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SPECIAL ISSUE EDITORIAL

Re-imagining Who Does STEM – Part 2

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This is the second of two special issues in the International Journal of Gender, Science and Technology. The authors are scholars who attended the Network Gender & STEM conference in Eugene, Oregon in August, 2018. The conference brought together international researchers from a multitude of disciplines to "re-imagine who does STEM".

While the first special issue, edited by Lara Perez-Felkner, focused mostly on perspective papers and qualitative research, this second special issue's emphasis is on quantitative work (with the exception of the work by Thoman, DiBona, Abelar, and Robnett) critically examining "who does STEM". The reader will find studies focusing on different age groups running the developmental gamut from elementary, middle, and high school students to undergraduates. Furthermore, one article introduces a novel theoretical model examining the gender gap in STEM. The emphasis of most of the articles in this issue (with the exception of the theoretical model by Master and Meltzoff) is on STEM or math and science in general rather than on individual STEM fields. The researchers whose work is published in this special issue hail mostly from psychology (social, developmental, educational), education, or public health, which explains the preponderance of quantitative approaches in this issue.

The articles in this issue are ordered by age of the study participants to highlight developmental trends and the kinds of concepts examined for different age groups. The last article in this series reviews some of the literature on female underrepresentation, culminating in a new theoretical model.

The study by Joan Barth and Stephanie Masters examines students in grades 5, 8, and 11 in the US, spanning two different school transitions (to middle school and to high school) through a gender lens by focusing on students' STEM stereotypes and perceptions of teachers. For boys and girls only the transition to 6th grade resulted in lowered interest in math and science. This decrease in students' interest in math and science was lower than reported in previous research. The gender difference in interest and efficacy in math and science was strongest in high school. Efficacy, and to a lesser extent classroom quality, predicted both male and female students' math and science interest.

In the second US study, Kaitlin Bodnar, Tara Hofkens, Ming-Te Wang, and Christian Schunn examined 6th, 7th, and 9th grade students' science identity and science career aspirations by gender and by race. They found that science identity and science career aspirations are correlated. However, the strength of the correlation depended on gender and race. Science identity and science career aspirations were not as closely related for black and white girls as they were for boys.

Luise von Keyserlingk, Michael Becker, and Malte Jansen's research is the only non-US study in this special issue. They examined German 12th graders and followed them to their second year in a STEM-intensive major at university. They found gender differences in math self-concept even while statistically controlling math achievement, but no gender differences in the underlying psychological processes. For example, the Big Fish in a Little Pond Effect was similarly weak in predicting female and male students' enrollment in math-intensive majors.

Amy Hayes, Kristin Hixson, and Stephanie Masters examined undergraduate STEM and non-STEM majors in US universities. They found no gender differences in perceptions of ability in science or math classes. There were also no gender differences in actual grades, however women rated themselves higher in participation and effort expended.

In Sara Kent's study, STEM and non-STEM undergraduates in US universities responded to an open-ended question about White male overrepresentation in STEM. This study used a mixed methods approach with a qualitative and a quantitative component to examine gender and racial differences in explanations of male overrepresentation in STEM. Latinx students were more likely than White and Asian students to believe that stereotyping was a reason for male overrepresentation in STEM. Men were less likely to believe that stereotyping and low confidence were issues for women and individuals of color and more likely to attribute the overrepresentation of men in STEM to lack of interest on the part of women and individuals of color.

Sarah Thoman, Tori DiBona, James Abelar, and Rachael Robnett contribute the only qualitative study in this issue. They interviewed nine female advanced undergraduates in a prestigious summer research program at a US university. They found that educational attitudes and opportunities, personal resilience, and situational resilience (social or financial support) were important to these women's continued success in STEM. The authors argue that this information can be used to tailor intervention strategies to increase women's recruitment into and persistence in STEM.

The article by Allison Master and Andrew Meltzoff reviews some of the research on underrepresentation of women in STEM and proposes the STEMO (STEreotypes Motivation and Outcomes) model. Specifically, the authors review the literature on the effect of stereotypes and sense of belonging on STEM interest, while carefully distinguishing among the different STEM fields and also differentiating effects by age groups. This level of differentiation should be applauded as reasons for women's underrepresentation differ to some extent by STEM field (e.g., for a theoretical model and review of female underrepresentation in computer science see Beyer (2016)). In addition, they address interventions that are likely to be effective at increasing gender balance in STEM. Importantly, the STEMO model has direct implications for future research and the kinds of research questions that have yet to be examined.

In sum, this body of research proffers evidence for both gender differences (e.g., Bodnar et al.'s finding that the correlation between science identity and science career aspirations differs by gender and race; Hayes et al.'s reporting that despite the absence of a gender difference in science or math grades, females perceived themselves to have expended more effort; Kent's study finding gender differences in attributions for male overrepresentation in STEM) and gender similarity (e.g., Barth & Masters' finding that efficacy predicted both boys' and girls' science interest; von Keyserlingk et al.'s finding that there was no gender difference in the underlying psychological processes predicting enrollment in math-intensive majors).

While we are far from completely understanding the causes of female underrepresentation in STEM, we have made progress as the articles in this issue illustrate. Many variables that contribute to female underrepresentation have been identified (see Beyer, 2020). Literature reviews have summarized empirical work (e.g., Yazilitas, Svensson, de Vries, & Saharso, 2013). Importantly, theoretical approaches (such as the Master and Meltzoff model in this issue or Cheryan, Ziegler, Montoya, and Jiang's (2017) model) are being developed to help us understand the phenomenon of female underrepresentation in STEM. The fact that we had to spread article submissions for this topic across two special issues attests to the vibrancy of research interest in this topic. It is my hope that the two special issues in this journal contribute to our understanding and help us move to a world where research on female underrepresentation in STEM eventually becomes obsolete.

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