

# More than half of biology majors are women, yet gender gaps remain in science classrooms

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In the largest analysis of gender differences known of in introductory college-level biology courses, researchers with Arizona State University and University of Washington have found evidence of gender-based gaps in both achievement and class participation. Credit: Sandra Leander

Science, technology, engineering and mathematics (STEM) fields are traditionally heavily dominated by males, which is of great concern to universities as they try to improve student retention and achievement. One exception to that trend is in the field of biology. Of undergraduate

biology majors, more than 60 percent are female and about half of biosciences graduate students are women.

Given that, a common assumption is that biology is one STEM field that no longer faces gender inequalities. However, researchers with Arizona State University and University of Washington have proven otherwise. In the largest analysis of gender differences known of in introductory college-level biology courses, researchers have found evidence of gender-based gaps in both achievement and class participation.

The findings appear in the current issue of *Cell Biology Education—Life Sciences Education*. The American Society for Cell Biology publishes the quarterly journal.

"Often, gender differences are assumed to be present only in fields where males outnumber females and where there is a strong emphasis on math," said Sara Brownell, assistant professor with ASU's School of Life Sciences. "But we are seeing it in undergraduate biology classrooms that do not focus on math—where females make up about 60 percent of the class—indicating that this could potentially be a much more systemic problem. It's likely this is not unique to physics or biology, but rather true of most undergraduate classrooms."

Researchers studied 23 classes at a research one (R1) university over a two-year period. The courses included mostly sophomores and biology majors, and were generally taught by two instructors each. Of more than 5,000 [students](#) enrolled in the courses, nearly 60 percent were female.

After studying exam performance and class participation, scientists discovered that even with similar college GPAs, female students had average exam scores of 2.8 percent lower than male students. In addition, while female and [male students](#) were equally likely to ask a question during class, when asked to volunteer responses to questions, 63

percent of males on average spoke up—even though they comprised only 40 percent of the classroom.

Co-author Sarah Eddy, a postdoctoral scholar at the University of Washington, says the gender gap in the classroom, along with performance equality, present problems.

"Introductory biology classes are the first opportunities for many students to interact with professionals and peers in their intended fields," said Eddy. "This is a critical opportunity to build up their confidence so that they can succeed in the field. Part of building that confidence is gaining recognition from their classmates and instructors. If females aren't heard as often as males, they don't have the same opportunity to succeed as biology majors."

Brownell and her team suggest that in order to improve student retention and achievement in [biology](#), new strategies must be put into place.

What can instructors do to level the playing field? To positively affect the participation differences in large classes, the researchers recommend using a pre-sorted list of student names to randomly call on them, rather than allowing students to raise their hands. Brownell and her team say that while students may be resistant to the method at first, it is a more equitable way to structure classroom discussions.

"In order to solve the problem, instructors must be aware that it even exists," shared Brownell. "That's really the point of this paper—to illustrate that there are [gender differences](#) that should not exist. The next steps are to try to determine what causes these differences and then develop additional strategies that instructors can use to lessen those differences."

Provided by Arizona State University

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