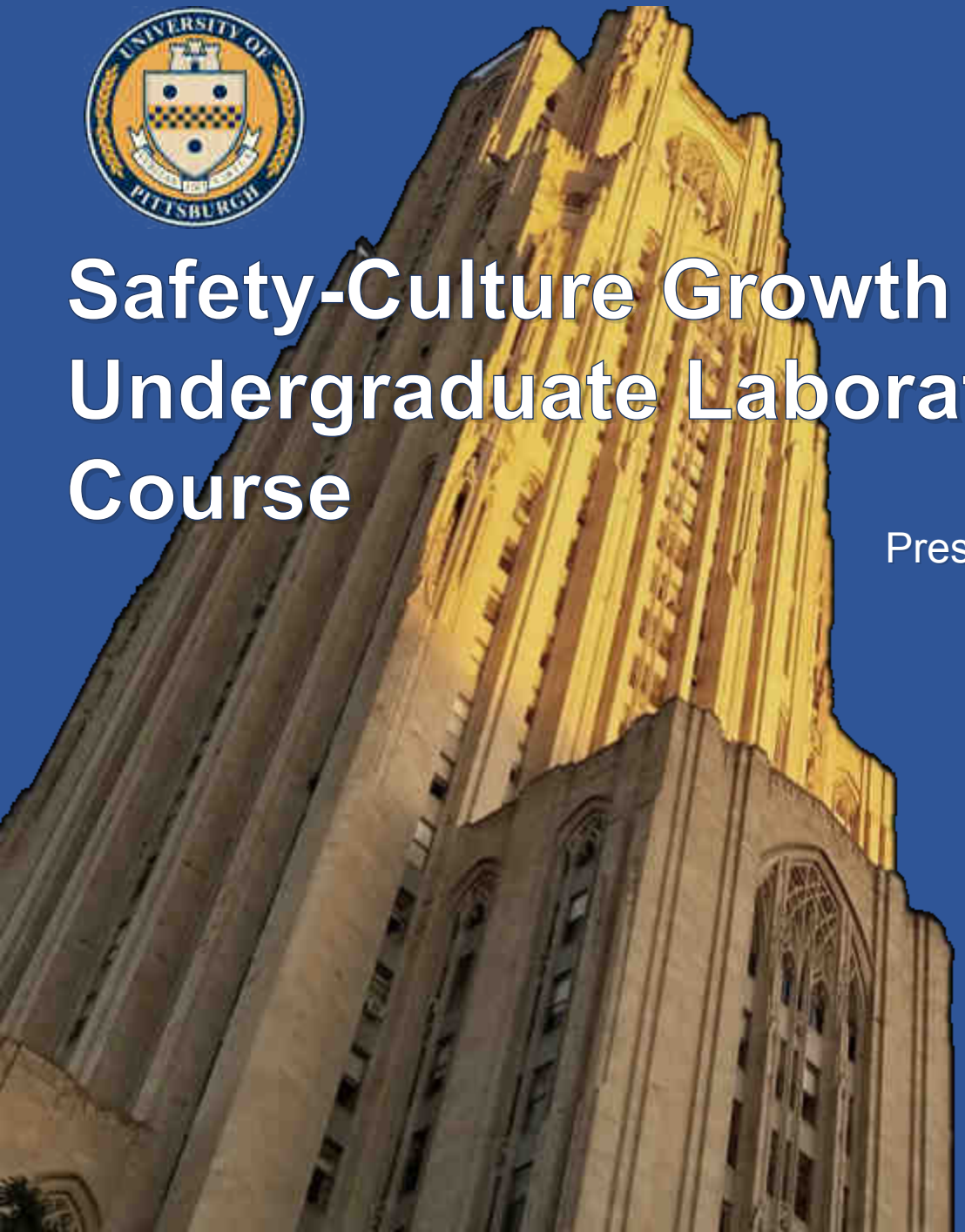

Safety-Culture Growth Catalyzed by an Undergraduate Laboratory Safety Course

Presented by:

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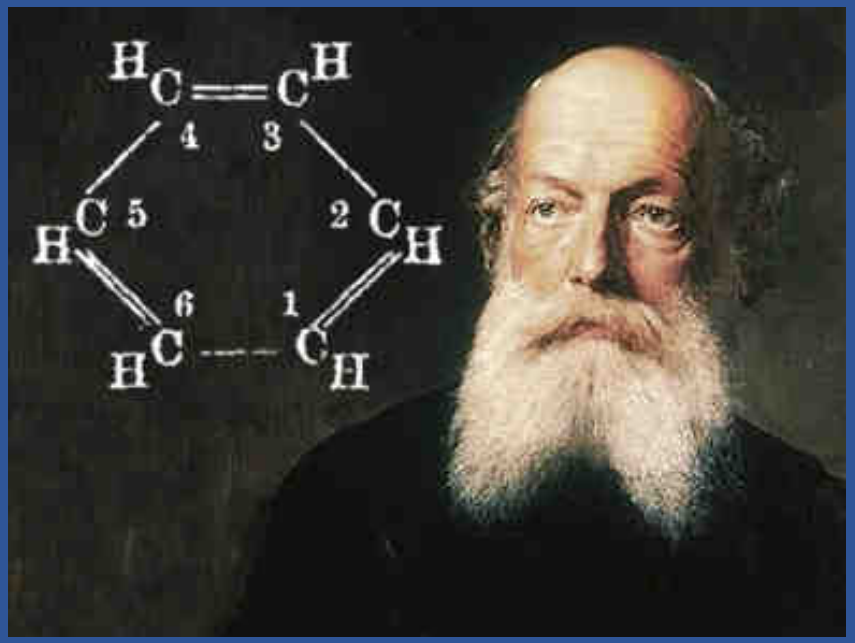
University of Pittsburgh EH&S
Environmental Manager

August 25, 2019

Dr. Huston, Mr. Duval and Kimi Brown

A Past Perspective on Safety "Culture"



Kekulé once said *"Who does not ruin his health by his studies, nowadays will not get anywhere in Chemistry."*

Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards: Updated Version.
https://www.ncbi.nlm.nih.gov/books/NBK55882/

https://www.chemistryviews.org/details/ezine/7168571/150th_Anniversary_Kekules_Benzene_Structure.html

A Modern Safety Culture Perspective

A collective understanding in an organization that:

- prioritizes safety practices above all other objectives
- establishes a framework for training and sharing of information
- supports validating procedures using state of the art best practices in hazard analysis, elimination, and management

Dr. Peter Wipf, Distinguished University Professor
University of Pittsburgh

An Ultimate Goal

*"…**students will acquire the skills** to recognize hazards, …to minimize the risk of exposures to hazards, and to be prepared to respond to laboratory emergencies."**

"Tell me and I forget, teach me and I may remember, involve me and I learn."

Benjamin Franklin

*Creating Safety Cultures in Academic Institutions: A Report of the Safety Culture Task Force of the ACS Committee on Chemical Safety (American Chemical Society 2012), Page 4.

https://i2.wp.com/elliotthall.me/wp-content/uploads/2016/07/tell-me-and-i-forget-benjamin-franklin-quotes-WfNEQ9-quote.jpg

A Leap in Pitt's Safety Journey

JOURNAL OF CHEMICAL EDUCATION

Article

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Development of an Undergraduate Course in Chemical Laboratory Safety through an Academic/Industrial Collaboration

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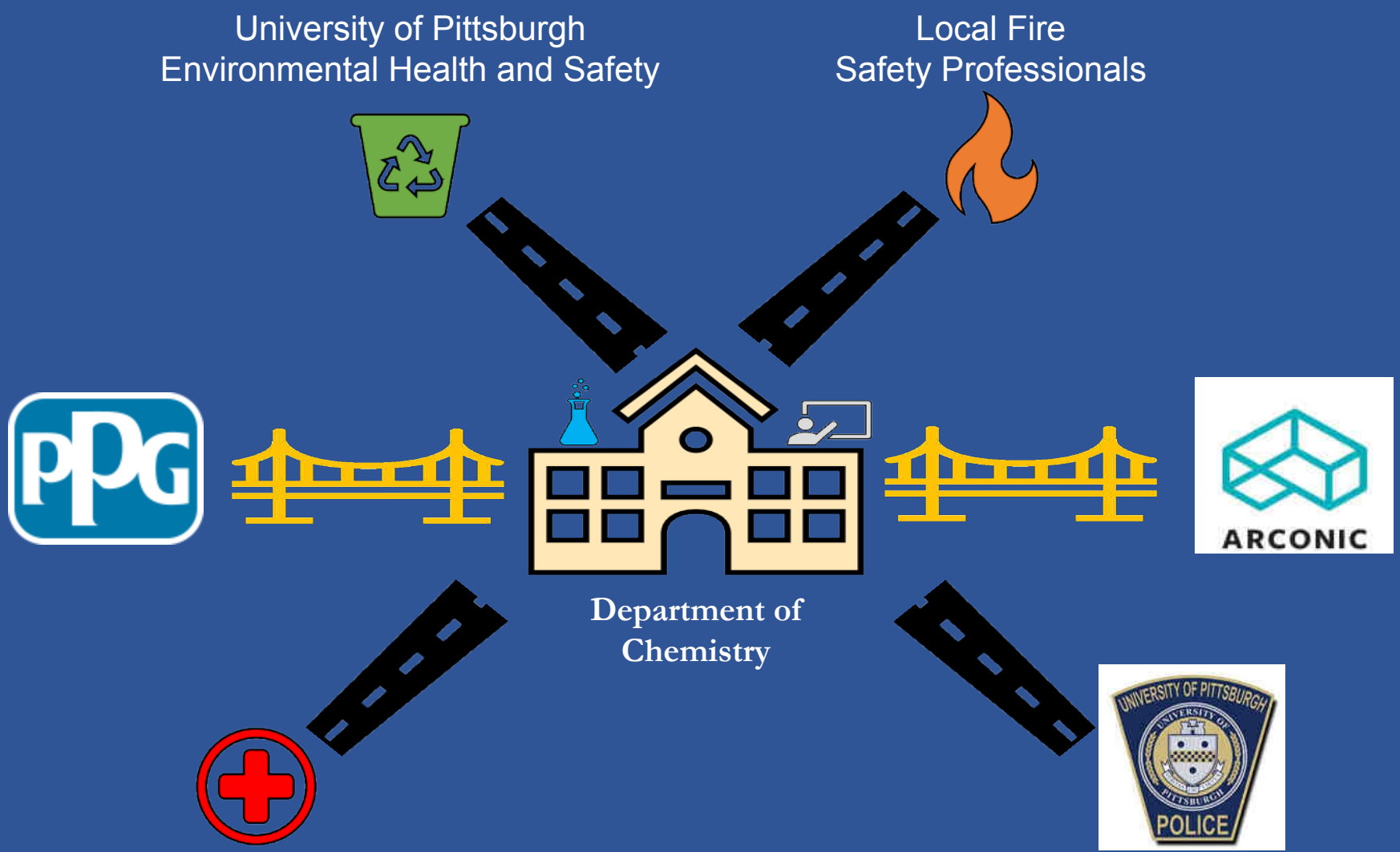
Collaborating to Build a Course



Safety Course Structure

- Scope
  - Accident analysis
  - Hazard recognition
  - Chemical compatibility
  - Risk assessment and mitigation
  - Emergency response
- Instructional approach
  - Interdisciplinary engagement
  - Interactive discussions
  - Hands-on activities

Unanticipated Benefit

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Unanticipated Benefit

Capstone Projects

Students became stakeholders in course development and safety culture growth by:

- proposing prototypes for hands-on activities for the course
- refining hands-on activities for use in the course and ultimately teacher training
- performing risk assessments for undergraduate laboratory experiments
- initiating a Safety Pause Slide program
- becoming safety integration team advocates

EYE PROTECTION IS REQUIRED IN ALL LABS

Appropriate eye protection keeps chemicals & flying particles out of our eyes, as defined by the American National Standards Institute (ANSI) Z-87.1 standard.

SAFETY GLASSES:
Impact resistant safety glasses are ventilated & are not suitable for chemical splash protection.


Safety Glasses

GOGGLES:
Are required in Undergraduate Teaching labs & are recommended when using Hazardous Chemicals like strong acids and bases.


Goggles

FACE SHIELDS:
Face shields must be worn over goggles or safety glasses when there is a significant risk of chemical splashes or projectile hazards.


Face Shields

EYEGLASSES:
Are NOT acceptable as eye protection.

Safety Integration Teams

This Photo by Unknown Author is licensed under CC BY-SA-NC

Members:

- Undergraduate safety course graduates
- Faculty, EH&S, Graduate Students, and Staff

Objective:

Explore ways to integrate safety content into our undergraduate lab curriculum and teacher training program

Safety Integration Team Projects

- Improve upon departmental “Safety Pause” slides
- Categorize departmental accidents to look for trends
- Use ACS undergraduate laboratory safety guidelines to identify weaknesses in our current undergraduate lab curriculum
- Rethink how safety rules are introduced to our lab students
- Develop safety training station kits

Graduate Student Safety Culture Training

Nine-hour program:

- Hazard versus risk
- Accident analysis
- Safety culture
- EH&S orientation topics
- Information resources
- Risk assessment tools (ACS website)
- Interactive safety training stations
- Risk assessment in research and industry

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Interactive Safety Training Stations

Safety station categories:

- Understanding PPE
- Best Laboratory Practices
- Chemical Compatibility
- Emergency response

Safety station kit components:

- Prop inventories
- Learning objectives
- Lesson plan for facilitator
- Future: short post-activity assessment

Safety Station Example: Chemical Storage & Compatibility

Safety Station Example: Chemical Storage & Compatibility

CST CHEMICAL SAFETY TRAINING

Store in a cool dry place

Simulated Chemical Information:

NH_4OH
CAS: 1336-21-6
MW: 35.05 g/mol
F.P. N/A
B.P. 27 °C
M.P. -60 °C
pH: 11.7

Chemistry Stockroom
(412) 624-8554
Product of Pittsburgh

UP0018 - 1 L

Ammonium hydroxide

28% NH_3 in H_2O

(Simulated with water)

Reagent Grade

WARNING:

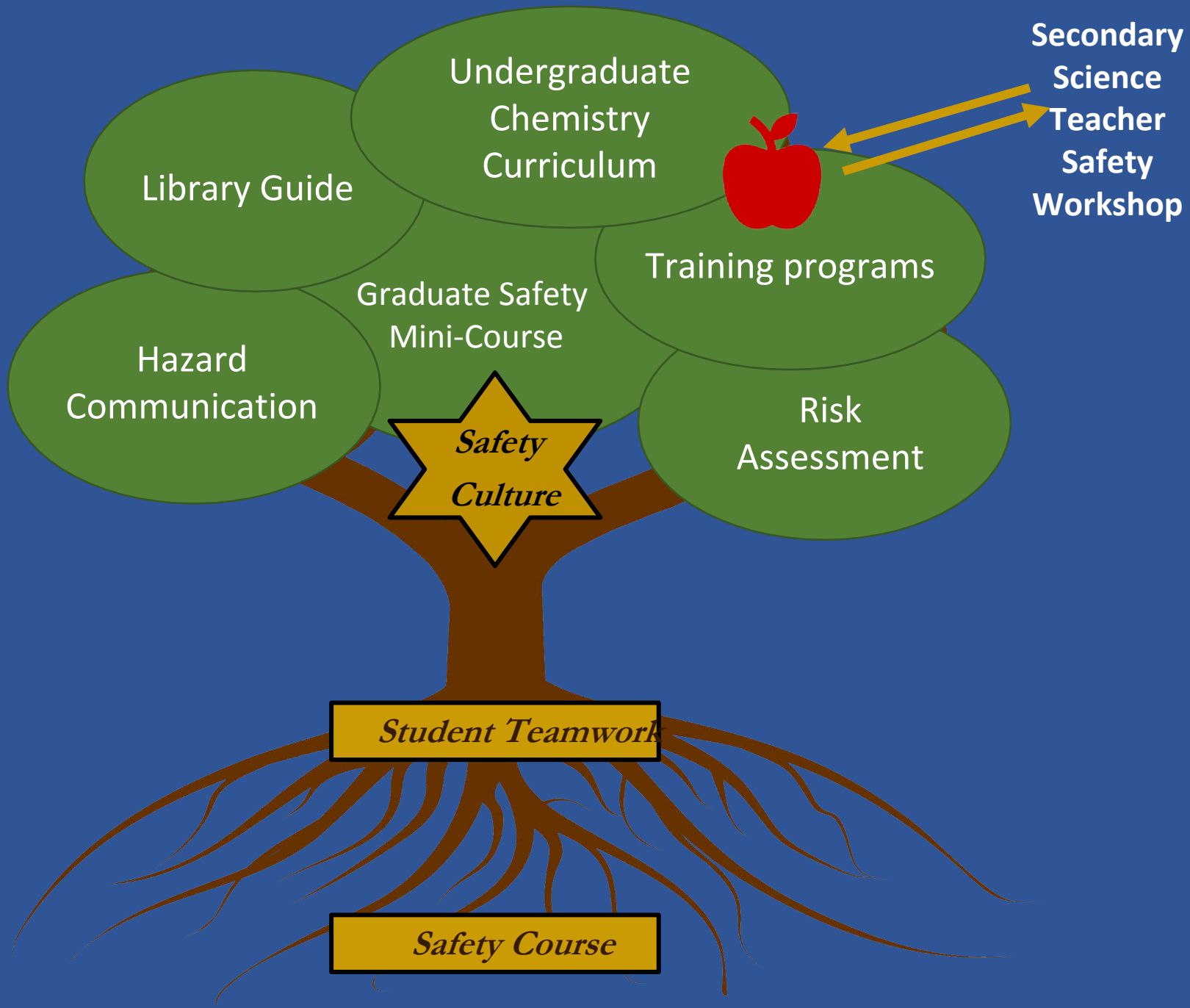
The contents of this container are for safety training purposes only. The material in this container is water and should not be used for chemistry applications.

HAZARDS: Harmful if swallowed. Causes severe skin burns and eye damage. Causes serious eye damage. Very toxic to aquatic life.

Safety Station Example: Chemical Storage & Compatibility

Participant Feedback

- Participants found the chemical storage station to be challenging
- Described it as being like a puzzle
- Wanted more individually focused training
- Expressed interest to facilitate other training sessions


Secondary Science Teacher Safety Workshop
Undergraduate Chemistry Curriculum
Library Guide
Training programs
Graduate Safety Mini-Course
Hazard Communication
Risk Assessment
Safety Culture
Student Teamwork
Safety Course

The Road Ahead

Refine safety stations

- Extend use to other institutions
- Develop program efficacy metrics

Embed safety education

- Undergraduate lab curriculum
- School of Education teacher preparation
- Safety becomes holistically integrated into experimental design

Expand leadership roles

- Undergraduate safety leaders
- Graduate student representatives
- Graduate student safety fellowship

Outreach

- High school science teacher training

Special Thank You

www.safetystratus.com

ACS Division of Chemical Health and Safety

Thank you: PPG Industries

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Heather Burleigh-Flayer, Global Manager Toxicology

Jane N. Valenta, Vice President, Global Technical Architectural Coatings
Mark Cancilla, Vice President, Environment, Health and Safety
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David Szabo, Manager of Toxicology

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MD Candidate 2020

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Assistant Stockroom Manager

Once Again, a Special Thank You

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