

What Algebra? When?

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"Algebra is a student's first experience with higher-level mathematics."

"Algebra is the serious study of the last three letters of the alphabet."

"All students should be doing algebra by grade 8."

Algebra is talked about a lot these days. Alan Schoenfeld (in Lacampagne, Blair, and Kaput [1995]) describes algebra as "an academic passport for passage into virtually every avenue of the job market and every street of schooling." Hyman Bass (2006) notes that algebra is viewed as foundational for all mathematics and science. Currently, about 40 percent of eighth-grade students in this country are enrolled in first-year algebra or an even higher-level math course (for example, geometry or second-year algebra).

At a time when maintaining our nation's competitive edge means encouraging more students to consider math- or science-related majors and careers, should we address the challenge by moving more students into higher levels of mathematics earlier? Well, I am not so sure.

Yes, we have more students taking higher-level courses in mathematics, and yes, the path to a good job often begins with algebra. But is mandating algebra for all seventh- or eighth-grade students a good idea? Teachers of algebra frequently tell me that far too many of their students are not ready for algebra, regardless of how it is defined (first- or second-year algebra, integrated mathematics curriculum, etc.).

I regularly ask teachers, "What do you wish your students knew—and knew well—before taking their first course in algebra?" Although I was initially surprised, I have grown accustomed to hearing some teachers reply, "Basic multiplication facts."

Actually, most teachers indicate that their students don't know as much about fractions as they would like. By *fractions*, I mean fractions, decimals, percents, and a variety of experiences with ratio and proportion. Another major topic on the wish list of algebra teachers is problem solving, but that's on every teacher's list.

So, if teachers could wave a magic wand, they would ensure that students beginning to study algebra—whether in a course with *algebra* in the title or an integrated curriculum—bring with them a strong background in the mathematics that precedes this first experience with higher-level mathematics.

As Chambers (1994) notes, algebra for all is the right goal—we just need to make sure that we're all targeting the right algebra in our teaching. This algebra would focus on topics like expressions, linear and quadratic equations, functions, polynomials, and other major topics of algebra. (Note that these ideas will be discussed in the National Math Advisory Panel's report on algebra topics.)

If students were better prepared for introductory algebra courses, their teachers could think more seriously about how and when to have them use technology or solve problems that engage them and help them connect algebra to everyday situations. Who knows? Such experiences might eliminate the age-old question, "When am I ever going to use this stuff?" Furthermore, these opportunities will allow students to see the need for reasoning as they learn how to generalize relationships.

Of course, we must not overlook the importance of integrating the essential building blocks of algebra in pre-K–8 curricula, especially during the middle grades. Work with patterns is probably overemphasized in some quarters as the defining component of algebra with younger learners, but early experiences with equations, inequalities, the number line, and properties of arithmetic (such as the distributive property) are foundations for algebra. Silver (1997) notes that integrating algebraic ideas into the curriculum in a manner that helps students make the transition from arithmetic to algebra also prepares them for what occurs later in algebra.

So is early access to algebra a good idea? Sure—for some—probably for many. More importantly, however, all students who are working to secure this valuable "passport" should begin their study of algebra with all the prerequisites for success, regardless of when the opportunity comes their way.

References

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