IMPACT OF PARTICIPATION IN

Pennsylvania Science Education Leaders Network

Interim Growth Report 2021–2022

PennSEL Network
Pennsylvania Science Education Leaders

THE GRABLE FOUNDATION
dedicated to improving the lives of children

ARCONIC FOUNDATION

NextGen Science
WestEd

SUMMARY OF FINDINGS

Vision

of science teaching and learning of participants **became more aligned** with today's science standards.

Leaders

built capacity in effective strategies for moving to rigorous learning goals.

Collaboration

was a **more widespread** practice after participating in the PennSEL Network.

For the first time in nearly two decades, Pennsylvania is undergoing a major effort to improve science teaching and learning across the Commonwealth through the introduction of the Science, Technology & Engineering, Environmental Literacy & Sustainability (STEELS) standards. Standards serve as a foundation for every other component of a school system: instructional materials, assessments, professional learning, course sequencing and instructional time, leadership structures and budget, internal and external communications, and community partnerships—and therefore are instrumental in advancing student engagement, equitable access, and outcomes.

To support this work, in spring 2021 NextGenScience at WestEd launched the Pennsylvania Science Education Leaders Network (PennSEL Network), a leadership development program in collaboration with Pennsylvania Department of Education, to prepare teams of Pennsylvania science leaders to improve science teaching and learning for all students as reflected in the new STEELS standards. The PennSEL Network includes representation from all 29 of Pennsylvania's regional education offices, or Intermediate Units (IUs).

This report summarizes survey findings on the impact of the PennSEL Network on participants after roughly one year of programming.

PennSEL Network Programming

The programming below describes key activities of the PennSEL Network from June 2021–December 2022.

Baseline Data Collection to Learn about Current State of Science Programs

WestEd worked with the PennSEL Network participants and Pennsylvania Department of Education to design and conduct a survey across the Commonwealth. Each team received a customized report synthesizing IU-specific data findings.

Regular Team Leader Check in Calls and Virtual Learning Opportunities Between Meetings

WestEd and PennSEL Network leaders have regular coaching calls about strategy, lessons learned, and shared resources.

Network-Wide Activities for PennSEL Teams

- **Launch Meeting:** Participants examine instructional shifts reflected in the Pennsylvania STEELS standards and define their current state of science teaching and learning in key areas.
- **Immersive Learning Experience:** Participants refine their shared vision of key features of effective science teaching and learning by engaging in an immersive classroom experience as learners. Participants consider the role of high-quality instructional materials and professional learning in improving science teaching and learning.
- **High-Quality Instructional Materials Evaluation:** Participants receive an introduction to the Paperscreen phase of NextGen TIME, a suite of tools and processes for curriculum-based professional learning that supports educators to evaluate, select, and implement instructional materials.
- **Effective Professional Learning Systems:** Participants examine inputs, outputs, and design features of high-quality professional learning systems through the Leading Professional Learning Simulation Game.
- **Strategic Planning and Launching Projects:** Throughout the above meetings, WestEd supports teams to build on their strategic plans, understand how to best manage change in their communities, and launch a team project with mini-grant funds to begin enacting a key strategy.

Activities to Support Team Implementation Area Strategies

- **Pennsylvania Science Curriculum Leadership Academy:** In Part I, leaders refine their shared vision of key features of instructional materials. In Part II, leaders map out a timeline for selection in their community and understand key milestones in a successful curriculum adoption.
- **Immersive Science Experience Facilitation Academy:** Participants prepare to facilitate a one-day immersive professional learning session to build a shared vision for science teaching and learning in their community.
- **Leading Professional Learning Simulation Facilitation Training:** Participants observe, co-facilitate, and reflect on facilitation strategies for leading the simulation in their own regions.

Findings

This report highlights **five areas** where the PennSEL Network has had a positive impact on its participants. Participant vision for science instruction has become more aligned with the research-base, science education has become a bigger priority both across Pennsylvania and within participant organizations, professional learning and collaboration opportunities have increased, and participants have begun enacting strategies that have been shown to be effective in similar work across the country.

The impact has been especially strong for some participants, with 43% of survey participants saying the program has been their **most impactful learning experience in the past 10 years.**

Vision for Science Teaching and Learning

Priority of Science Education

Professional Learning Experiences

Current Practice and Strategies

Frequency of Collaboration

Data Collection for this Report

There are over 180 PennSEL Network participants. Upon joining the PennSEL Network (either in June 2021 or February 2022[1]), participants completed a Pre-Survey (88% response rate) that asked a series of questions about their vision for science teaching and learning, the work of transitioning to new science standards, professional learning experiences, collaboration type and frequency, and policies, people, and resources that either support or hinder their efforts to move toward their vision for science teaching and learning. In January 2023, they again completed the same survey, referred to in this report as the Post-Survey (77% response rate), following participation in PennSEL Network activities.

[1] The second wave of teams joined in February 2022 when the PennSEL Network grew due to high demand.

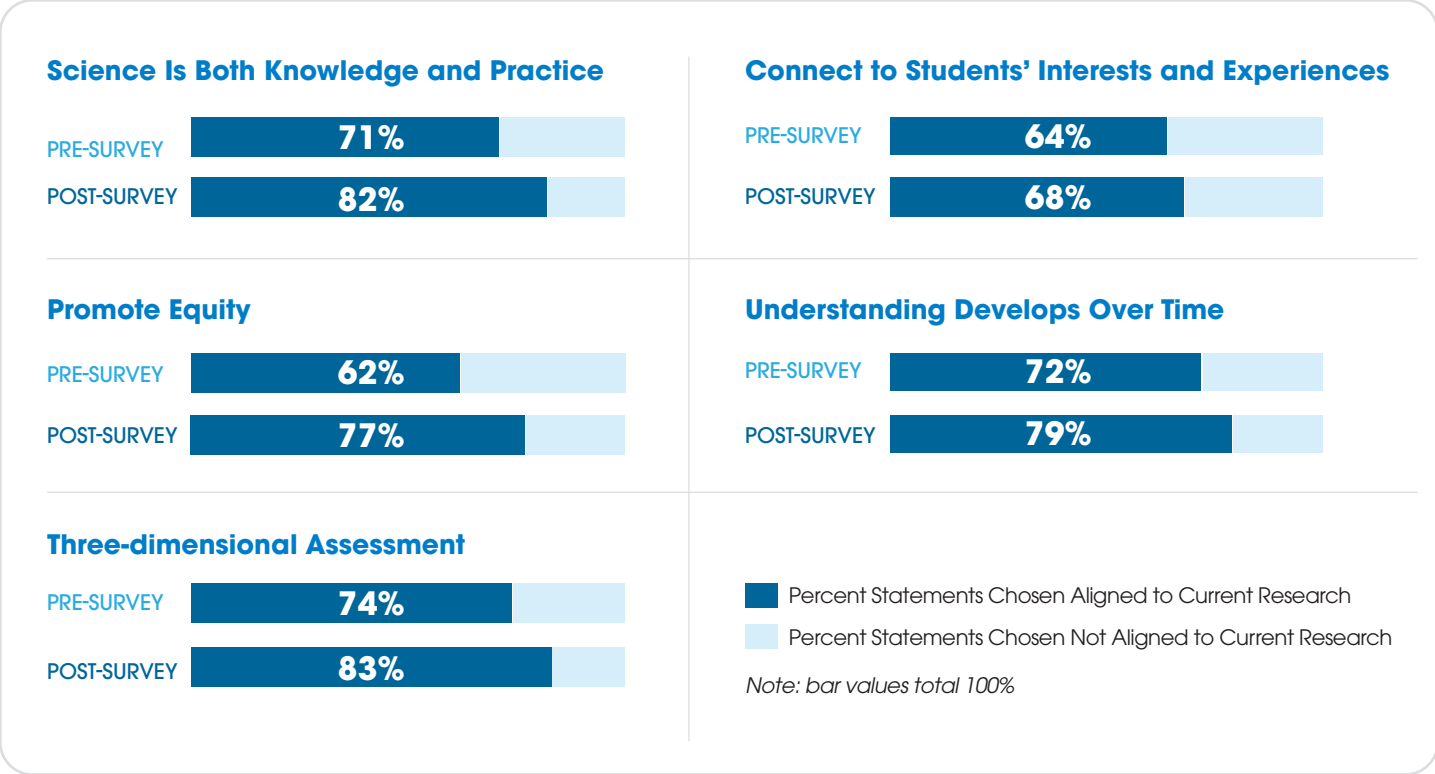
"The PennSEL meetings have pushed my intellect in a totally different yet awesome way. I am surrounded by people who are passionate about improving science education while learning the tools to improve it. [This approach] makes me excited to finish my final decade in teaching better than my previous 25 years."

— PennSEL Network Participant

Vision for Science Teaching and Learning

The PennSEL Network programming aimed to build a shared vision for science teaching and learning among participants aligned with the Pennsylvania STEELS standards based on the research in *A Framework for K–12 Science Education (Framework)*[2].

On the Post-Survey, PennSEL members were more likely to select statements aligned to current research in each of the following five categories. The findings suggest that members' **visions for science have become more aligned with the innovations in the *Framework* after participating in Network activities**.[3]



Example Statements for "Science is Both Knowledge and Practice" Category

Example Statement Aligned to Current Research

Students are learning how to construct scientific models to explain scientific phenomena.

Example Statement Not Aligned to Current Research

I am explaining an idea to students before having them consider evidence that relates to the idea.

To see the aligned and not aligned statements from all five categories, click here.

Learn more about how one of the PennSEL Network teams is building a shared vision for science teaching and learning in its community here.

[2] National Research Council. 2012. *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press. https://doi.org/10.17226/13165

[3] Participants were asked about their vision for science education, choosing from six aligned statements and six non-aligned statements from each of the five categories. Vision items were adapted from a Science Vision Survey developed by ACESSE, an NSF-funded project that brings together educators and researchers to collaboratively research, develop, and pilot strategies to make science education more coherent and equitable.

Priority of Science Education

Participants reported that **the level of priority for science and science education has increased since the launch of the PennSEL Network.** The PennSEL Network and adoption of the STEELS standards has led to an increase in focus on science across the state and within organizations as leaders prepare for the complex work of transforming their science programs.

SCIENCE AS A STATEWIDE PRIORITY

More participants "strongly agreed" that **improving science teaching and learning was a priority across Pennsylvania** since the launch of the PennSEL Network.

314%
more participants strongly agreed science was a priority across Pennsylvania in the Post-Survey

"The fact that I have had very few professional learning experiences directly geared toward science (until now), I would say that my vision now has hope. Based on what I've learned since working with the PennSEL Network, I see how vital professional development for science is."

— PennSEL Network Participant

GROWTH OF THE PENNSEL NETWORK

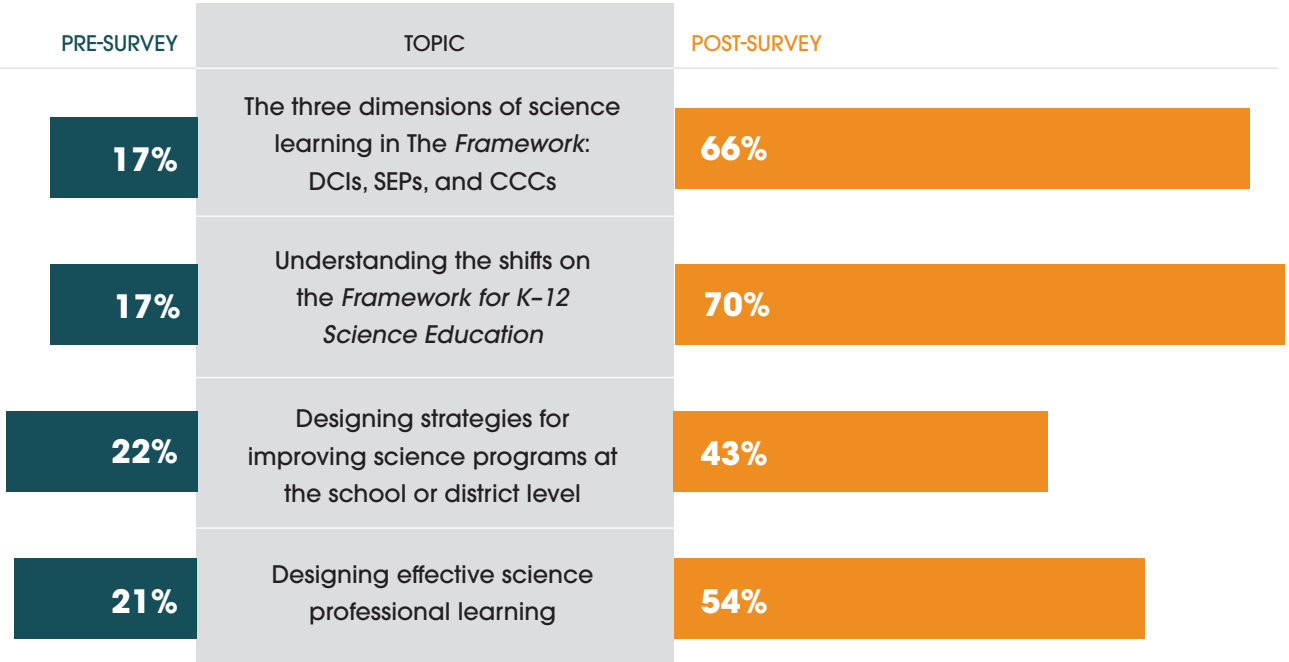
The growth of the PennSEL Network itself illustrates the increased priority of science education across the Commonwealth. Originally envisioned as an "early implementer" initiative with five IUs, the program grew as there was wide and enthusiastic interest in participation from nearly all IUs in the state. The program now includes all 29 IUs, representing the entire Commonwealth of Pennsylvania.

Professional Learning Experiences

Participants reported receiving more science professional learning than the amount they reported at the beginning of the PennSEL Network. In particular, the percentage of participants reporting **eight or more hours** of professional learning relating to understanding the shifts of the *Framework* **quadrupled from 17% in the Pre-Survey to 70% in the Post-Survey**. This suggests participants chose to prioritize time for professional learning in key science areas, both through the PennSEL Network and other offerings that have arisen due to a statewide increase in priority for science education.

This graph shows the increase in professional learning experiences in key areas.

CHANGE IN PARTICIPANTS' PROFESSIONAL LEARNING EXPERIENCES BY TOPIC (8+ HOURS IN THE LAST TWO YEARS)



Learn more about how education leaders in the Harrisburg region boosted district leader capacity to design an effective professional learning plan here.

Current Practice and Strategies

To learn whether participants changed their practice in their work of transitioning to Pennsylvania's new learning goals after participating in the program, the Post-Survey asked about the **most important strategies for ensuring the successful implementation of the Pennsylvania STEELS standards** and **current implementation strategies**.

MOST IMPORTANT STRATEGIES FOR IMPLEMENTING SCIENCE STANDARDS

PRE-SURVEY

23%

of participants identified key strategies for implementation

POST-SURVEY

89%

of participants identified key strategies for implementing the new science standards

After participating in the program, the top two strategies identified included:

- **Building a shared vision** for science teaching and learning (23%); and
- **Engaging interested/affected groups** to increase buy-in (23%).

CURRENT PRACTICES FOR IMPLEMENTING SCIENCE STANDARDS

PRE-SURVEY

16%

of participants indicated they had begun the transition to new standards

POST-SURVEY

78%

of participants indicated they had begun the transition **and** identified current practices

The most important practices listed included:

- **Professional learning** for myself as a leader (48%);
- **Developing science leadership teams** (16%); and
- Participating in the **PennSEL Network** (14%).

These strategies and practices listed indicate important lessons learned in the past year. In the Pre-Survey, participants most frequently described "updating curriculum" (15%) as the most important strategy. In the Post-Survey, participants indicated they learned that other critical strategies are needed before updating curriculum, including engaging in learning as leaders, developing leadership teams, building a shared vision, and engaging interested/affected groups, such as educators, parents, or community partners.

Lessons from Practice

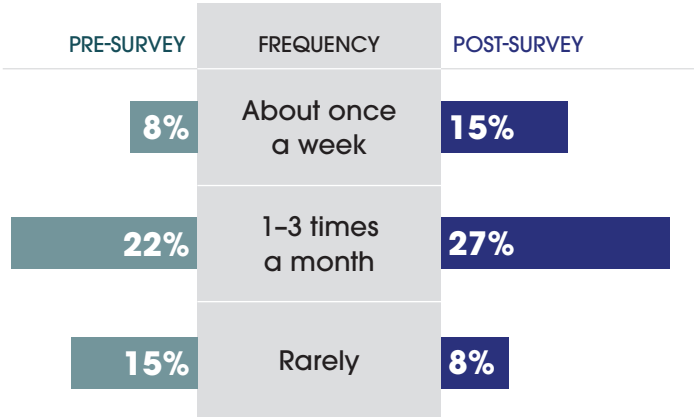
The PennSEL Network supports members to move forward with a key strategy for transitioning to new learning goals for students. Read the story of five teams engaging in early implementation work **here**.

Frequency of Collaboration

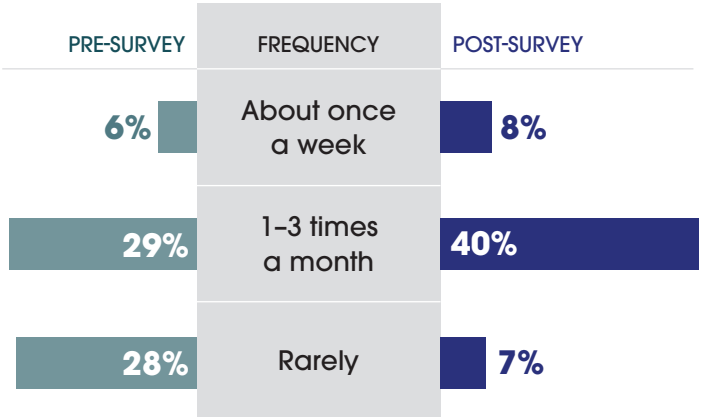
Collaboration is a key strategy for supporting changes required with new science standards, allowing for the sharing of resources, lessons learned, and expertise. Collaboration was a more widespread practice after participating in the PennSEL Network, both within and across their organizations.

When asked how frequently participants collaborated with others both within and outside of their organizations on matters related to science teaching and learning, they **reported more frequently collaborating with others in the Post-Survey than in the Pre-Survey on a weekly and monthly basis.**

FREQUENCY OF COLLABORATION WITHIN AN ORGANIZATION



FREQUENCY OF COLLABORATION ACROSS ORGANIZATIONS



In addition, when asked specifically about collaborating with individuals in the participants' same roles (e.g., biology teacher, science coach, school principal), **those reporting collaboration once a month more than doubled from 9% to 20%** and **the percentage reporting rarely was cut in half from 21% to 9%.**

Looking Forward

Participants were asked about what they were most interested in learning next. Responses in the Post-Survey indicated **they were interested in bigger picture next steps related to implementing new standards**.

Top Four Areas of Interest for Future Learning

ASSESSMENTS

Learning more about assessments designed for the PA STEELS standards

ELEMENTARY

Knowing how to support the transition to new standards in the early elementary grades

EQUITY

Knowing how issues of equity and diversity can be foregrounded in science instruction

CURRICULUM

Exploring what curriculum exists to support teachers in the new vision for science teaching and learning

In looking across the data, the changes in Pre- and Post-Survey results suggest participants have begun to build a foundation of learning about the shift in teaching and learning and effective strategies to make them a reality in classrooms for all students. The PennSEL Network will build on that foundation and support teams to take important next steps toward implementation in the coming years.

> *"I think the strategy of getting elementary science prioritized will be monumental in the successful implementation of these standards at all levels."*
>
> — PennSEL Network Participant

About the PennSEL Network

PennSEL NETWORK PARTICIPANTS

NextGenScience worked with local leaders to launch the PennSEL Network in anticipation of the new STEELS standards in all 29 of Pennsylvania's regional education offices, or Intermediate Units (IUs).[4] This work invited school, district, and IU leaders from both urban and rural areas, state leaders, and other key community-based STEM vested partners from across the Commonwealth to learn, plan, and work together toward a new vision for science teaching and learning. The PennSEL Network has 27 teams of up to seven members each, totaling over 180 members.

PennSEL NETWORK DESIGN PRINCIPLES

The PennSEL Network supports the intentional and equitable transition to Pennsylvania's new science standards by supporting regional teams to collaborate in a statewide community. This design builds on Pennsylvania's current structure while fostering new opportunities for educators and leaders to learn together, develop a shared vision, and collectively solve problems across regions. The PennSEL Network is designed around the following principles:

Build a shared vision of equitable science teaching and learning	Prepare to lead change across the science education system	Provide tools and processes to inform and continuously improve strategy
To effectively lead change in their communities, science education leaders need learning focused on understanding the key shifts in science teaching and assessment and why these shifts matter for students. The decisions that science leaders make about how to design or adopt science curriculum, which assessments to prioritize, and the structure of professional learning systems are informed by a leader's vision of what high-quality science teaching and learning looks like in the classroom.	Learning experiences build leaders' skills for system-wide strategy development around curriculum, professional learning, and related implementation indicators. Leaders explore the key components of a strategic plan to improve science teaching and learning, lessons learned from other states and districts, the resources required to implement reforms at scale, and the data required to understand their current state of science programs.	Connecting the program's science education leadership development work with science professional learning, teams gather data on the current state of science teaching and learning in their region and use that data to begin building and implementing a strategy. Based on lessons learned and vetted resources across the country, teams make strategic decisions that will have the greatest impact towards the goal of meaningful science education for all students.

[4] The PennSEL Network launched in two waves: the first in June 2021 and the second in February 2022. The second wave had an expedited and more efficient experience, and by January 2023 both waves had experienced similar support and programming.

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