Redefining Instructional Excellence with the Rigor of *McGraw-Hill My Math*

by Robyn Silbey

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Robyn Silbey taught in Montgomery County Public Schools (Maryland) for 36 years as a classroom teacher and math coach. She has co-authored McGraw-Hill Math products (textbooks and intervention programs) since 2000. Robyn also writes the Coaches' Corner feature for Teaching Children Mathematics, an NCTM periodical. Robyn served in the Teacher Training Corps for the United States Department of Education under George W. Bush. A chronicle of Robyn's professional development strategies for raising teacher quality and student achievement in mathematics can be found in the AIR/USDE report, "What the United States Can Learn From Singapore's World-Class Mathematics System (and What Singapore Can Learn from the United States)." Robyn loves sharing her passion for mathematics with schools around the country through workshops, webinars, and campus visits.

Redefining Instructional Excellence with The Rigor of McGraw-Hill My Math

Why is rigor a sought-after element in mathematics classrooms around the country? To find the answer, consider what it means to be "career-ready" in the 21st Century. The workplace goals in cutting-edge companies include identifying and completing tasks that require invention, creativity, and teamwork. Colleagues apply pertinent skills based on their deep understanding of a concept to identify and solve new problems. Daniel Pink observes in his landmark book, DRiVE[1], that 70% of all job growth is heuristic, or focused on innovative problem solving. This shift in job growth requires a shift in learning, which can be accomplished only if we make a corresponding shift in instruction.

Enter the Common Core State Standards; [2] the first national curriculum addresses the content, processes, and proficiencies needed to prepare students for their successful future. Within the Standards, rigor is defined as "deep, authentic command of mathematical concepts."[3] To help students meet this goal, the Standards cite three aspects of rigor on which to focus: conceptual understanding, procedural skills and fluency, and application.

a. **Conceptual understanding:** Concepts must be accessible from a number of perspectives in order to see mathematics as more than a set of mnemonics or discrete procedures.

- *McGraw-Hill My Math* lessons include an Investigate the Math exploration that engages students and increases conceptual understanding. Model the Math, also in each lesson, provides more structured activities to enrich that understanding. Each lesson opener shows how practice exercises increase in complexity throughout the lesson, moving from conceptual understanding to application to extending fluency.

b. **Procedural skills and fluency:** Core procedural skills, such as single-digit multiplication, must be mastered in order to access more complex concepts and procedures. Fluency is addressed in the classroom and through supporting materials to be used over an extended period of time.

- *McGraw-Hill My Math* embeds fluency practice opportunities throughout each lesson, utilizing a variety of formats for optimal engagement by all students – games, manipulative work, traditional practice, and many others. Homework pages are built into the Student Edition. Additionally, a vast collection of extra practice is available in black line masters, practice with manipulatives, online games, online assessment, and by using the adaptive learning tool, *ALEKS*.

c. **Application:** Application is the outcome—and the goal—of the conceptual understanding and procedural skills or fluency. Students must continuously use their knowledge in situations that require applying mathematical concepts to relevant, every day activities.

- *McGraw-Hill My Math* lessons launch with a relevant, Math in My World application that takes students out of the classroom and into daily life. Higher-Order Thinking push students to think deeply about the content as they apply it to other mathematical concepts, look for patterns in their work, and draw conclusions about what they experience, see, and do. Chapter Projects and Real-World Problem-Solving Readers entice students to enrich their learning with additional engaging, real-world, multi-layered experiences.

In order to embed rigor into daily practice, teachers must create a learner-centered, discourse-rich, risk-free learning environment in which students are intrinsically motivated to succeed. The Common Core Standards for Mathematical Practice[4] provide a clear description of this type of classroom—one in which students productively persist through difficult and challenging problems to find a justifiable and reasonable solution. Three research-driven strategies put teachers and students on the path to creating this dynamic, learning atmosphere.

1. Teachers engage students in thought-provoking student discussions that are prompted by open-ended, stimulating questioning. Classroom conversations involve *all* of the students. A teacher poses questions to the class for students to discuss in small groups or with a partner. Every student is held accountable to think about and articulate a response. Teachers facilitate the collection of students' ideas, and encourage a clarifying discussion surrounding them. In one scenario, a teacher embracing Cognitively Guided Instruction[5, 6] listens to children's mathematical thinking and uses their responses to drive instruction.

   - *McGraw-Hill My Math* lessons feature Talk Math, a challenging question that encourages a multi-layered discussion around the day's learning. In addition, each lesson concludes with Building on the Essential Question, which connects the day's learning to the broader, Common Core Standards-based goal. Students see how each piece fits in the overall body of mathematical knowledge, and teachers can listen to students' responses to inform future instruction.

2. Teachers nurture a risk-free atmosphere in which students believe that mistakes are markers on the road to success. In Mindset[7], Carol Dweck suggests nurturing a *growth mindset*, where students are encouraged to work through productive persistence. Praise is given to students who demonstrate perseverance. Dweck says, "When children are taught the value of concentrating, strategizing, and working hard when dealing with academic challenges, this encourages them to sustain their motivation, performance, and self-esteem."[8]

    - *McGraw-Hill My Math* lessons feature differentiated instruction, targeted strategic intervention, ELL support, digital tools, My Learning Stations, and beyond level activities to ensure that every student's needs are met and challenged to that learner's highest potential.

3. Teachers encourage students to become intrinsically motivated to learn mathematics. In DRiVE[1], Pink describes three elements of intrinsic motivation: *autonomy, mastery,* and *purpose*. Using the lens of rigorous math instruction, teachers nurture intrinsic motivation using these elements:

    a. **Autonomy:** Students independently think through problems, choose their best solution strategies, and develop their own individual style of problem solving.

        - *McGraw-Hill My Math* lessons expose students to a variety of workable approaches and strategies. Students are invited and encouraged to select or invent their own solution pathway and then held responsible to discuss and justify their thinking.

    b. **Mastery:** Students believe in their own capability, knowing that with effort and persistence, they are cognitively able to deeply understand everything they learn.

        - *McGraw-Hill My Math* lessons create a growth-mindset environment in which errors are an expected part of learning. This motivates students to strive for mastery. *Common Errors* capture frequent misconceptions and provide teachers with tools and strategies that put students back on track for successful learning.

    c. **Purpose:** Students place a high value on their own learning, recognizing that the knowledge they accrue is necessary for success in their world.

        - *McGraw-Hill My Math* lessons expose students to relatable, relevant; real-world problems that support students' aspirations for learning the mathematical concepts presented in the classroom. Math in My World and Problem solving are a critical part of every lesson, as well as a *Chapter Project* and a wide variety of online opportunities.

To teach the skills our students need, excellent instruction must be redefined. It is not a checklist of procedures for teachers to present and students to memorize. Great teaching of mathematics involves ensuring that all students deeply understand and make sense of the concepts they need to succeed as lifelong learners, workers, and citizens. More importantly, students must be able to identify patterns, make connections, draw conclusions, and apply what they have learned to new situations and unique settings. To be career-ready in the 21st century marketplace, our students must excel at critical thinking, communication skills, and collaboration. *McGraw-Hill My Math* provides the innovation, tools, strategies, and support a new and higher standard of rigor, defined by 21st century criteria.

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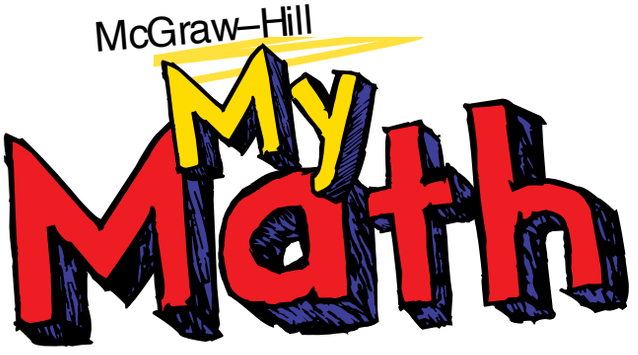

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