



Gender Identities in STEM Education

Connected Collections

Connected Collections are meant to support professional learning conversations about a particular topic—in this case gender identity and science education. A Collection consists of 4-6 research briefs, short synopses of recent research published in peer-reviewed journals, each addressing some key aspect of practice related to topic. The Collection also provides a set of overarching discussion prompts as well as links to other relevant resources.

Learning Goals

The persistent problem in practice that we explore in this collection is the need to create learning environments that support girls' development of positive STEM learning identities. Through engaging with the Collection, readers will be able to define what researchers mean by "identity" and discuss tensions associated with youth relating their STEM and gender identities. Next, the briefs challenge readers to consider how to create learning opportunities for girls to create positive identities with STEM. Finally, the Collection provides examples of how educators can help students make connections across their STEM experiences at home, in school, and during out-of-school time. Supporting youth identity development by connecting youth interests and experiences across settings is critical to sustaining long-term involvement in STEM.

Overview

Expanding participation of women in STEM education and fields is a significant concern of policy and practice. Although women now participate in some STEM fields in equal numbers as men, they are seriously under-represented in many others, including those fields that are projecting the most growth over the coming decades, such as engineering and computer science. Current research suggests there are socio-cultural and identity issues—not innate talent or capabilities—at play in these disparities. The first brief provides an introduction to how and why socio-cultural issues affect girls' decisions to engage in science learning, demonstrating how science requires young women to balance their personal aspirations with societal expectations of femininity. The next three briefs summarize case studies on how girls' identities shift in relationship to STEM as well as gender, race, and class, respectively. The final two briefs explore how educators can support young women's long-term interest in science. The research on how girls learn and develop long-term interest in science quickly leads to discussions of identity development for all students underrepresented in STEM fields. This collection can help inspire your thinking, spark productive conversations, and explore how you can make specific shifts in their work to support students development of positive science learning identities.

Summaries of Research Briefs

[“Science helps me figure things out”: Authoring science identities across time & place \(by Calabrese Barton et al.\)](#)

This case study seeks to answer the question, “What do girls from non-dominant populations do to author themselves into or out of science, in spite of—or because of—their grades?” The study also examines how systematic structures promote or hinder opportunities for these students to author identities in science through observation and interview work across settings. It encourages educators to focus on having girls do science.

[Girls’ science identity development in and out of school \(by Tan et al.\)](#)

Using critical ethnographic case studies, researchers examined middle school girls’ participation in school-day science classes and out-of-school time (OST) science clubs to understand the girls’ identification with and relationship to science. The authors cite several studies suggesting that girls, particularly girls of color, do not identify with science regardless of their achievement levels. This “science identity gap” helps explain the low participation of women in post-secondary STEM education and the STEM workforce.

[Negotiating Science Identities with Gender, Race, and Perceptions of Expertise Across Settings \(by Rahm\)](#)

This three-year study of community-based afterschool initiatives focused on girls’ engagement with science and how they negotiate identities with and in opposition to science. The study is part of a larger multi-sited ethnography of learning and identity in science. The researcher observed girls whose families had recently immigrated to Montreal, Canada and were participating in an afterschool program focused on creating science newsletters and science fair projects. She describes how different science-related activities—creating a newsletter vs. conducting science inquiry—related to the negotiation of gendered roles and the development of science identities.

[Girls with scientific aspirations: Negotiating femininity \(by Archer et al.\)](#)

This paper is rooted in a feminist poststructuralist theory of identity—in which identity is a way of acting in and with the world. Identity, which includes one’s gender, culture, and class, is nestled within the broader society. As the context shifts, so do people’s ways of enacting their identities. The authors of this paper explore the ways in which girls with self-proclaimed aspirations in science enact their gender identities.

[The impact of gender on young people’s STEM choices \(by Buccheri et al.\)](#)

This study presents an interesting cross-national analysis of young people’s preferences, expectations, and perceptions of ability regarding STEM subjects. It finds that gender plays a significant role in students’ choices regarding STEM study and careers on the basis of comparison of students from four countries using the data from PISA, an international cross-comparison study. This study provides ISE educators with insight into young people’s thinking regarding STEM and suggests possible strategies for greater gender equity.

[How youth validate their identities as experts across learning settings \(by Fields and Enyedy\)](#)

This study investigates how skills developed in an OST setting may bolster students’ self-identification as experts in classrooms. Fields and Enyedy studied how two students who learned computer programming in an OST program leveraged their skills in the classroom to broker positions as experts in the school community. Expert identity is reinforced by the interactions among what students do, how they see themselves, and how others see them.

DISCUSSION PROMPTS

- One article suggested that, “gender plays a significant role in students’ choices regarding STEM study and careers.” What ideas from the collection could help you construct alternative gender and science identities for youth in your programs?
- How does helping girls make connections across home, school, and after-school science broaden notions of “what counts” as science and how might this support girls’ long-term interest in science?
- What barriers exist for girls interested in constructing science-linked identities?

RELATED RESOURCES

- [Learning Science in Informal Environments, Diversity & Equity](#)
- [How can we promote equity in science education?](#)
- [Learning STEM Through Design: Students Benefit from Expanding what counts as “Engineering”](#)
- [Surrounded by Science](#)
- [Engineering in K-12 Education](#)
- [Failing Forward: Managing Student Frustration During Engineering Design Projects](#)

