CONSIDERATIONS IN PREPARING A TRACK 4 GRANT

NOYCE RESEARCH

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ABOUT NOYCE

Next deadline
August 25, 2020
(4th Tuesday in August)

The National Science Foundation Robert Noyce Teacher Scholarship Program seeks to encourage talented science, technology, engineering, and mathematics (STEM) majors and professionals to become K–12 mathematics and science (including engineering and computer science) teachers. The program invites creative and innovative proposals that address the critical need for recruiting and preparing highly effective elementary and secondary science and mathematics teachers in high-need local educational agencies.

NOYCE HAS FOUR TRACKS

- Track 1: The Robert Noyce Teacher Scholarships and Stipends
- Track 2: The NSF Teaching Fellowships
- Track 3: The NSF Master Teaching Fellowships
- Track 4: Noyce Research

In addition, Capacity Building proposals are accepted from proposers intending to develop a future Track 1, 2, or 3 proposal.

RFP NSF 17-541
More information:
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5733

NOYCE RESEARCH TRACK GRANTS (SOLICITATION NSF 17-541)

- Study issues of STEM teacher effectiveness, persistence, or retention in high-need local educational agencies.
- Ideally, pair with a current or past Track 1, 2, or 3 project.
- Longitudinal studies of Fellows/Scholars beyond end of Noyce funding are encouraged.
- Frame research project with Common Guidelines for Education Research.*
- Budget can be up to $800,000 for 5 years plus $100,000 per additional Noyce Track 1, 2, or 3 project involved (max $2.3 million).
- Descriptions of current and past projects are online at: **https://www.nsfnoyce.org/**

*Institute of Education Sciences, U.S. Department of Education, and the National Science Foundation (2013). Common Guidelines for Educational Research and Development. Washington, DC. **http://www.nsf.gov/pubs/2013/nsf13126/nsf13126.pdf**

COLLABORATIONS ARE ENCOURAGED

STEM TEACHERS WHO REMAIN IN THE TEACHING PROFESSION BECOME MORE EFFECTIVE OVER TIME

STEM teachers who remain in the teaching profession tend to become more effective over time (Harris & Sass, 2011; Papay & Kraft, 2015) and contribute to a positive climate in their schools, which in turn supports greater student achievement (Bryk & Schneider, 2002; Newmann, Smith, Allensworth, & Bryk, 2001). However, **low teacher persistence and retention pose ongoing challenges within STEM education**. Teacher turnover and attrition are especially problematic in high-poverty schools (Carver-Thomas & Darling-Hammond, 2017; Goldring, Taie, & Riddles, 2014; Ingersoll & May, 2012) and rural schools (Darling-Hammond, 2009; Ingersoll & Perda, 2010).

A number of researchers have explored issues related to STEM teacher persistence, retention, and effectiveness, but **additional research is needed**. Since 2002, there have been over 10,000 Noyce Scholars and Fellows, which serve as a ready group of teachers with whom to conduct research on teacher persistence and teaching effectiveness.

PERSIST NOYCE TRACK 4 RESOURCES: GETTING STARTED

AAAS-ARISE: Advancing Research & Innovation in the STEM Education of Preservice Teachers in High-Need School Districts

The AAAS-ARISE website provides resources for current and prospective researchers who seek to expand the research base on STEM teacher preparation, especially as related to high-need schools. Visit their ADAPTATIONS blog at **https://aaas-arise.org/whats-new/blog** for more insight into research toward and replication of what works in the education of STEM teachers for high-need school districts.

AAAS Commissioned White Papers

Bell, C., Gitomer, D., Savage, C., & McKenna, A. H. (2019). A synthesis of research on and measurement of STEM teacher preparation. *American Association for the Advancement for Science.*

Fuller, E. J., & Pendola, A. (2019). Teacher preparation and teacher retention: Examining the relationship for beginning STEM teachers. *American Association for the Advancement for Science.*

Youngs, P., Bieda, K., & Kim, J. (2019). Teacher induction programs associated with retention in the STEM teaching workforce. *American Association for the Advancement for Science.*

PERSIST NOYCE TRACK 4 BOX FOLDER: AN EVOLVING RESOURCE

The 2019 AAAS Commissioned papers focus on teacher preparation, effectiveness, and retention. A pdf copy of each of these papers can be found in the PERSIST box folder as well as online at **https://aaas-arise.org/commissioned-papers.**

PERSIST Box folder

See **http://go.unl.edu/track4-resources** for a selection of references and other material related to research on teaching effectiveness, teacher persistence, and teacher retention.

Help us improve this resource. If you know of references or additional resources that would be valuable to include, please email us at **nebraskamath@unl.edu**.

http://go.unl.edu/track4-resources

CURRENT TRACK 4 PROJECTS

Through FY19

Network Retention in Noyce Communities of Practice

NSF Awards 1660736/1660665/1917181
Greg Rushton (PI), Middle Tennessee State University

Focus: To what extent Communities of Practice (CoP) are relevant to teacher development, measurable as social networks, and related to outcomes in identity, self-efficacy, and disposition to remain in teaching.

An Exploratory Study: The Role of Social Networks and Self-Efficacy in the Retention of Noyce Teachers

NSF Award 1660597
Meltem Alemdar (PI), Georgia Institute of Technology

Focus: The impact of Noyce teachers' personal networks and self-efficacy on teacher retention; interactions between school district-level characteristics and individual Noyce project characteristics with personal networks, self-efficacy, and retention.

Assessment Practices of STEM Teachers

NSF Award 1757249
Hannah Sevian (PI), University of Massachusetts Boston

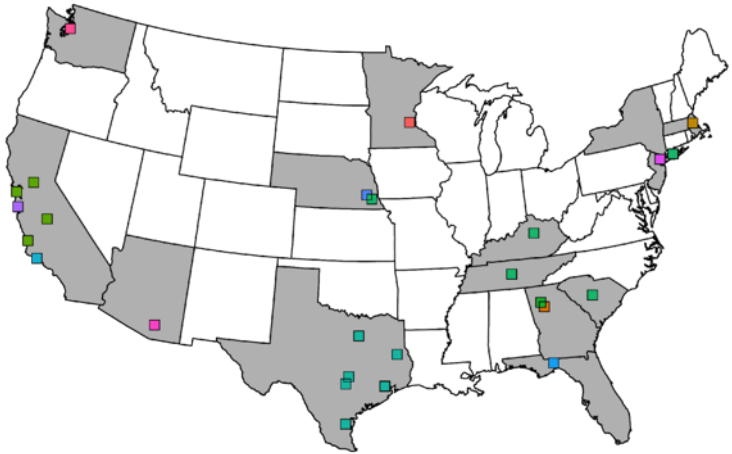
Focus: Teachers' assessment practices, including current assessment practices, changes in assessment practices over time, the influence of conceptual, pedagogical, cultural, and political challenges on teachers' formative assessment practices, and the relationship between assessment practices and student performance outcomes on classroom and district/state assessments.

Collaborative Research: A Study of the Impact of Pre-Service Teacher Research Experience on Effectiveness, Persistence, and Retention

NSF Awards 1660839/1660658/1660777/1660810/1660715
John Keller (PI), University of Colorado Boulder

Focus: Components of the STAR (STEM Teacher and Researcher) program and STAR teachers' persistence and retention in high-need settings; teacher effectiveness at engaging students in STEM learning and increasing student achievement gains, particularly in high-need settings.

Locations of Current Track 4 Projects



Projects are grouped by color. All data were taken from nsf.gov.
Note: There are no current Track 4 projects in Alaska or Hawaii.

TRACK 4 PROJECTS

Effective Novice Teachers: How Systems of Support Can Transform the Clinical Experience During Teacher Preparation

NSF Awards 1758264/1852960
Karin Lohwasser (PI), University of California, Santa Barbara

Focus: Pre-service teachers' opportunities to learn in the field and how systems of tools, routines, and informational resources impact the frequency and quality of those opportunities, as well as which tools, routines, and resources PSTs and cooperating teachers use, how they use them, and to what effect.

PREPSci: A Study on Promoting Reflective and Equitable Practice through Science Teacher Induction

NSF Award 1540789
Gillian Roehrig (PI), University of Minnesota

Focus: Induction and teachers' reflective practice and reform-based practices, including how teachers' reflective practices, beliefs about reformed science teaching, and reform-based practices change throughout the induction period and how induction program elements support teachers' reflective practice and reform-based practices.

TRACK 4 PROJECTS

SMTRI: Science & Mathematics Teacher Research Initiative

NSF Award 1557283
Patricia Stoddart (PI), University of California, Santa Cruz

Focus: Preparing secondary science and mathematics teachers to implement reform-based teaching in culturally and linguistically diverse classrooms; in particular, the project is focusing on examining teacher knowledge, beliefs, and practice during pre-service and first years of teaching across six University of California (UC) teacher education programs (TEPs), and comparing the impact of (a) additional undergraduate teacher preparation through UC's CalTeach program and (b) type of TEP (graduate vs. integrated undergraduate).

Collaborative Research: Understanding Robert Noyce Teacher Scholarship Outcomes in Texas

NSF Awards 1557273/1557276/1557278/
1557286/1557290/1557294/1557295/1557410
Catherine Horn (PI), University of Houston

Focus: Evaluation of eight different Noyce STEM preservice education programs and their program implementation, association with teacher outcomes and association with K-12 student outcomes.

TRACK 4 PROJECTS

Investigating the Characteristics of Programs that Produce Persistent STEM Teachers with High-Quality Instruction

NSF Award 1661400
Courtney Preston (PI), Florida State University

Focus: Noyce program features and their association with the quality of instruction in secondary math and science classrooms (e.g., coursework, field experiences, and induction) and persistence to the Noyce commitment, as well as the relationship between persistence and quality of instruction.

Collaborative Research: Teacher Leadership - Investigating the Persistence and Trajectories of Noyce Master Teaching Fellows

NSF Awards 1758462/1758452/1758438/1758342/1853560
Wendy Smith (PI), University of Nebraska-Lincoln

Focus: Master teaching fellows from eight current or past Noyce projects and their persistence and professional trajectories as teacher leaders. (Nebraska MTFs featured in photo at left.)

Studying the Retention of Novice Science Teachers by Learning from School District Induction and Mentoring Programs

NSF Award 1758282
Doug Larkin (PI), Montclair State University

Focus: Identify school districts in New Jersey, Pennsylvania, Wisconsin, and North Carolina where science teachers are successfully being retained, and investigate why they are being retained, particularly with a focus on teachers in high-need schools, teachers of color, and recipients of Noyce scholarships.

Teacher Education for Equitable Mathematics Instruction: An Exploratory Study of Noyce Program Impacts

NSF Award 1758401
Rebecca McGraw (PI), University of Arizona

Focus: Equity and teacher education for teaching, in particular focusing on how students in Noyce programs think about and work with equity in their coursework and fieldwork, as well as what practices they're taking up in the first few years of teaching.

TRACK 4 PROJECTS

FOR FURTHER PROJECT INFORMATION, VISIT:

https://www.nsfnoyce.org

1) Navigate to the "Project Locator" tab.

2) Click on your state or nearby states to find local projects

OR

click "Advanced Search" and enter in the NSF award number or PI name.

METHODOLOGICAL CONSIDERATIONS

Studying STEM teacher persistence and teaching effectiveness in high-need districts

- What are relevant research questions?
- What research designs are appropriate to answer those questions?
- What data collection instruments are available? Appropriate? Practical?
- What data analysis approaches are appropriate? Practical?
- What outcomes (for teachers, students, school systems) can be measured to document teacher persistence and teaching effectiveness?
- What is unique for teaching effectiveness in high-need districts?
- What is unique about teaching effectiveness for STEM subjects?
- How might research be conducted as part of research-practitioner partnerships?

Further Reading

Bryk, A. S., Gomez, L., Grunow, A., & LeMahieu, P. (2015). *Learning to improve: How America's schools can get better at getting better.* Boston: Harvard Education Publishing.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches, 5th Ed.* Thousand Oaks, CA: Sage Publications.

Institute of Education Sciences, U.S. Department of Education, and the National Science Foundation (2013). *Common Guidelines for Educational Research and Development*. Washington, DC. **http://www.nsf.gov/pubs/2013/nsf13126/nsf13126.pdf**


Darci Meiners

POTENTIAL FUTURE RESEARCH

Gaps in knowledge identified by current Track 4 PIs and the research literature

- An accepted definition and agreed-upon measures of teaching effectiveness
- A clear framework on effective teaching that brings together best practices, theories of learning, and measures of student outcomes
- Identification of critical factors in effective induction programs
- Preparation, retention, and persistence of computer science and engineering teachers
- How preparation of teachers for effectiveness in high-need districts relates to retention in the profession
- Impacts of standards-based assessments and/or teaching evaluation systems on teacher retention
- Longitudinal study of how high-leverage features of teacher prep affect recruitment and retention/persistence
- How to identify and support good mentor teachers
- Effects of district, state, and federal policies on teacher retention and effectiveness

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PHOTO CREDITS

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