

2018 Noyce Summit Theme

Towards a 2026 STEM Education: Implications of Convergent Science for K-12 STEM Teacher Preparation in the Face of Changing Student Demographics

The NSF *Ten Big Ideas for Future Science Investments* identifies a future STEM research agenda aimed at solving some of the most pressing societal problems. The research agenda includes:

- Understanding the Rules of Life: Predicting Phenotype;
- Work at the Human-Technology Frontier: Shaping the Future;
- Windows on the Universe: The Era of Multi-Messenger Astrophysics;
- Navigating the New Arctic;
- Harnessing Data for 21st Century Science and Engineering; and
- The Quantum Leap: Leading the Next Quantum Revolution.

(https://www.nsf.gov/about/congress/reports/nsf_big_ideas.pdf)

What is common to all of these research areas is a convergence of knowledge across multiple disciplines. The grand challenges of today -- protecting human health; understanding the food, energy, water nexus; exploring the universe at all scales --will not be solved by one discipline alone. They require convergence: the merging of ideas, approaches and technologies from widely diverse fields of knowledge to stimulate innovation and discovery.

Recognizing the significant demographic shifts, the NSF *Ten Big Ideas for Future Science Investments* document leads with the idea of supporting collective problem solving to develop scalable ways to broaden STEM potential among traditionally underrepresented groups -- including women, Hispanics, African Americans, Native Americans, persons with disabilities, people from rural areas and people of low socioeconomic status.

Also, the 2014 NAS report, *Convergence: Facilitating Transdisciplinary Integration of Life Sciences, Physical Sciences, Engineering, and Beyond* (<https://www.nap.edu/download/18722>) identified some goals for undergraduate student interdisciplinary learning, regardless of field, including:

- to develop in students the intellectual capacity to deal with real, complex problems;
- to build student confidence and willingness to approach problems from multiple perspectives;
- to build student ability to communicate with scientists from other disciplines;

- to develop student ability to make decisions in the face of uncertainty (reflective judgment); and
- to help students understand strengths and limitations of different disciplinary perspectives.

To this end the 2018 Noyce Summit will begin to explore the *Implications of Convergent Science for K-12 STEM Teacher Preparation*, including:

***How can STEM teacher preparation programs show the deeper connections among STEM fields within each course, including connections to societal challenges and the risk and benefits of science?

***What new courses or labs are needed to help prospective teachers to be prepared to make deeper connections across STEM fields in the K-12 classroom?

***What are the infrastructure changes needed to implement courses and labs that show the deeper connections across STEM fields within each course?

***What resources exist and are needed to facilitate course changes that show the deeper connections across STEM fields within each course?

***What experiences need to be provided to help teachers understand how to use culturally responsive connections to engage diverse learners?