

## EDUCATION WEEK

Published Online: February 4, 2014

Published in Print: February 5, 2014, as **Creating a National Network of STEM Teacher Leaders**

### COMMENTARY

## How We Created a Network of STEM Teachers

By **Nicole Gillespie**

Nobody would accuse today's education reformers and policymakers of ignoring the science, technology, engineering, and mathematics fields. For good reason, schools across the country have been urged to beef up their STEM programs, in order to give every student a solid foundation in subjects that are critical to their personal and professional success.

And yet, for all the efforts that have been made to strengthen math and science standards, create new courses, write new curricula, and design STEM-related software programs and resources for students, we still struggle to ensure that those students have access to experienced, effective STEM teachers.

Moreover, what is needed today isn't just an influx of new STEM teachers, but more teachers with deep expertise in these fields and a commitment to staying in the profession long enough to hone their craft and take on leadership roles without leaving their classrooms and students.

Instead, the current national "strategy" seems to involve hoping that that some STEM teachers will forgo more lucrative and professionally rewarding opportunities elsewhere and will stick around to become mentors and leaders in the profession. It's time to help ensure that individuals with crucial STEM skills and knowledge see teaching as an attractive, rewarding, and viable career path. This will require that schools and districts find ways to identify their most promising new STEM teachers, making it feasible and rewarding for them to take on leadership roles from the classroom, and preparing them accordingly as they begin their careers. Equally important, schools and districts must develop and support thriving networks of teacher leaders, giving them access to the kind of intensive, peer-to-peer professional development that allows individuals in every field to feel connected and

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empowered, to continue to learn and be challenged, and to sustain their interest and job satisfaction over a long career.

In the past decade, the Knowles Science Teaching Foundation, of which I am the executive director, has built a network of hundreds of STEM teachers across 39 states through our five-year fellowship program. The network has been formed through a rigorous process of identifying and selecting promising novice teachers in STEM fields with a demonstrated commitment to teaching and the potential to serve as leaders in the profession. The program provides sustained opportunities to develop STEM content knowledge for teaching and pedagogy; create learning opportunities for students; use data to inform and improve instruction and learning; design instruction that supports individual student learning; and build capacity to work collaboratively with colleagues to improve education for all students. Fellows meet regularly with each other and experts in science and mathematics education and use online spaces to support one another, share elements of their practice, and provide critical feedback.

Through the online network, fellows collaborate with, learn from, and support peers in their own districts and across the country to support and mentor novice teachers and provide leadership opportunities for more-experienced ones. Fellows work with nationally known researchers to develop new pedagogical skills grounded in the realities of the classroom and then help train and support the next generation of novice STEM teachers.

By contributing to the building of STEM capacity nationwide, our work over the last five years has led us to believe that this approach can address many of the issues that educators and policymakers have sought to resolve, including:

- *Providing extended opportunities for teachers to work together to learn, implement, and evaluate content-specific pedagogy.* Our program provides experiences and supports for fellows around content-specific pedagogy, as well as a way to share the work in their schools and across districts.
- *Acknowledging the differences in curriculum and policy within states and across districts by focusing on what works instructionally, allowing the shared knowledge of the network to be leveraged everywhere.* For example, KSTF senior fellows have formed an engineering task force that will develop models to integrate engineering into all science classes to satisfy the aspirations and requirements of the Next Generation Science Standards.
- *Addressing teacher retention and differentiation of roles by keeping teachers engaged through leadership and research opportunities with ongoing support from experts and peers.* Nearly 90 percent of our fellows are still teaching after five years, compared with the 50 percent national retention after the same period of time.
- *Providing a realistic way of promoting the deep knowledge and expertise required by rigorous*

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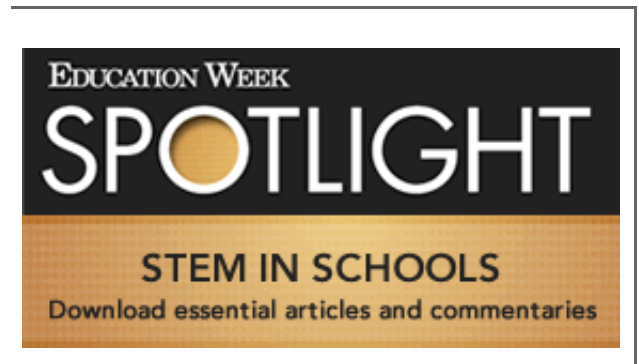
*standards through peer collaboration and professional learning.* With studies suggesting that professional development must be sustained for it to have an effect on student learning, a collaborative, teacher-led approach is the only feasible way to build professional knowledge for lasting impact. Our approach provides extensive and ongoing professional learning that helps fellows develop skills and habits by studying teaching with colleagues.

We also believe our program's experience developing an emerging network of teacher leaders in STEM fields has broader implications for professional development, teacher leadership, and instructional improvement. Our findings suggest:

- Bringing teacher-leader networks to scale requires a supportive and high-tech approach to deliver support, encourage resource sharing, and bolster collegial relationships.
- Our focus needs to change from the replication of specific programs to a new understanding of how individual teachers, when connected to others across buildings, districts, and states, can transform student learning, teacher practice, delivery of effective programs, and policy.
- Teachers who take responsibility for their own professional learning and support their peers through collaborative networks can transform teaching and learning within their buildings, across districts, and beyond.
- Even in high-need subject areas, teachers must not be selected for their expertise alone, but also for their ability and willingness to continue improving their own teaching and to collaborate with colleagues in improving theirs.
- Effective development of content and pedagogical expertise and teaching practice requires persistent time and effort.

Other nations, such as China, have implemented policies **to create a corps of teacher leaders**. In 1999, China's Ministry of Education implemented the Trans-Century Teachers Training Project, which called for the selection and training of 100,000 "backbone teachers" within two years to play key roles as instructional leaders, mentors, and specialists in research and pedagogy at the school, district, and regional levels. Today, these teachers make up about 30 percent of the teaching force in the provinces, according to a 2013 report by Hiron Salle and Charlene Tan of the National Institute of Education, Nanyang Technological University, **who studied the mentoring of new teachers in Shanghai**.

We recognize that the United States can't build a top-down network of teacher leaders by force of federal action. But what we can do is support efforts to back promising teachers and develop their leadership and pedagogical skills, as well as connect them through networks that grow organically by subject area or need. We can also link these networks to allow research and best practices to



scale across traditional educational boundaries.

For such networks to flourish, they need the support of policymakers, philanthropists, and other stakeholders at all levels to ensure they have the resources needed to grow from the bottom up. We must identify STEM teacher leaders and nurture them so that they can become effective leaders capable of building effective networks. This challenging work for our educators requires an equally effective backbone of support.

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