

The NJ STEM Innovation Fellowship

Powering innovation in STEM education from the math classroom

The New Jersey STEM Innovation Fellowship is an exciting **teacher-leadership program** open to experienced **elementary teachers** working in **New Jersey public schools**. Teachers accepted to the fellowship will receive a **\$5,000 stipend** and join a **supportive learning community** where they will learn about a research-based, **innovative math teaching practice** alongside talented teachers from New Jersey schools. The new program is based on Math for America's (MfA) fellowship model developed in NYC and successfully adapted in other cities and states.

Fellowship at-a-glance:

- **Eligibility:** Currently licensed K-5 math teachers and coaches, with 4+ years of experience, working in a NJ public school
- **Activity:** Teachers implement and reflect on number strings, an innovative math-teaching practice
- **Time commitment:** One year – 2019 summer institute + monthly after-school meetings, 2019-20
- **Locations:** Montclair State University, Princeton University, Rowan University
- **Benefit to fellows:** \$5,000 stipend; high-quality professional learning experience
- **Benefits to schools/districts:** Increased capacity for high-quality math instruction

The innovation: *number strings*

A number string is a brief (15-20 minute) routine in which a teacher presents a carefully designed sequence of math problems that students solve mentally (*see reverse side of this document for more information*). Number strings help students develop computational fluency by deepening their conceptual understanding of fundamental mathematical procedures. Teachers who implement number strings can improve their ability to facilitate mathematical discussions and boost their students' mathematical ability and confidence. Number strings can be implemented with any math curriculum.

Fellowship activity

Summer 2019: fellows attend a 2-day summer institute (**August 22 & 23, 2019**) at Montclair State University where they will meet other participants and learn about number strings and how to integrate them into their regular math instruction. (Fellows that live far from MSU will be provided accommodations during the institute).

School year 2019 - 2020: fellows will implement number strings during their math instruction and attend monthly after-school meetings at their regional university campus to discuss implementation successes and challenges with other fellows in a supportive learning community.

How to apply

Application information will be coming soon at www.innovatestemnj.org.

For more information contact Anne Catena, Ed.D., Program in Teacher Preparation, Princeton University acatena@princeton.edu or 609-258-3336.



More about number strings and their use in the fellowship:

Ambitious math teaching requires providing students with opportunities to struggle with important mathematics (Hiebert & Grouws, 2007), work on cognitively demanding tasks (Stein & Lane, 1996), and engage in discourse that requires them to formulate their ideas and make sense of the ideas of others (Yackel & Cobb, 1996). Teaching math this way is difficult – even among experienced instructors!

There are many reasons that ambitious mathematics instruction is difficult. However, one promising support for teachers seeking to make their teaching more ambitious is instructional routines (Lampert et al., 2013). Instructional routines create a structure that supports teachers in facilitating discourse, engaging students, and providing opportunities for struggle. The routine creates norms around patterns of discourse that allow teacher and students to concentrate on sense-making.

One especially helpful routine is **number strings** (Fosnot & Dolk, 2001). In number strings, a teacher gives students a series of problems, beginning with ones that they can do easily. The string of problems is designed to highlight a specific mathematical idea or structure. By doing increasingly complex problems and explaining how they are solving them, students develop techniques for doing calculations, and they connect these techniques to larger ideas about the structure of operations and number system.

During the summer 2019 institute, NJ STEM Innovation Fellows will learn how number strings are created and what they are intended to accomplish. Fellows will watch videos of other teachers implementing number strings, and practice implementing in simulated classroom environments with their peers.

To further explore the ideas behind number strings, and see videos of teachers implementing them, see: <https://numberstrings.com> or <https://tedd.org/number-strings/>.

Each fellow will receive a book with high-quality number strings, crafted for their grade level. Fellows will implement these number strings in their classroom throughout the 2019-20 school year. They will discuss successes and challenges related to student learning with other fellows during monthly cohort meetings at regional universities. Fellows will also have an opportunity to interact and share with each other online.

Once comfortable with number strings, fellows will also receive support to facilitate professional learning communities organized around number strings for interested teachers in their schools and districts.

References:

Fosnot, C. T., & Dolk, M. L. A. M. (2001). *Young mathematicians at work*: Heinemann Portsmouth, NH.

Hiebert, J., & Grouws, D. A. (2007). The effects of classroom mathematics teaching on students' learning. In F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning*. Charlotte, NC: Information Age Publishing.

Lampert, M., et al (2013). Keeping it complex: Using rehearsals to support novice teacher learning of ambitious teaching. *Journal of Teacher Education*, 64(3), 226-243.

Stein, M. K., & Lane, S. (1996). Instructional tasks and the development of student capacity to think and reason: An analysis of the relationship between teaching and learning in a reform mathematics project. *Educational Research and Evaluation*, 2(1), 50-80.

Yackel, E., & Cobb, P. (1996). Sociomathematical norms, argumentation and autonomy in mathematics. *Journal for Research in Mathematics Education*, 27(4), 458-477.



New Jersey STEM Innovation Fellowship now accepting applications

NEW YORK, MONTCLAIR, PRINCETON & GLASSBORO - February 13, 2019 - Math for America (MfA), a nationally recognized STEM education nonprofit, announced with partners Montclair State University, Princeton University, and Rowan University today that a new program called [The New Jersey STEM Innovation Fellowship](#) is now accepting applications, with a deadline of March 31, 2019.

The one-year fellowship comes with a \$5,000 stipend and is initially open to experienced K – 5 educators who teach math in New Jersey public elementary schools. To apply, teachers should visit www.innovateSTEMnj.org.

Thirty teachers will be selected as fellows for the pilot year of the program, which will focus on improving math instruction in the classroom. Fellows will attend a two-day summer institute on August 22 and 23 at Montclair State University, and then attend monthly workshops hosted after school by participating universities in their region. Throughout the school year fellows will implement a brief, innovative, research-based math teaching routine called “number strings” shown to help students – particularly in high-needs schools – develop flexible computational thinking skills they need to thrive in mathematics in the early grades.

“New Jersey has some of the best public school teachers in the nation, who are committed to helping students reach their greatest potential,” **said Governor Phil Murphy**. “This Math for America pilot will help teachers implement new, STEM-based teaching practices and will enable them to further provide our children with the skills they need to prosper in the innovation economy.”

The summer institute hosted by Montclair State University will prepare teachers to bring number strings to their classrooms throughout the year. As part of the application process, fellows are required to secure the support of their school building and school district leaders, including principals and superintendents, to use the innovation to enhance their existing math curricula.

“Number strings are brief teaching routines that only take about ten-minutes to execute, but have been shown to boost teachers’ confidence in facilitating mathematical discussions, and substantially improve student-learning outcomes,” **said Michael Driskill, National Director of Advocacy at MfA**. “We are excited to build strong relationships through this fellowship with school and district leaders in New Jersey who trust teachers to drive innovation from their classrooms.”

MfA developed the new program with feedback and support from several key stakeholders in New Jersey including the Murphy Administration, New Jersey Department of Education, and JerseyCAN, an advocacy group that supports equitable access to STEM education for students. The fellowship is funded with support from the Overdeck Family Foundation, PSEG Foundation, Celgene Corporation, Becton, Dickinson and Company (BD), and the Maher Charitable Foundation.

About MfA

At MfA, we've created fellowships for accomplished mathematics and science teachers. Our model is based on the belief that collaboration, continued learning, and genuine respect enables teachers to grow professionally and provides long-term career satisfaction. This is a remarkable community of teachers who stay in the profession longer and define what teaching excellence means. These are teachers who inspire and motivate their colleagues. They change the lives of their students. Learn more at MathForAmerica.org.

About Montclair State University

Montclair State University is a research doctoral institution ranked in the top tier of national universities. Building on a distinguished history dating back to 1908, the University today has 11 colleges and schools that serve 21,000 undergraduate and graduate students with more than 300 doctoral, master's and baccalaureate programs. Situated on a beautiful, 252-acre suburban campus just 12 miles from New York City, Montclair State delivers the instructional and research resources of a large public university in a supportive, sophisticated and diverse academic environment. montclair.edu

About Princeton

Princeton University is a vibrant community of scholarship, research, and teaching that stands in the nation's service and the service of humanity. As a global research university with world-class excellence across the arts and humanities, the social sciences, the natural sciences, and engineering, the University is home to more than 1,200 faculty members who share a commitment to innovation, free inquiry, and the discovery and transmission of knowledge and new ideas. Princeton combines its strengths in research with a distinctive emphasis on undergraduate and doctoral education, preparing its 5,200 undergraduates and 2,800 graduate students for positions of leadership and lives of service.

About Rowan University

Rowan University is a Carnegie-classified national doctoral research institution dedicated to excellence in undergraduate education. It offers bachelor's through doctoral and professional programs to 19,500 students through its campuses in Glassboro, Camden and Stratford, New Jersey. Home to Cooper Medical School of Rowan University and the School of Osteopathic Medicine, it also comprises the William G. Rohrer College of Business; the Henry M. Rowan College of Engineering; the colleges of Communication & Creative Arts; Education; Humanities & Social Sciences; Performing Arts; Science & Mathematics; the School of Health Professions; the School of Earth & Environment, the Graduate School of Biomedical Sciences and a multidisciplinary honors college. Rowan is collaborating with regional leaders to create research and academic programs in health sciences. It has earned national recognition for innovation, commitment to high-quality, affordable education and developing public-private partnerships.