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# Understanding Facilitation Techniques for Hands-On Chemistry Activities

Elizabeth Kunz Kollmann, Allison Anderson, Marta Beyer, Hever Velázquez, Marjorie Bequette, Gretchen Haupt and Owen Weitzman

**ABSTRACT**

Educators play a key role in facilitating interactive learning experiences in informal science education settings, such as science centers and museums. Despite their importance, research around facilitation has generally focused on visitor impacts and not the strategies used by the educators themselves. The *ChemAttitudes* project studied and characterized facilitation moves used by educators during hands-on chemistry activities with visitors at two science museums. Building on previous research done by the Exploratorium, the project team defined a framework of three overarching categories of facilitation techniques: "Invite participation," "Support exploration," and "Deepen understanding." (referenced in short form as "Invite," "Support," and "Deepen"). Each of these categories also included distinct facilitation moves that educators used throughout an interaction with visitors. Overall, data indicated that educators used Support moves most often, Deepen moves less frequently, and Invite moves the least. Although educators almost always started an interaction with Invite, afterwards, they moved flexibly back and forth between the three types of moves in a non-linear order in response to the visitors. The framework and findings from this project can be used to support training and professional development for other informal educators using hands-on activities with visitors.

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## Educator facilitation in museums

The visitor experience has been a primary focus in modern science centers and museums. This focus has pushed institutions towards offering a variety of hands-on or interactive learning experiences, including interactive exhibits and cart activities.[1] Facilitated activities can be built into an exhibition, set up temporarily in a museum as a pop-up or cart activity, or used as part of an outreach event, all of which represent a range of approaches to facilitation in a museum setting.[2] While these activities cover a variety of topics, an important connecting thread is that an educator supports participants in exploring an idea, demonstration, or experiment. Educators who facilitate visitor experiences may be volunteers, part-time educators, or full-time educators and are referred to by many names, including facilitator, interpreter, explainer, or docent.

Museum professionals, including researchers and practitioners, recognize that facilitation is a key part of the learning that occurs in informal settings and strive to understand the role and impact of facilitated experiences for their audiences.[3] Despite this, some museum educators lack formalized or standard pedagogical training or experience institution-specific training.[4] Research around museum educators often focuses on their impacts on the learner, whether that is knowledge acquisition, behaviors, or attitudes.[5] Specific research focused on the educator and their practices, rather than the learner, is more limited.[6] Some of this research has included educator support of family learning at an exhibition, practices for reinforcing internal meaning-making, or facilitation practices in maker spaces.[7] These studies describe the role of facilitators within specific contexts. For example, in one project led by the Oregon Museum of Science and Industry, researchers created a framework for educators to responsively support family groups at a math exhibit.[8] A study at the Exploratorium developed a framework with and for practitioners that formally categorized aspects of learning that appear in making and tinkering contexts.[9] It is this final set of studies that are most similar to the work described in this paper. However, this paper goes beyond proposing a facilitation framework for educators to describe what facilitation looks like when educators facilitate hands-on activities, specifically chemistry activities.

The National Science Foundation-funded project, *ChemAttitudes: Using Design-Based Research to Develop and Disseminate Strategies and Materials to Support Chemistry Interest, Relevance, and Self-Efficacy* (*ChemAttitudes*, DRL-1612482), was a collaboration between the Museum of Science, Boston (MOS), the Science Museum of Minnesota (SMM), the National Informal STEM Education Network (NISE Network), the American Chemical Society (ACS), and others. In response to concerns about the public being ambivalent about chemistry, its aim was to create hands-on activities for informal science environments, meant to be facilitated by educators, that would positively impact museums visitors' interest in chemistry, understanding and perception of its relevance, and feelings of self-efficacy about chemistry.[10] The project's *Explore Science: Let's Do Chemistry* kit was distributed to 250 informal science institutions and chemistry societies across the United States. The kit included nine hands-on chemistry activities and two additional training activities that could be adapted for public audiences. Each activity is accompanied by resources needed to train educators to facilitate the activities and is adaptable to a variety of settings. Example activities include the exploration of water quality, batteries, and scent molecules, and how these chemical interactions manifest in real-world situations. Additional information about individual kit activities is available on the NISE Network website (https://www.nisenet.org/chemistry-kit).

As a part of the project, research took place during the activity development process to better understand how facilitation played a role in increasing visitors' positive attitudes towards chemistry. The research team was comprised of staff from MOS and SMM, who worked together in collecting, analyzing, and reporting data. The research questions explored in this paper are:

- What do specific facilitation moves look like when educators facilitate hands-on chemistry activities?
- How often and when are different verbal facilitation techniques used by educators during these activities?

The *ChemAttitudes* team wanted to identify an existing facilitation framework to ground the coding of the video data. After examining a variety of facilitation frameworks in both formal and informal education settings, the project team determined that the Exploratorium's "Tinkering Studio" framework would best fit because the categories lined up with what the *ChemAttitudes* researchers observed and educators described about their own facilitation practices.[11] The Tinkering Studio Framework drew on earlier work, and describes a set of facilitator "actions" that were regularly carried out by activity facilitators: Spark, Sustain, and Deepen (SSD).[12] These three areas were defined in the Exploratorium's framework as:

- **Spark:** facilitators help orient learners to the maker environment;
- **Sustain:** facilitators help learners to continue maker activity participation when participants stop or withdraw because of a challenge;
- **Deepen:** facilitators assist learners in gaining deeper understanding by challenging learners to take the maker activity a step further.[13]

Both making and inquiry-based hands-on activities are facilitated, involve creative problem solving, and are highly interactive. However, they differ in that making activities have process-based learning goals, are learner-driven (with facilitators available to support the process), and are comprised of open-ended exploration, while hands-on activities generally have specific content learning goals, are facilitator-driven (with the educator responding to visitors' cues), and have a planned series of steps (with the flexibility to deviate). Because of these differences, the *ChemAttitudes* team changed "Spark" to "Invite participation," recognizing that hands-on activities involve a formal introduction; "Sustain" to "Support exploration," recognizing that learners need instruction to move through activity steps; and "Deepen" to "Deepen understanding," recognizing the content learning goals of hands-on activities. Researchers did explore other facilitation frameworks but decided that these frameworks were either too specific or broad for comparison of actual techniques or emphasized the learner instead of the educator's role.[14]

## Collecting and analyzing data

The *ChemAttitudes* project relied on several phases of data collection and analysis in order to answer the research questions about what facilitation looked like and when and how often different techniques were used. The phases, described below, included interview and video data collection with museum visitors trying the activities and distinct rounds of data analysis.

### *Data collection with museum visitors*

During the activity development phase at MOS and SMM in spring and summer of 2017, visitor groups with members ages 8 and up were interviewed after using one of the 15 activities. A subset of the sample was also videotaped as visitors interacted with an educator while engaging with 11 of the 15 activities ($n = 44$). The duration for these recorded interactions ranged from about 5 to 31 min, with an average duration of about 15 min.

These videos captured interactions with seven different educators, two from SMM and five from MOS, leading a wide variety of activities. These educators were all experienced facilitators who had developed their practice in informal education settings.

After using an activity, visitors were interviewed to determine if taking part in the *ChemAttitudes* activities had affected their interest, sense of relevance, or self-efficacy in chemistry. To learn about visitors' attitudes, they were asked "Compared to when you walked into the museum today:

- How **interested** are you in chemistry after this activity?
- How **relevant** do you feel chemistry is to your life?
- How **confident** are you in:
  - Your **understanding** of the chemistry concepts in this activity?
  - **Talking** to others about the chemistry concepts in that activity?
  - Your **ability to do** a similar activity on your own?"

Visitors' responses to these questions were used to select a smaller subset of the videos for an in-depth qualitative analysis to better understand which facilitation strategies most positively impact interest, relevance, and self-efficacy. Out of the 44 transcribed videos, there were 19 cases where visitors gave ratings of "a lot MORE [interested/relevant/confident]" in their corresponding interview. Six videos were from participants who gave the highest rating for all three attitudes, two include groups who had the highest increase in interest, four had the highest increase in relevance, and seven had the highest increase in self-efficacy.

### Analysis

As described above, 44 videos were included in the analysis to help researchers understand when and how often various facilitation techniques were used with hands-on activities. These videos were transcribed,[15] and the spoken portions of the educators' interactions, as opposed to non-verbal behaviors or techniques, were coded using the modified Exploratorium Tinkering Studio facilitation framework.[16] Using Dedoose software (www.dedoose.com), transcripts were subdivided into excerpts, using the educator's turn-of-speech. The team defined a facilitator turn-of-speech as each time an educator spoke and was bounded by any visitor speech. Each transcript was coded by two team members, pairing researchers from MOS and SMM when possible. The team tried to choose only one code per excerpt. However, multiple codes were sometimes applied when educators very clearly used multiple facilitation techniques within a turn-of-speech. A consensus coding process was employed to come to agreement over any discrepancies in coding.[17]

The team also looked more closely at 19 of the 44 videos that corresponded with visitor groups who, after participating in one of the kit activities, had given the highest level of increase in their attitudes towards chemistry. Representative quotes used throughout this article are pulled from these 19 videos. The more in-depth qualitative analysis used on this subset of cases focused on better understanding educators' interactions with visitors and how these moves may have impacted their attitudes toward chemistry. Through a memoing process, the research team described specific moves that constituted the three facilitation categories and noted the presence and prevalence of specific moves within each case. Throughout, the team had in-depth discussions about what they were seeing in the video data, including any general notes or observations along with how the techniques in these cases were similar or different. The following sections will provide further detail of which particular types of facilitation moves were seen comprising the three overarching facilitation categories, and how these data were incorporated into the project's final framework.

## Facilitation techniques for hands-on chemistry activities

### *What do specific facilitation moves look like?*

A major piece of the *ChemAttitudes* project was to understand what facilitation looked like as educators used hands-on chemistry activities with visitors. Overall, the in-depth analysis of 19 videos suggested nuances to the three broad categories of facilitation that guided this project's work. The three facilitation categories are:

- **Invite participation (Invite),** which includes techniques that **initiate visitor engagement or participation;**
- **Support exploration (Support),** which includes techniques that maintain visitor engagement in the **process of participating in or "moving through" the activity;** and
- **Deepen understanding (Deepen),** which includes techniques that **encourage and support meaning-making.**

The rest of this section provides examples of the distinct types of facilitation moves that the research team identified within these three categories.

### *Invite participation*

From the video data, researchers found that Invite techniques varied widely and generally happened once or twice within an interaction. However, across all 19 cases examined in depth, educators always provided an introduction or activity overview at least once to give grounding and background to the visitor. For example, during an activity where visitors explored the chemical reaction between an acid and a base to pop a cap off of a tube, the educator introduced the activity by saying,

> Alright. Hi everybody. Thank you so much for your patience. If you want to come on over and join us, we are building some rockets today. So I have all the materials we need to make some rockets right here on the table and some instructions right here that we can follow.

In another example, during an activity where visitors explored primary and secondary colors through chromatography, the educator introduced the activity by explaining the process, saying,

> Well, [in] chemistry, we have a process where we can take colors that are already mixed, and break them apart. And that's called chromatography. And that's what we're gonna do today.

These quotes illustrate the types of language educators used to invite participants to take part in hands-on chemistry activities.

Other ways that educators might "Invite" visitors to take part in activities occurred less often. Those facilitation techniques included building rapport with participants, learning about their prior experiences or understandings of chemistry, or encouraging all group members to participate and/or re-engage when attention waned. In addition, educators might use facilitation moves to transition between different portions of activity or encourage visitors to pursue a new goal. Finally, some facilitators gave visitors the option to stop but also the encouragement to stay.

## Support exploration

Educators supported visitors' exploration or maintained their engagement in the process of participating or moving through the *Let's Do Chemistry* activities in a variety of ways. Video data showed that educators used several techniques to maintain visitors' momentum. These included offering positive reinforcement, sharing basic information or vocabulary, and providing step-by-step instructions. Educators also used facilitation strategies that supported inquiry by asking participants to make observations and predictions or encouraging iteration and continued experimentation.

Video data indicated that educators frequently offered positive reinforcement to all the groups. Sometimes they gave positive reinforcement in the form of quick phrases such as "all right," "nice," or "good job." At other moments, encouraging statements were more direct or specific, such as "That's a great question." At other times, the technique of offering positive reinforcement simply consisted of the educator repeating back a word or a phrase that the visitors had said, to acknowledge or validate the visitor's contribution. For example, during one activity a child was layering zinc, copper, and vinegar-soaked felt discs to build a voltaic pile battery and said "Let's add another stack then," and the educator repeated "Let's add another stack then."

Besides positive reinforcement, the other main support technique that educators often used to encourage visitor engagement was to ask visitors to make observations and predictions about materials and the outcomes of experiments. For example, one activity had visitors use a small vacuum chamber to investigate how air moves. With one group, an educator prompted them to observe what was happening by asking, "Is it getting any bigger now?" In another instance of the same activity, an educator asked, "Oh, what did you see happen?" And finally, in an activity where the visitors were exploring a chemical reaction that luminesces, one educator probed a visitor to consider what might occur, by saying "All right, so I'm gonna let you do a little bit of an experiment here: what do you think we should do to make the light last longer?" Together these examples highlight some of the ways that educators engaged visitors in looking closely at the activities and considering what might occur next.

## Deepen understanding

Researchers found that educators also used a range of Deepen techniques to enhance visitors' understanding of the concepts in the *Let's Do Chemistry* activities. In general, this took the form of either providing information or encouraging participants to make meaning about what they thought was happening. Educators generally relied on four facilitation moves with visitors when trying to Deepen understanding of the activity. Educators provided information to help participants understand why or how something was happening, to enhance the participant's knowledge, or shared supplemental information to make connections outside the activity. Alternatively, educators supported meaning-making by encouraging participants to apply something they learned during the activity or explaining why or how something was happening.

Even though all these moves were observed in the videos, educators more frequently used the technique of providing supplemental information to enhance the participant's knowledge or to make connections outside the activity. In one activity where visitors experiment with pile batteries, the educator sometimes did this by talking about the history of batteries, saying "Some of the first batteries were made of glass with vinegar inside." In an activity exploring spherification, the educator explained that a chemical reaction was causing the phenomena the group was witnessing, saying

> A little squishy, right, so it's not quite as solid, and that's because this chemical reaction is kind of interesting. It happens from the outside and it works its way in until it gets all hard.

As can be seen in these examples, educators often offered additional information to strengthen visitors' sense of what was going on in the chemistry activity.

### *Facilitation framework*

The facilitation techniques identified through the analysis of the videos described above were collected into a framework and organized into three categories: "Invite participation," "Support exploration," and "Deepen understanding" (Figure 1). Each area includes subcategories further describing the facilitation moves used within that category. This framework describes the specific kinds of verbal techniques educators used to initiate visitor engagement, help visitors as they used the activities, and lead visitors to have a better understanding of what they were experiencing. This framework was also used by the research team as their coding framework to understand when and how often these large categories of facilitation occurred, as described below.

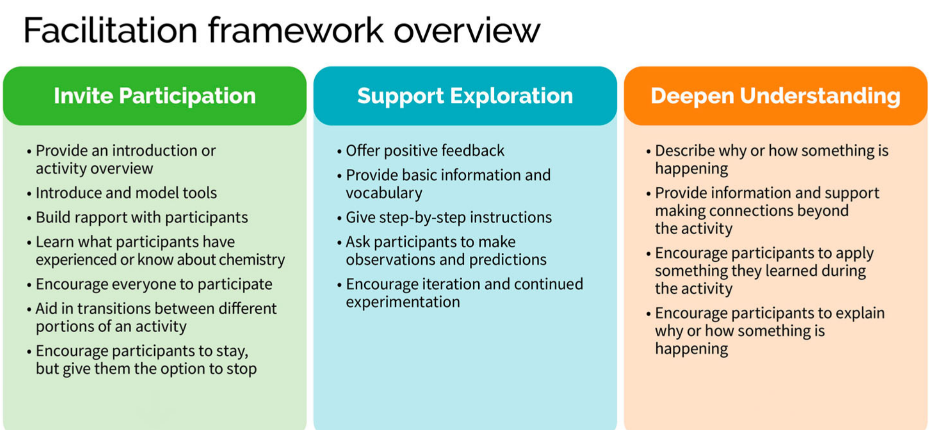


**Figure 1.** Facilitation framework.

## How often and when were the different facilitation strategies used?

### *How often facilitation strategies were used*

The complete set of 44 videos was coded for the three facilitation categories: Invite, Support, and Deepen. Researchers found that educators used Invite techniques the least (15%), Deepen techniques a little more frequently (22%), and Support techniques the most frequently (58%); see Figure 2. Educators sometimes spoke about other things when they were facilitating an activity (6%), but analysis of these comments revealed that they were largely related to the data collection process rather than to intentional facilitation moves. For example, when a visitor was fiddling with their clip-on mic, the educator told them “Just leave it right there, you don’t have to touch it.” Overall, these data provide a sense that educators spend most of their time supporting visitors’ exploration as they facilitate a hands-on activity, and that Deepening understanding or Inviting participation will occur less often.

### *When facilitation strategies were used*

Beyond understanding how frequently these moves were occurring, the team analyzed the video data to learn more about when these moves were happening. By mapping the occurrence of the different techniques, researchers discovered that these three techniques did not occur in a linear fashion with a clear beginning, middle and end—rather, all three categories were distributed throughout the interactions.

Overall, when looking chronologically at the video cases and the facilitation techniques used, there was no clear sequential pattern (Figure 3). Instead, the data showed that Inviting participation occurred at multiple points in the activity, rather than only at the beginning. The same was true for Supporting exploration and Deepening understanding, in that these facilitation moves also occurred at multiple points throughout the activity. While educators spent the most time in Support, often using a series of Support-type moves in a row, they also flipped back-and-forth between using Support or Deepen techniques. In Figure 3, each column represents an interaction between a facilitator and visitor group, while each row represents the facilitator’s turn-of-speech.

The following in-depth examination of coded video (column 28 in Figure 3) emphasizes the non-linear aspect of facilitation and shows how educators might combine the different techniques. Specifically, this example highlights a small portion of an interaction between an educator and a visitor as they explore the reaction between an acid and base by building pressure in a capsule after mixing baking soda, citric acid, and water, with the goal of making the cap pop off. Figure 4 provides a visualization of the back-and-forth


**Figure 2.** Frequency of facilitation moves, video data ($N = 44$).

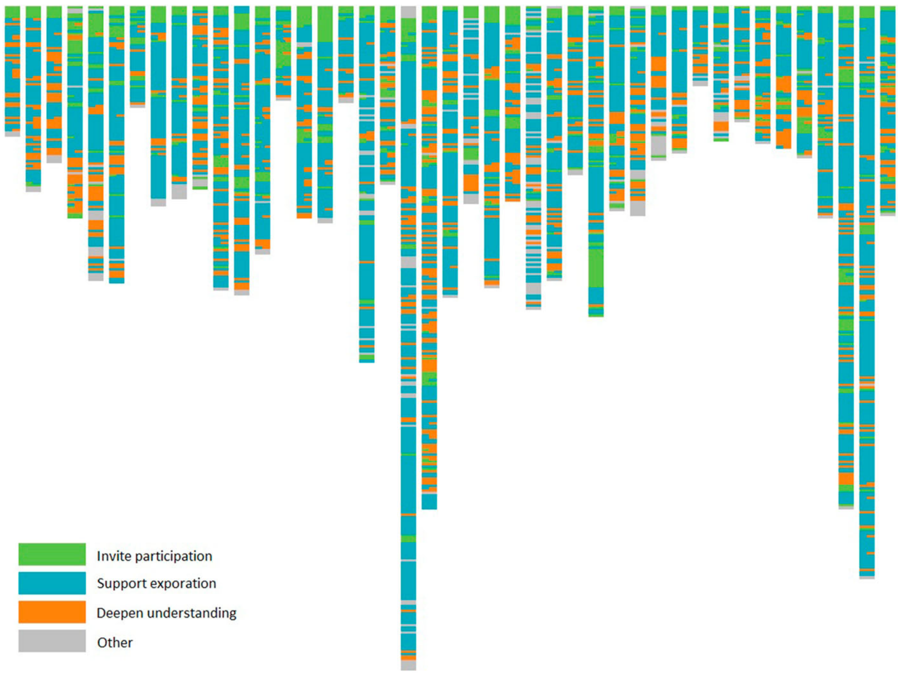


**Figure 3.** Videos coded using Invite, Support, and Deepen facilitation categories, $N = 44$. Each column represents one facilitated interaction of an activity and each row represents the facilitators turn-of-speech. The length of the column is proportional to how often the educator talked.

between the multiple facilitation techniques over the course of the total interaction, along with a small conversation excerpt, outlined in black on the shaded bar.

As can be seen in Figure 4, at the beginning of this excerpt, the educator is responding to the visitor's observations and employing Support techniques when asking, "What reminds you of champagne?" The educator continues to guide the visitor's engagement by offering positive feedback to the visitor's response, rephrasing their thought, and validating their

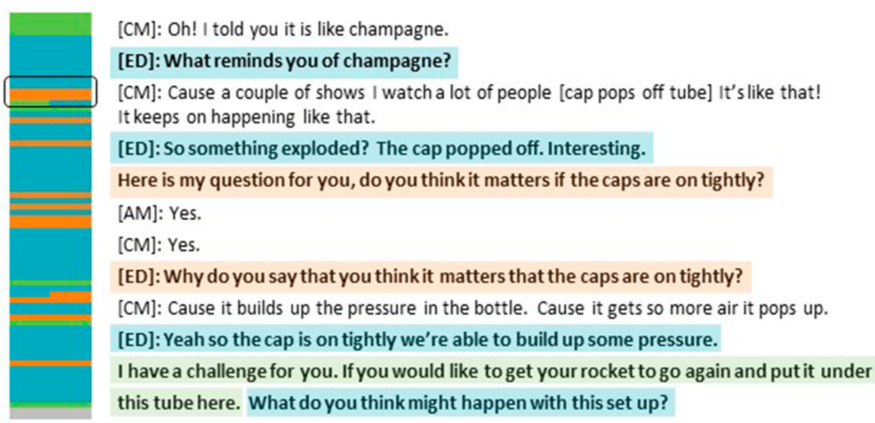


**Figure 4.** Coded transcript example, with accompanying color bar from Figure 3.

idea by saying, "So something exploded? The cap popped off. Interesting." After these Support techniques, the educator then prompts the visitor to deepen their understanding of what is occurring by posing a question: "Here is my question for you: do you think it matters if the caps are on tightly?" The visitor provides a brief response of "yes" at this point, and the educator follows up with another question to further deepen their meaning-making: "Why do you say that you think it matters that the caps are on tightly?" After using a Support technique and confirming what the visitor said by repeating their phrase, "Yeah, so the cap is on tightly we're able to build some pressure," the educator Invites the visitor to pursue another challenge: "I have a challenge for you, if you would like to get your rocket to go again and put it under this tube here." This invitation is quickly followed by the educator utilizing a Support technique asking the visitor to make predictions about the new proposed opportunity: "What do you think might happen with this setup?" Overall, in this very brief snapshot of an interaction, it is evident there was a lot of shifting back-and-forth between the facilitation techniques of Inviting participation, Supporting exploration, and Deepening understanding. When conducting this hands-on activity, the educator was adjusting the experience at the moment based on the needs and responses of the visitor.

Overall, data from the *ChemAttitudes* study indicate that educators are continuously moving through different facilitation techniques during an experience to support visitors' needs and extend their learning and experiences. This level of flexibility was seen not only at key instances, but over the course of whole interactions and even with the same educator conducting the same hands-on activity. While it is important to note that most of the *Let's Do Chemistry* activities had multiple sections or experiments that would lend themselves to new introductions or moments of explanation before moving on to another step, this configuration is quite typical of hands-on experiences in museums; and the data strongly suggest that across activities a non-linear order of Invite, Support, and Deepen are used to engage visitors.

## Understanding the findings

Findings from this research study led to the creation of a facilitation framework for hands-on chemistry activities, expanding on the work done by the Exploratorium Tinkering Studio.[18] Within the three main facilitation technique categories, Invite, Support, and Deepen, educators had distinct and identifiable facilitation moves they used with visitors. While Invite almost always occurred first, educators did not use the other facilitation moves in a linear order. Instead, they adjusted their facilitation based on what was happening as a part of the activities and the needs of the visitors they were working with. While some moves were used more often by particular educators, patterns emerged as to which techniques educators tended to use when facilitating hands-on activities. For example, when Inviting participation, educators always gave an introduction and then did not use Invite techniques very frequently at other points in the activity. Educators used Support techniques most frequently, often providing positive reinforcement or encouraging visitors to make observations and predications. Educators used Deepen techniques less frequently than Support techniques and more frequently than Invite techniques. As a part of these moves, educators typically provided additional information or made connections to something visitors might be familiar with outside of the activity. Facilitators also had periods where they would flip back and forth between Deepen and Support moves. The framework developed in the *ChemAttitudes* project is another tool for educators to understand techniques for facilitating inquiry-based activities or in refining their practice. While it was created specifically for chemistry activities, this new framework could be used broadly to enhance training and professional development for informal educators using any kind of inquiry-based activities with visitors.

However, this study did have limitations. This research was conducted with multiple educators at MOS and SMM. Each of these educators had slightly different facilitation styles. Additionally, there was diversity among the visitor groups in terms of their ages and experiences with chemistry. Finally, the data presented represents 11 different chemistry inquiry activities. This variety added to the complexity of the study and the data. Despite this, it should be noted that the research team found that the broad facilitation categories worked well across cases, leading the team to have confidence that the facilitation framework is broadly applicable.

This study also suggests future research. The research team saw some positive relationships between the techniques that educators used while facilitating an activity and visitors' increased feelings of interest, relevance, and self-efficacy regarding chemistry. In exploratory analyses, the data showed that describing why or how something is happening or providing information that help make connections outside the activity (both Deepen techniques) may promote visitors' feelings that chemistry is more relevant. In addition, using any of the Support moves or encouraging participants to explain why or how something is happening (Deepen) may increase visitor self-efficacy. Finally, discussion about visitors' prior experiences and knowledge (Invite) may encourage an increased feeling of relevance and self-efficacy around chemistry. However, because these findings were only suggestive rather than conclusive, more research should be done to investigate any correlations between techniques and changes in attitudes.

## Notes

1. National Research Council, *Learning Science in Informal Environments.*
2. Petrich, Wilkinson, and Bevan, "It Looks Like Fun."
3. National Research Council, *Learning Science in Informal Environments.*
4. Allen and Crowley, "Challenging Beliefs, Practices, and Content"; Tran, "Work of Science Museum Educator."
5. Andre, Durksen and Volman, "Museums as Avenues of Learning"; Bevan and Xanthoudaki, "Professional Development for Museum Educators"; Falk and Dierking, *Learning from Museums*; Falk and Dierking. *Museum Experience Revisited*; Renni and McClafferty, "Science Centres and Science Learning."
6. Hein, "Progressive Education and Museum Education"; Tran, "Teaching Science in Museums."
7. Gutwill and Allen, "Facilitating Family Group Inquiry"; Litts, "Making Learning"; National Research Council, *Surrounded by Science*; Pattison et al. "Staff-Facilitated Family Learning."
8. Pattison et al. "Staff-Facilitated Family Learning."
9. Bevan and Xanthoudaki, "Professional Development for Museum Educators"; Gutwill, Hido, and Sindorf, "Research to Practice."
10. Anderson et al., "Design Strategies"; Zare, "Where's the chemistry"; Etine, *Scared to Death*; National Science Board, *Science and Engineering Indicators 2018*; TNS BMRB, *Public Attitudes to Chemistry.*

11. The Tinkering Studio, "Facilitation Field Guide"; Bevan et al., "Learning Through STEM-Rich Tinkering"; Kloser, "Identifying Science Teaching Practices"; Michaels and O'Connor, *Talk Science Primer*; National Research Council, *Surrounded by Science*; National Research Council, *Learning Science in Informal Environments*; Pattison et al. "Staff-Facilitated Family Learning."
12. Meyer, Bevan, and Garza, "Museums Afterschool."
13. The Tinkering Studio, "Facilitation Field Guide."
14. Bevan et al., "Learning Through STEM-Rich Tinkering"; Kloser, "Identifying Science Teaching Practices"; Michaels and O'Connor, *Talk Science Primer*; National Research Council, *Surrounded by Science*; National Research Council, *Learning Science in Informal Environments*; Pattison et al. "Staff-Facilitated Family Learning."
15. Due to poor audio quality, some activities were excluded from analysis. Ultimately, 11 activities were included in the facilitation analyses.
16. Ostman, *NISE Network Program Development.*
17. Jenson et al., "Perceptions of Self-efficacy"; Olson, et al., "Applying Constant Comparative Method."
18. The Tinkering Studio, "Facilitation Field Guide."

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***Marta Beyer*** participated in this project as Research and Evaluation Associate at the Museum of Science, Boston. She has worked in the museum field for over 10 years, contributing to internal and cross-organizational projects. Her evaluation and research work has looked at informal learning opportunities and professional development offered by museums. Beyer has been integrally involved in the professional impact evaluation studies for the NISE Network and was a key part of the research team for the *ChemAttitudes* project.

***Hever Velázquez*** participated in this project as an Evaluation and Research Associate, Science Museum of Minnesota. Velázquez's experience includes six years of combined experience in the research and evaluation for ISE programs and bilingual (English and Spanish) exhibit projects at science museums across a wide range of topics. Velázquez's work advocates for the consideration and use of culturally responsive practices to serve all audiences with a focus on underrepresented communities.

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