

## An Action Plan for Change

### Individual Steps

- a. Take the Harvard's Project Implicit Bias gender test
- b. Have a colleague observe your classroom for equitable air time
- c. Use popsicle sticks, or other random selection method, to select students to answer
- d. Ask your school to have students fill out standardized test forms (name, gender, etcetera) either after taking the test or days before the test
- e. At Back to School Night, ask parents not to tell their children that they were not good at math and explain how this encourages a fixed mindset.

### Classroom Strategies and Ideas

#### 1. Student operated Study Sessions

Students who work together have demonstrated significant grade improvements and noticeable increases in confidence. Move from teacher-led review sessions to student-led study sessions. Teachers have observed students become less reliant upon one-on-one meetings and more able to question and gauge their own understandings as a result of working in a group setting.

#### 2. Create a classroom setup that allows opportunities for partner and group work.

Multiple studies indicate girls learn best through cooperation and collaboration rather than competition. Arrange desks to allow for frequent group/partner sharing and work.

#### 3. Take time from class to discuss that is a learned skill and not an innate talent.

Anonymously ask students how one excels in math: through natural talent or hard work and practice? Then consider reading Rene's story from Malcolm Gladwell's *Outliers* to them.

#### 4. Change the buzz about mistakes - stress that mistakes are part of the learning process.

Consider devoting a wall to "positive quotes." Begin a few class sessions with stories of famous scientists or historical figures that experienced multiple failures before arriving at success. In class, encourage students to share their work on the board even when it is not right.

#### 5. Have older students read and discuss online articles or excerpts from books about the learning process

Students will gain an understanding of how they learn in all of their classes, not just math.

#### 6. Give time for reflection.

Require students to analyze and reflect upon their work when graded assignments are returned. It is important for students to analyze the mistakes they made, determine why they made these mistakes, and brainstorm how they can prevent making these mistakes in the future.

#### 7. Give appropriate praise

Do not give praise for high scores and performance; give praise for effort applied to the task. This fosters a growth mindset

#### 8. Talk about stereotype threat

#### 9. Bring in women role models

Have female students in higher grades visit your classroom to help with a math activity or bring in outside women speakers.

## Recommended Resources

### Recommended Books

1. *Mindset* by Carol Dweck, Ph.D.
2. *How Girls THRIVE* by JoAnn Deak
3. *Outliers* by Malcolm Gladwell
4. *Research Based Strategies to Ignite Student Learning* - Judy Willis, M.D.
5. *Learning to Love Math: Teaching Strategies That Change Student Attitudes and Get Results* – Judy Willis, M.D.

### Websites of Interest

1. Mindset <http://www.mindsetonline.com/>  
Learn about growth and fixed mindsets; take a quiz to determine your mindset; learn how to change your mindset.
2. AAUW Why So Few <http://www.aauw.org/learn/research/whysofew.cfm>  
The American Association of University Women reviewed eight large gender research studies and discusses their findings in this publication, available as a free pdf download.
3. Project Implicit <https://implicit.harvard.edu/implicit/>  
The Harvard implicit bias test provides free online tests to make one aware of personal areas of bias; specifically there is a gender-science association test.

### Recommended Articles (Available Online)

1. "Teaching to Fail" by Edward Burger, Insider Higher Ed  
<http://www.insidehighered.com/views/2012/08/21/essay-importance-teaching-failure#.UTqMxuicmA.mailto>
2. "The Need for Belonging in Math and Science" by Scott Barry Kaufman, Scientific American  
<http://blogs.scientificamerican.com/beautiful-minds/2013/10/21/the-need-for-belonging-in-math-and-science/>
3. What is Stereotype Threat?  
<http://www.stereotypethreat.org>
4. Why Girls Drop Math I: Beliefs About Math - Dr. Art Markman, Ph.D  
<http://www.psychologytoday.com>
5. Girls Learn Lesson in Math Anxiety  
<http://www.futurity.org/society-culture/girls-learn-lesson-in-math-anxiety/>
6. How Boys and Girls Learn Differently  
<http://www.webmd.com/parenting/features/how-boys-and-girls-learn-differently>
7. Gender Differences in the Sequence of Brain Development by Leonard Sax M.D., Ph.D.  
[http://www.education.com/reference/article/Ref\\_Boys\\_Girls/](http://www.education.com/reference/article/Ref_Boys_Girls/)
8. "Women and Men in the Classroom: Inequalities and Its Remedies" Catherine Krupnick  
<http://isites.harvard.edu/fs/html/icb.topic58474/krupnick.html>
9. "Girls and Mathematics: Confidence and Success are Directly Proportional" Sally Reid  
<http://www.ncgs.org>
10. "The Role of Stereotype Threats in Undermining Girls' and Women's Performance and Interest in STEM Fields" by Shapiro, Williams, Academeia.edu, Web 2011
11. "Gender Equity Still Knocking at the Door." By David Sadker, *Educational Leadership*, Vol 56 April 1999