Foreword

As a student of mathematics and even as a novice teacher, I often misunderstood algebraic reasoning. I thought it was all about symbolic manipulation, graphs, tables, and solving for a variable. Even though I was considered successful in mathematics and I made all As, I never made the connection among these areas of mathematics. I thought everything was an isolated task. It wasn't until later in my teaching career that I began to see the connections between and among the different representations and how each representation told a story about the mathematics. Making the links among the representations brought new understanding to mathematics.

Sometimes the move from number operations to algebra (symbolic representation) is too drastic for students. They never learn to make connections between the two and therefore struggle with mathematics as they work through the middle grade years. Often students move to the abstract world of algebra without understanding what it is all about. Algebraic reasoning helps bridge the gap from numbers to symbolic rules and functions.

As students begin to use algebraic representations to understand mathematics and real-life problem situations, they begin to build their understanding of functions as they relate to life (everyday situations). Developing representational fluency sets the stage for success in their future learning of mathematics. *It's All Connected: The Power of Representation to Build Algebraic Reasoning* is an excellent resource to help students bridge the gap.

In this resource, Dr. Frances Van Dyke helps students develop algebraic reasoning and an understanding of the different representations for functions through a series of short lessons. These lessons often concentrate on one representation at a time. In doing so, teachers can easily isolate where students may be struggling as they move toward the symbolic world in mathematics. These lessons can be used to teach and assess students' knowledge as Dr. Van Dyke provides guidance and helpful hints for teachers as they teach the lessons. The Overview describes what each lesson entails, giving suggestions on prerequisite lessons and pointing out where students may be prone to misconceptions. The Teaching the Lesson section assists teachers in implementing the lessons as it provides questions that teachers can ask in order to assess what students know.

It is refreshing to have a resource that helps teachers see and understand mathematics through different representations. After learning a concept, students are asked to demonstrate their understanding through additional problems and explain their thinking using appropriate mathematical language. These lessons provide a smooth progression through the world of representation. Students can focus on one aspect at a time, allowing them to use what they have learned to develop further understanding. These lessons make all aspects of algebraic reasoning accessible to both students and teachers and finally bring clarity to the abstract world of algebraic reasoning through representation, thus allowing our students to want to continue to learn mathematics.

It's All Connected: The Power of Representation to Build Algebraic Reasoning will be beneficial to all teachers, from the novice to the experienced. This resource provides a variety of ways that students can approach the mathematics and be successful. Answers to the lessons are provided, homework assignments are suggested, and further practices are offered to push students' thinking. This resource guides our students through the difficult world of representing mathematics in a variety of ways while making important connections along the way. Using this resource, we can help our students develop a firm grasp on understanding different representations. With this understanding, students will be able to comprehend the use of properties of operations as they develop their mathematics from arithmetic to algebra, keeping them interested in learning and being successful with mathematics.

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