accessibility

Employer is required to provide immediate access for employees to SDSs for all hazardous chemicals!

Two Key Points:

1. Make sure you read and understand the **SDS** sheet for any chemical you use.
2. If you do not have the SDS sheet, do not do the activity

IIIF. Soil Activities: Pesticides, Herbicides & More!

Compost Pile Activity Out-of-doors

Compost Activity in Classroom Unsafe!

Greenhouse Composting Activity

IIIG. Heat Sources

- Candle
- Microwave
- Hot Plate
- Butane
- Alcohol Lamp – UNSAFE!

IIIH. Dressing for Science/STEM Activities!

- Tie hair back
- Secure Loose clothing
- No hanging jewelry
- No flip flops or other open toed footwear
- No eating or drinking in science/STEM classroom or laboratory
- Always wash hands with soap and water after completing an activity

IIII. Hazardous Materials!

- Use only non-mercury equipment
- Safety matches
- Dry ice
- Battery acid

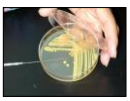
More Hazardous Materials!

- Hazardous Chemicals –
  - Vinegar?
  - Alcohol
  - Clay

IIIi. Biologicals – Allergens!

Use caution when working with plants and animals:

- Mold
- Bacteria
- Flowers
- Fruit/Nuts
- Poisonous plants
- Mammals
- Birds
- Owl Pellets
- Other



IIIJ. CLEAN-UP & Disposal Procedures!

- Assign clean-up duties upon completion of the activity
- Do not allow students to clean-up chemical spills or broken glassware
- Return all materials to appropriate areas as determined by the teacher.

IIIK. CLEAN-UP & Disposal Procedures!

- Always follow SDS disposal procedures for hazardous materials.
- Flinn Scientific also is a good source.
- Know how to dispose before you purchase.

IIIL. Acknowledgement Forms Student Safety Awareness

- After science/STEM activity training, provide safety acknowledgement form noting safety expectations and hazards.
- Both parents and students sign!
- https://static.nsta.org/pdfs/SafetyAcknowledgmentForm-ElementarySchool.pdf

IIIM. First-Aid

- Know your district's procedures before you start!!!
- Where local BOE policies permit, there should be an adequately stocked first-aid kit easily accessible for emergency use.
- Phone numbers and means of communication available:
  - School nurse
  - Poison control (1-800-222-1222)

IIIN. FIELD TRIPS

- BOE Policies
- Visit & Survey the site BEFORE bringing students
- Inform parents/guardians/administration (acknowledgement form)
- Be aware of medical and physical issues
- Plan for appropriate adult supervision – 1:10
- Group students in pairs (buddies) or teams

- Have means of communication – cell phone
- Review student behavioral expectations
- Use appropriate PPE

IIIO – Animal Studies!

- The following animals can be worked with in the science/STEM classroom/laboratory, but with caution:
- Animals with fur (allergy potential)
- Turtles (Salmonella infection potential)
- Birds (Psittacosis infection potential)
- Fish (bacterial infection potential)

IIIP – Animal Studies!

The following animals should not be allowed in the school or science/STEM classroom/laboratory:

- Wild animals
- Spiders which are poisonous such as black widow or brown recluse spiders
- Venomous reptiles and fish
- Scorpions
- Stinging insects such as bees, hornets, and wasps (save self-contained observation hives)

IIIP – Animal Studies!

- Check with local Division of Fish & Wildlife Services
- NSTA Position Statement:
- "Responsible Use of Live Animals and Dissection in the Science/STEM Classroom"

https://www.nsta.org/nstas-official-positions/responsible-use-live-animals-and-dissection-science-classroom

IIIR – Grocery Items for Experiments!

- Know the source!
- Know your student's allergies!
- Read the labels!
- Do not allow eating of items.
- Check for evidence of insects, fungi, etc.
- Wash hands with soap and water after handling.
- Board Approval

IIIS – Visitors To Classroom

- Make sure you know who you are inviting to the classroom to work with students!
- Clearly state the objective or purpose.
- Review safety procedures in advance.
- Review security procedures in advance.
- Advise administration of visitor. Get permission not forgiveness!
- Get feedback from visitor and students.

IV: PERSONAL PROTECTIVE EQUIPMENT

- When engineering controls are not sufficient, personal protective equipment or PPE must be used!
- PPE includes clothing or other devices worn to help protect a student or teacher from direct exposure to a safety hazard or situation.
- Examples: Gloves, eye protection, aprons

BEST PROFESSIONAL PRACTICE EYE PROTECTIVE DEVICES – NATIONAL SCIENCE TEACHING ASSOCIATION

- ANSI Z87.1 approved chemical splash goggles or safety glasses, as appropriate or directed by your instructor, shall be worn at all times in the laboratory or field, including pre-laboratory work and clean-up, unless the instructor specifically states that the activity does not require the use of chemical splash goggles or safety glasses.
- Eye protection required for:
  - Glassware
  - Sharps – needles, pins, compasses, etc.
  - Large levers – meter sticks

https://www.nsta.org/personal-protective-equipment

Appropriate Eye Protection Devices
Indirectly Vented Chemical Splash Goggles

IVC. Personal Protective Equipment

- Body - Aprons

PPE: Electricity Study

Wires are considered sharps and require eye protection!

V. Duty of Care

High Duty or Standard of Care For Teaching Science/STEM:

a. Duty of Instruction – adequate direction prior to activity

b. Modeling of Safety – adequate "showing" of procedure

c. Duty to warn – showing possible safety issues

Expectations

d. Duty of Maintenance – ensuring a safe environment/equipment

e. Inspection of Safety – ensure safety is being followed

f. Duty of Supervision (Enforcement of Safety)

g. Liability of Safety -

Negligence of Safety – conduct falling below a standard of care established by law or profession to protect from unreasonably risk of harm or failure to exercise due care.

VI. Resources – Internet!

- NSTA Science Safety Portal:
  - https://www.nsta.org/topics/safety

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Let's Pause…

Let's pause for questions from the audience.

Please share your questions in the chat window.

QR Codes for Presentation Links

THANK YOU
FOR WATCHING
AND
STAY SAFE!

Thanks to Today's Presenters…

Ken Roy
Chief Safety Compliance Officer/Safety Blogger - NSTA

Kevin Doyle
District Supervisor of Science – Morris Hills Regional District, NJ

Thank You for Participating!

https://www.nsta.org

Post-program Survey – *coming up!*

We value your feedback!

The post-program survey link will be shared after the recording is stopped at the end of the program.

Your completed survey confirms your attendance which allows us to award you a certificate of participation and attendance.

Collection of Resources

This collection includes the slides (as PDF), handouts and other resources.

Link to the collection:
https://my.nsta.org/collection/yaPVtM_sqnS4_E

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NSTA Virtual Learning Team

National Science Teaching Association
Tricia Shelton, Chief Learning Officer
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Michelle Phillips, eLearning Engagement Specialist
Patrice Scinta, Curriculum Writing Specialist
Holly Hereau, Instructional Materials and PL Specialist
LaShawn Duckett, Director of Meetings
Emilee Clemens, Project Coordinator
Jasmine Dandridge, Database Coordinator
Eddie Hausknecht, Senior Manager Web Development
Don Boonstra, Technical Coordinator

This concludes today's program.

Post-program Survey

- Click on the URL in the chat window to access the survey.
- Please take as long as you need to complete the survey.
  - After 5 minutes we will return for more Q&A.
  - If you have no further questions you may leave the program at this time.
- Certificates of attendance are awarded to all who complete the survey.
  - **You will be notified via email when your certificate is ready. Please allow two weeks** for your certificate to be generated.
  - Go to the **NSTA website and select "Menu…My Account…Certificates" to find your certificate**.

Informal Q&A with the Presenters

- If you have no further questions you may exit at this time.
- Thank you for participating in today's web seminar!

For All: Type your questions in the chat window.