

TEACHERS' VOICES ARE REGULARLY ABSENT FROM CONVERSATIONS ABOUT THEIR PROFESSIONAL GROWTH.

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01 CONTEXT AND TRENDS

According to the U.S. Department of Commerce, science, technology, engineering, and mathematics (STEM) jobs are expected to increase by “17 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations” (Langdon, McKittrick, Beede, Khan, & Doms, 2011). The growth of careers in STEM has contributed to an increased emphasis on STEM education, including a demand for highly qualified STEM teachers. Efforts to recruit qualified STEM teachers comprise one strategy being used to build the capacity of the teacher workforce to effectively prepare students with the skills they will need to thrive in the labor market.

While it is critical to address the immediate need for more teachers with STEM skills through targeted recruitment efforts, it is equally important to tackle the issues that are pushing experienced STEM teachers out of the profession. Teacher attrition rates suggest that enhancing the STEM teacher workforce will require a focus not just on new teachers entering the profession, but also on retaining the qualified and effective teachers working in today's classrooms. With respect to supporting teacher retention, one particular area of focus may be ensuring that STEM teachers have access to learning and professional growth opportunities that they see as relevant and valuable. To do so, it will be imperative to address a rising concern in the field: the lack of teacher autonomy in the selection of professional development (PD) opportunities (Strauss, 2011).

The specific needs of individual teachers presently in the workforce are often lost in the matrix of collaborative efforts among professional development providers, school districts, and individual schools (Strauss, 2011). This

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is largely due to school cultural practices that privilege a top-down approach to decision-making. In many cases, teachers are not provided autonomy in selecting their own PD. Lack of teacher input on PD decisions perpetuates the notions that outside stakeholders are better equipped to determine the needs of both teachers and students. Excluding teachers’ voices from the PD selection process creates a dynamic where practitioner knowledge and skills are devalued, which in turn diminishes the value and effectiveness of professional development. The most effective professional learning opportunities are centered

on the specific challenges teachers face at the school and classroom level (Wilson, 2011). Who is better prepared than teachers to identify those challenges?

During his time as director of special projects with the New Teacher Center, Eric Hirsch found “a mismatch between what teachers say they need in professional development and what they’re actually getting” (Rebora, 2008, para. 12). Hirsch’s observation is supported by the results of a study of TNTP in which fewer than 50 percent of the surveyed teachers felt the professional development they received addressed their specific context and/or development needs (Jacob & McGovern, 2015). The disconnect between professional development selection and teacher needs can hinder teacher effectiveness and retention. Lederhouse (2001) suggests that teacher autonomy and commitment to the profession are intricately linked: “It is this decision-making ability, I believe, that defines any profession. . . . We need a teaching position with more imaginative space, more ownership, more room to

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make a difference. This comes only from having the autonomy to make one’s own educational decisions (para. 14).”

By not considering, or perhaps in some cases undermining teacher decision-making capabilities, school administrators diminish the professionalism of teaching. Proponents of teacher leadership argue that teachers are more privy to specific school-based challenges and therefore are more equipped to determine strategies to address them (Strauss, 2011). The use of teacher leadership is a suggested strategy for fostering a professional learning environment where teacher voices and experiences are privileged. The utilization of school-based teacher leaders in selecting and facilitating professional learning opportunities has been shown to

elicit teacher trust and commitment (Durrant & Holden, 2006). Furthermore, an investment in training and the use of the expertise of teacher leaders within school has proven to help retain highly effective teachers (Berry, Daughtrey, & Weider, 2010).

Professional learning communities (PLCs) also serve as spaces where teachers work together to address challenges around content and instructional practices. Unlike traditional professional development, PLCs position the intellectual contributions of teachers at the center of discussion. In their study, Hausman & Goldring (2001) found that PLCs effectively foster teacher commitment. Additional studies (Phillips, 2003; Supovitz, 2002) have found PLCs useful in developing teacher collaboration and decision-making capacity. When existing teacher knowledge and skills are positioned as valued assets, teachers are more inclined to see themselves as agents in influencing change within and outside of their classrooms (Taylor, Goeke, Klein, Onore, & Geist, 2011).

03 BRIGHT SPOTS

One example of a strong PLC can be seen in the [Math Teachers' Circle Network](#), a professional learning community model used throughout the United States. Math Teachers' Circles provide local opportunities for K–12 mathematics teachers and higher education faculty, to engage in mathematical problem solving and dialogue. For example, the Wayne County (Michigan) Math Teachers' Circle describes its professional learning community as a space where “participants explore, question, conjecture, collaborate, and discover mathematical connections.” [Recent research on the Math Teachers' Circle Network](#) shows that participating math teachers “feel more pedagogically prepared and have increased self-efficacy” as a result of their participation in Math Teachers' Circle.

The Arizona-based [Project Pathways Professional Learning Communities](#) emerged from a research and professional development initiative focused on enhancing learning opportunities for teachers and students in the areas of science and mathematics (Carlson, Slemmer, Moore, Teuscher, Joyner, 2011). Through Pathways, teachers work together to develop learning materials for high school classrooms. Teacher collaboration, knowledge production, and dissemination are key components of the work being done through Pathways. As a result, teachers were more readily able to develop lessons that connected across STEM classrooms (Oehrtman, Carlson, Martin, & Sutor, 2010).

04 CONCLUSION

The potential for effective and sustainable change in enhancing the capacity of the STEM teacher workforce increases when teachers feel empowered to identify, plan, and implement professional developments specific to their needs. According to Avery and Reeve (2013), “a one-size-fits-all [professional development] model will not be conducive to preparing a diverse group of teachers with the necessary knowledge, skills, and abilities to deliver STEM education to their students” (p. 67). The use of teacher leaders and PLCs in the design and implementation of professional learning opportunities aid in addressing the specific needs of teachers and help foster a school culture that supports teachers by valuing their knowledge and expertise.

ABOUT THE GRAND CHALLENGES WHITE PAPERS

In 2017, 100Kin10 released an unprecedented representation of the big, systemic challenges to preparing and supporting STEM teachers following over two years of extensive research alongside more than 1,500 STEM teachers and hundreds of other education experts. As a part of this work, 100Kin10 commissioned a series of short white papers from well-versed thinkers and practice-oriented researchers to synthesize the most relevant research around the specific challenge areas. Together, they compose a thoughtful and well-rounded examination of the systemic challenges currently facing STEM teaching.

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