Making The Blind To See: Balancing STEM Identity With Gender Identity
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ABSTRACT

The theoretical implication of this paper concerns the gender blindness in science, technology, engineering, and mathematics (STEM) education, and thus careers, on the cultural level. Social discourse concerning how men and women are supposed to enact their socially sanctioned roles is being played out daily in educational institutions. Females who chose STEM education and STEM careers are constantly battling this social discourse. It is necessary for P-16 STEM education to examine and integrate understanding of gender within the larger societal culture for systemic and lasting change to happen.

Keywords: Increase K-20 Interest and College Enrollment, Teaching Quality, Gender

While the disparity of women in science, technology, engineering, and mathematics (STEM) occupations stress the nation’s economic capacity and growth in a time of global competitiveness, the most pressing issue regarding the dearth of women in STEM professions concerns the principle of social equality. The lack of women pursuing STEM degrees not only results in the loss of valuable perspectives and experiences necessary for the advancement of science and technology, it also creates an unbalanced societal power structure.

Recognizing both science/technology and gender as being socially constructed, assists in understanding the power structure of gender manifested within the creation and implementation of technology. Science/technology is not gender-neutral and gender is not a fixed, essential trait. Institutions, practices, and power establishments, regulate the shape and meanings that culturally construct gender (Butler, 1991). It is part of an inter-related, continuous process constantly being reconstructed in a dynamic and relational manner with the individual and the environment. Gender and technology are co-constructed and mutually shaped by culture and society with resulting in STEM careers as disproportionately masculine dominated. The danger of assuming the culture of science is gender-neutral leaves little room for how factors of gender affect the experiences of women (Ong, 2005).

Despite the large amount of public subsidizing with federal funds and great efforts made by colleges and middle/high schools to encourage more females to pursue STEM disciplines, these fields continue to show some of the largest gender disparities (Daudt & Salgado, 2005). If girls express as much interest in math and science as boys (Galloway, 2007), and ability is not an issue (Kusku, Ozbilgin, & Ozalke, 2007), then this lack of females pursuing STEM education and careers must be a matter of socialization. This socialization includes the tacit understanding and cultural expectations that STEM disciplines are masculine pursuits.

In educational settings, gender boundaries are sanctioned, activated, and enforced in ways that construct “natural” categorical differences between boys and girls. With only certain forms of femininity and masculinity being celebrated and recognized within our schools, there is a need created for females and males who want to succeed within the educational process to not only perform the approved gender for their biological body, but to perform the form of gender that is culturally expected and socially acceptable (Bettie, 2003). For example, Li’s (1999) study of secondary school teachers shows how teachers tend to view mathematics as a “male” domain.
resulting in overrating males’ abilities to do math, holding male students to higher expectations and having more positive attitudes towards male students. This lack of attention to female students by teachers has been used to substantiate girls’ lower participation in math and science related classes and activities (Clewell & Campbell, 2002).

Palpable gender politics happen everyday in educational institutions. Gender divisions are produced within schools, resulting in reproduction within the professional workforce (Acker, 1994). Girls excelling in math and science in middle and high school are already linked with male-gendered abilities (Skaggs, 2010). By continuing to only venerate the need for robust math and science skills for STEM careers, girls must decide very early in their education to challenge culturally sanctioned gender practices and pursue STEM courses. The “ invisibility of culture in science” leaves little room for how factors of gender…affect the experiences of women…the burden overwhelmingly falls on the individual to conform and contort herself to fit into the tightly regulated boundaries of how science is done” (Ong, 2001, p.42).

Gender blindness in STEM education unintentionally impedes females at every educational transition. While the Business Higher Education Forum (BHEF) U.S. STEM Education Model (2010) provides an excellent simulation model tracking the flow of students as they move through their education into STEM industry/teaching careers, it does not acknowledge the varying gender implications affecting and impeding each transitional stage. Culturally, females are being asked to make continually constraining choices (CeCi & Williams, 2010) regarding their gender identity and negotiation beginning as early as middle school (pre-adolescence). These choices and more importantly, the consequences of these choices increase exponentially in significance throughout their educational and professional careers.

It is vital for teachers to have greater understanding of gender issues in STEM classes and careers. If female students are not inspired to pursue more math and science courses early in their educational career, those students are already at a disadvantage. A late entry into the STEM educational pipeline can result in more obstacles in an already difficult career path. “Changing the conversation” of what is necessary for success in the STEM disciplines can be an effective tool when used strategically.

By intentionally integrating feminist thought into STEM teacher preparation classrooms, students can be encouraged to critically evaluate science’s relationship to systemic power, oppression, and domination within broader societal contexts (Mayberry, 1998). In turn, as these students begin their own teaching they are able to utilize feminist/critical pedagogy within their classrooms and reveal the gendered nuances and politics of science and technology while reducing overall science anxiety of all their students, especially females (Udo, Ramsey, & Mallow, 2004). By providing alternative and developmental courses for students interested in STEM disciplines, greater enrollment and increased persistence can result (Whitten et al, 2004). Also having targeted curricula in place of generic general education courses gives science an accessible social context, offers the potential for making science more accessible, and widens students’ perspective of their discipline.

Effective STEM education is strategic in assisting students to achieve authentic identity development alongside increasing their technical skills. When females believe their personality and skills are good matches for their environment, their self-efficacy and commitment to academic [or work] environment increases. Females travel very deliberate and sometimes long journeys to make it to STEM undergraduate classrooms; it is vital they be allowed unconstrained opportunity to pursue and persist in the sciences.
REFERENCES


AUTHOR INFORMATION

Jen Skaggs (j.skaggs@uky.edu) has a Ph.D. in higher education with a concentration in gender studies from the University of Kentucky. She received her MS in College Student Development from Miami University, OH and her BA in Communications Studies/Theatre from Taylor University, IN. She has been a public school teacher and a corporate trainer. Her research focuses on undergraduate engineering education, gender, and P20 STEM education access.