National Science Teaching Association Position Statement

Gender Equity in Science Education

Introduction

The National Science Teaching Association (NSTA) strongly asserts that gender equity is critical to the advancement of science and to the achievement of global scientific literacy. Gender equity means ensuring *all* students of *any* sex, gender identity and/or expression, or sexual orientation—regardless of racial or ethnic background or ability—are empowered, challenged, supported, and provided full access to become successful science learners.

The *Next Generation Science Standards* (*NGSS*; NGSS Lead States 2013) and the *Framework for K–12 Science Education* (NRC 2012) upon which the *NGSS* are based, envision equitable and excellent science education experiences for all students. The *NGSS Appendix D* entitled, "All Standards, All Students," cites girls as a marginalized group in science education due to women's persistent underrepresentation in science careers, particularly in the areas of engineering and technology (NSF 2015; NGSS Lead States 2013). While strides have been made in encouraging more girls to take classes in science, technology, engineering, and math (STEM), girls continue to take fewer advanced-level science courses in high school and graduate from college with fewer STEM degrees (NCES 2012; Sadler et al. 2012), even though they demonstrate equal STEM talent (Wang and Degol 2013). Recent studies suggest that although students associate women with science much more frequently than they did in earlier decades, the stereotype of scientists as males persists and becomes stronger as students progress through school (Miller et al. 2018). A variety of research-based best practices for supporting girls in STEM includes (1) instructional strategies that increase girls' achievement in science; (2) promotion of successful female role models in science; and (3) classroom, school, and district structures, such as afterschool and mentoring programs, that encourage girls in science (Baker 2013; NGSS Lead States 2013; Scantlebury 2014). All of these practices—together with educators and policy makers addressing their own gendered biases—can support girls in developing their STEM identities (Kim et al. 2018).

While gender equity in science education has traditionally focused solely on providing opportunities and access for girls in science, contemporary notions of gender equity transcend binary male/female roles to include students' gender identity (one's internal sense of their own gender), gender expression (a person's behaviors or mannerisms that are societally associated with masculinity or femininity), and sexual orientation (identity with respect to sexual attraction), as well as sex (biological identity based on genitalia or genetics) as important factors for consideration in students' learning and feelings of safety at school (Greytak et al. 2016). Science educators must recognize and respect diversity within gender and sexuality to include LGBTQ students, and become sensitized to the ways in which language, curricular materials, and pedagogical choices can impact, both positively and negatively, students' feelings of belonging and competence in

science classes and careers. For example, when teaching topics such as reproduction or evolution, limiting discussions of gender or sexuality solely to male-female heterosexuality may unwittingly marginalize students who do not identify with these roles and miss important opportunities for exploring the diversity of reproductive strategies among living things (Bazzul and Sykes 2011; Milne 2011) and growing evidence of the non-binary nature of sex in humans (Ainsworth 2015). Intersectionality, or the confluence of factors including but not limited to sex, gender identity, gender expression, sexual orientation, race, ethnicity, and/or ability, also plays an important role in understanding how students experience classroom science and science in society as some populations who represent these intersections have been more marginalized than others with respect to STEM participation (Ong, Smith, and Ko 2017; Sparks 2017; Tan et al. 2013). Science teachers can capitalize on the rich and diverse strengths and experiences of all students by first recognizing and addressing their own biases and becoming familiar with the array of practices that can support students of any gender identity, gender expression, or sexual orientation.

Declarations

NSTA makes the following declarations to achieve gender equity. It is critical to note that, while these statements focus on preK–12 education, gender equity in higher education, the workforce, and national policy influence, and are influenced by, the active and informed participation of stakeholders at every level. Science teachers, school administrators, counselors, teacher educators, professional and curriculum developers, and policy makers must work together to ensure all students are scientifically literate and can envision themselves as future scientists and citizens of a global society. To support gender equity, NSTA recommends **all stakeholders** support the adoption of this position statement, including its definition of gender equity and the following recommended policies.

For **science teachers** to focus on gender equity, NSTA recommends that they:

- Create an inclusive learning environment that respects, values, and empowers all students and encourages them to participate fully in class discussions, activities, and investigations.
- Practice self-reflection about the biases they may have related to gender. This includes being conscious of their words, actions, expectations, and stereotypes for all expressions of gender identity; including but not limited to male, female, non-binary, and transgender students, and be prepared to take actions to learn from their mistakes.
- Be conscious of the ways students treat each other and the words they use, including the verbalization of stereotypes and biases by students during their classes. This includes challenging stereotypes and clarifying misconceptions that come up during class activities and discussions.
- Select curriculum materials that promote gender inclusiveness through their text, illustrations, and graphics with emphases on historical and current inequities.
- Select curriculum materials that promote culturally diverse role models representing all expressions of gender identity, including but not limited to male, female, and transgender individuals working in all disciplines and at all levels of science.
- Encourage all students to take science and science-related classes and participate in science-related afterschool opportunities throughout their time in school.

- Encourage all students to consider science and science-related careers by offering them opportunities to see scientists who represent all expressions of gender identity, including but not limited to male, female, and transgender scientists at work through online videos, videoconferencing, field trips, and/or guest visits.
- Build a rigorous, supportive, and empowering classroom environment that includes high expectations, safety from bullying, and the acceptance of all students, no matter their race, culture, religion, ability level, gender identity, gender expression, or sexual orientation.
- Cultivate culturally relevant instructional practices and be cognizant of the intersectionality of female, male, and transgender students who represent underrepresented groups in the fields of science, technology, engineering, and mathematics.
- Implement varied and effective research-based teaching and assessment strategies that align with the needs of all students.

For **teacher educators** and **professional developers** to focus on gender equity, NSTA recommends that they:

- Ensure professional development and teacher education programs include discussions about gender equity pedagogy that emphasize research findings and use accurate data about inequities in science.
- Ensure professional development and teacher education programs include specific strategies, tips, and examples to combat inequity and challenge stereotypes.
- Help teachers create an inclusive learning environment that respects and values students so that all students participate fully in class discussions and science activities and investigations.
- Practice self-reflection to discover their own biases as they help teachers uncover and mediate their unconscious biases regarding gender to minimize negative impacts on student achievement.

For **curriculum specialists/developers, counselors,** and **administrators** to focus on gender equity, NSTA recommends that they:

- Design and/or select curriculum materials that accurately and equitably portray diverse gender identities, religions, cultures and races, various ages, languages, and abilities through their text, illustrations, and graphics (online and print materials).
- Design and/or select curriculum materials that emphasize these diverse groups of people in positive and contributing roles across all disciplines and all grade levels.
- Design and/or ensure that varied assessments are implemented so that all students can be evaluated fairly in science.

Specifically, **administrators** should:

- Provide administrative support for the development and use of a range of assessment methods that give diverse students more latitude to demonstrate their knowledge and understanding, and foster students' learning.
- Encourage all staff to be inclusive and to facilitate communication about gender equity between and among all stakeholders.

- Provide teachers with recognized, research-based materials and models, and include statements related to gender equity pedagogy and assessment strategies in teacher evaluations.
- Document student achievement and science course taking patterns by gender using intersectionality to identify key social categories so that data can be analyzed by gender and race, gender and language, etc.

Specifically, **counselors** should:

- Encourage all students to take science and science-related classes throughout their time in school.
- Encourage all students to consider science and science-related careers by exposing them to a range of in-person and media-based role models, and school and community activities that align with different science careers.
- Provide all students with the most recent information about the kinds of opportunities available in the sciences, as well as the preparation necessary to attain such careers.

For **policymakers** at the local, state, national, and international level to focus on gender equity, NSTA recommends that they:

- Recognize the importance of gender equity as a civil right in teaching and learning.
- Support policies that encourage educators to attain a gender equity mindset and demonstrate gender equity practices.
- Create opportunities for pre-service and in-service educators to learn about gender inequities in science.
- Include implementation of gender strategies in assessments of principals, district personnel and state departments of education.
- Provide opportunities for educators to learn gender-equitable teaching strategies and access gender-equitable curriculum for their classrooms.
- Develop opportunities for preservice and inservice educators to uncover their own biases in gender equity and learn strategies to counteract their own biases so that their classrooms are more inclusive.
- Create and support programs in which preservice and inservice educators can engage in discussions across districts, states, and nations to develop a deep and global understanding of the importance of gender equity as a civil right in teaching and learning.

— Adopted by the NSTA Board of Directors, November 2019

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Additional Resources

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