

Northwest Earth and Space Sciences Pipeline (NESSP)

Eric R. Banilower (HRI)

Robert M. Winglee (UW)

NESSP Overview

- Original Partnerships among entities in Montana, Oregon, and Washington:
 - Institutions of Higher Education
 - Informal Education Programs
 - Formal Precollege Programs
- New partners in original states and Idaho

The NESSP Collective

- Original partners in Montana, Oregon, and Washington:

Institutions of Higher Education	<ul style="list-style-type: none">• University of Washington• Central Washington University• Everett Community College• Montana State University• Oregon State University• Oregon Health Sciences University
Informal Education Programs	<ul style="list-style-type: none">• Pacific Science Center• Museum of Flight• Oregon Museum of Science and Industry• Museum of the Rockies• Red-Tail Hawks Flying Club
Formal Precollege Programs	<ul style="list-style-type: none">• UW Pipeline Project's Alternative Spring Break• Washington Aerospace Scholars• Olympic Educational Service District• North Central Educational Service District• Montana Office of Public Instruction• South Metro-Salem STEM Partnership

- New partners in original states, Idaho, and beyond?

Overarching NESSP Goal

- Leverage and expand on existing networks to create a model network to bring NASA-infused learning opportunities to **historically underserved and underrepresented communities**
 - Creating a “pipeline” of opportunities
 - Focusing on rural, Hispanic, and Native American communities

Formal and Informal Education Components

- Museum-based programs
- Outreach events to schools and communities
- Summer camps
- Professional development for teachers
- Curriculum development
- Apollo 50th Challenge

Alignment With Top-Level Metrics

Top-Level Metric	NESSP Objective
Enable STEM education	Improvement of including NASA Science content to middle and high school programs through PD, with the goal of increasing teachers in NASA PD from 500 in 2016 to 1,000 by 2021. Survey teachers for change in preparedness to teach NASA STEM.
Improve US scientific literacy	Improvement of including NASA Science content to middle and high school programs through outreach events and camps, with the goal of going from 2,000 participants in 2016 to 10,000 participants in outreach events in 2021 and going from 400 students in extended NASA STEM experiences in 2016 to 1,250 by 2021. Document increase in student interest from outreach events to extended experiences.
Advance national education goals	50% inclusion of underserved and underrepresented minorities in NESSP programs, and in particular incorporating non-urban areas where there is reduced access to STEM education.
Leverage through partnerships	Use a collaborative approach with partner institutions to create extended programs across the NW. Use of partner relationships to provide geographical coverage and establish relationships with local educational groups as evidenced by memorandums of understanding and/or proposals.

Evaluation Components

- Formative
 - Quality of project activities
 - Extent it is reaching intended audiences
 - Functioning of the partnership
- Summative
 - Impact on teachers
 - Impact on students
 - Likelihood of sustainability

HRI Evaluation Activities

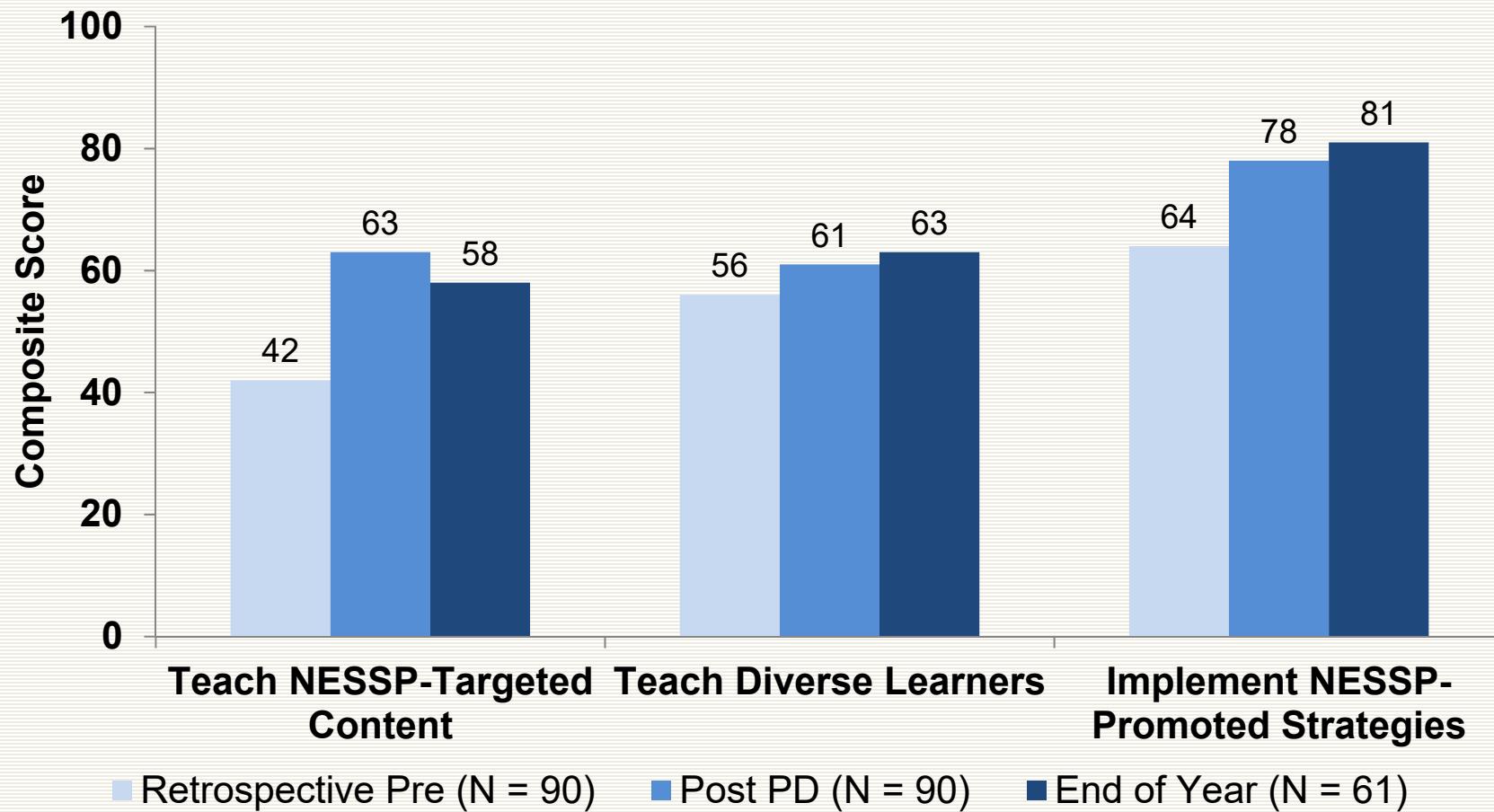
- Surveys:
 - Extended Professional Development Teacher Survey
 - End-of-Academic-Year Teacher Survey
 - Extended Event Student Survey
 - Outreach Student Survey
- Interviews:
 - Project staff
 - Participating teachers and camp leaders
- Observations:
 - PD
 - Camps
 - Outreach events
- Document review:
 - Workshop plans
 - Activities

Example Adjustments Resulting From Formative Feedback

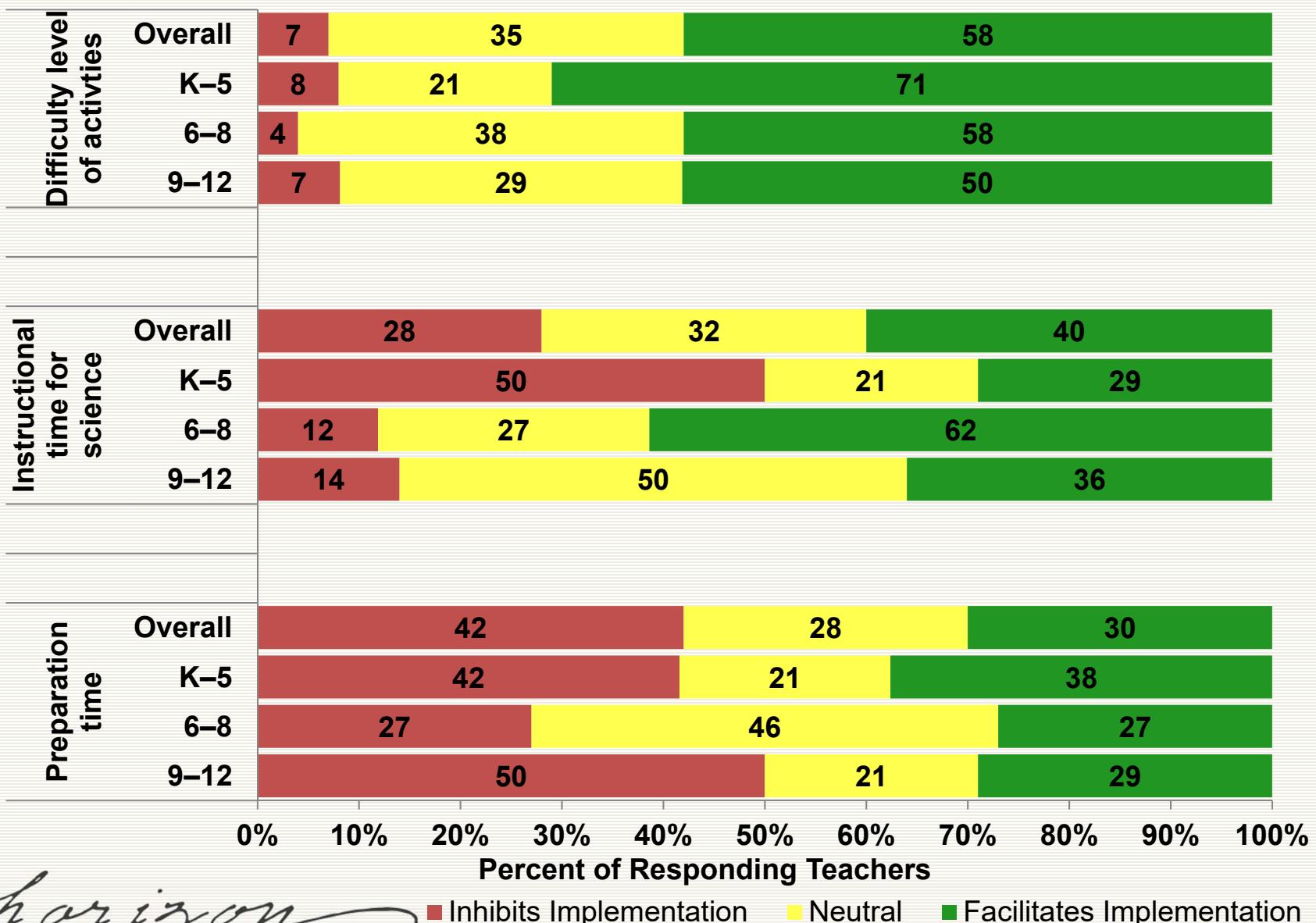
- Demographics of teachers served:
 - Most teachers attending project PD were not representative of the student population being targeted
 - Project implemented a program specifically targeting Native American and Hispanic teachers
- Duration of professional development:
 - Working to offer more extended learning opportunities for teachers

Impacts on Teachers

Year Two Participants' Perceptions of Preparedness



Factors Influencing Implementation



Impacts on Students

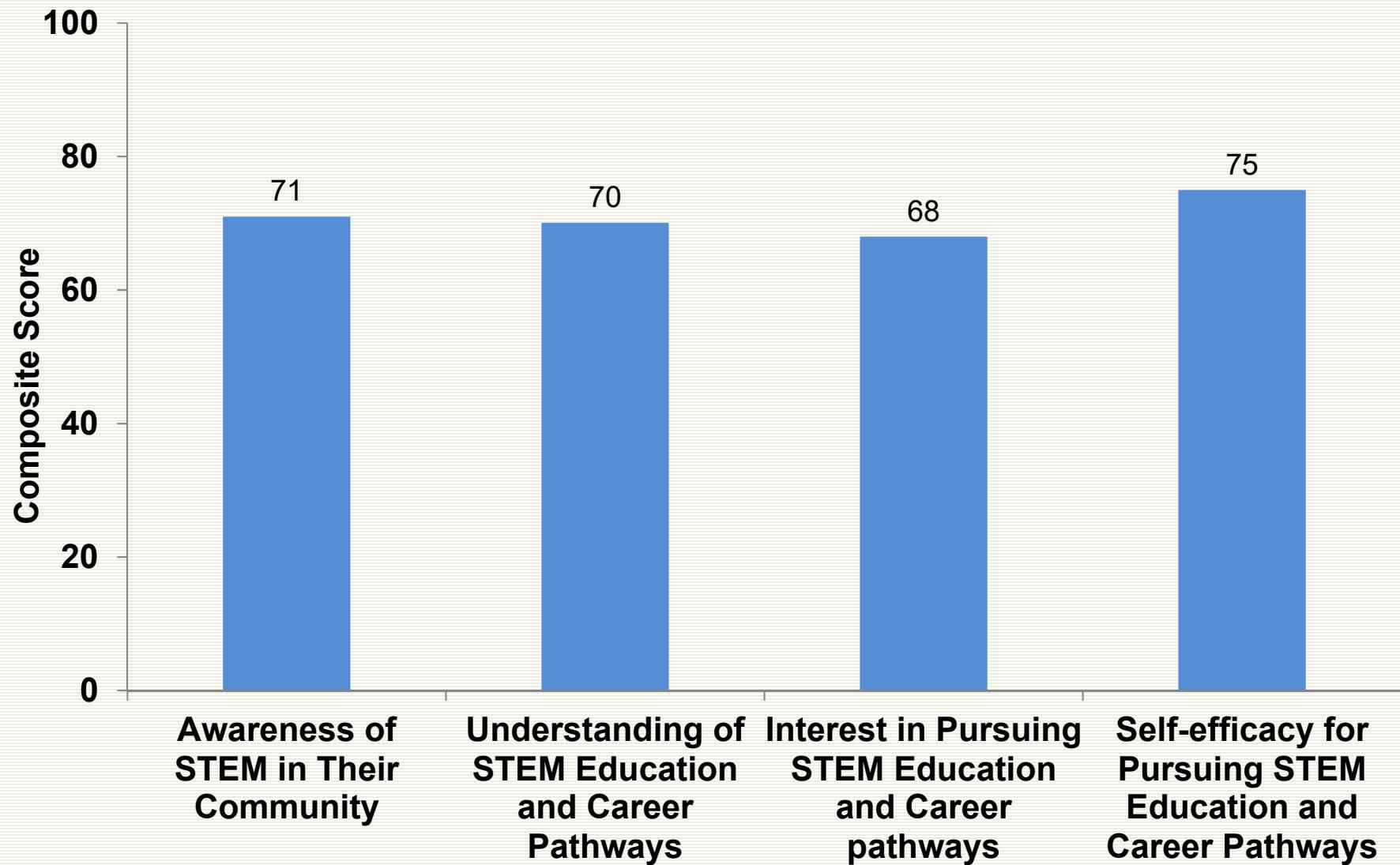
- Outreach events
- Extended student events

Impacts of Outreach on Students

Students Agreeing with Statements About the Experience

	Percent of Respondents (N = 2,269)
It was interesting.	94
It taught me something new.	87
It made me want to learn more about science.	75
It made me want to learn more about NASA.	68
It made me want to learn more about engineering.	66

Impacts of Extended Events on Students



Challenges

- Many of the communities NESSP is targeting are very high needs, with limited local STEM opportunities
- Thus, creating a pipeline of opportunities is a large undertaking
- Providing both formal and informal education STEM opportunities is likely necessary

Challenges

- Addressing formal STEM education is not trivial, especially in under-resourced communities
 - Lack of equipment and supplies
 - Teachers responsible for multiple disciplines
 - Limited time for teachers to prepare

Opportunities

- Most states have adopted the NGSS or NGSS-like standards, but there is a severe lack of instructional materials aligned with these standards
- NASA is uniquely poised to address this problem—NASA missions and science can generate interest and excitement and could form the basis of high-quality units and lessons aligned with the NGSS
- Curriculum development is not a trivial task and requires expertise, but has the potential to impact the system at scale.

NESSP and the SCIACT Collective

- NESSP is leveraging connections within SCIACT for the Apollo 50th challenge
- Other projects serving as hubs, providing support and materials to local teams for the challenge
- NESSP plans to implement another challenge next year for Mars 2020

Evaluation and the Collective

- Evaluators have formed a community of practice
- But evaluators work for their individual projects, so limited time (budget) for collaboration

Evaluation and the Collective

- Also, projects vary greatly and many have unique features
- Top level metrics are broad and open to differing interpretation making sharing of evaluation resources challenging

Looking Ahead

- As NASA moves towards a second round of funding:
 - PIs, evaluators, and NASA personnel may benefit from spending **more time** working toward:
 - A shared vision of the collective's goals
 - Operationalizing the top-level metrics (e.g., How would we know if SCIACT was successful?)
 - Unpacking the system (opportunities and barriers) and the collective's theory of action
 - Doing so would allow for projects to adjust, or new projects added, to strengthen the collective