COMMUNITIES OF PRACTICE IMPROVING SCIENCE TEACHING AND LEARNING

Stories from the Field

Stories from the Pennsylvania Science Education Leaders Network

PennSEL Network
Pennsylvania Science Education Leaders

THE GRABLE FOUNDATION
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Adopting new learning goals, called academic standards, is an opportunity for a state or district to advance science education for all students. Doing it effectively, however, requires careful planning from education leaders at all levels. To support the transition to Pennsylvania's Science, Technology & Engineering, Environmental Literacy & Sustainability (STEELS) standards, NextGenScience in 2021 launched the Pennsylvania Science Education Leaders Network (PennSEL Network) in partnership with the Pennsylvania Department of Education. The PennSEL Network is a group of regional leadership teams working together to lead systemwide change toward meaningful and equitable science instruction.

One part of the work is supporting members to move forward with key strategies for transitioning to new learning goals for students. Among other priorities, these early milestones include:

- Creating a shared vision for science teaching and learning in your community;
- Supporting teams to evaluate and select high-quality instructional materials;
- Building school administrator capacity in science teaching and learning; and
- Boosting district leader capacity to design an effective professional learning plan.

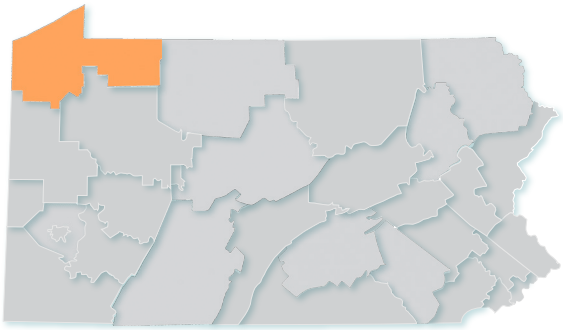
As part of their participation in the PennSEL Network, regional teams received funding to begin implementing STEELS in the unique context of each of their communities. Here are stories from PennSEL Network teams working toward each of these milestones.

Creating a Shared Vision for Science Teaching and Learning

The new Pennsylvania STEELS standards require that students make sense of the world around them and design solutions to problems. Establishing a shared classroom vision of what this really looks like in practice is a foundational step that sets the stage for the rest of the work to implement new standards. Three key pieces — leadership team, vision, and strategy — are necessary for meaningful, sustained shifts to take root in a system. When science leaders engage educators at all levels around a common vision, backed by a careful plan for achieving that vision, students' science learning experiences and outcomes improve.

STORY FROM THE FIELD

Northwest Tri-County Intermediate Unit 5 created a cross-departmental team of school and regional leaders, educators, and science content specialists to support the science classroom shift. This cross-departmental team is working together to build a shared vision for science with teachers, instructional coaches, curriculum directors, and building level administrators across the region.



Map highlighting Northwest Tri-County IU 5

Through the PennSEL Network, the cross-departmental team engaged in learning research-based approaches to effective science instruction. They reflected on the current state of the science programs in their communities and identified their hopes for the programs in the future.

To engage members across their communities, they began providing professional learning sessions and guidance for these audiences within the region.

Learning Content for Community Members	Key Strategies to Plan for Change
• Experience the classroom shifts as learners	• Review state-level implementation guidance
• Reflect on what they envision students would experience in the science classroom	• Advise on the development of local action plans for transitioning to the new standards
• Determine effective strategies to make meaningful science experiences a reality for all students	• Connect districts to tools and resources to support their work

"Coming together as a team across the region allows us all to lean on each other to ensure that the message that reaches classrooms is coherent. All vested partners need to be a part of the conversation to best support the learning of our students. These are big changes that will take time to implement — and our PennSEL team is moving mountains to ensure that our students become critical thinkers, achieve the pinnacle of their potential, and reach unparalleled heights of success."

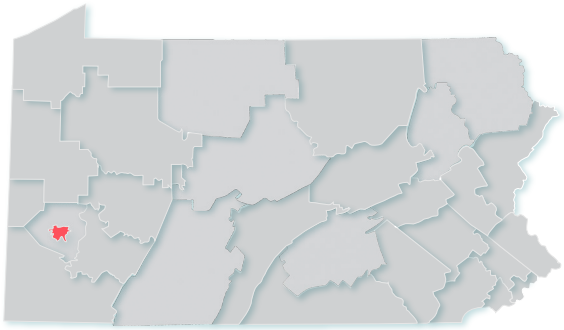
— **Joy Shaffer,** PennSEL Network Leader, Supervisor of School Improvement Services for Curriculum, Instruction and Assessment, Northwest Tri-County Intermediate Unit 5

Supporting Teams to Evaluate and Select High-Quality Instructional Materials

A review process that includes engaging educators at all levels, clear criteria, and careful evaluation of evidence from materials enables schools and systems to select the best materials possible. Multiple studies show that high-quality instructional materials coupled with professional development can dramatically improve student outcomes at scale. Instructional materials are a key to achieving equity because they have a significant impact on learning experiences and outcomes for students, particularly those living in poverty and historically marginalized communities.

STORY FROM THE FIELD

Pittsburgh Public Schools (PPS) is investing in new science curricula to improve science learning experiences and outcomes for students across the district. The district science team at PPS is leading their high school instructional materials adoption process using NextGen TIME to ensure their materials meet the district's priorities for engaging and meaningful instruction and preparing students to meet the state's rigorous science learning goals.

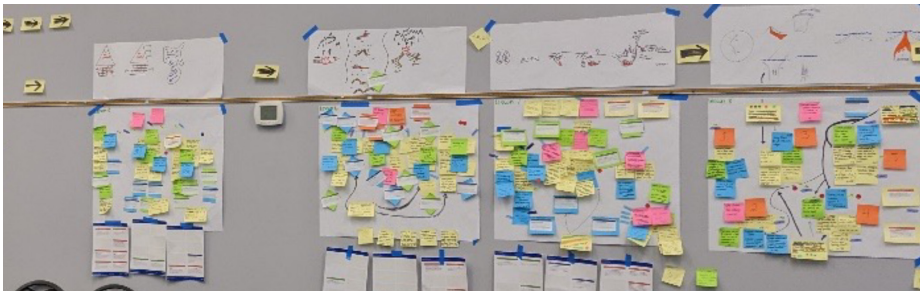


Map highlighting Pittsburg Public Schools

NextGen TIME is a suite of tools and processes for curriculum-based professional learning that supports educators to evaluate, select, and implement instructional materials designed for today's science standards. Through the PennSEL Network, PPS team members began working with tools and processes for evaluating and selecting high-quality science instructional materials. Equipped with lessons learned from districts across the nation, they engaged in carefully planning their own district's selection process.

> *"Once selected, the instructional materials will be the basis of the written curriculum and assessments for biology, chemistry, and physics in PPS. Providing all students with access to high-quality, standards-aligned, rigorous science materials and instruction results in a more equitable student experience"*
>
> — **Rhonda Graham**, PennSEL Network Leader, K–12 Science Supervisor, Pittsburgh Public Schools

Through an application process, the district team identified 12 high school teachers (biology, chemistry, and physics) to be part of the selection committee. Their selection committee participated in learning experiences to ensure all members of the committee had a shared understanding of the selection criteria that align to the district's instructional priorities and were identified through the evaluation process. After completing the review of materials and selection, the team will make recommendations to its school board in June 2023.



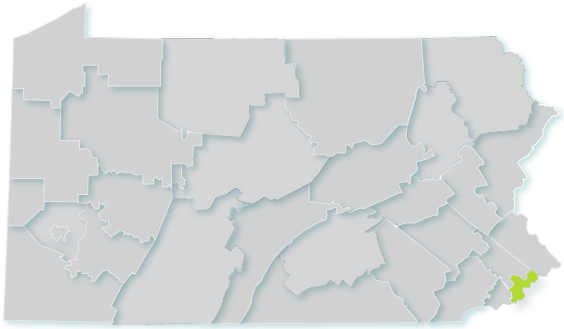
In the NextGen TIME process, participants gather and represent evidence from across an instructional unit.

Building School Administrator Capacity in Science Teaching and Learning

Professional learning for school and district leaders is key to any successful implementation effort. These formal leaders often hold decision-making abilities for purchasing, policymaking, and programmatic design. Investments in effective and early learning for these leaders will ensure that both teachers and students receive the resources and support needed to engage in high-quality science teaching and learning.

STORY FROM THE FIELD

The School District of Philadelphia's science team, which serves over 250 schools and 120,000 science students, came to the Fall 2022 PennSEL Network meeting with a question: After years of delivering high-quality professional development to teachers on research-based science instructional practices, why were these practices being implemented in some classrooms, but not others?



Map highlighting School District of Philadelphia

A critical conversation at the meeting led the team to a potential missing piece of the puzzle: While they had focused intently on developing teachers, they had not yet developed all the school leaders who supported them. They realized that if principals better understood what a research-based, student-centered science classroom should look, sound, and feel like, they would be better able to support teachers in bringing it to life.

With help from their PennSEL colleagues and facilitators, the Philadelphia team created an engaging professional learning experience to help school leaders experience the excitement of student-centered sense-making, and then prepare to support it in their own schools. This dynamic session brought over 100 school leaders—principals, APs, school-based teacher leaders, and science leads—through a research-based lesson based on a real-life disaster that occurred on Mount Everest.

By analyzing authentic data, creating and revising their own models, and sharing their thinking with their peers, the school leaders developed a new understanding of how the Earth's movements can cause big changes for landforms and people. They **also** developed a new understanding of how a science classroom based on student ideas can be both exciting and effective.

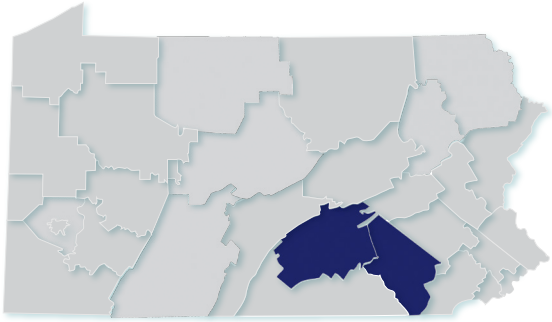
As a direct result of the training, School and Learning Network leaders in Philadelphia began to increase attention on science in their Professional Learning Communities and walkthroughs; now that they knew what to look for in excellent science instruction, they were ready to go find it! Assistant Superintendent Ariel Lajara of Learning Network 10 was one such Network leader. As Lajara said, "Our district delivered transformational professional learning to my team. We are now scheduled for three Network-wide science walkthroughs in the next few months." The District's science team is excited to support him, and many others like him, thanks to their transformative work with the PennSEL Network.

Boosting Capacity to Design an Effective Professional Learning Plan

High-quality instructional materials matter, but they alone are not enough to enable teachers to prepare all students to meet today's science standards. Educators and leaders need sustained professional learning opportunities closely tied to classroom instruction and high-quality instructional materials, positioning educators as both learners and professionals. A well-designed plan for professional learning ensures that teachers have access to meaningful, impactful, and high-quality professional learning experiences. To build such a plan, leaders need support to examine their current data, understand the research behind effective learning, and identify strategies based on their educators' interests and needs.

STORY FROM THE FIELD

Lancaster-Lebanon Intermediate Unit 13 and Capital Area Intermediate Unit 15 partnered to implement a two-day learning experience for formal and informal leaders in district teams. The experience immersed the leaders in learning how to lead complex change efforts in schools and districts and how to implement actions in ways that increase success and involve and build support among key staff and community members.



Map highlighting Lancaster-Lebanon IU 13 and Capital Area IU 15

After reflecting on their current ideas and practices related to planning and implementing a new initiative, teams engaged in a simulation game, WestEd's *Leading Professional Learning: Building Capacity for Sustained Practice, a Simulation Game for Educators*. By engaging in a simulation, teams were able to "test" professional learning experiences in a realistic school system, quickly see the impacts of their decisions, and reflect on which strategies result in the most successful outcomes for educators and ultimately, students. Teams reflected on learning from the simulation as they worked on developing their own local action plans for the STEELS standards roll-out.

Participating teams were composed of both formal and informal leaders who all benefited from learning the research and best practices for leading professional learning and change efforts and experiencing the complexity of learning design firsthand.

> *"Before this session, some leaders may have leaped at any professional learning opportunity, creating an uneven and scattershot approach to implementing the new standards. Instead, they are being more intentional in the professional learning requested, the sequencing of the experiences offered, and aligning opportunities with each teacher's professional capital strengths and needs. Ultimately, this will create a stronger foundation for sustainable improvements."*
>
> — **Susan C. Voigt, Ph.D.**, PennSEL Network Leader, Educational Services Supervisor, Capital Area Intermediate Unit 15

The workshop was a leadership development experience for teacher participants, who — for the first time — had the opportunity to engage in professional learning *about* professional learning, including the many factors that influence leaders' decisions regarding who, when, where, and how professional learning occurs. Participants were struck by the importance of building the capacity of ALL teachers, not just the willing, in order improve outcomes for all students.

Transforming Science Education

As leaders across the country seek to move closer to the vision of meaningful and equitable science education reflected in today's science standards, attending to the strategies used by these Pennsylvania leaders has shown great promise. Starting with building a shared vision, building capacity of leaders, and providing time and resources to form communities of practice highlights the expertise and passion of educational leaders and leads to sustained effective practice. To learn more, see the **Key Takeaways for Transforming Science Education here**.

About the PennSEL Network

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). 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.

Read more about participation in the PennSEL Network here.

About NextGenScience

NextGenScience, a project at WestEd, works alongside educators to transform science teaching, learning, and leadership through equitable and evidence-based approaches to reviewing classroom instructional materials, fostering meaningful partnerships, and developing system strategies for coherent science programs. Learn more about our work: ngs.wested.org

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