How might we raise the prestige of the STEM teaching profession?

STEM PROFESSORS OFTEN DEVALUE PK-12 TEACHING AND DO NOT ENCOURAGE STEM STUDENTS TO PURSUE THE PROFESSION.

Written by
MELISSA A. RASBERRY, AMERICAN INSTITUTES FOR RESEARCH

01 CONTEXT AND TRENDS

Among the most prominent issues When the Soviets launched Sputnik in 1954, the United States began a mad dash to prepare more science, technology, engineering, and mathematics (STEM) graduates in order to secure global domination in space and beyond (Abramson, 2007; Powell, 2007). Since that time, other national priorities, such as the civil rights movement, and education reforms, like No Child Left Behind, have drawn attention away from STEM, resulting in the nation falling behind in areas ranging from global STEM learning indicators to technological inventions and economic growth to environmental innovations.

Today we face a lack of excellent PK–12 STEM teachers, which exacerbates many of these shortcomings, including our efforts to keep pace with the competitive global market (Watt, Richardson, & Pietsch, 2007). According to Watt, Richardson, and Pietsch (2007), "well-educated, specialist teachers of those disciplines are the critical link for the next STEM generation" (p. 796). Without teacher role models encouraging elementary and secondary students to explore STEM (in general) and STEM teaching (in particular), as well as instilling a strong knowledge base among young people in these content areas, researchers posit that the persistent shortages in STEM PK–12 educators will continue (Watt, Richardson, & Pietsch, 2007). Unfortunately, the root causes for the teaching shortages are complex and challenging to combat. One powerful barrier to bolstering the STEM teacher workforce is that many STEM professors devalue PK–12 teaching as a STEM career option and therefore do not encourage students who excel in STEM to pursue teaching.

02 DISCUSSION

At the university level, teaching often takes a back seat to research pursuits. STEM professors tend to favor research over pedagogy due to institutional structures that reward faculty for securing research grants and publishing findings (Fairweather, 2010). As a result, faculty members place less interest in and devote less time to their instructional practices, viewing teaching "more as means towards pursuing their much stronger interest, that of conducting scientific research" (Bouwma-Gearhart, 2012, p. 566). In turn, undergradu-

ate and graduate students, just like professors, are expected to focus on developing and applying their research skills, rather than delving into basic concepts of teaching and learning to improve their skills (Gray, Frob, & Diamond, 1992; Porter, Roessner, Oliver, & Johnson, 2006; Bouwma-Gearhart, 2012).

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STEM college students, as a result, typically aren't exposed to role models and mentors who value STEM teaching more than as a means to a greater end—with the end goal being a highly esteemed research or industry position, not the PK–12 classroom. Even when exposed to innovative and engaging learning experiences, STEM majors are unlikely to translate those experiences into aspirations for a PK–12 teaching career. Indeed, if STEM faculty do not value teaching for their own professional esteem, it follows that they are not likely to respect STEM teaching at the PK–12 level either. Consequently, they might hold back from encouraging (and may actually discourage) their students from pursuing elementary and secondary teaching as a career (Hewes, 2013), pushing them toward industry and research over education.

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This devalued perception of the teaching profession is further complicated by the fact that US News & World Report does not classify STEM teaching as a STEM career (US News & World Report, 2016). If universities want to maintain strong standing among their peers in producing STEM graduates who transition into recognized and esteemed STEM occupations, they may be further dissuaded from encouraging students to consider teaching (Morse & Tolis, 2013), thereby making students view their professional options as a forced choice between industry and research versus education.

03 BRIGHT SPOTS

Two large universities are bucking this trend and throwing their support behind STEM teaching. At the University of Georgia, Fostering Our Community's Understanding of Science (also known as Project FOCUS) provides field-based opportunities for science majors to put their knowledge and skills to use in local K–8 schools. As a result of their participation, students have bolstered their understanding of diversity, enhanced their own learning, improved their communication and time-management skills, and increased their appreciation of public schools and teachers (University of Georgia Project FOCUS, 2016). Amy Peacock, the K–12 science content coach for Project FOCUS's partner district, Clarke County School District, noted the high demand for individuals interested in pursuing teaching as a STEM career: "We need STEM teachers who have strong STEM backgrounds that

allow them to engage students and develop within them a love for science" (Wong, 2016). The University of North Carolina Baccalaureate Education in Science and Teaching (UNC-BEST) program allows students in physics, biology, chemistry, geological sciences, and mathematics to earn their secondary teaching licenses during their four years of undergraduate study, enabling them to graduate with both a STEM degree and a teaching license without requiring the cost of a fifth year at the university. The UNC-BEST program combines the best of both worlds (i.e., STEM content and teaching), which supports students in pursuing multiple options after graduation. Methods courses are taught in their home STEM departments (e.g., physics or biology) so students are able to learn the most effective teaching practices for their particular subject area, rather than general pedagogical practices. Between 2009 and 2012, 49 STEM student majors completed the program, earning their STEM degree as well as secondary mathematics or science teaching licenses (UNC-BEST, 2016).

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CONCLUSION

In order to broadly prepare and support STEM teachers, more must be done to elevate the teaching profession, give it the prestige that it deserves, and expose STEM majors to the benefits and rewards of PK–12 teaching careers. Professors at the collegiate level must first value teaching more for their own learning and development—and their universities should reward them accordingly, just as they would for innovative research. As the faculty members themselves begin to embrace teaching, they can, in turn, encourage their students to pursue it as a career choice. Whether working in the noneducation sector or teaching PK–12 students, STEM graduates should be equally celebrated for their contributions and success in building the nation's STEM future.

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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