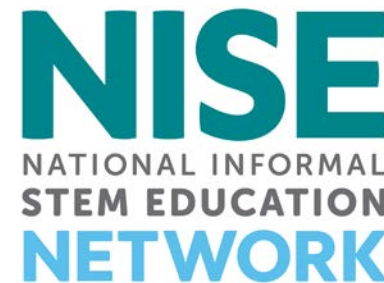


NISE Net Online Workshop

Making Chemistry Matter to Your Public Audiences – Using Hands-on Activities to Stimulate Interest, Relevance, and Self-efficacy

Tuesday, September 17, 2019



Welcome!

Today's presenters are:

- **Rae Ostman, Project Co-PI, Arizona State University**
- **David Sittenfeld, Project Co-PI, Museum of Science**
- **Marta Beyer, Allison Anderson, and Owen Weitzman, Museum of Science**
- **Patti Galvan and David Horwitz, American Chemical Society**
- **Emily Hostetler, Museum of Science**



As we wait to get started with today's discussion, please:

Introduce yourself! Type your name, institution, and location into the Chat Box

Questions? Feel free to type your questions into the Chat Box at any time throughout the webinar or use the raise your hand function in the participants list and we'll unmute your microphone.

Today's discussion will be recorded and shared on nisenet.org at:
nisenet.org/events/online-workshop

Online Workshop Overview

- Project overview, development process, implementation
- Research findings
- American Chemical Society (ACS) work and implementation of project framework
- ACS's National Chemistry Week (NCW) 2019, themed "Marvelous Metals"
- Applying the project framework to Explore Science: Let's Do Chemistry kit activities aligned with NCW 2019 theme
- Q&A



Credit: Science Museum of Minnesota, 2018



Rae Ostman
Arizona State University

Introduction

Project overview: Partners, goals, and activities

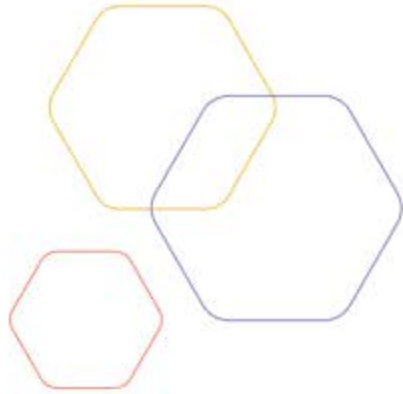
Development process: Design-based research

Implementation: Let's Do Chemistry events



EXPLORE SCIENCE

Let's Do Chemistry



Overview

Project partners

NISE NATIONAL INFORMAL
STEM EDUCATION
NETWORK

 **ACS**
Chemistry for Life®



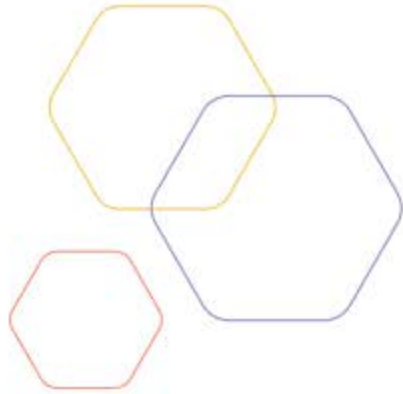
Project goals and activities

To have a strategic impact on publics' attitudes toward chemistry:

- **interest** in chemistry
- understanding and perception of its **relevance**
- feelings of **self-efficacy** with respect to it

through the creation of knowledge and educational activities that embody that knowledge





Development

Design-based research

1. **Prototyping** promising activities
2. **Testing** and data collection with visitors
3. **Studying** interactions among educators, visitors, and activities
4. **Talking** about the data together
5. **Improving** the activities and testing them again



Activity and training materials



LET'S DO CHEMISTRY

Nature of Dye



LET'S DO CHEMISTRY Nature of Dye Facilitator Guide

ACTIVITY LEARNING GOALS

Learners will develop positive attitudes toward learning.

- Learners will increase their feelings of interest in exploration and observations of phenomena.
- Learners will increase their understanding of the applications and uses of chemistry and science.
- Learners will increase their sense of self-efficacy in interaction with real tools and materials.

Learners will explore chemistry concepts, tools, and materials.

- Chemists use tools to discover and make new materials.
- People shape the development and use of new materials.

FACILITATION STRATEGIES

Try to encourage **interest** and **self-efficacy** through tools and materials. Ask participants to predict, observe, and experiment with the dye. What was their favorite color?

You can help make connections (**relevance**) by asking responses. Ask participants to predict, observe, and experiment with the dye. Discuss with visitors what they know about dyes and foods, and what they think about labeling materials. More about where the color comes from. Ask if the colors they might be wearing.

MATERIALS

- Cochineal bugs (dried)
- Soda ash (sodium carbonate) solution
- Vinegar solution

LET'S DO CHEMISTRY

Nature of Dye

Prepare a dye

Place two pieces of cochineal bug parts into the mortar. Crush the bug into a fine powder using the pestle. What does it look like?

Use the water dropper bottle to add three or four drops to the mortar and mix the solution using the pestle. How does it change?



Change the color

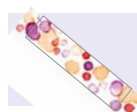
Use the pipette at your station to transfer one drop of your bug mixture (cochineal dye) from the mortar dish into each section of the 3-part petri dish.

Use the vinegar dropper bottle to add one drop onto the cochineal dye in one of the petri dish sections. What changes do you notice?

Now, use the soda ash dropper bottle to add one drop onto a different cochineal dye section. What changes do you notice here?

Test and experiment

Test the differences in the three dyes using strips of pH paper. How do the different dyes compare? Experiment by mixing the three dyes. You can retest the pH of your new mixture.



Let's keep exploring! Make a cochineal bookmark to take home! Dip a strip of watercolor paper into your dye samples to transfer the color. Or try using the pipette to add colors to the paper. How many shades of reds, oranges, and purples can you make?

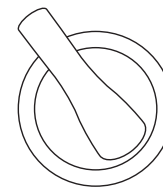


What makes me red?



What makes me orange?

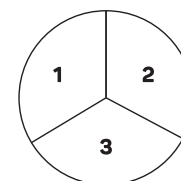
How many colors can you make?



Mortar & Pestle



Pipette



Petri Dish



Theoretical framework

Facilitation and design strategies that support learning



High-level findings

Facilitation strategies

- support engagement and learning generally rather than specifically

Design strategies

- To encourage interest in learning chemistry, chemistry content and activity format and structure are important
- To illustrate the relevance of chemistry to everyday life and societal issues, chemistry content is important
- To help learners develop feelings of self-efficacy related to learning chemistry, activity format and structure are important

Design strategies for interest

Chemistry content →	Activity format and structure →	Public learning outcome
Chemistry concepts Connections to everyday life Applications and uses of chemistry Connections across other STEM topics	Hands-on and interactive Observation of phenomena Use of tools and materials Experimentation with variables Familiar experiences	Increased <i>interest</i> in the field of chemistry



Chemistry is Colorful

Design strategies for relevance

Chemistry content

Connections to everyday life
Applications and uses of chemistry
Chemistry concepts
Connections across other STEM topics
Connections to societal issues

Activity format and structure

Familiar experiences
Use of tools and materials
Observation of phenomena

Public learning outcome

Increased understanding of the *relevance* of chemistry to their lives



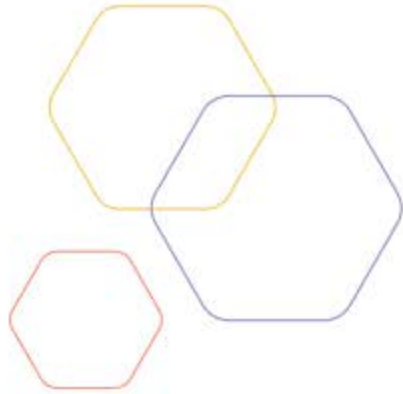
What's in the Water?

Design strategies for self-efficacy

Chemistry content →	Activity format and structure →	Public learning outcome
<div>Chemistry concepts</div> <div>Connections to everyday life</div> <div>Experimentation with variables</div>	<div>Hands-on and interactive</div> <div>Simple to do and easy to understand</div> <div>Use of tools and materials</div> <div>Evoke familiar experiences</div> <div>Observation of phenomena</div>	<div>Increased feelings of <i>self-efficacy</i> about chemistry</div>

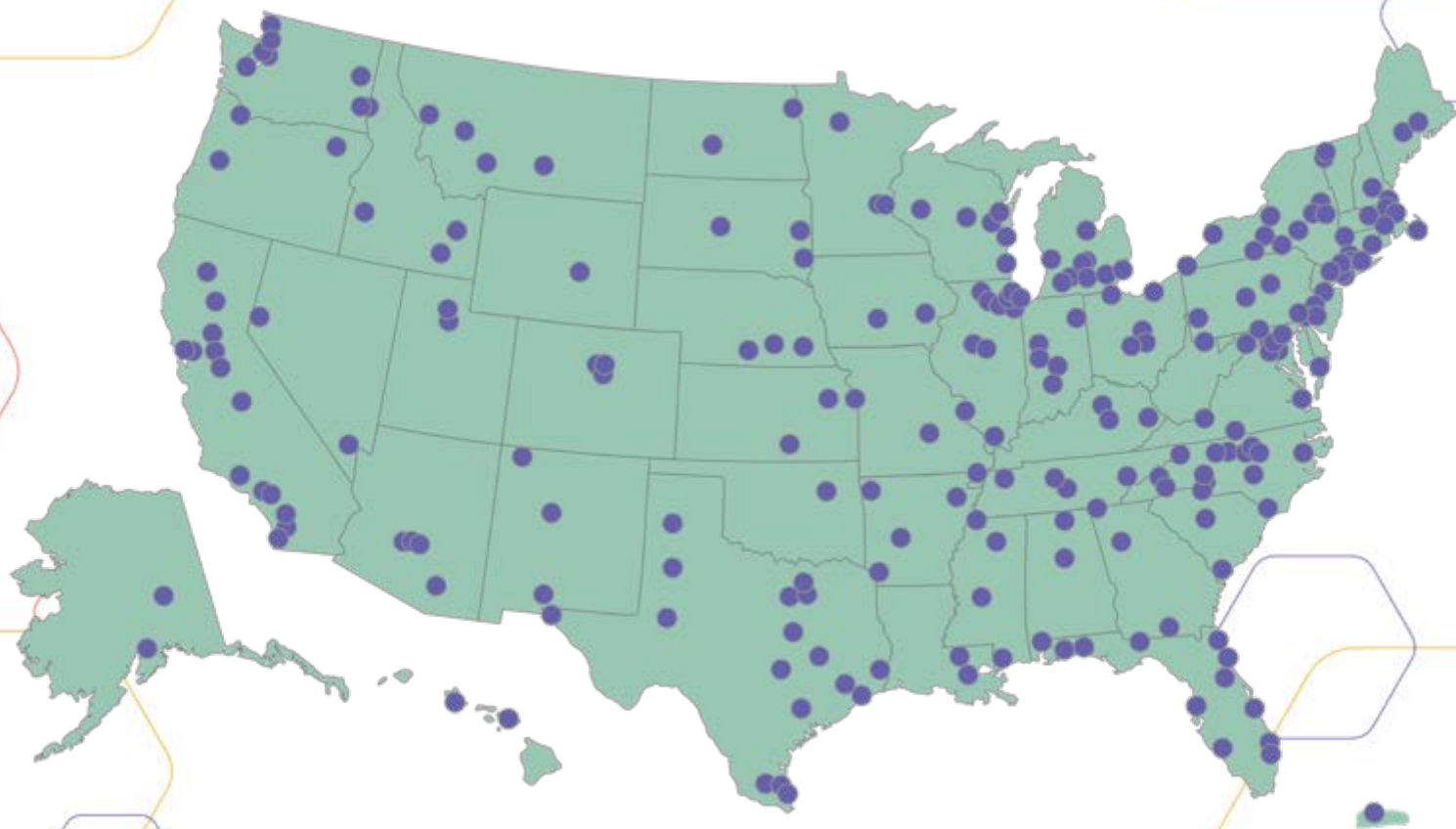


Nature of Dye



Implementation

Let's Do Chemistry events



250 sites across the US

Let's Do Chemistry events



Museum of Science, Boston



Science Museum of Minnesota, Saint Paul

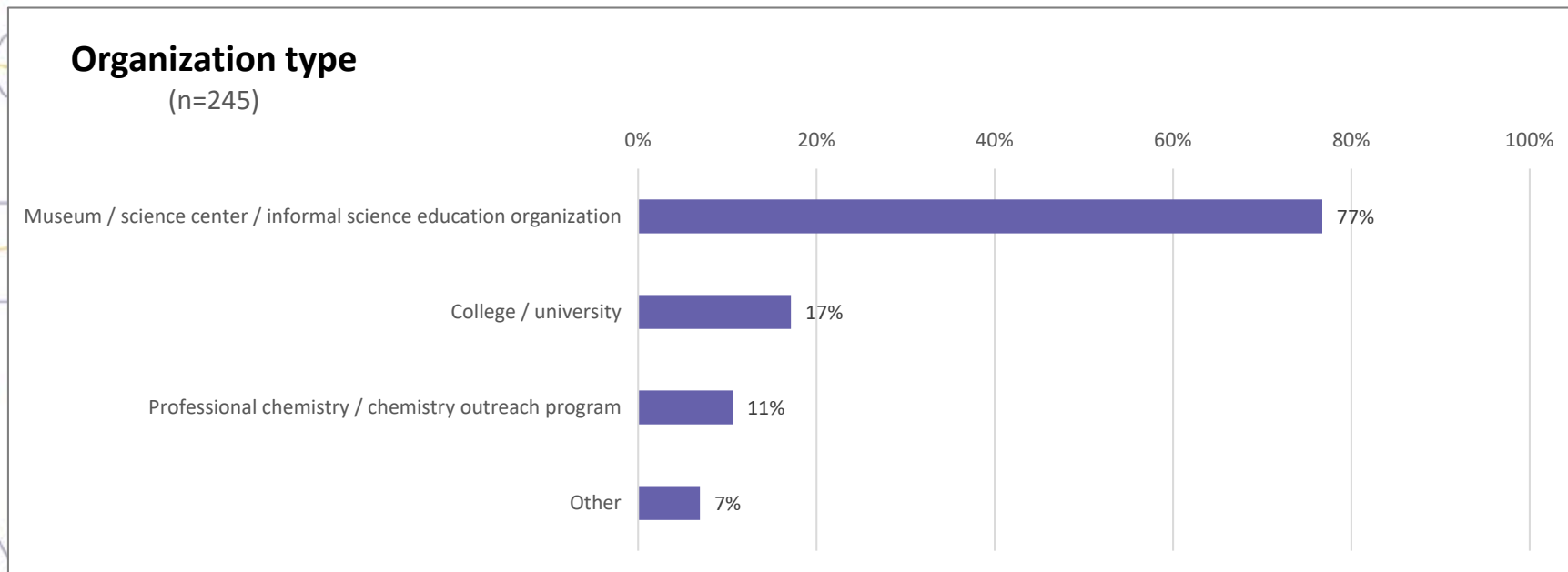


Children's Creativity Museum, San Francisco



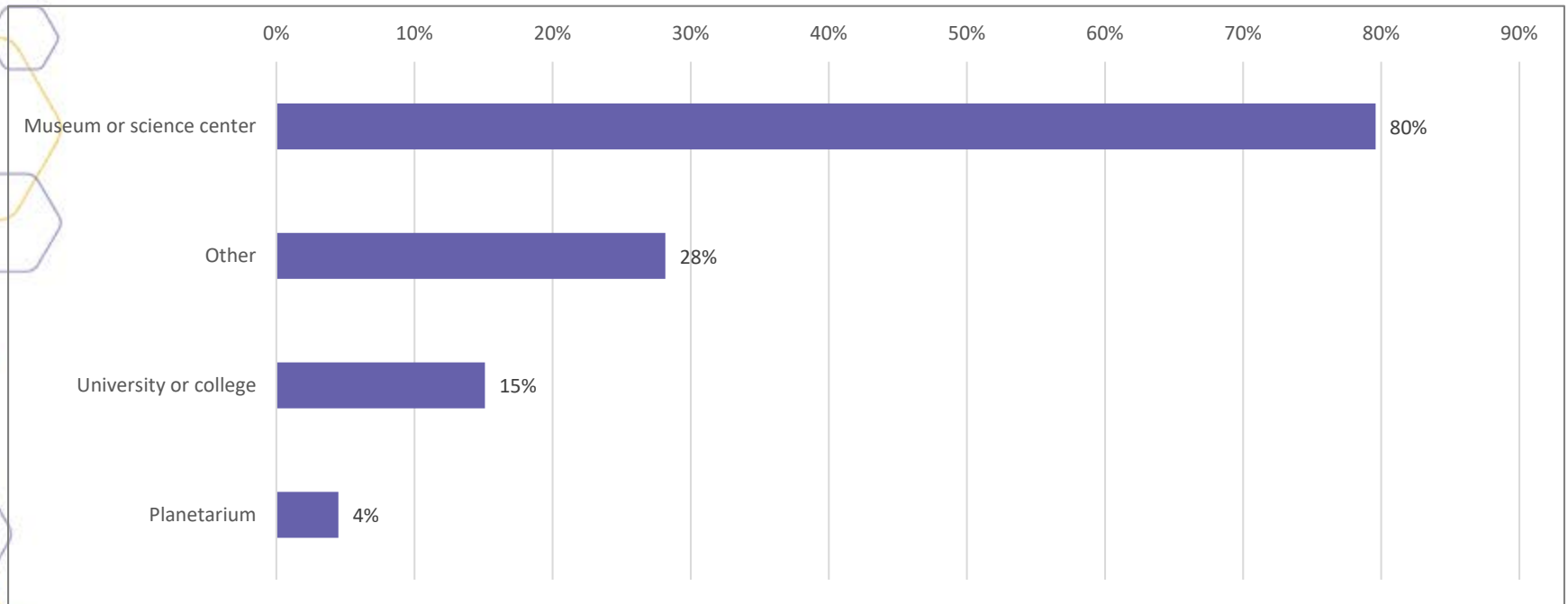
Sciencenter, Ithaca NY

Kit recipients



- Museums included science centers (51%) and children's museums (49%)
- Chemistry organizations included ACS local sections (12%), chemistry departments/outreach groups at colleges and universities (9%), and ACS student chapters (8%)

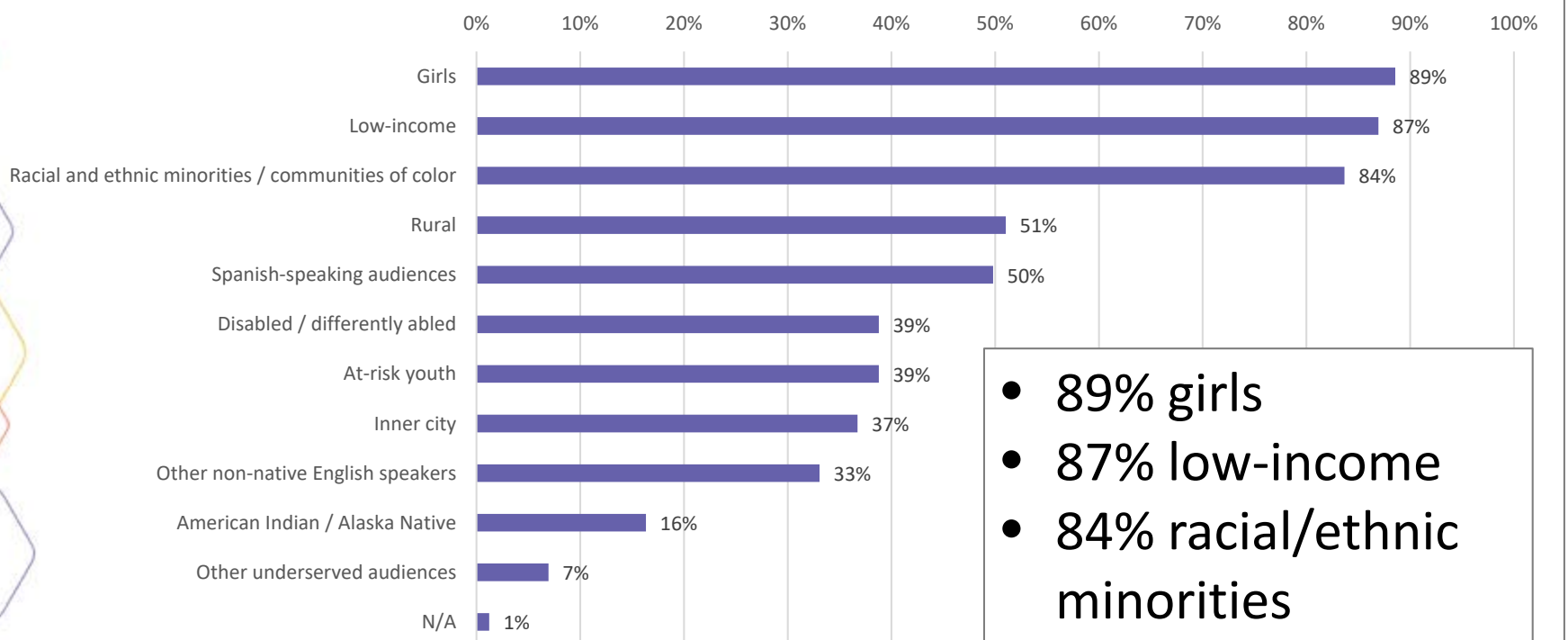
Event location



- 80% Museums and science centers
- 28% other (e.g. libraries, K-12 schools, camps and afterschool)
- 15% Universities and colleges
- 4% planetariums

Event participants

- **210,526 people** participated in events held Oct–Nov 2018
- **6,121 volunteers** facilitated hands-on activities
- Many partners continue to use their kits in other programming



Collaborations



Collaborations reported by kit recipients:

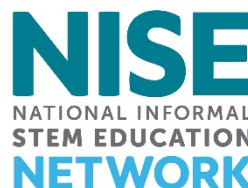
- 69% reported using their activities during National Chemistry Week, October 21–27, 2018
- 40% reported working with ACS volunteers for their events: ACS local sections, student chapters
- 30% reported collaborating with a museum or an ACS group

Findings overview from the ChemAttitudes design-based research

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Allison Anderson, aanderson@mos.org

Owen Weitzman, owitzman@mos.org



**EXPLORE
SCIENCE**



Museum of Science.

Research Team Members

Museum of Science

Liz Kollmann (Co-PI)

Allison Anderson

Marta Beyer

Owen Weitzman

Science Museum of Minnesota

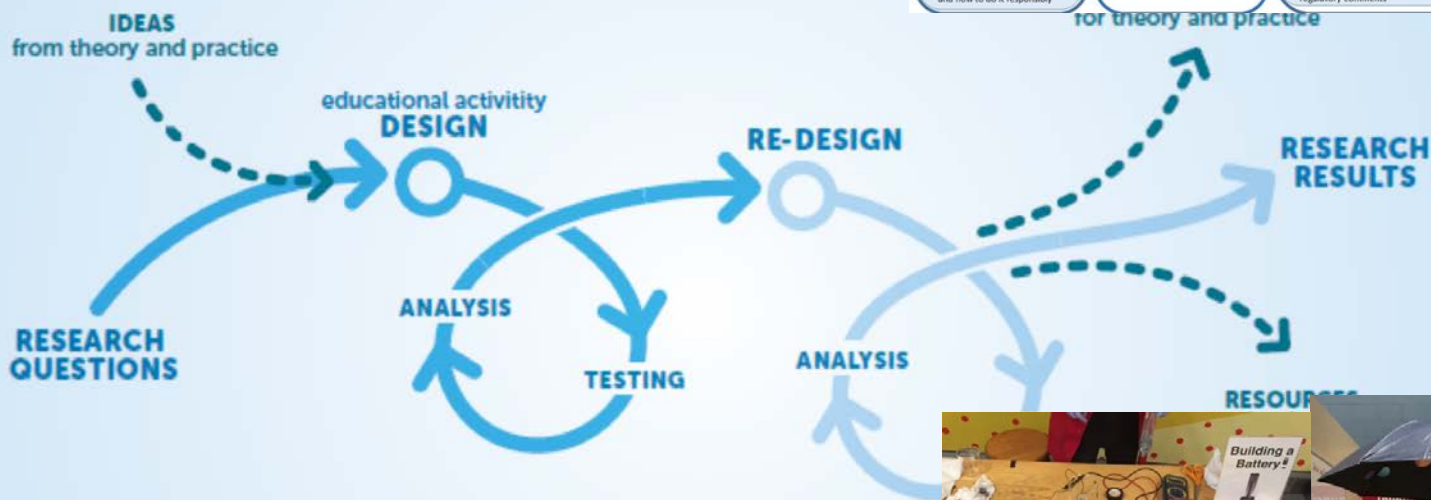
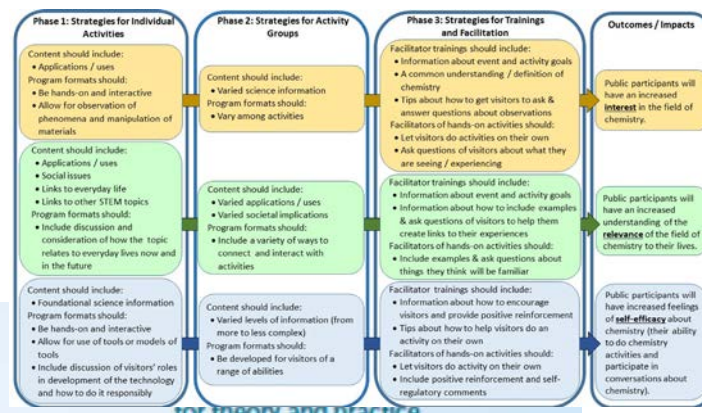
Marjorie Bequette

Gretchen Haupt

Nikki Lewis

Hever Velazquez

Design-based research



Design-based research focuses on learning in a real-life setting. Design experiments are based on previous theory and practice. They often go through multiple cycles of design, testing, analysis, and improvement. In the end, the process can result in new theories, practices, and educational materials that can be used by others.





Research questions

How should hands-on activities, events, and trainings be designed to increase visitors' positive attitudes about interest in, relevance of, and self-efficacy around chemistry?

- How does activity **content** affect visitor attitudes about chemistry?
- How does activity **format** affect visitor attitudes about chemistry?
- How does activity **facilitation** affect visitor attitudes about chemistry?

Data collection methods

	2016			2017							2018								2019																	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Activity testing & development																																				
Event facilitator survey																																				

Activity Testing and Development with museum visitors

- Paired interviews & observations (n=274)
- Videotapes (n=44)



National Chemistry Week Events facilitator feedback

- Follow up online survey (n=254)



The background of the slide is white and features several decorative hexagonal outlines. These hexagons are drawn with thin lines in three colors: yellow, purple, and red. They are scattered across the slide, with some appearing as simple outlines and others as more complex, overlapping shapes. For example, in the top left, there is a large yellow hexagon with a smaller purple one partially overlapping it. In the top right, a large yellow hexagon is partially cut off by the edge, with a small purple one below it. The bottom left has a yellow hexagon with a small red one above it and a purple one below it. The bottom right features a purple hexagon, a yellow one, and a small red one. The central text 'Content and Format Findings' is written in a large, black, sans-serif font.

Content and Format Findings

Design criteria for **Interest** in the theoretical framework

Content should include:

- Applications / uses
- Chemistry concepts*
- Connections to everyday life*
- Connections across other STEM topics*

Program formats should:

- Be hands-on and interactive
- Allow for observation of phenomena
- Allow for experimenting with variables
- Allow for use of tools and materials*
- Evoke familiar experiences*

Outcomes

Public participants will have an increased **interest** in the field of chemistry.

*= strategies emerging from the interviews

Design criteria for **Relevance** in the theoretical framework

Content should include:

- Applications / uses
- Connections to everyday life
- Connections across STEM topics
- Societal issues
- Chemistry concepts*

Program formats should:

- Evoke familiar experiences
- Allow for use of tools and materials*
- Involve observation of phenomena*

Outcomes

Public participants will have an increased understanding of the **relevance** of the field of chemistry to their lives.

*= strategies emerging from the interviews

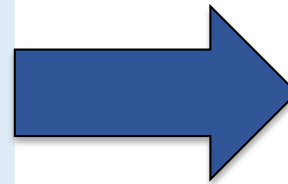
Design criteria for **Self-efficacy** in the theoretical framework

Content should include:

- Chemistry concepts
- Connections to everyday life*

Program formats should:

- Be hands-on and interactive
- Allow for use of tools and materials
- Be simple to do and easy to understand*
- Evoke familiar experiences*
- Allow for observation of phenomena*
- Allow for experimenting with variables*



Outcomes

Public participants will have increased feelings of **self-efficacy** about chemistry (their ability to do chemistry activities and participate in conversations about chemistry).

*= strategies emerging from the interviews

How does content and format affect visitor attitudes?



- Visitors felt that:
 - Both **content** and **format** supported increasing **interest**
 - **Content** was important for increasing **relevance**
 - **Format** was key for increasing **self-efficacy**
- Facilitators perceive **format** as **more important than content** for supporting interest, relevance, and self-efficacy



Implications and considerations

- Our team considered these ideas when **designing the Let's Do Chemistry kit**
- **You can use these findings** when creating the content and format of your educational products
- **Facilitators might need support in understanding the role that content and format can play** in increasing visitor interest, relevance, and self-efficacy




The background of the slide is white and decorated with several thin, hollow hexagonal outlines. These hexagons are arranged in a scattered pattern around the central text. They come in three colors: yellow, purple, and red. Some hexagons are large, while others are small. Some are positioned such that they overlap with each other. The overall effect is a modern, geometric, and minimalist design.

Facilitation Findings

Facilitation strategies



- Invite Participation
 - Techniques that initiate visitor engagement or participation
- Support Exploration
 - Techniques that maintain visitor engagement in the process of participating in or “moving through” the activity
- Deepen Understanding
 - Techniques that encourage and support meaning-making

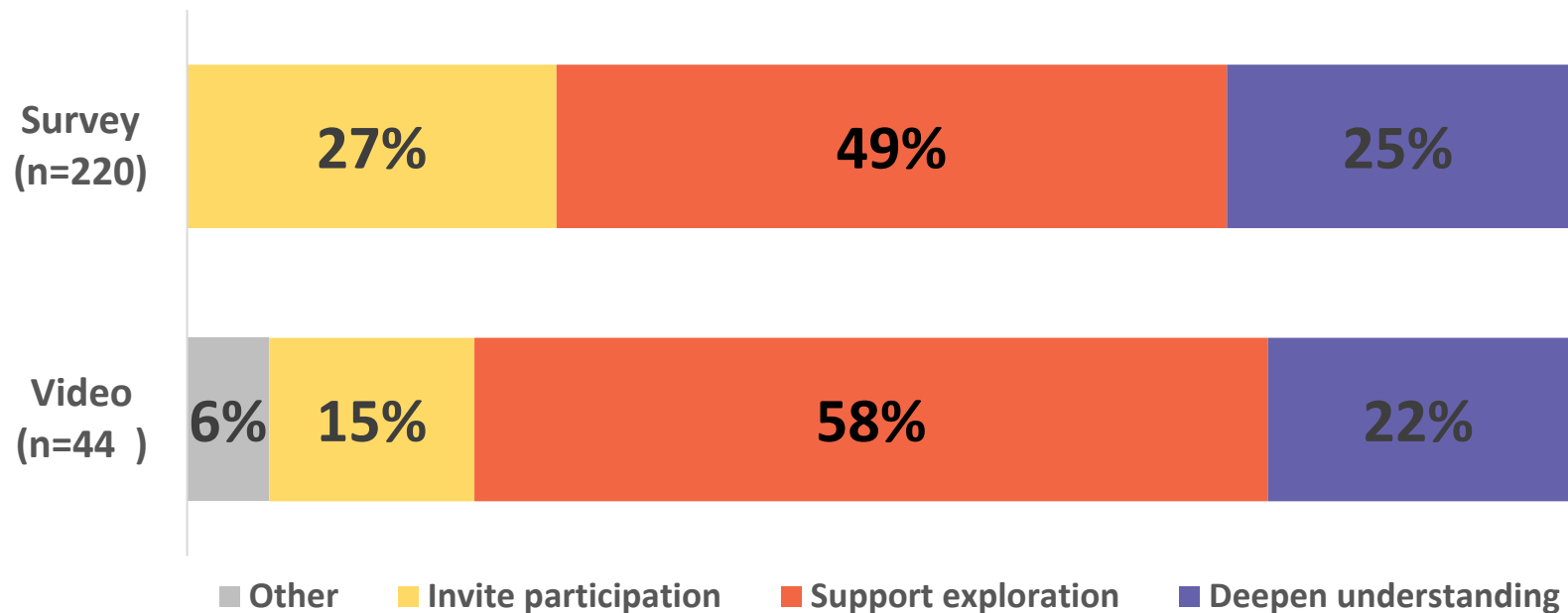
A decorative pattern of overlapping hexagons in red, yellow, and blue outlines is located on the left side of the slide.

What does facilitation
look like?

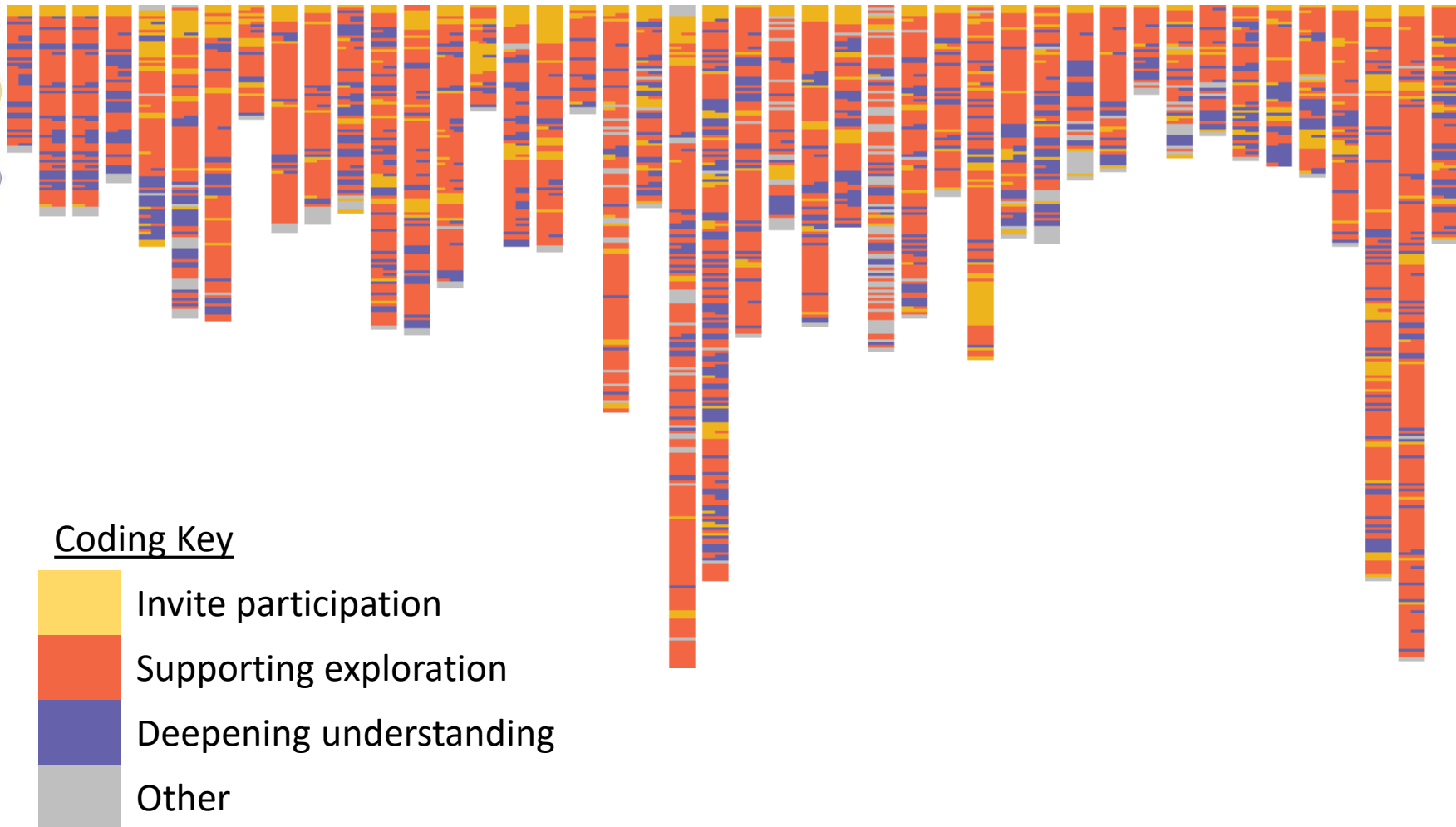
How often are the different facilitation strategies used?



Distribution of estimated time in each facilitation move



When during the activities does each facilitation strategy occur?





What did Invite Participation look like?

- **Invite Participation** includes techniques that initiate visitor engagement or participation.

Invite Participation Facilitation Techniques
A. Providing an introduction or activity overview
B. Giving broad directions or modeling the use of tools
C. Building rapport with participants
D. Learning about participants' prior experiences or understandings of chemistry
E. Encouraging all group members to participate and/or re-engage when attention waned
F. Transitioning between different portions of an activity or pursuing a new goal
G. Giving visitors the option to stop but the encouragement to stay
H. Spark (other)

Overall findings

- Techniques varied widely and generally happened rarely
- There was always an introduction or an activity overview



What did Support Exploration look like?

- **Support Exploration** includes techniques that maintain visitor engagement in the process of participating in or “moving through” the activity.

Support Exploration Facilitation Techniques
I. Maintaining momentum: Offering positive reinforcement
J. Maintaining momentum: basic information or vocabulary
K. Maintaining momentum: Step-by-step instructions
L. Supporting inquiry: asking participants to make observations and predictions
M. Supporting inquiry: encouraging iteration and continued experimentation
N. Sustain (Other)

Overall findings

- Positive reinforcement was used commonly across all cases
- All of the other techniques were used a fair amount as well

What did Deepen Understanding look like?



- **Deepen Understanding** includes techniques that encourage and support meaning-making.

Deepen Understanding Facilitation Techniques
O. Providing information to help participants understand why or how something is happening
P. Providing supplemental information to enhance the participant's knowledge or to make connections outside the activity
Q. Supporting meaning making by encouraging participants to apply something they learned during the activity
R. Supporting meaning making by encouraging participants to explain why or how something is happening
S. Deepen (other)

Overall findings

- Facilitators frequently use the technique of “providing supplemental information to enhance the participant’s knowledge or to make connections outside the activity.”



Implications and considerations

- Facilitators will **use a variety of techniques when inviting participation** and should make sure to include an activity introduction.
- Facilitators will **likely spend a majority of their time supporting exploration** and should use positive reinforcement.
- Facilitators will **spend some of their time deepening visitors' understandings**, and as a part of this facilitation, should provide supplemental information as a way to enhance knowledge or make connections outside the activity.

A decorative pattern of overlapping hexagons in red, yellow, and blue outlines is located on the left side of the slide.

What is the relationship
between facilitation and interest,
relevance, and self-efficacy?



Possible relationships between facilitation and visitors' attitudes

- The data suggest that:
 - **Deepening understanding** moves may increase visitor understandings of relevance, and that **providing supplemental information** is especially helpful
 - **Supporting exploration** moves may increase visitor self-efficacy, and that encouraging visitors to **explain how or why something is happening** is important
 - Discussion about **visitors' prior experiences and knowledge** may also be helpful to increasing relevance and self-efficacy

Ways ACS is Implementing the *Let's Do Chemistry* Framework

Patti Galvan

Program Manager, Science Outreach

ACS and *Let's Do Chemistry*

1. Activity Write-Ups
2. Hands-On Science Events
3. Training/Workshops



EXPLORE SCIENCE
Let's Do Chemistry

Activity Write-Ups



M&Ms in Water

Place one drop of food coloring in a cup of room-temperature water. Let random molecular motion do its thing. Kids' observations moving support a fundamental idea in chemistry—water molecules are always in motion. Explore this idea further with the question: what will happen if M&Ms are placed in a plate of water?

Key chemistry concept
 Water molecules are always in motion.

What you'll need

- 4 small plastic cups of M&Ms, 2 cups blue and 2 cups yellow
- 4 squirt bottles water
- 4 petri dishes or small white dessert plates
- 4 50 mL graduated cylinders
- 4 food coloring bottles
- 1 bucket
- 400 paper towels

Be safe

Wear goggles for this activity. Make sure to label reagents.

Prepare the demonstrations

1. Label 4 clear plastic cups **water**. Fill each cup about 2/3 full. Keep these near the activity facilitators.
2. Place one bottle of food coloring near the graduated cylinder of water and one drop of food coloring in the demonstration.
3. Use a squirt bottle to completely cover the bottom of a petri dish with water. Place one M&M in the center of the dish and leave it. You will need to refresh this every 30 minutes or so.

Prepare for the activity

1. Place 4 petri dishes across the front of the table for students.
2. Label 4 clear plastic cups **M&Ms**. Half-fill each cup with water. Place a stack of paper towels near the cups.

www.acs.org/kidszone
 ACS Kids Zone Outreach Activity



Invite participation

Watch what happens when I add one drop of color to the water.

- Hold the graduated cylinder up for all to see. Do the color move? Explain that in this graduated cylinder the color is moving and sliding past each other.
- Explain that gravity is pulling down on the food coloring. As the food coloring moves toward the bottom of the graduated cylinder, water molecules bump into the color and push it around. The color moves and mix in the water. It will take a while, but eventually the water will be evenly colored throughout.

Support exploration

1. Show students one M&M that has been sitting in water for at least 5 minutes. Explain that the color and sugar coating the color shows us how sugar moves in the plate. The little water and sinks to the bottom of the plate. The regular water out of the way. More dissolves, pushing the sugar and color enough that it spreads evenly. There is a circle of color around the M&M. Eventually, the sugar and color enough that it spreads evenly.
2. Have students use a wash bottle to completely cover the bottom of the petri dish with water. The amount of water needs to be just enough that only the bottom of the M&M is submerged.
3. Have each child select one blue and one yellow M&M. Place one M&M in the center of the dish and leave it. Plate of water at the same time about one inch apart.
4. **Ask:** what do we normally do when we want to dissolve something? **Answer:** we might shake it, stir it, or even heat it. It's interesting because we are not going to shake or stir it. What happens with the normal movement of molecules?
5. Watch and wait. At first, the sugary water spreads. It comes to another area of sugary water, neither dissolves. So the colorful solutions stack up next to each other. A line.
6. **Ask:** do you think the colors will eventually mix? **Answer:** They will! But the random way molecules move, so, if left alone, it would take hours before the colors mix.
7. **Ask:** what other arrangements of M&Ms would you like to see? If there is time, empty and reset the dishes.

www.acs.org/kidszone
 ACS Kids Zone Outreach Activity



8. After each child is finished exploring, empty the water and M&Ms into the bucket. Then wipe each dish with a paper towel to remove any residual color and sugar. Reuse the paper towels as much as possible.

Deepen understanding

- Even when water appears still, water molecules are in motion. In fact, they are even moving a bit when frozen as ice. In liquid water, the molecules move past each other. When water is frozen, the molecules can't slide past each other so they stay in position and shake back and forth. Fun fact: the higher the temperature, the faster the molecules move.
- The sugar solution that is made when a little bit of the coating of an M&M dissolves in water is heavier (more dense) than regular water, so it sinks to the bottom of the water.

Clean and pack after the activity

- ✓ Dispose of any M&Ms leftover in the clear plastic cups. Make sure the bags of M&Ms are sealed and place them back in the bin.
- ✓ Empty clear plastic cups and petri dishes, and wipe with a paper towel. Return the petri dishes and cups to the bin for reuse.
- ✓ Place used paper towels in the nearest trash receptacle.
- ✓ Pour bucket of water down a sink. Use a paper towel to retrieve used M&Ms and place them in the solid trash.
- ✓ Dispose of the plastic tablecloth.
- ✓ Deliver the table sign and closed bin to the entrance table.
- ✓ Return borrowed goggles to the exit table.

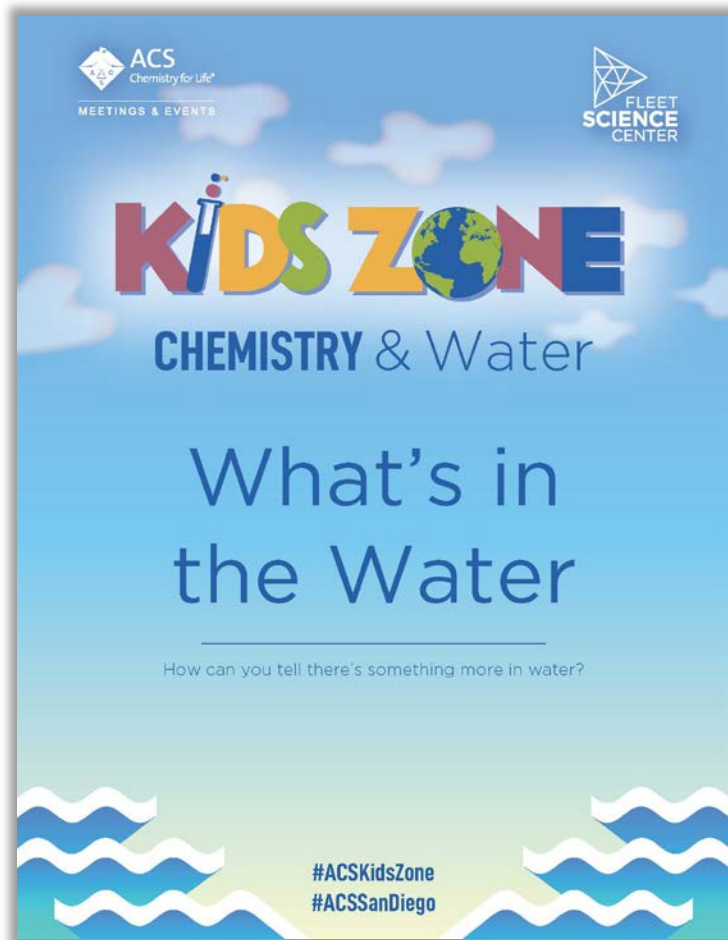
www.acs.org/kidszone
 ACS Kids Zone Outreach Activity

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 M&Ms in Water, Page 3

Hands-On Science Events



Kids Zones



Training/Workshops



OUTREACH TRAINING PROGRAM



The ACS Outreach Training Program (OTP) is designed to help ACS members passionate about science outreach fully maximize Society resources through in-person workshops or an online course. Let ACS help you get started in community outreach or help prepare you for your next big event!

What You Will Learn

- Introduction and History of ACS Outreach
- Event Planning and Fundraising
- Safety in Outreach Settings
- Communicating through Hands-On Activities
- Leading Volunteers
- Marketing and Partnerships
- Monitoring and Sustaining Success

Visit us online at acs.org/otp for additional information and to enroll today!



Leverage ACS resources and *Let's Do Chemistry* for National Chemistry Week 2019

David C. Horwitz

Program Manager, Science Outreach



NCW Background

- Celebrated annually during the fourth week of October
- National Chemistry Week (NCW) unites ACS local sections, student chapters, technical divisions, businesses, schools, and science enthusiasts in communicating the importance of chemistry to the public at the local, national, and global levels to make a positive change in the public's impression of chemistry.



NCW Reach

- NCW 2017
 - 81% of ACS local sections participated
 - 163K+ issues of the *Celebrating Chemistry* were distributed
- NCW 2018
 - 91% of ACS local sections participated
 - 167K+ issues of the *Celebrating Chemistry* were distributed
 - ACS local sections interacted with more than 75K+ people at in-person events
 - NCW reached more than 25M+ online



NCW Collaborations



The New York Local Section teams up with the New York Hall of Science, and 19 universities and nonprofit organizations, to host an annual NCW event for 1,200 attendees

NCW Collaborations



The Northeast Tennessee Local Section works with Eastman Chemical to provide 1,400 students a day of chemistry

NCW Collaborations



The Puget Sound Local Section teams up a local ACS student chapter to visit 23 middle school classrooms

NCW Collaborations




The Permian Basin Local Section works with three ACS high school ChemClubs to host tables of activities at the local mall and during the annual homecoming float parade

NCW Resources

NCW Coordinator Lookup Platform

[ACS](#) [Publications](#) [C&EN](#) [CAS](#) [Log In](#)



National Chemistry Week Coordinator Lookup

[American Chemical Society](#) » National Chemistry Week Coordinator Lookup

National Chemistry Week

Coordinator Lookup

You can find National Chemistry Week Coordinators in a local section by entering either your state or a 5-digit zip code.

☒ Search by Zip Code
☐ Search by State

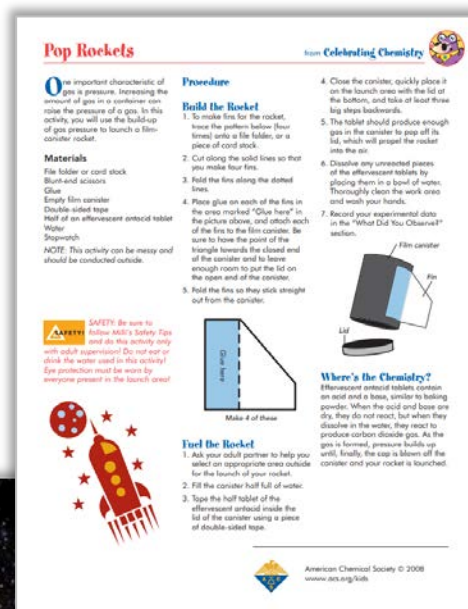
Zip Code:

www.ncwlookup.acs.org



NCW Resources

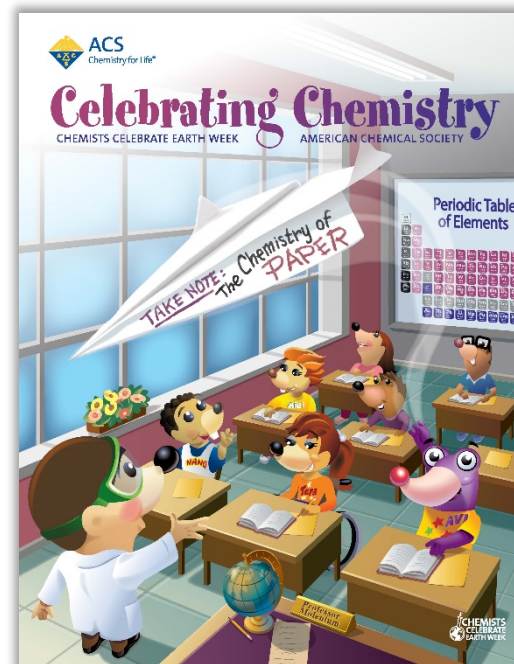
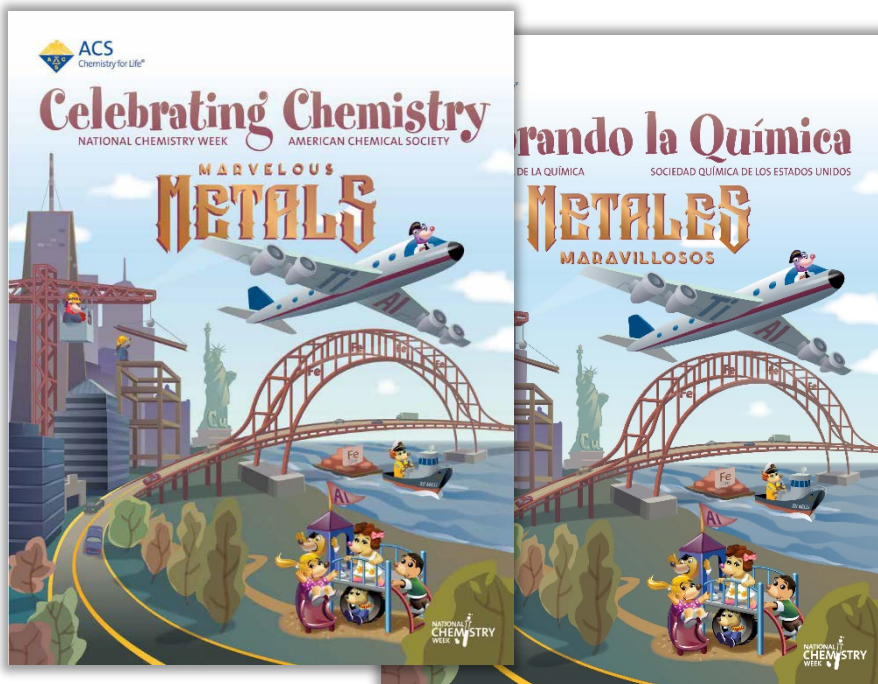
Educational Resources



www.acs.org/ncw

NCW Resources

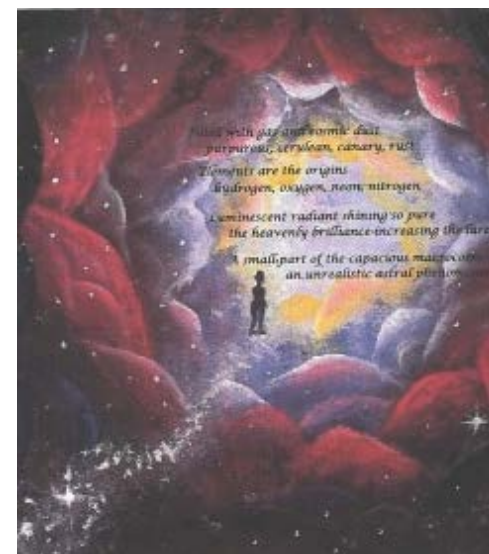
Digital Celebrating Chemistry



www.acs.org/celebratingchemistry

NCW Resources

Illustrated Poem Contest



www.acs.org/ncw

Promotional Items

Three balloons are shown against a white background. The blue balloon on the left features the ACS logo (a diamond shape with 'A', 'C', 'S' inside) and the text 'ACS' in large letters, 'Chemistry for Life' in smaller letters below it, and 'AMERICAN CHEMICAL SOCIETY' at the bottom. The yellow balloon in the background has 'NATIONAL CHEMISTRY WEEK' and a stylized '150' with a flame. The red balloon on the right has 'NATIONAL CHEMISTRY WEEK' and a large stylized '150' with a flame.

www.store.acs.org



NCW Resources

Design Toolkit

Social Media

- #NCW
- #NationalChemistryWeek
- Marvelous Metals
- Twitter - @ACS_NCW
- Facebook - National Chemistry Week



www.acs.org/ncw



Are you planning a chemistry event during National Chemistry Week 2019?



NCW Resources

Find an Event



National Chemistry Week
Liked 8.2K likes

- OCT 12 Science Saturday 2019: Marvelous Metals**
Sat 9 AM · Valdosta State University · Valdosta, GA
72 people interested
- OCT 20 National Chemistry Week 2019**
Oct 20 - Oct 26 · Everywhere
You like National Chemistry Week [Tickets](#)
- OCT 20 National Chemistry Week**
Oct 20 - Oct 26 · Roane State Chemical Society · Oak Ridge, TN
Party
- OCT 20 National Chemistry Week**
Sun 11 AM · New York Local Section of the American Chemical So...
Causes
- OCT 24 National Chemistry Week: Marvelous Metals**
Thu 7 PM · Chagrin Falls Branch Library · Chagrin Falls, OH
1 person going
- OCT 25 National Chemistry Weekend with America...**
Oct 25 - Oct 26 · Cincinnati Museum Center · Cincinnati, OH
82 people interested [Tickets](#)
- OCT 26 Midland ACS Fall Scientific Meeting- Marvel...**
Sat 8 AM · The Conference Center at Saginaw Valley ...
2 people interested [Tickets](#)
- OCT 26 National Chemistry Week: Marvelous Metals**
Sat 3 PM · Gates Mills Branch Library · Gates Mills, OH
1 person going

Already planned your event?

Promote your NCW event on our Facebook events page!

Paste your Facebook event link here

Submit



Check for
local events
in your area!

[View all Events](#)


www.acs.org/ncw



Thank You!

NCW 2019 – October 20-26
Questions? Contact outreach@acs.org

MARVELOUS
METALS
OCTOBER 20-26, 2019

NATIONAL
CHEMISTRY
WEEK 



Let's Do Chemistry: National Chemistry Week!



National Chemistry Week @ACS_NCW - 23 Oct 2018
Thanks to @airandspace and our volunteer chemists who taught over 320 people about the importance of #chemistry through 8 engaging hands-on experiments!
#NationalChemistryWeek @AmerChemSociety - at National Air and Space Museum

NISE
NATIONAL INFORMAL
STEM EDUCATION
NETWORK



NATIONAL
CHEMISTRY
WEEK



ACS
Chemistry for Life®

Share



National Chemistry Week

National Chemistry Week is a community based program of the American Chemical Society (ACS). This annual event unites ACS local sections, businesses, schools, and individuals in communicating the importance of chemistry to our quality of life.



ACS members and NISE Network partners are encouraged to seek out local partners to carry out National Chemistry Week events. NISE Net is sharing a list of partner institutions that have held NanoDay events as a starting point for all ACS members. NISE Net participants can start their search for partners on the ACS page by following the links below.

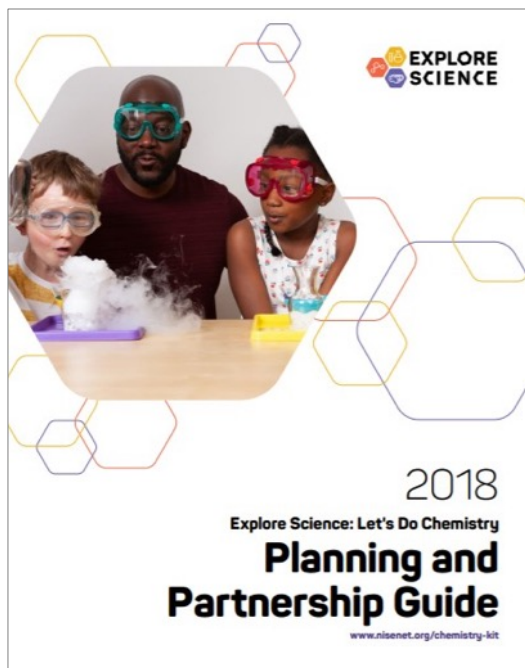


Volunteer and Event Coordinator Resources

- ACS National Chemistry Week website: www.acs.org/ncw - How to get involved
- Find resources for planning a hands-on science event - Find information on planning, fundraising, promoting events, and more
- Find educational content and resources aligned to the yearly NCW theme
- Utilize the Design Toolkit resources to brand your event and align with the NCW campaign
- Reactions: Everyday Chemistry videos and infographics
- Finding American Chemical Society (ACS) potential collaborators
 - Find a National Chemistry Week event in your area
 - Find a National Chemistry Week Coordinator in your area
 - ACS local sections
 - ACS student chapters
- Finding NISE Network potential collaborators
 - List of NISE Network partners

www.nisenet.org/national-chemistry-week

Event Planning and Partnerships Guide



Event Planning and Partnership Guide

<http://nisenet.org/catalog/explore-science-lets-do-chemistry-event-planning-and-promotion-guide>
Guide covers:

- Planning timeline
- National Chemistry Week
- Collaborations and finding local experts
- Training staff and volunteers
- Additional resources
- Evaluating your event
- Promotional and marketing materials

NATIONAL CHEMISTRY
WEEK

October 21-27, 2018



About National Chemistry Week

National Chemistry Week (NCW) is an annual event that has been coordinated by the American Chemical Society (ACS) for over 30 years. NCW occurs the third week of October and coincides with Mole Day on October 23—a reference to *Avogadro's number*. Tens of thousands of volunteers around the country participate every year, including in all 50 states, Puerto Rico, and the District of Columbia. The dates for NCW in 2018 are October 21-27. Although not required, we strongly encourage collaboration between museums, local chemists, and chemistry students to support the American Chemical Society's National Chemistry Week and similar events this year and into the future.

You can learn more about NCW in this NISE Network blog post by ACS's Office of Science Outreach Manager, Lily Raines, <http://www.nisenet.org/blog/post/partner-highlight-outcomes-american-chemical-societys-2017-national-chemistry-week>.

For digital and material resources to celebrate NCW or to get involved, visit <http://www.acs.org/ncw>.

Additional resources:

- NISE Network National Chemistry Week links and resources

Tips for hosting a National Chemistry Week Event

Plan ahead. Communication and planning is a key element of a successful event. You can find collaborators, secure local sponsorships or event funding, and coordinate regional activities by reaching out early to share your plans and goals. Invite partners to contribute their own program ideas or demos, and share your own!

Work together. Partner with local or regional informal science institutions, universities, colleges, industry, chemistry clubs, or other enthusiasts to host your event. Partner organizations will be useful in providing program resources (like glassware or special reagents), safety and disposal of materials, space, and most importantly staff and volunteer facilitators.

You can go big or small. There's no required size or format for a NCW event. Your event might start off small and could grow into something much larger over time. Many locations choose to keep it simple. For example, try taking a few activities out for a couple hours a day throughout the week. Or go big, and focus your efforts on a larger weekend festival or multiple events over the course of the week.

Get creative. Incorporate chemistry into other ongoing activities or events. Celebrations include programming at science cafes, science festivals, STEM events, regional fairs, and many other settings. NCW activities can pair up well with seasonal celebrations, such as Halloween. Or you can include chemistry activities alongside other STEM related programming and events, especially as it relates to the yearly theme.

Other Opportunities for Using the Let's Do Chemistry Kit at ACS-affiliated Events

Chemists Celebrate Earth Week: ACS also coordinates a national Chemists Celebrate Earth Week

NISE NATIONAL INFORMAL
STEM EDUCATION
NETWORK



Sunday, October 13 | 11:00 am – 3:00 pm



National Chemistry Week 2019: Marvelous Metals

Celebrate National Chemistry Week at the Museum of Science! Participate in engaging hands-on activities all about the chemistry of metals facilitated by guest educators from local colleges, universities, and organizations. And be sure to check out the special demonstrations from world-famous chemistry professor Dr. Bassam Shakhashiri.

Hands-on activities are held from 11:00 am to 3:00 pm in the Blue Wing, Lower Level. Professor Shakhashiri's

Public Event

Free with Exhibit Halls admission. Purchase Exhibit Halls tickets:

Sunday, October 13, 2019

Adult (12+)

- 0 +

Adult \$26.00

Child (3 - 11)

- 0 +

Child \$21.00

Senior (60+)

- 0 +

Senior \$22.00



Applying the Let's Do Chemistry Learning Framework to New Activities



Interest



Relevance



Self-efficacy

Emily Hostetler
Forum Education Associate II
Museum of Science, Boston

Selecting Activities

1. Consider IRS on a surface level
2. Review & select activities based on IRS design strategies
3. Amend activities as needed
4. Create facilitation guide
5. Test!

Design strategies for interest

Chemistry content →	Activity format and structure →	Public learning outcome
Chemistry concepts Connections to everyday life Applications and uses of chemistry Connections across other STEM topics	Hands-on and interactive Observation of phenomena Use of tools and materials Experimentation with variables Familiar experiences	Increased interest in the field of chemistry

Design strategies for relevance

Chemistry content →	Activity format and structure →	Public learning outcome
Connections to everyday life Applications and uses of chemistry Chemistry concepts Connections across other STEM topics Connections to societal issues	Familiar experiences Use of tools and materials Observation of phenomena	Increased understanding of the relevance of chemistry to their lives

Design strategies for self-efficacy

Chemistry content →	Activity format and structure →	Public learning outcome
Chemistry concepts Connections to everyday life Experimentation with variables	Hands-on and interactive Simple to do and easy to understand Use of tools and materials Evoke familiar experiences Observation of phenomena	Increased feelings of self-efficacy about chemistry

Testing Activities

- 2hrs on floor per activity
- 6 - 9 interviews per activity
- Used data collection instruments provided by MOS Research & Evaluation Team
- General Museum audience, participants were ~4 - 14yrs

Collector Initials	Date	Activity	Group #	Open-ended		Open-ended
				What do you think the museum wanted you to learn about in this activity?	Learning Themes & Framework Strategies	Was anything about the activity confusing or hard to understand?
ETH	8/28/19	Etching	1	How it changes. How beautiful it is (the experiment).	Change (general), beautiful	no
ETH	8/28/19	Etching	2	How reactions can change colors. Just like a penny. The penny looks a little bit like this color (points to shiny) then it changes to this color (points to dull).	Change (color)	no
ETH	8/28/19	Etching	3	You can change copper into a different color.	Change (color)	no
ETH	8/28/19	Etching	4	Saltwater corrodes copper (adult's response)	Chemical Reaction	no
ETH	8/28/19	Etching	5	Copper. If you dip copper in saltwater a long time later it will turn brown (or green).	Chemical Reaction	no
ETH	8/28/19	Etching	6	About copper and chemical reactions	Chemical Reaction	no
ETH	8/28/19	Etching	7	Learned about this before the experiment	Other	no
ETH	8/28/19	Etching	8	How to make stuff change	Change (general)	how to make it change that color (participant struggled to get the color to change/notice the change)
ETH	8/28/19	Etching	9	Overtime things change	Change (general)	how it changed

Electrical Metal Etching

Can you make your mark in metal? Using chemistry and electricity, create a design by instantly corroding metal!

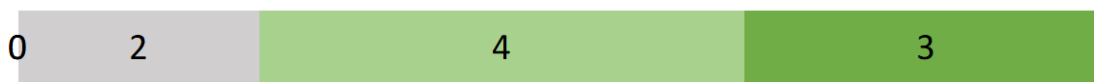
Framework Goal: Interest

Strategies Observed

Observation of phenomena	3
Applications and uses of chemistry	2
Other	2
Hands-on and interactive	1
Beautiful	1



Visitor change in interest



■ Much less ■ A little less ■ No change ■ A little more ■ A lot more

Is There Iron in Your Cereal?

Is there iron in cereal? In this activity, visitors will use a strong magnet to extract iron from iron-fortified breakfast cereal.

Framework Goal: Relevance

Strategies Observed

Connections to everyday life	2
Chemistry concepts	2
Applications and uses of chemistry	1



Visitor change in relevance



■ Much less ■ A little less ■ No change ■ A little more ■ A lot more

Can it Conduct? Make Your Own Circuit!

Do all metals conduct electricity? In this activity, visitors will experiment with various types of metals to complete a circuit and make a lightbulb light up, or a buzzer buzz!

Framework Goal: Self Efficacy

Strategies Observed

Chemistry concepts	2
Simple to do and easy to understand	1
Use of tools and materials	1
Hands-on and interactive	1
Fun	1
Other	1



Visitor change in self-efficacy
(understanding chemistry)



Visitor change in self-efficacy
(doing a similar activity)



Visitor change in self-efficacy
(talking to others)



■ Much less ■ A little less ■ No change ■ A little more ■ A lot more

Questions?

PROFESSIONAL DEVELOPMENT

Upcoming Online Workshops



Empowering Girls in Science Through Growth Mindset and the New Girl Scout Space Science Badges

Tuesday, October 8, 2019

2pm-3pm Eastern / 11am-12pm Pacific

Online Workshop: Programming for Audiences with Special Needs

Tuesday, November 19, 2019

2pm-3pm Eastern / 11am-12pm Pacific

Learn more at nisenet.org/events

NISE Net & Upcoming Conferences



ASTC 2019 Conference, hosted by Ontario Science Center
September 21-24, 2019 in Ontario, CA

- Booth in Exhibit Hall
- Sessions
- Partner Happy Hour and Breakfast

<https://www.nisenet.org/events/astc/astc-annual-conference-2019>



2019 Great Lakes Planetarium Association (GLPA) Conference

October 23-26, 2019 in Toledo, OH

- Booth in Exhibit Hall
- Come say hi!

<https://glpa.org/2019>

Get Involved

Learn more and access the
NISE Network's online digital resources
nisenet.org

Subscribe to the monthly newsletter
nisenet.org/newsletter



Follow NISE Net on social networking
nisenet.org/social



Explore Science: Let's Do Chemistry Promo Videos

Let's Do Chemistry promo videos (15 and 30 seconds, and 3 minutes)

<https://www.nisenet.org/catalog/explore-science-lets-do-chemistry-promo-video>



Thank You

