Formative Evaluation Report

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Background

Introduction

The 2024 National Rural STEM Learning Summit was held June 5-7, 2024 at the Westin La Paloma Resort and Spa in Tucson, Arizona. It was funded through a grant from the National Science Foundation's Advancing Informal STEM Learning (AISL) program.

The National Rural STEM Learning Summit is an initiative of the Arizona Science Center and SciTech Institute. It leverages the work and partnerships from a previous NSF AISL award for establishing the Rural Activation and Innovation Network (RAIN) across Arizona. Planning for the Summit drew on insights and lessons from the Arizona-focused Rural STEM Learning Summit held in Flagstaff, Arizona, in August 2023 and experience with the Arizona STEM Ecosystem, part of the larger STEM Ecosystems movement.

Speaker and participant recruitment for the 2024 Summit made use of these and other networks. Calls for proposals, participant registration, and exhibitors were posted on multiple social media platforms and distributed via email, using the organizing team's contact lists. Final attendance at the Summit totaled 140 participants, including the organizing team.

The Summit involved two and a half days of plenary and concurrent sessions with opportunities for networking. Concurrent sessions included information-sharing presentations as well as those that engaged participants in hands-on activities. Presenters came from governmental agencies, non-profit organizations, K-12 and higher education institutions, and private sector entities.

Summit sponsorships helped defray costs for participants. Breakfast was provided on Days 1-3, lunch was provided on Days 1 and 2, and a reception was held at the end of Day 2. Lunch on Day 1 included flash talks and on Day 2 included table talks by Summit exhibitors and sponsors as well as a guest speaker.

Evaluation Design

Dr. Marcia Nation, Nation Evaluation Consulting, LLC, conducted a formative evaluation of the Summit with the aim of providing actionable evaluation findings and information to the program team to inform the planning of future Summits.

The evaluation focused on the following questions:

1. Who is participating in the Summit?
2. To what degree did the Summit meet participants' expectations?
3. What aspects of the Summit worked for participants and which did not?
4. To what degree did participants make new connections?
5. To what extent did participants acquire new knowledge, ideas, and resources?
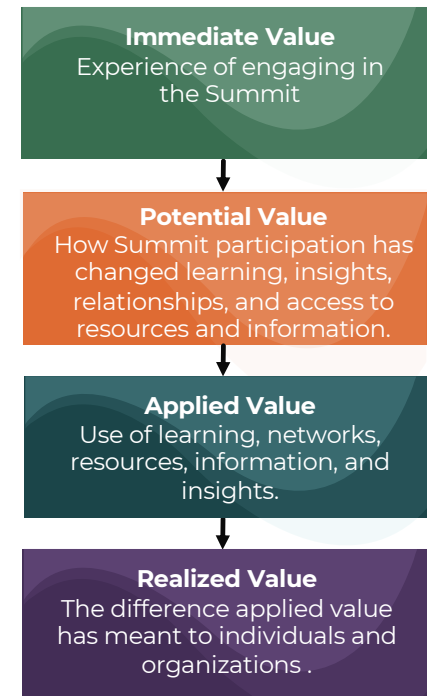
The evaluation plan was submitted to Viable Insights Independent Institutional Review Board (IRB) and determined to be exempt from full IRB review.

Data and information for the evaluation were collected through evaluator observations at the Summit, informal conversations with Summit participants, feedback collected by the Summit organizing team, and a post-Summit anonymous survey sent to participants two weeks after the Summit. The survey was based on an instrument pre-tested at the 2023 Summit. It was distributed via the Survey Monkey platform to 134 attendees, excluding those involved in organizing the Summit, with a 40% response rate.

Quantitative data were analyzed using Excel, and Excel and Datawrapper were used for data visualization. Qualitative data were thematically coded to surface patterns.

The analysis draws on Etienne and Beverly Wenger-Trayner's (2020) Value-Creation Framework, which includes the immediate, potential, applied, and realized values of engaging in social learning spaces like the Summit. This formative evaluation focused on measuring immediate value (participants' experience of the Summit; evaluation questions 2-3),

and potential value (outcomes around learning, network growth, and changes in access to information and resources; evaluation questions 4-5). Applied and realized value will emerge once potential value is put in motion, and therefore are outside this evaluation scope.

Immediate Value
Experience of engaging in the Summit

Potential Value
How Summit participation has changed learning, insights, relationships, and access to resources and information.

Applied Value
Use of learning, networks, resources, information, and insights.

Realized Value
The difference applied value has meant to individuals and organizations .

Wenger-Trayner, E. and B. Wenger-Traynor. 2020. Learning to Make a Difference: Value Creation in Social Learning Spaces. Cambridge: Cambridge University Press.

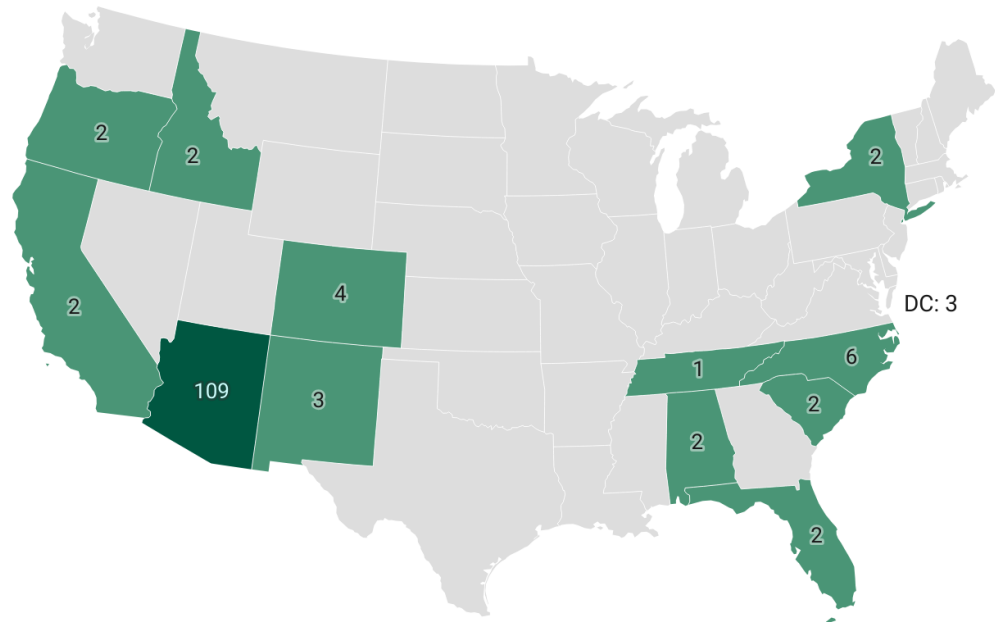# Summit Participants

Most attendees were from Arizona.

The Summit welcomed 140 attendees, 87% of whom were from the western U.S. with 78% from Arizona.

+ The U.S. South was represented through 13 participants while the Northeast was represented by two attendees.
+ Three attendees came from Washington D.C.
+ There were no attendees from the Midwest or the Plains states.

In addition, most of the 41 presenters and speakers were from Arizona-based organizations and institutions.

There is considerable scope for growing participation both nationally and within the western region.
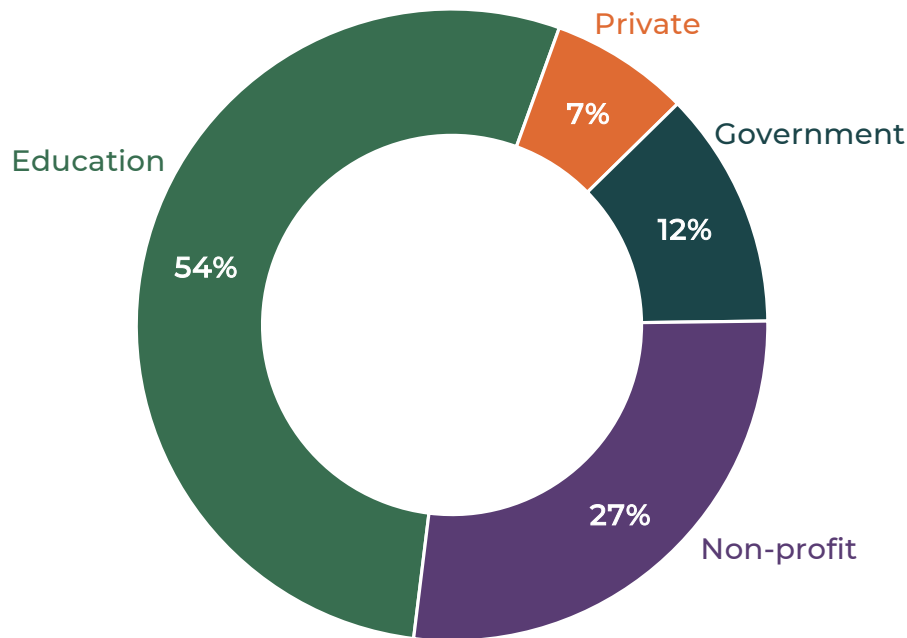
Number of Participants by State
n=140 participants

Created with Datawrapper

"Excellent conference. Worth the trip across the country."

Percentage of Summit Participants by Sector
n=140 participants

Private
7%

Government
12%

Education
54%

Non-profit
27%

The Summit attracted cross-sector participation.

Participants represented the education, non-profit, private, and government sectors.

+ Over half of participants (75) were from the education sector. Within that sector, 55% (41) were from higher education institutions with 45% (34) from preK-12 schools.

+ Governmental sector participants (n=17) came from federal (4), state (6), county (6), and municipal (1) levels of government.

+ Participants from outside of Arizona (n=31) were mostly from higher education institutions (14) or non-profit organizations (11).

The 41 Summit presenters and speakers represented multiple sectors with 44% from non-profits, 32% from education sector institutions, and 12% each from the government and private sectors.

"I really enjoyed the mix of participants and also everyone's shared passion and inspiring contributions to supporting rural STEM. It was the first time for me to be in a space where I felt like I experienced an ecosystem."

Most participants were experienced professionals.
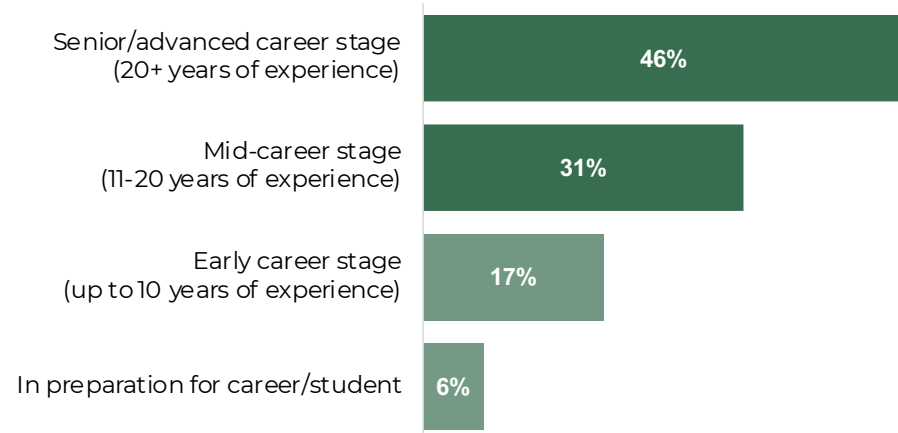
The post-Summit survey found that:

+ Survey respondents were mostly in their mid-career stage (11-20 years experience) or senior/advanced career stage (over 20 years experience).

+ There were fewer early career stage (9 respondents) and individuals who were students or in career preparation (3 respondents).

+ Age-wise, 75% of survey respondents were 35 years old and older.

  · 15% (8) were age 55 and older, 30% (16) were age 45-55, 30% (16) were age 35-44.

  · 6% (3) survey respondents were age 18-24 while 19% (10) were age 25-34.

Survey findings were borne out by observations and informal discussions at the Summit. Youth under age 18 did not participate in the Summit in any capacity.

There is an opportunity to involve more early career stage professionals, those preparing for careers, and youth in the Rural STEM Learning Summit.

Career Stages of Post-Summit Survey Respondents
% of valid survey responses (n=52)

Career Stage	%
Senior/advanced career stage (20+ years of experience)	46%
Mid-career stage (11-20 years of experience)	31%
Early career stage (up to 10 years of experience)	17%
In preparation for career/student	6%

Evaluation Results

Immediate Value: Participants' Reactions to the Summit

Attendees valued the Summit and had a positive experience.

Over 80% of survey respondents agreed that they:
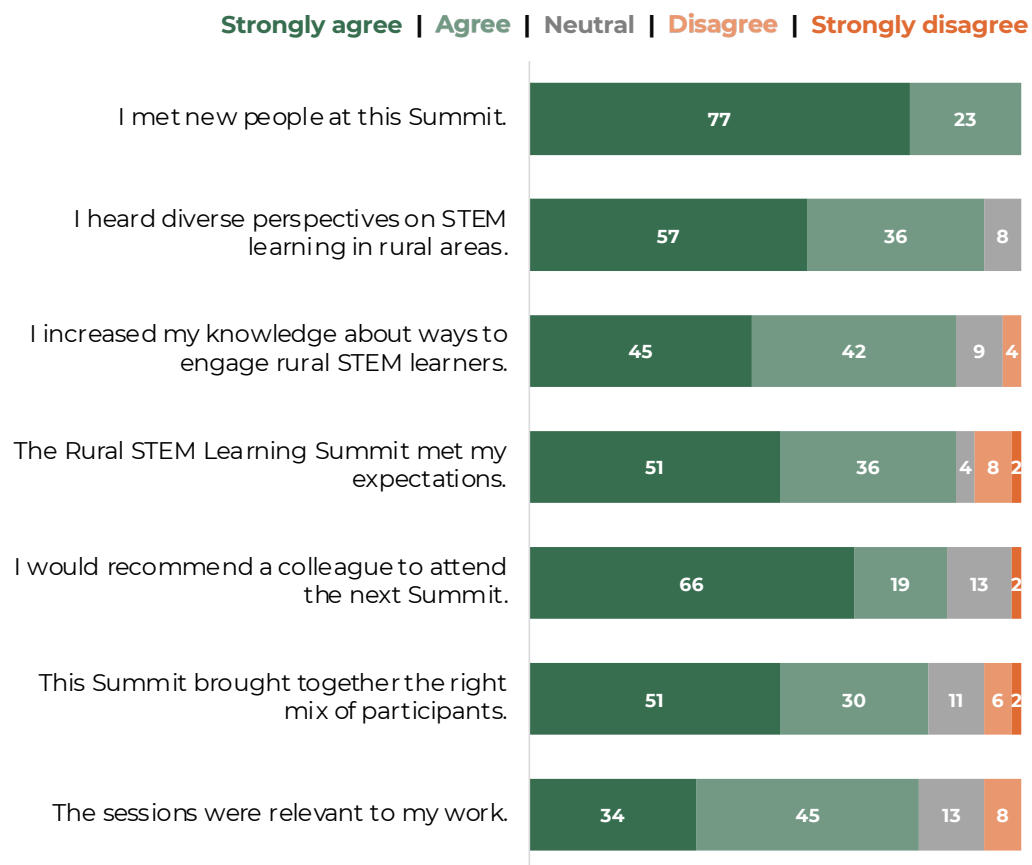
+ Met new people at the Summit.
+ Heard diverse perspectives at the Summit.
+ Felt there was the right mix of participants.
+ Increased their knowledge about engaging STEM learners.
+ Felt the Summit met their expectations.
+ Would recommend the Summit to a colleague.

While 46 respondents (87%) agreed that the Summit met their expectations, five (10%) disagreed. These were more likely to be out-of-state attendees.

Respondents were less certain about the relevance of the Summit to their work. Four respondents (8%) disagreed that the Summit was relevant to their work, and seven (13%) were neutral.

Reactions to the National Rural STEM Learning Summit
% of survey respondents (n=53 responses)

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I met new people at this Summit.	77	23			
I heard diverse perspectives on STEM learning in rural areas.	57	36	8		
I increased my knowledge about ways to engage rural STEM learners.	45	42	9	4	
The Rural STEM Learning Summit met my expectations.	51	36	4	8	2
I would recommend a colleague to attend the next Summit.	66	19	13		2
This Summit brought together the right mix of participants.	51	30	11	6	2
The sessions were relevant to my work.	34	45	13	8	

Select Participant Reactions

"I loved this event. It felt very generous – everyone wanting to support and share."

"It was well organized and offered a variety of sessions. The speakers were engaging and impressive. The food provided was good as well."

"Amazing, but I unfortunately wouldn't attend again just due to the content not being what I needed. Thank you!"

"It was my first time at the Rural Summit, and I didn't know what to expect. It was well thought out and exceeded not just my expectations, but it certainly opened my eyes and inspired me."

"To be advertised as a National Summit, I was disappointed in the amount of sessions geared toward Arizona. The session titles would lead me to believe it could translate over, but then all resources were AZ-based or only supported for AZ residents."

"Honestly, this year's Summit was really great. It was the right amount of time, great diversity in the people who attended, and a very good balance of sessions and networking time."

Participants' Suggestions for Improvement

Attendees and Presenters

- Need more preK-12 teachers attending.
- Include more business/industry speakers.
- More speakers and participants from outside Arizona.
- Panels with rural community members and leaders.
- Inclusion of student and youth speakers and participants.
- Representation of indigenous communities in presentations.

Summit Sessions

- Fewer Arizona-centered sessions and more focus on tools and approaches with general application.
- More sessions on teaching strategies and hands-on STEM activities.
- Sessions on connecting rural STEM efforts to rural community needs.
- Sessions for grant seekers and administrators.
- BIPOC outreach sessions.
- More on technology, coding, and AI.

Organization and Logistics

- Better information in agenda about each session and who would benefit from attending.
- Continue to have sponsors to keep cost low.
- More hands-on sessions.
- Provision of coffee throughout the day.
- Keep sessions and speakers within time allocated.
- Vendor table talks at lunch should be rethought.

Networking

- More small group networking opportunities.
- More time in general for networking.
- Organized evening events.
- Encourage use of digital business cards to promote networking.

Evaluation Results

# Potential Value: Networking and Professional Connections

Over 90% have already or plan to connect with people they met.

The Summit organizers intentionally built networking sessions into the schedule and encouraged pop-up meetings by providing space for these at the venue. Small group activities during many sessions as well as breakfasts and lunches provided at the Summit facilitated networking.

The survey administered two weeks after the Summit sought to understand if attendees had followed up with people they met via social media or email. Most (31; 58%) said that they already had connected with people they met, and a further 19 survey respondents (36%) said that they intend to make these formal connections. Only three people (6%) do not intend to follow up with people they met. Written survey responses (next page) provide further evidence around how networking was valued.

Growing networks and connections emerged as important value created for individuals by attending the Summit.

Making Connections with Other Summit Participants
% of survey respondents (n=53 responses)

58%
Have made connections with people they met at the Summit via social media or email.

36%
Plan to make connections.

6%
Don't plan to connect.
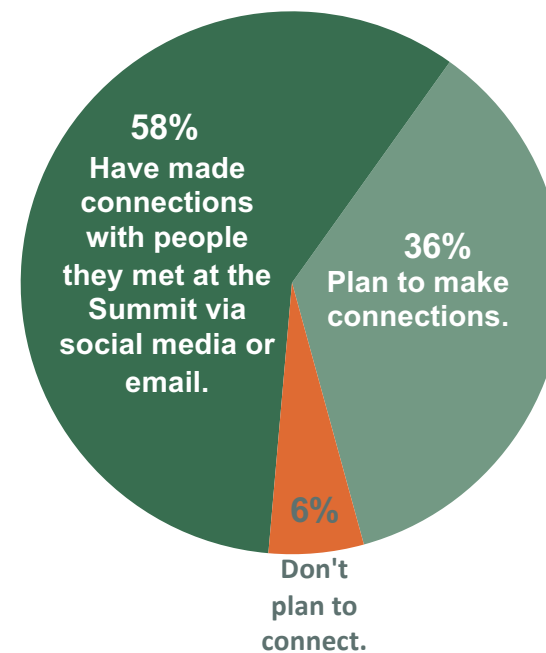
Participant Comments on Networking

Select responses to open-ended question, "Please share any other comments or reflections."

"Meeting individuals with diverse backgrounds was especially valuable to me as it opens avenues for collaboration."

"The Rural STEM Learning Summit was an incredible experience where I successfully connected with other organizations."

"This conference was invaluable for networking connections."

"It was exciting to network with likeminded folks about the ways we can improve our fields to reach more learners."

"Really appreciated the built-in time to interact and learn with others not just during the sessions. Generous time for interactions. Very glad it was opened up to national attendance as it was helpful to hear from others in other states."

"The intentional networking was excellent as well. I made several contacts that I am excited to follow up with."

Evaluation Results

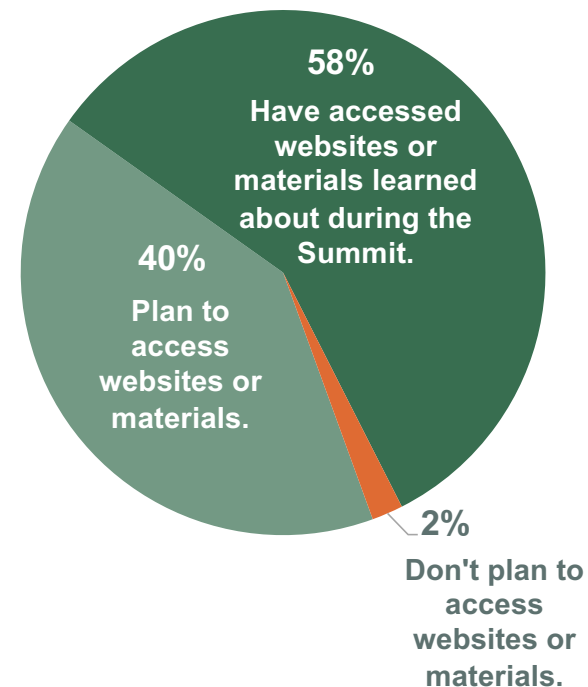# Potential Value: Learning and Professional Practice

98% have already or plan to access resources from the Summit.

To measure the potential value of the Summit for participants' learning and professional development, the post-Summit survey asked attendees whether they had:

+ Accessed websites or other resources they had learned about during the Summit.

+ Shared information learned at the Summit.

+ Integrated activities and/or ideas they learned about during the Summit into their work.

Most (30 out of 52 respondents; 58%) had already accessed resources that they learned about during the Summit. Another 21 respondents (40%) said that they plan to access resources. Only one attendee did not intend to follow-up on resources learned about during the Summit; the Summit had not met this individual's expectations and needs.

Accessing Information and Resources Shared at the Summit
% of survey respondents (n=52 responses)

58%
Have accessed websites or materials learned about during the Summit.

40%
Plan to access websites or materials.

2%
Don't plan to access websites or materials.

"At the moment, I am exploring the CommunityShare resources I found out about."

Sharing Information and Learning from the Summit
% of survey respondents (n=52 responses)

88%
Have shared information and learning from the Summit with a colleague or friend.

12%
Plan to share information.
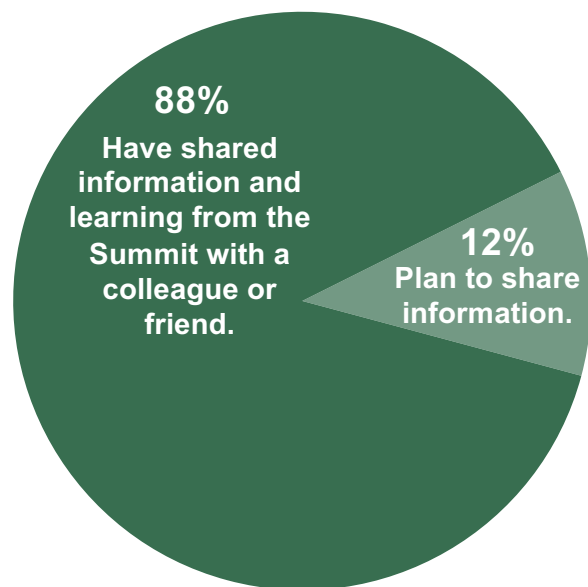
Attendees gained knowledge from the Summit and valued this learning.

By two weeks after the Summit, all survey respondents indicated that they either had already shared information and learning from the Summit with colleagues and friends (46 responses; 88%) or intended to do so (6 responses; 12%).

Sharing with other professionals and friends is an sign that knowledge acquisition has occurred. It is also a strong indicator of the value that attendees placed on the information and learning they acquired through participating in the Summit.

"Sharing data and insights from Dr. Dhawan's presentation on future workforce."

94% have or plan to integrate learning from the Summit into their work.

Three-quarters of survey respondents (39) said that they plan to integrate activities and/or ideas learned at the Summit into their work and a further 19% (10) indicated that they already had begun to integrate Summit learning into their work.

Participants' plans for integrating Summit learning into their work fall into four categories:

+ Engaging pre-K-12 STEM learners with new activities.
+ Enhancing networking and collaboration.
+ Changing approaches and ways of thinking.
+ Developing professional capacities.

For many participants, such as teachers and participants from education-focused non-profits, learning about new STEM activities was a major motivation for attending the Summit. They were looking for ways of engaging preK-12 students in STEM and plan to integrate new activities and learning approaches into their classrooms and out-of-school time (OST) programs.

The Summit changed the way that some participants think about collaboration through sessions that discussed the STEM ecosystem approach and systems thinking. They shared their intentions to reach out to organizations in their community, such as local libraries, that they had not before considered as potential partners. The Summit has also influenced participants' thinking about integrating rural perspectives and the voices of rural youth into their work.

Some participants intend to hold sessions with their colleagues to share learning from the Summit and to develop their professional capacities to use tools like the Habits of Systems Thinkers and STEM identity mapping. New collaborations may also be leveraged to provide training and professional development.

"We are developing materials specifically for rural communities based on the feedback and ideas developed at the Summit."

How Participants Intend to Use Summit Learning

Engaging STEM Learners

Adopt Minecraft activities.

Use stations from ¡Explora! and AZ Science Center sessions.

Provide new perspectives on AI.

Access resources from Pipeline AZ.

Integrate Materials on teaching coding.

Use Infiniscope software to create virtual field trips.

Develop lesson plans that connect with local issues.

Enhancing Collaboration

Conduct STEM ecosystem mapping.

Have all educators, regardless of subject areas, work together.

Strengthen connections with local libraries.

Approach organizations like United Way to collaborate.

Explore CommunityShare resources.

Build STEM mentor list.

Changing Approaches

Adopt systems thinking.

Introduce rural perspectives into work.

Integrate new strategies for boosting OST participation.

Incorporate voices of rural youth.

Strategize how to provide inclusive education for the public.

Begin to think expansively about partners for STEM learning.

Developing Capacities

Work with Phoenix Zoo on professional development for rural teachers.

Conduct STEM identity session with teachers and administrators.

Hold sessions with colleagues to share Summit learning.

Use Habits of Systems Thinkers with staff.

"Information from the two sessions facilitated by DaNel Hogan and Sara Torres will be used to build STEM identity with teachers and administrators during this school year."

Evaluation Conclusions and Recommendations for Future Summit Planning

Evaluation Conclusions

1 The Summit engaged participants from across the education, non-profit, private, and government sectors. Over half of attendees represented the education sector. Most had 11 or more years career experience and were age 35 and older. These individuals contributed important perspectives from their experience to the Summit sessions as presenters and participants. Younger and early career professionals made up smaller percentages of attendees, and there were no youth participants.

Over three-quarters of the participants were from Arizona. While 22% of attendees lived outside of Arizona, some regions like the Midwest and Plains states were not represented. This is to be expected since 2024 was the first year that the Summit was extended to national participation.

2 The post-Summit survey found that the event met a significant number of attendees' expectations. The five out of 140 attendees who felt that the Summit did not meet their expectations tended to be out-of-state attendees. However, most out-of-state attendees were positive and enthusiastic about the Summit.

3 Survey results found that respondents appreciated and valued the Summit. They increased their knowledge about ways to engage rural STEM learners and heard diverse perspectives on STEM learning in rural areas. Most felt it brought together the right mix of participants and would recommend the Summit to a colleague. All participants said that they met new people at the Summit. These results indicate that a large portion of participants gained immediate value from attending the Summit.

Some were less certain about the relevance of the Summit to their own work, although most (79%) rated this positively. A handful of out-of-state participants felt the Summit was too centered on Arizona and did not present enough models and approaches that had general applicability. Given that some sessions were focused on initiatives in Arizona and Arizona-based service providers, this is a fair assessment.

Feedback indicated that at least a few preK-12 teachers thought that sessions not focused on preK-12 learners were irrelevant to their work. These individuals were more interested in tools and activities that they could bring into their classrooms than the other topics presented, even though the Summit was advertised as having a broader mission around collective impact, rural empowerment, and successful rural STEM programs. Some felt that there were not enough teachers as speakers or participants.

Evaluation Conclusions

4 The post-Summit survey found that 90% of participants either have or intend to connect with people they met at the Summit via social media or email. More than half (58%) had already made such connections. For a large portion of participants, the opportunity to grow their networks and connect with future collaborators was one of the most valuable outcomes of the Summit. This has the potential to add more value for attendees and their organizations in the future.

5 Participants also valued the resources and knowledge gained from the Summit. Of those surveyed, 88% had already shared information and learning from the Summit with a colleague or friend, and 12% intended to do so. Most (94%) responded that they will be putting this information and knowledge to work through engaging preK-12 learners, enhancing their networks and collaborations, changing ways of thinking and approaches in their organizations, and developing the professional capacities of their work colleagues to use new tools and approaches.

It is notable that two weeks after the Summit, many survey respondents were able to cite specific tools and information that they intend to use in their work, indicating that these have made a lasting impression on them. Several participants cited the ideas, methods, and tools presented during sessions held by facilitators from the Waters Center for Systems Thinking. These session engaged attendees in small group and hands-on activities on STEM identity, STEM ecosystems, and systems thinking.

Recommendations for Future Summit Planning

1 **Continue to focus the Summit on multi-sector approaches to supporting STEM learning in rural areas.** The STEM ecosystem framework is the Summit's value-added approach compared to other convenings that focus more narrowly on rural STEM education. At the same time, the nature of this framing needs to explicit. A few preK-12 teachers expected the Summit to be a teachers' conference. One elementary school teacher shared that she had no idea what a STEM ecosystem was when it was mentioned in the opening session. If a STEM ecosystem or other approach is foundational to the Summit, then this needs to be well-explained in the outreach materials and at the event.

2 **Consider the geographic focus of the Summit carefully.** This will entail weighing the pluses and minuses associated with organizing and holding an Arizona-wide, Western region, or national convening. One out-of-state participant shared that she was thinking about this Summit as a model for implementing a similar convening in her home state. Clarity about goals and objectives as well as the Summit framing (above) can help with this decision making.

3 **Incorporate a fuller understanding of rural communities' needs, challenges, opportunities, and assets into the Summit.** The rural focus of the Summit can get lost when sessions are not grounded in an understanding of rural communities as well as a reflection of the diversity of rural experiences. The inclusion of diverse voices in the Summit is critical. This year, there were no youth involved directly in the Summit, but attendees benefitted from the serendipitous convening of Arizona FFA in the same venue, reminding them of why this work is so important. For the next Summit, youth involvement in select sessions should be intentional.

4 **Continue to provide meaningful presentations and dialogues on rural workforce and economic development as connected to STEM learning.** These are critical topics for rural areas that go well beyond a consideration of formal preK-12 and higher education learning to understanding how taking a STEM ecosystem approach can generate collective impact in rural areas.

5 **Encourage different types of sessions at the Summit.** Feedback suggested that while many attendees enjoyed hands-on and small group sessions, shorter presentations also had appeal to individuals who wanted to sit back and learn. The networking sessions were popular and had tremendous energy, although networking facilitators should make some accommodation for participants who find it difficult to interact with others in loud spaces – maybe suggest another space, such as a hallway or room, for quieter conversations.

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Acknowledgements