

100Kin10: A Decade of Accelerating Impact on Teachers and Students in STEM

Bellwether Education Partners' Research Findings Brief

Introduction

100Kin10's origin story is etched in U.S. presidential history. In his 2011 State of the Union address, [President Obama called for](#) preparing 100,000 new teachers in the fields of science, technology, engineering, and math (STEM) in the ensuing decade to accelerate economic recovery and maintain global competitiveness. 100Kin10 answered the call, building a nationwide network of outstanding partner organizations and persisting against the backdrop of a [significant decline in total enrollment nationwide](#) in teacher preparation programs since 2010.

Amid this challenging environment, 100Kin10 and its partner network surpassed its moonshot goal, adding more than 100,000 excellent STEM teachers to America's K-12 classrooms by 2021. What's more, 100Kin10's success in simplifying a vastly complex problem and galvanizing action across the country accelerated positive shifts in the STEM education field that will better equip students to address current and future threats to our health, planet, and economy.

How Has STEM Education Changed?

Ten years after 100Kin10 first set out to answer President Obama's call, education leaders describe a STEM education field that has progressed in significant ways. These leaders, many of whom work in organizations that made commitments to the 100Kin10 goal (and thereby became "partners" in the 100Kin10 effort), consistently draw connections between 100Kin10's leadership and changes in awareness, values, and practices in institutions that serve STEM teachers and students around the country. In 100Kin10's most recent partner survey, **88% of partners agreed that 100Kin10 enabled their organizations to increase their impact on STEM teachers, students, and schools.** Bellwether's in-depth interviews with network partners — along with interviews of teachers and students around the country and an extensive review of program documents and data — shed light on 100Kin10's impact over the past decade. **Specifically, 100Kin10's support for its partners contributed to five key changes in STEM education:**

1. 100Kin10 preparation programs use improved strategies to recruit highly qualified STEM teacher candidates
2. More STEM teacher candidates have access to evidence-based STEM preparation via 100Kin10 partners
3. 100Kin10 partner programs have increased emphasis on preparing and supporting elementary teachers with STEM skills, and in particular foundational math
4. More teachers have access to quality STEM professional growth and collaborative work environments via 100Kin10 partners
5. More teachers and students have access to meaningful, authentic, and rigorous STEM learning via 100Kin10 partners

This brief summarizes Bellwether's research findings. First, we provide a high-level description of 100Kin10's contribution to the key changes listed above, illustrated by a representative

example and a statement from the field. Then we briefly discuss the themes we consistently heard about *how* 100Kin10 achieved success

Research Methods

Through an extensive review of network documents and in-depth interviews with beneficiaries of 100Kin10's efforts — including higher education programs, funders, community organizations, teachers, and students — Bellwether investigated changes reported in the field related to the STEM teacher shortage and what role the network played in sparking those changes.

Forty partners, teachers, and students were interviewed for this project. We also reviewed 10 years of documentation provided by 100Kin10 to gain a deeper understanding of the context and scope of its work. Documents reviewed included blog posts, articles, videos, funding reports, and research papers, among others. Bellwether also reviewed publicly available documents (e.g., news articles) related to 100Kin10's work and the work of its partners.

This was a qualitative investigation of 100Kin10's influence and impact on the STEM field, teachers, and students; it does not incorporate quantitative methods. As such, it is not intended to be an exhaustive representation of the organization's impact or prove causal links between 100Kin10's strategies and specific outcomes. That said, our assessment does yield evidence of the many ways in which stakeholders across the STEM education field agree that 100Kin10 galvanized action that resulted in higher quality STEM experiences for teachers and students around the country.

Bellwether conducted a separate examination of 100Kin10's process for tracking the number of new STEM teachers trained through the network over the ten-year period. For more detail on this validation study, please see the [memo](#) entitled "A Review of 100Kin10's Methods to Track Increased STEM Teacher Supply."

1. 100Kin10 preparation programs use improved strategies to recruit highly qualified STEM teacher candidates

Through joining in 100Kin10's mission and collaborating with other network partners, preparation programs in 100Kin10's network developed more effective strategies to attract highly qualified candidates to their programs. In interviews, partners explained that being part of 100Kin10's ambitious mission to transform STEM teaching and learning brought increased prestige to their work. Some even reported using messaging about their 100Kin10 membership to attract students who might not otherwise have considered their program.

For example, a 100Kin10 Project Team provided the time, space, and structure for a diverse set of organizations from across the country to develop an initiative to recruit more university STEM majors into teaching. Wendy Adams, a professor at the Colorado School of Mines, came to the work with a [simple hypothesis](#): Access to better information about the teaching profession could increase the number of STEM teacher candidates. After years of struggling to find a way to act on that idea, the Colorado School of Mines joined 100Kin10, and Adams turned to the network for help tackling this challenge.

Adams worked with other 100Kin10 partners through a Project Team to develop the [Get the Facts Out](#) (GFO) recruitment campaign, providing information and materials to professors and undergraduate STEM majors designed to dispel common negative myths about teaching. In 2021 alone, GFO [reported](#) reaching over 5,000 faculty and students at roughly 1,000 institutions across the country. The program is in the process of evaluating its impact, with the help of over 60 higher education institutions that have signed on to collect perceptions survey data from faculty and students each year. [Preliminary data indicate that the GFO approach has had a positive impact on university students](#), who were more likely to report an interest in teaching and that their professors value and encourage teaching than they were before exposure to GFO. Preparation program partners point to GFO and other 100Kin10-supported efforts to address barriers to recruitment as instrumental in helping them develop more effective, targeted outreach to prospective STEM teacher candidates.

VOICES FROM THE FIELD

"I discovered the strength of misperceptions that people had, and the fact that if you just clarified some of these facts about the profession with students, it totally opened up their minds about the teaching profession.... And that's when I thought, 'Boy, we really need to do something about this conversation.' I didn't know how I could possibly make a change, just little old me at a university. And then I thought, 'If it's possible, the 100Kin10 network might be the way to do this.'"

**Wendy Adams, research associate professor
Colorado School of Mines**

2. More STEM teacher candidates have access to evidence-based preparation via 100Kin10 partners

Understanding that access to high quality pre-service training was critical to achieving the moonshot goal and to addressing the systemic national STEM teacher shortage, 100Kin10 intentionally selected preparation program partners who were committed to embracing evidence-based approaches to STEM teacher preparation. These approaches include integrating STEM content and pedagogy, providing ample opportunities for candidates to observe effective STEM instruction, and ensuring that the candidates have classroom-based practice and coaching. Although these programs were already doing research-based work, preparation program partners reported that participating in the 100Kin10 network allowed them to further expand the reach of existing high-quality programs and develop new approaches to teacher preparation, which positioned them to have a greater impact on teaching and learning than they would have had on their own.

Rider University's post-baccalaureate full-time residency certification program provides an illustrative example of how 100Kin10 facilitated the expansion of evidence-based STEM preparation programs. The program launched in 2014 under the leadership of then-Dean Sharon Sherman and then-professor Judith Fraivilling, with the aid of a grant offered through a 100Kin10 funding competition seeking innovations in teacher preparation and awarded by the Carnegie Corporation of New York and S.D. Bechtel, Jr. Foundation. The program's development was further bolstered through the 100Kin10 network when Fraivilling met staff from

VOICES FROM THE FIELD

“[My colleague] Judith had a dream of creating a year-long residential opportunity for career changers who had backgrounds in STEM, or who wanted to develop backgrounds in STEM, to spend a year at our college, get a Master of Arts in teaching, and also get a teaching certificate and be residents at a P-12 school for a year.... That was 100% enabled by 100Kin10. We would not have had that opportunity if it wasn't for 100Kin10.”

**Sharon Sherman, professor emerita
Rider University**

two strong residency programs – Mary Lou Fulton Teachers College at Arizona State University and Denver Teacher Residency – at a 100Kin10 Summit, and continued learning from them via a 100Kin10 collaboration grant that supported site visits to Arizona. Rider’s residency program integrates coursework and student-teaching experiences, providing career-changing teacher candidates with the kind of extended real-world practicum and coaching that [research shows](#) is most effective for preparing excellent STEM teachers. Like many of 100Kin10’s preparation partners, Rider’s residency program produces graduates that are well-prepared to engage and challenge students in STEM classrooms.

3. 100Kin10 partners have increased emphasis on preparing and supporting elementary teachers with STEM skills, and in particular foundational math

Given that positive early STEM experiences can [set young children on a path](#) toward greater academic success and future STEM engagement, 100Kin10 set out to align and amplify partners’ efforts to improve training and support for teachers in elementary STEM, with an additional specific focus on foundational math. Through research and project teams dedicated to addressing challenges to high quality elementary STEM education, 100Kin10 spurred partners to incorporate a stronger emphasis on STEM teaching and learning in their programs for both pre-service and in-service elementary school teachers.

For example, the Intrepid Sea, Air, and Space Museum in New York City developed the Code Together program and received funding to support it as a part of 100Kin10’s Fellowship Program. Code Together partners teachers and students for 15 hours of professional development, in which they learn basic coding together and explore ways to integrate computer science concepts into other subject areas. Participant feedback indicates that teachers feel more comfortable taking risks and tackling new skills because they are learning alongside students who are new to computer science as well. This shared learning model is intentionally designed to boost the confidence of teachers who feel unprepared or anxious about teaching STEM subjects—a common mindset among elementary teachers.

VOICES FROM THE FIELD

“Without that experience coming from Intrepid, I probably wouldn't have been even comfortable or dare to go into coding. It opened up a whole new world for me, because once I saw there are programs that are much simpler than let's say, Python, it gave me a way to get in to starting and getting more comfortable with it, to then give me the courage to tell [other teachers]. And it opened up a whole new world of me thinking of how I could bring the coding part into my everyday activities.”

**Maria, PreK teacher
Participant in CodeTogether**

100Kin10's 2019 launch of a network-wide effort to tackle the “catalyst” issue of foundational math proficiency — a high-leverage issue that, if improved, would generate a positive domino-like effect across the system — was instrumental in bringing national attention from researchers, educators, funders, and others to the critical importance of joyful, hands-on early math instruction. For example, 100Kin10 brought together experts to produce the influential report [*Doing the Math: Building a foundation of joyful and authentic math learning for all students*](#), which has become an important tool for network partners to raise awareness about the critical role of foundational math and highlight bright spots that can serve as examples for other educators.

Preparation programs shared that 100Kin10 resources like *Doing the Math* — along with opportunities to collaboratively tackle the issues described in it — helped them improve training in foundational math by ensuring that teacher candidates gained both the knowledge of foundational math content and the pedagogical skills necessary to teach young children those concepts. Dewayne Morgan, senior director for Education, Outreach, and Pipeline Development at University System of Maryland, took part in a team that worked together to develop resources to help teachers transform their mathematical pedagogy to support student-driven, authentic mathematical experiences. As he explained: “Our foundational math work that we’ve been doing with 100Kin10 [involves] really a realigning of how we look at our curriculum, and making sure that it's more than just the content, but that we are intentional about making sure that our candidates can actually teach the concepts.”

4. More teachers have access to quality STEM professional growth and collaborative work environments via 100Kin10 partners

100Kin10 cultivated a community of partners with interest and expertise in preparing STEM teachers, while also supporting and retaining them in the classroom. By focusing resources on improving professional growth for STEM educators — and through an additional special focus on fostering collaborative work environments — 100Kin10 enabled partners to expand existing opportunities for professional development and develop new, innovative initiatives to foster teacher experimentation and shared learning.

The network's investment in expanding professional growth allowed teachers to stay motivated and up-to-date with rapidly changing content knowledge and STEM best practices. For example, longtime 100Kin10 partner [Ignited](#) offers a professional development fellowship for teachers by immersing them in STEM companies, nonprofits, and university research labs. Shari Liss, former Ignited CEO, explains that her collaboration with other partners through 100Kin10 helped the organization innovate on its model in ways that allowed them to serve more teachers and be more accessible to educators in historically under-resourced schools. [Surveys of Ignited fellows](#) indicate that participation in the fellowship increased teacher retention, expanded teacher leadership capacity, improved effectiveness in the classroom, and encouraged student engagement in STEM learning.

In 2018, 100Kin10 further deepened its focus on improving support for STEM teachers by launching an effort to highlight [teacher Work Environments as a high-leverage focus area](#). The

network catalyzed work in this area by compiling research on best practices, enabling knowledge exchange, and providing the collaborative problem-solving structures for partners to tackle these issues. One way that 100Kin10 facilitated collaboration on this topic was through Project Teams. For example, building on the work of previous teams focused on creating professional development modules for training mentor teachers, a group of partners led by Jenny Hicks of Purdue University joined a Project Team to develop a toolkit for states and districts to adapt in developing their own STEM mentoring program. They understood how critical teacher-mentorship is to a healthy school culture, a positive work environment for teachers, and the retention of new and seasoned STEM teachers.

The resources from the Project Team were disseminated around the 100Kin10 network, enabling other organizations and educators to improve their mentoring services for teachers.

VOICES FROM THE FIELD

"I put the link to the toolkit out to my listserv and many people responded that they were going to use it. They remarked that there were so many useful resources in it. The toolkit represents the work of six people and it's all resources we use in our daily work."

Jenny Hicks
Director of K-12 STEM Engagement,
Office of Engagement
Purdue University

5. More teachers and students have access to meaningful, authentic, and rigorous STEM learning via 100Kin10 partners

In interviews, Bellwether consistently heard that because 100Kin10 encouraged and supported collaboration among partners from a variety of organizations, educators and STEM experts (often from informal science institutions) began working together to co-create instructional materials, assessments, and programs. **100Kin10's support for partnerships between schools and STEM experts enabled teachers and students to build STEM skills grounded in authentic, real-world experiences.**

VOICES FROM THE FIELD

"I think what we've seen from [our work with the Project Team] is more authentic engagement, and students understanding and figuring something out versus being a passive learner and just taking in information. Even if a student is not going to ever study or pursue anything in STEM after their K-12 experience, they now have a framework and a toolkit for how to solve problems."

Lauren Jones-Kaplan, senior manager of STEM
DSST Public Schools

For example, Lauren Jones-Kaplan, the senior manager of STEM at DSST Public Schools, worked on a [100Kin10 Project Team](#) with scientists from Fiske Planetarium at the University of Colorado Boulder to improve the quality of experiential learning and performance-based assessments in science. She shared that the generative nature of partnerships between STEM experts and K-12 teachers — combining expertise in STEM practice and pedagogy — increased student access to high-quality curricula and rigorous, engaging instruction. Because of **100Kin10's Project Team structure, Jones-Kaplan and her teammates helped create more classrooms where students engage in active learning**, developing skills like critical thinking and problem-solving that will be important in their lives beyond high school.

100Kin10 also provided support for organizations focused on integrated STEM experiences for students. One program they helped to seed and grow was [WeTeach_CS](#), which was founded by Carol Fletcher, director of Expanding Pathways in Computing at the University of Texas at Austin, as a direct result of her participation in 100Kin10's Fellowship Program. **By supporting the development and growth of Fletcher's initiative to increase the number of trained and certified Computer Science (CS) teachers, 100Kin10 has had an outsized impact on CS teaching and learning.** Between 2015 and 2018, WeTeach_CS helped [more than 500 in-service teachers in Texas earn a CS certification](#) – more than every university pre-service program in the nation combined. Since WeTeach_CS' launch in 2014, there has been a 46% increase in the number of Texas high schools that offer computer science courses. And as of 2021, more than 850 people outside of Texas have taken the WeTeach_CS self-paced online course, indicating that the program has been instrumental in motivating teachers across the country to make the leap to teaching computer science.

In 2020, 100Kin10 committed to increasing equitable access to high-quality STEM courses for high school students — its third catalyst focus area. This work is still in its nascent stages, given its launch amid the ongoing COVID-19 pandemic. However, 100Kin10 has seen an overwhelmingly positive response for this work from its network: 56 partners currently participate in 100Kin10's High School STEM Equity Project Teams, and 38 partners served on the organization's Brain Trust for high school STEM equity, lending insight and expertise the 100Kin10's report, [Shifting Courses: Achieving Equity in High School STEM](#).

How Did 100Kin10 Galvanize Change?

Preparing and recruiting 100,000 excellent STEM teachers in a decade is an impressive achievement with deep and lasting field impact. **In interview after interview, partners credited 100Kin10 with shaping and supporting a collective and coordinated effort that empowered network partners to drive systemic change for schools, teachers, students, and families on a level they could not have achieved alone.**

While 100Kin10 deployed many strategies to drive this work, Bellwether's research pointed to four core approaches at the heart of 100Kin10's ability to catalyze systemic change over time and across the network:

1. Cultivating a Network with a Shared Purpose

At the root of 100Kin10's success is a keen understanding that addressing a complex problem requires harnessing the power of a broad network working toward common goals. According to Katherine Wilcox of [EnCorps](#), 100Kin10 "shone a really good light on how complex the state of education is in America and how we need to be networked in order to address these challenges."

The 100Kin10 team aligned and connected its network to achieve impact in ways that individual organizations cannot. 100Kin10's activities strategically focused on creating and empowering the network — supplying the connections, structures, and resources partners needed to increase their own impact. On 100Kin10's most recent partner survey, **72% of respondents indicated that through their participation in the network, they tackled challenges related to STEM that they would not have taken on alone.**

2. Focusing Collective Attention on Key Challenges and High-leverage Catalysts

100Kin10 laid a foundation for early success by clarifying interconnected challenges underlying the STEM teacher shortage in the U.S. The [Grand Challenges Map](#) was developed alongside the entire network and thousands of STEM teachers and other experts. It represented a first-of-its-kind analysis of the root causes of the STEM teacher shortage, how those challenges were interconnected, and where there were high-leverage opportunities for change. The map helped partners understand exactly where they were uniquely positioned to solve pieces of the overall problem.

While 100Kin10's Grand Challenges Map outlines more than 100 challenges related to the STEM teacher shortage, the organization focused partners' attention on a few groups of **"catalysts"** — high-leverage challenges that if addressed could have an outsized impact on teaching and learning. As described above, over the last three years 100Kin10 has mobilized its partners to address these high-leverage issues, one set of catalysts at a time: first, [nurturing positive work environments for teachers in schools](#); second, [building a foundation of joyful and authentic math learning](#); and third, [achieving equity in high school STEM](#). 100Kin10 provided an unprecedented level of support for coordination and collaboration around these catalysts, maximizing talent and skills in the network by focusing its resources and the work of its partners on significant opportunities for change. **100Kin10's efforts to encourage collaboration and deepen partners' capacity to act on the catalysts enabled the network to address long-standing problems in new ways.**

3. Magnifying the Existing Work of Exemplary Partners

In addition to defining key challenges and focusing attention on high-leverage catalysts, 100Kin10 recognized that systemic change requires amplifying and aligning the efforts of organizations already doing highly effective work. 100Kin10 intentionally designed opportunities for excellent partners to find each other and amplify each other's impact. Through activities like annual summits, regional gatherings, [lightning talks](#), ["steal this" sessions](#), and collaboration grants, 100Kin10 enabled partners to share effective practices, connect with new resources and funding, and grow their efforts' impact in ways they could not have achieved operating alone.

4. Mobilizing Partners to Collaboratively Problem-Solve and Innovate New Solutions

The 100Kin10 network boasts a wide array of partners in an equally wide array of communities — everything from traditional teacher preparation programs to corporations, museums, foundations, and school districts. But beyond 100Kin10's interesting lineup of partners, its approach to **shepherding collaborative problem-solving among its diverse members — recognizing that by working together, partners with different models, target populations, and geographies could generate new, innovative solutions to entrenched challenges — leaves an enduring field impact.** 100Kin10's unique approach to networked problem-solving served as a focusing framework for partners to tackle challenges that have long plagued efforts to prepare excellent STEM teachers, including diversifying the STEM teacher pipeline and supporting STEM education in rural communities.

A Decade of Remarkable Change

If 100Kin10 had merely reached its moonshot goal of 100,000 excellent STEM teachers, it would have had an impressive impact on STEM teaching and learning in America. But, as Talia Milgrom-Elcott, the founder and executive director of 100Kin10, has explained, if the network had only trained 100,000 STEM teachers, it would have [“met the goal, but failed the mission.”](#)

100Kin10 understood that placing excellent teachers in classrooms might not be enough to overcome the STEM teacher shortage. Instead, it invested in a network of diverse partners with a wide range of skills to address the wide-ranging systemic challenges underlying the persistent STEM teacher shortage.

Much of 100Kin10's success can be attributed to the organization's acuity in leveraging its deep understanding of the field – both what it knew about the challenges facing STEM education and how to address those challenges – to accelerate change. Most parts of the equation for overcoming the STEM teacher shortage existed without 100Kin10. But 100Kin10 catalyzed the generative collaboration and innovation that happened when all of those parts of the equation came together to spur deeper impact. Through their dedication, creativity, and transformational support for their partners, **100Kin10 led the creation of a more interconnected, focused, and prepared community of experts, collectively scaling impact on the STEM education field, on STEM educators, and on K-12 students.**

100Kin10's [work is not done](#). In its second decade, 100Kin10 will continue to pursue its vision of an education system that equips all students with the knowledge, skills, and agency they will need to thrive in a rapidly changing world.