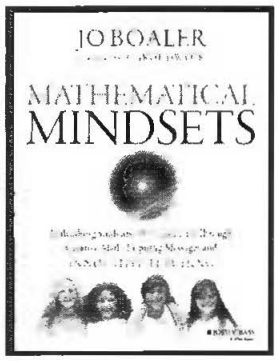
Mathematical Mindsets by Jo Boaler Jossey-Bass, 2016



Reviewed by Ashley Durbeniuk and Terry Freeman

Mathematical Mindsets, by Jo Boaler, brings to light the five Cs of learning: curiosity, collaboration, connections, challenge and creativity. It allows students to see that math is not just a black and white subject. Multiple pathways can get learners to their final destination. In our experience, allowing students to use their own creativity in math gives them the satisfaction of connecting their life to mathematical concepts. It also gives them a chance to succeed in a subject that they may have previously failed. An example of this is the linear relations task that introduced the idea of linear relations in Grade 9 math. It encouraged students to think outside the box, see their own patterns and express their learning in multiple ways. Students were given the opportunity to collaborate with one another and share their ideas with a table group, where students of all levels of understanding were able to be experts in their own right. As a class, they discussed the multiple pathways.

The book discusses many nontraditional approaches to the learning of math. Boaler proposes "Positive Norms to Encourage in Math Class." These norms include (1) everyone can learn math to the highest levels, (2) mistakes are valuable, (3) questions are really important, (4) math is about creativity and making sense, (5) math is about connections and communicating, (6) depth is more important than speed and (6) math class is about learning not performing. Jo Boaler provides the research behind each of these norms. *Mathematical Mindsets* is ripe with tangible examples. Taking on the debate over Mad Minutes, the book references an article by Boaler entitled "Fluency without Fear." The article discusses the stress associated with timed fact tests. She proposes cooperative, nontimed activities like Close to One Hundred. This game is a favourite of many students. It strengthens numerical fluency while working with a partner in a nonthreatening environment.

The lens of the 5 Cs encourages teachers and students to interact with math in meaningful, real-world situations. Watching Grade 4 students work on a challenge requiring collaboration, creativity, connecting and curiosity to discover the area and perimeter of an alien ship produced an unexpected mathematical discovery—how to discover the area of a triangle. This activity was what Jo Boaler calls "Low Floor—High Ceiling" tasks. Such tasks engage all students in meaningful ways. Grade 1 students were challenged to discover the cost of a pizza party for their class, grade and school. These young mathematicians were totally engaged for 90 minutes. "The Power of Mistakes" was celebrated. Favourite mistakes were celebrated and moved thinking forward. The beauty of each of these "Rich Mathematical Tasks" is that they were carefully crafted so that each student would have success. More important, the work and effort of each team member contributes to the final outcome.

Mathematical Mindsets is not a theoretical discourse on what could be. Rather, it is thoughtfully written so that teachers of all grade and ability levels can affect positive change in their practice. More important, these shifts in practice engage the students and they see the beauty of math, how powerful struggle is and how a growth mindset can be fostered. Join the revolution and read this book.

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