

## **Sondra LoRe: SPEAR Consultants**

### **Sample of integration of Qualitative (Interviews) and Quantitative (Survey)**

#### **Thematic Analysis: Visting Scientists Interviews**

To explore how scientists experienced MemSTEMM, semi-structured interviews were conducted via Zoom during March and April 2025, shortly after each scientist completed their presentation to high school students. Using thematic analysis, four overarching themes were identified, reflecting the scientists' growth as communicators, their engagement with students, and the program's influence on how they view their roles in science and outreach. The figure below summarizes these themes, and each is further illustrated with representative quotes drawn directly from the interviews.

*Figure 1: Thematic analysis of scientist interviews*



#### **Gaining Confidence Through Practice**

Across the interviews, scientists described personal growth in their ability to explain complex science to non-specialist audiences. Through repeated journal club presentations and preparation workshops, many gained confidence in simplifying language, reducing jargon, and engaging with high school students in a meaningful way.

*"I like it, and each year I can **see myself improving a lot**. I was more of a kind of introvert in the beginning."*

*"Now I **feel more comfortable**... I can present now... It depends which audience—high school or elementary. I **feel more confident**."*

*"I wasn't sure how to make the connection between what I do and what high school students care about, but now I think I **can explain it much better**."*

*“This gave me a **better perspective** on what’s appropriate or level appropriate for high schoolers.”*

*“It **gave me confidence** that I could do more teaching in the future.”*

## Meeting Students Where They Are

Scientists reflected on the diverse experiences they had across classrooms—ranging from highly interactive sessions to quiet or challenging ones. They adapted their delivery style based on student background knowledge, time of day, and classroom dynamics, learning to adjust in real time.

*“I had like **three totally different experiences**... one class was advanced, one asked general questions, and one was silent.”*

*“Some of the classes asked **really deep questions**, and **others were more quiet**, especially if it was early in the day.”*

*“One student asked if **cancer can be contagious**, which really **made me think about how to talk about risk**.”*

*“It depended on the school... I had to **pivot on the spot to keep them engaged**.”*

*“They wanted to know how many years of school it took—I **could tell they were thinking about their own futures**.”*

## Making Science Tangible Through Analogies and Interaction

To make abstract or complex ideas more understandable, scientists used hands-on analogies, visuals, and technology. These strategies helped students connect scientific research to their own lives and learning.

*“We made **paper airplanes to explain protein folding**... their function depends on how they fold.”*

*“I used a **balloon to show how lungs inflate and deflate**.”*

*“I told them about Alzheimer’s mice to **help them understand genetic models**.”*

*“I used **simple animations** to show how a molecule interacts with a protein—**something they could actually see**.”*

*"We included quiz questions using Vevox to check their understanding and keep them engaged."*

## Identity as Scientists and Mentors

Participation in the program encouraged scientists to reflect on their roles beyond research. They saw themselves more as mentors and educators, recognizing the importance of sharing their journey and inspiring the next generation.

*"Now I feel like **I want to do more outreach...** I want to **go back to my hometown and talk to students there.**"*

*"I **used to be shy** talking about my research, even at lunch with colleagues—**this experience changed that.**"*

*"They asked about **my path to science** and what it's **like to be a researcher—that stuck with me.**"*

*"Students asked me how I **manage science and motherhood.** It made me realize **I can be a role model too.**"*

*"I didn't expect them to be **so curious about my background.** It made me think about **what I represent.**"*

*"I didn't expect them to be so curious about my background. It made me think about what I represent."*

*-Scientist*

*"They wanted to know how many years of school it took—I could tell they were thinking about their own futures."*

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*"I wasn't sure how to make the connection between what I do and what high school students care about, but now I think I can explain it much better."*

*-Scientist*

*"Now I feel like I want to do more outreach... I want to go back to my hometown and talk to students there."*

*-Scientist*

## Survey of Visiting Scientists

*“One student asked if cancer can be contagious, which really made me think about how to talk about risk.”*

*-Scientist*

The Retrospective Pre-Post (RPT) survey for ambassadors (volunteer scientists) was designed to evaluate participants' training experiences as they prepared for their spring semester presentations in schools. Distributed in December 2024, the survey was sent to eight (8) participants over a two-week period, with five (5) reminders issued to non-respondents. An additional follow-up reminder was sent by program leadership. The evaluator was informed that one (1) participant had withdrawn from the program, and another submitted the survey but did not provide usable data due to an upcoming leave.

The survey included a combination of questions with predefined response options, Likert-scale items, and open-ended prompts. Participants were asked to select from structured choices, rate their agreement with various statements, and provide written responses when applicable. Likert-scale items were analyzed by calculating weighted averages for pre- and post-training responses to estimate percentage-based growth in key areas (Robinson & Leonard, 2019). Some questions allowed multiple selections, and an “Other” option enabled participants to add additional context. Respondents were also permitted to skip any questions.

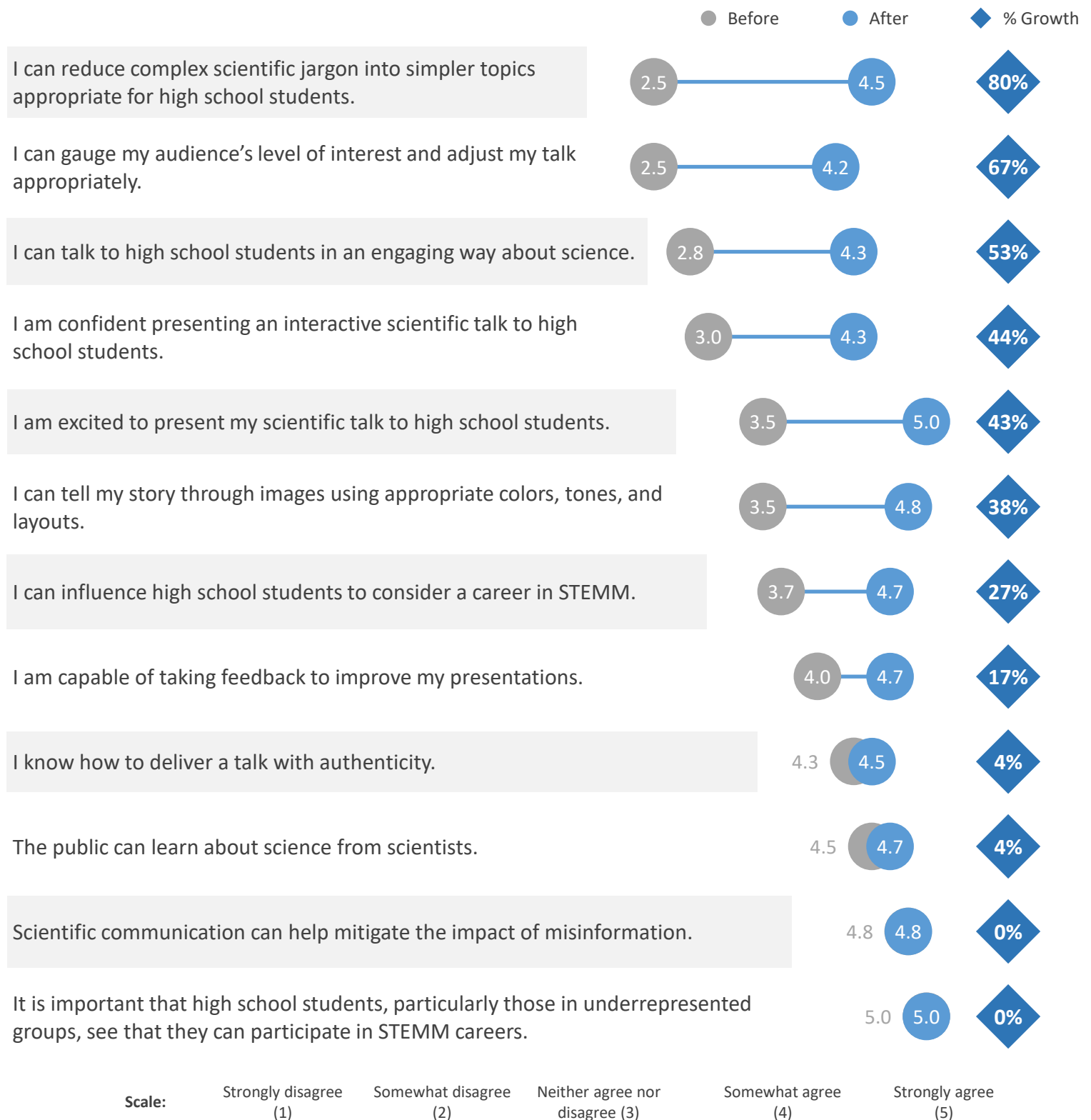
Open-ended responses were coded and thematically analyzed to identify recurring patterns (Saldaña, 2021). Findings are presented as the percentage of respondents who referenced each theme, with accompanying descriptions and illustrative participant quotes.

All data in this report is self-reported and has been visualized by the evaluator to provide a comprehensive summary of participant feedback. The visualizations below represent aggregate group-level responses.

***“Students asked me how I manage science and motherhood. It made me realize I can be a role model too.”***

*-Scientist*

Figure 2: Ambassadors rate their level of agreement to the following statements *before* and *after* participating in the MemSTEMM Ambassador training



The training emphasized the importance of simplifying content and minimizing scientific jargon to communicate effectively without overwhelming the audience. Participants recognized the need to adjust their approach by using clear, relatable language and limiting the number of messages on each slide. They found value in refining figures, enhancing communication through visuals, and tailoring their presentations to engage their audience, particularly high school students. Additionally, the training underscored the importance of authenticity and interactive delivery, helping participants create more engaging and impactful presentations. The following visualization and participant quotes illustrate these key findings.

Figure 3: Themed responses from ambassadors of what have they have learned from the MemSTEMM training that they feel will help them most with their talk (by percentage and number of mentions)

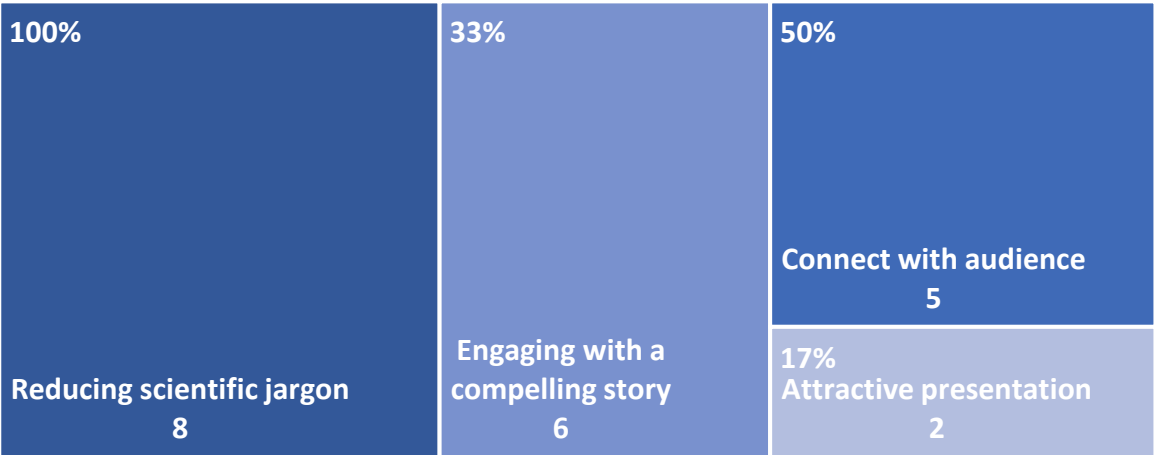


Table 1: Ambassador responses of what have they have learned from the MemSTEMM training that they feel will help them most with their talk

“One of the most helpful lessons was learning how to simplify. I thought I had a clear understanding of how simple the information should be, but after having the session, I realized I needed to revise a lot more. My biggest challenge was with simplifying the figures, but it was helpful getting suggestions on this.”

“How to reduce scientific jargon without compromising on message. How to simplify to not overwhelm your audience (too many messages on 1 slide). How to create an interactive talk. How important it is to show your authentic self, so that others can relate to you.”

“Simple is better. Don't overcomplicate concepts. Keep it simple and carry on with the main message.”

“Reducing scientific jargon is the best thing that I learned in the training. My communication skills, presenting through simplified pictures have been improved.”

“I think the strong emphasis on reducing jargon was really helpful. Even when I thought I was reducing it enough, it was still too much for the high school level (before I received feedback).”

“Avoiding too much scientific jargon in my talk, and do my best to present and use words that the students are familiar with.”

Ambassadors encountered challenges with Vevox and Adobe Learning, highlighting the need for session leaders to spend more time familiarizing themselves with these platforms to improve efficiency. While live troubleshooting was appreciated, participants suggested providing more proactive support. They also recommended clearer communication about class times, additional reminders for deadlines and pre-work, and addressing issues with Adobe's unintuitive interface and technical malfunctions.

To enhance the learning experience, participants proposed shorter sessions (under two hours) and brief scheduled meetings to review homework and platform usage. They also expressed a need for more opportunities to practice presenting, along with additional training on technical aspects such as embedding Vevox in PowerPoint and using Teams for recording. The following table of participant quotes supports these findings.

Table 2: Ambassador suggestions for improving the workshop trainings

*"One of the challenges was learning how to use the technology (Vevox and Adobe learning). I think it would be helpful if the leaders of the session had a bit more time to learn about these platforms beforehand, so that we could make more efficient use of our time together. However, it was also helpful doing live troubleshooting!"*

*"More reminders about deadlines and pre work/homework. The adobe learning platform wasn't very intuitive and sometimes malfunctioned. Communications about class times could also be more transparent. For the last workshop we didn't have a calendar invite but we still had the workshop, it was just a little confusing."*

*"It would be nice to have quick meetings (already on the schedule) to touch base on the homework and platform usage."*

*"Try to keep it a bit shorter. 2 hours a session seems little too much for me."*

*"I think more practice presenting would be helpful. I haven't actually presented anything yet."*

*"More time in learning and doing the technicalities for Vevox (like embedding it in PowerPoint) and Teams recording."*

Figure 4: Ambassadors rate their current level of agreement to the following *science communication statements*

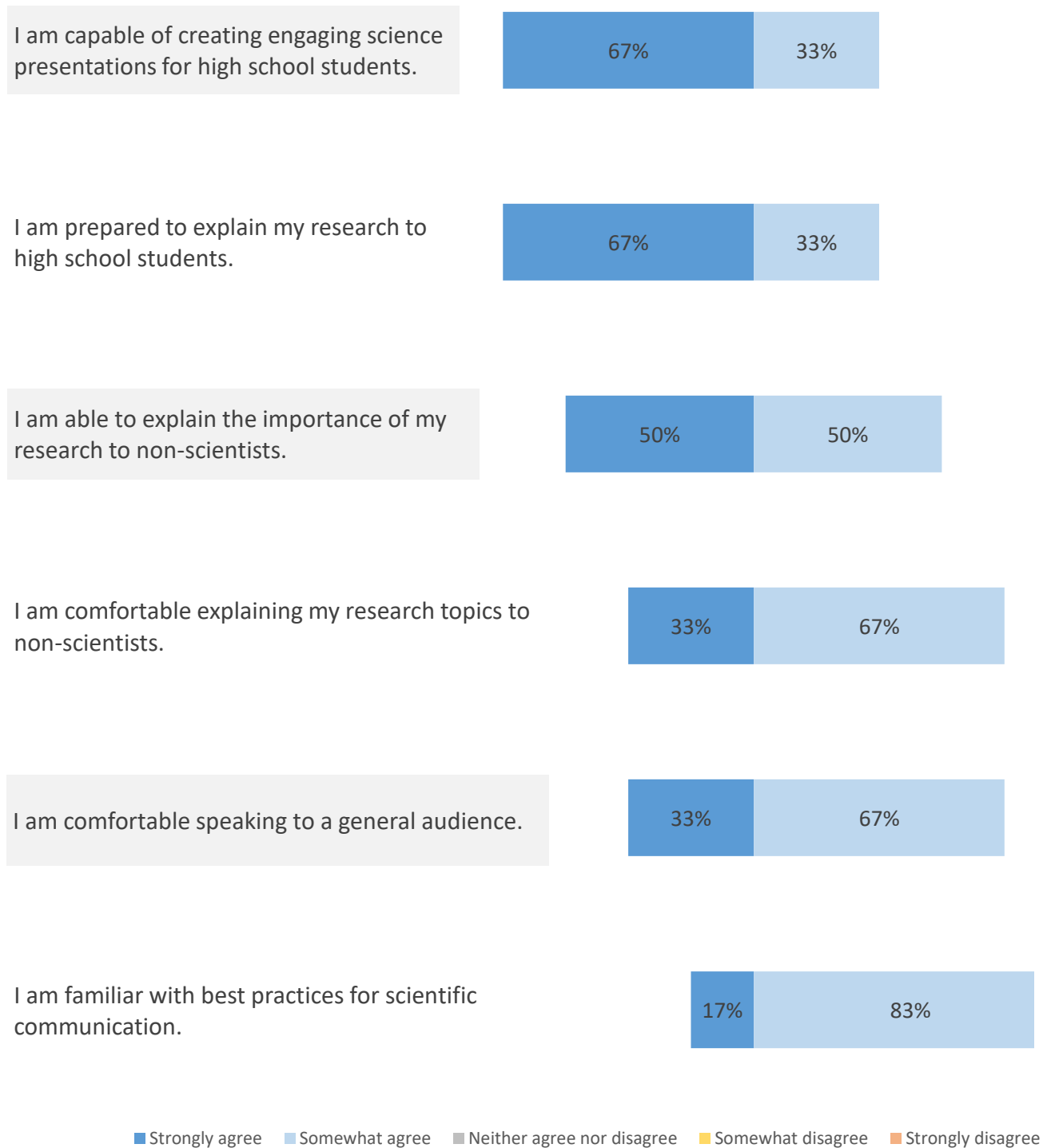




Figure 5: Ambassadors rate their current level of agreement to the following *outreach and education statements*

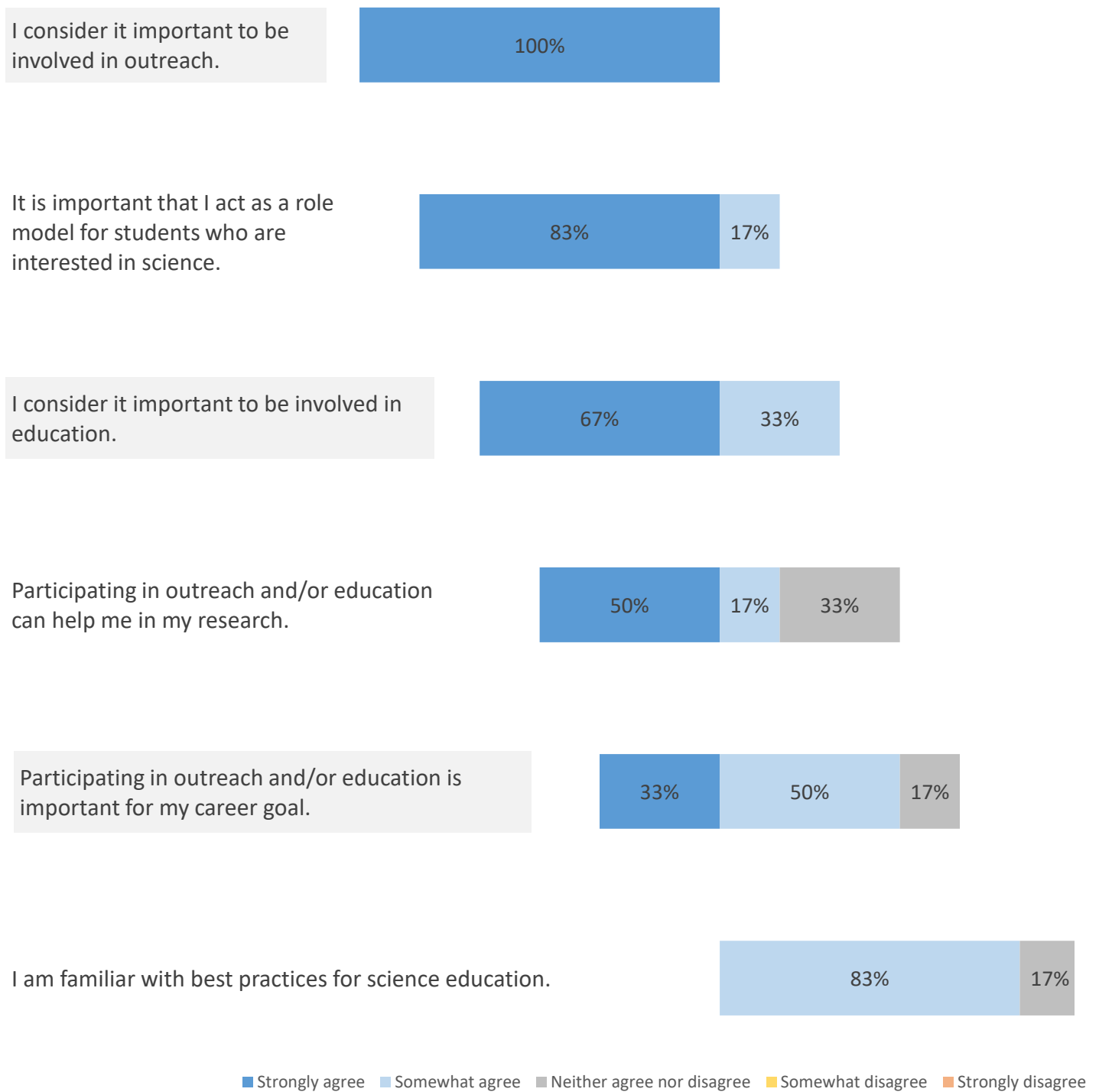
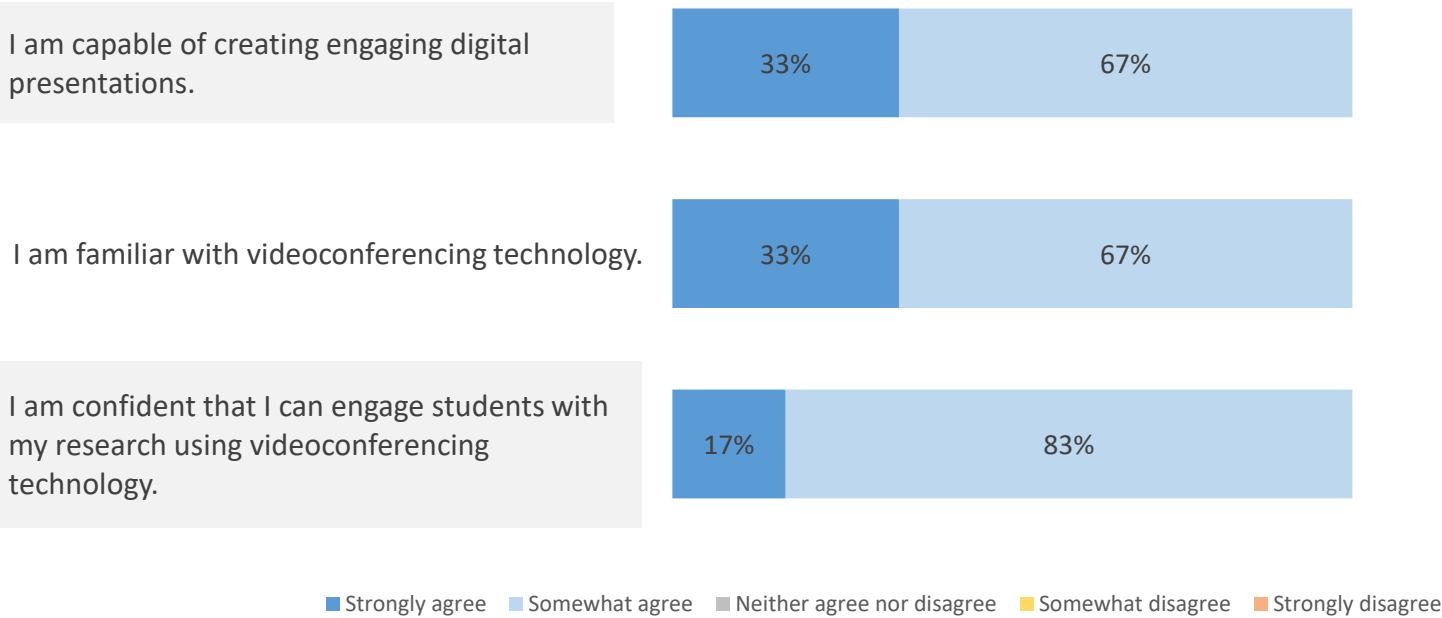


Figure 6: Ambassadors rate their current level of agreement to the following **technology statements**



The program is highly valued for helping volunteer scientists gain a fresh perspective on their work while giving back to their communities and inspiring high school students' interest in STEM. Participants expressed appreciation for the opportunity to serve as ambassadors, emphasizing how much they learned through the training. They praised the workshop leaders for their kindness, patience, and expertise in facilitating the sessions and expressed interest in a continuation of the program, such as a “Part 2 for STEMM.” Additionally, ambassadors suggested that incorporating in-person interactions would further enrich the experience.

Table 3: Additional comments participants have about their MemSTEMM Ambassador training experience

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| <i>“I think it is a valuable program that truly allows scientists to view their work through a different lens. It is so important that we give back to our communities and pass on what we know to those behind us. This program plays a role in helping scientists to do, while addressing an area of need concerning high school students and their interest in STEM.”</i> |
| <i>“I have learned a lot from the training, and I am glad that I was given the opportunity to be an ambassador.”</i>   |
| <i>“It was a wonderful experience. All the tutors were very kind, patient, and skilled at running the workshops. I wish there were a part 2 for STEMM.”</i>  |
| <i>“An opportunity for in-person interaction would be helpful.”</i>  |

Figure 7: Ambassadors note the **novelty** of workshop topics

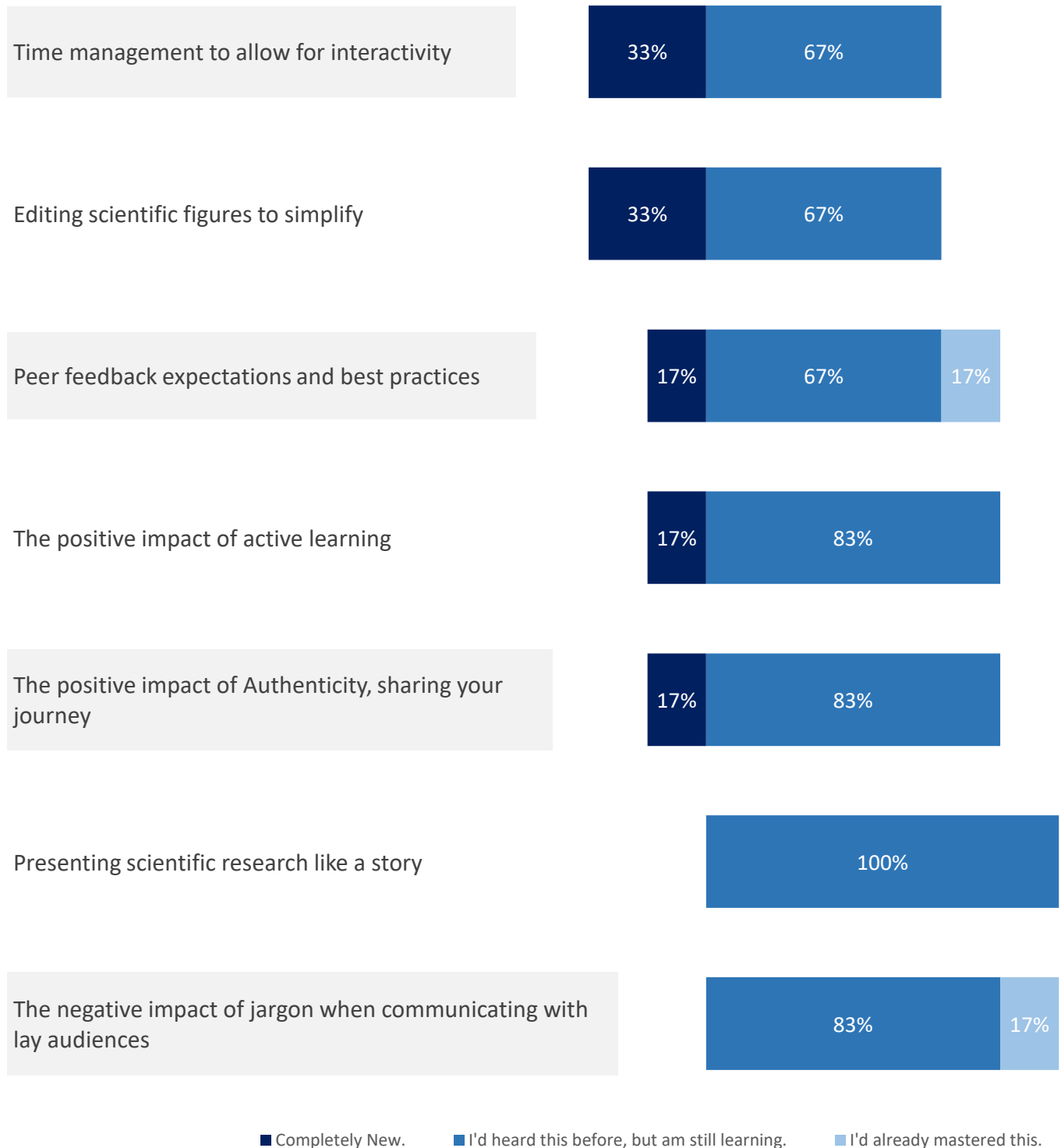


Figure 8

