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COMMENTARY

# High School Math and Science Faculty and Growing the Roots of Female STEM Majors

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The increasing demand for a STEM workforce and the insufficient supply produced by American educational institutions has led many researchers and policy analysts to focus on the shortage of women in these important fields. Although women are the majority of college students they represent a distinct minority of STEM degree holders. Too few female students appear interested in pursuing degrees in science, technology, engineering or mathematics, and even if they have a strong interest, too few remain in STEM majors once they arrive in college.

Existing literature focuses primarily upon analyzing the influence of the gender distribution of college faculty on students' STEM outcomes. The almost exclusive focus on college faculty is surprising given the fact that the pre-college setting is highly influential on students' choice of college major and the majority of the students who concentrate in STEM make that choice during high school.

Using longitudinal data from students who spent their academic careers in North Carolina public secondary schools and attended North Carolina public universities, this study, funded by the National Science Foundation (NSF), examines the role of the demographic composition of high school faculty—specifically the proportion of female high school math and science teachers—on college students' decisions to declare and/or major in STEM fields. Our results suggest that although the proportion of female math and science teachers at a school has no impact on male students, it has a powerful effect on female students' likelihood of declaring and graduating with a STEM degree, and effects are largest for female students with the highest math skills.

There is something about high schools with very high proportions of female math and science teachers that has a powerful effect on the STEM interest of highly skilled young women—with virtually no expense incurred by their comparable male peers. We speculate that secondary school math and science faculty gender composition is important during the pre-college years because it helps disrupt the pervasive stereotypes regarding which individuals are suitable for a job in science, technology, engineering and mathematics.

Based on our findings we suggest that increasing the proportion of female instructors in math and science subjects might be an efficient way of making the STEM environment at schools friendlier for girls. In the case where hiring more women is not an option, high schools should aim to make the school's math and science classroom climate one that is more normative for females. Our research suggests one way to do this is by implementing a student-centered pedagogy designed to be more inclusive of young women that could contribute to fostering the STEM interest in girls, particularly high-skilled girls. Doing so could mirror the classroom climates to which girls are exposed when attending schools with very high proportions of female math and science teachers.

Our recommendations emphasize the importance of providing women with early opportunities to attend schools that challenge entrenched gender stereotypes about math and science. Doing so will likely sustain and support greater numbers of young women pursuing careers in science, technology, engineering and mathematics. In these ways, greater numbers of women in STEM majors will grow the academic roots that will enable other young women to pursue STEM careers. This outcome will generate more female role models and stronger challenges to any lingering fictions that science, technology, engineering, and mathematics are not for young women.

*The full study can be found in Bottia, M.C., Stearns, E., Mickelson, R.A., Moller, S. and Valentino, L. (2015). "Growing the roots of STEM majors: Female math and science high school faculty and the participation of students in STEM," Economics of Education Review 45, 14-27. An ungated version is available here.*

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