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# Formula for Success

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I read just about every word of *Education Week* every week to stay informed about educational “best practices,” about innovations, about policy, about available teaching/learning materials, about leadership changes, and about research. And I try to read that periodical as a sociologist might, paying particular attention to “what’s hot” in our profession. It would be interesting, for instance, to compare headlines and story content over time. It would be equally interesting to graph the number of articles having to do with students’ mathematical performance and the concerns at all levels that continued low achievement in this discipline may lead to a decline in the U.S. economy and our standard of living.

Recent issues included an article about the activities of the National Mathematics Panel, charged by the President to address several priorities, one of them being “the skills needed for students to learn algebra and be ready for high levels of mathematics.” Even more recent was an article about the National Council of Teachers of Mathematics’ new document, *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence*, which provides “descriptions of the most significant mathematical concepts and skills at each grade level.” They add: “... curriculum focal points are clearly areas of emphasis, calling for instruction that will help students learn content that gives them a foundation for increasing their understanding as they encounter richer and more challenging mathematics.”

We have long known that students who are successful in algebra are more likely to go to college and succeed in college than those who either never take the course or who fail it, perhaps more than once. So algebra has come to be the “gatekeeping” course, and success in algebra has become, at least to many, a civil rights issue since it is so critical to life success.

“What to do about the algebra failure rate” is not a new issue for schools. I can recall that we had long discussions back in the early 1980’s about strategies to improve the performance of students taking algebra. We tried tutorials. We tried teaching it in two periods each day, rather than one. We tried breaking the curriculum in half and teaching the content over a two-year period, hoping that all students needed was more time. We tried tough love and just passed out those “F’s.” We

offered the course in summer school and in evening high school. We assigned the “best” teachers in the school to teach algebra at least one period a day. And yet the high failure rate persisted. We finally learned, in the words

of Elmore, (2002) that “the usual remediation strategies we employ when kids fail to meet statewide testing requirements are to give them the same unbelievably bad instruction they got in the first place, only in much larger quantities with much greater intensity. This is what we call the louder and slower approach.” Re-teaching, in other words, is not effective for students who have learning difficulties or disabilities.

**We have to address root causes for failure in mathematics.**

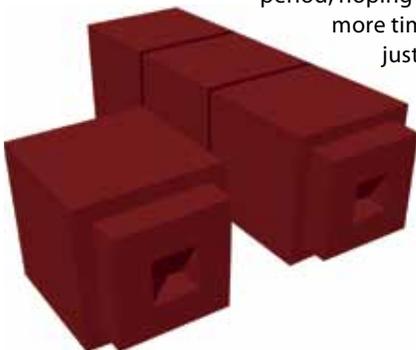
Creative Education Institute (CEI) created the solution to the “algebra problem” about 10 years ago with the development of *Mathematical Learning Systems (MLS)*. The content — both concepts and procedures, along with a strong emphasis on fact fluency development — includes the topics identified through research as those most likely to cause students with learning difficulties and disabilities to struggle AND the topics identified through research as being most critical for success in higher-level mathematics, e.g., algebra.

## What the Research Says

According to research studies, students fail algebra, regardless of whether they have learning difficulties or disabilities, for three major reasons:

- 🌀 lack of fact fluency;
  - 🌀 lack of understanding of operations algorithms, particularly long-division; and
  - 🌀 lack of understanding of fraction concepts and operations
- 🌀 Once these findings are known, it becomes clear why re-teaching of algebra does not work. Rather, what students need is the kind of therapeutic approach offered in *MLS*, along with an appropriate focus on developing these prerequisite skills.

*MLS* includes two major strands: concept development and fact fluency. Lessons are organized into five units. The first unit includes such foundational concepts as counting, number comparisons, patterns, the base-10 system, and place value. Unit 2 teaches to mastery of the four operations: adding, subtracting, multiplying, and dividing — along with plenty of practice in problem-solving and with adequate and varied practice for fact fluency development. Applications of whole number concepts and skills are the focus in Unit 3, including lessons on estimation. Two units are devoted to fractions, one on fraction concepts and the other on fraction operations. Any student completing the *MLS* program will clearly be well-armed to take algebra and to master it.



# MLS Concept Building Scope and Sequence

Unit 1: Understanding Numbers	
Level 1: Defining Numbers	Identification 0-10 Recognition 0-10 Identification 11-20 Recognition 11-20
Level 2: Numbers 0-20	Patterns & Counting 0-20 Comparison 0-20
Level 3: Numbers 21-99	Place Value 21-99 Patterns & Counting 21-99 Comparisons 21-99
Level 4: Numbers 100-999	Place Value 100-999 Patterns & Counting 100-999 Comparison 100-999
Unit 2: Number Operations	
Level 1: Addition	Single Digits (Advance to Addition Fluency) Double Digits Triple Digits
Level 2: Subtraction	Single Digits (Advance to Subtraction Fluency) Double Digits Triple Digits
Level 3: Multiplication	Single Digits (Advance to Multiplication Fluency)
	Single & Double Digits Double Digits
Level 4: Division	Single Digits (Advance to Division Fluency) Single & Double Digits Double Digits
Unit 3: Using Whole Numbers	
Level 1: Money	Pennies, Nickels, and Dimes Pennies, Nickels, Dimes, and Quarters
Level 2: Time	To the Hour In Hours and Minutes
Level 3: Estimation	Rounding to the Nearest Ten Rounding to the Nearest Hundred
Unit 4: Understanding Fractions	
Level 1: Fraction Identification	Less Than One or Equal To One
Level 2: Equivalent Fractions	Using Larger or Smaller Denominators
Level 3: Comparing Fractions	Common Denominators Different Denominators
Level 4: Simplifying Fractions	Simplified Numerators Equal to One Simplified Numerators Greater than One
Level 5: Converting Fractions	Improper Fractions to Mixed Numbers Mixed Numbers to Improper Fractions
Unit 5: Fraction Operations	
Level 1: Addition	Common Denominators Different Denominators
Level 2: Subtraction	Common Denominators Different Denominators
Level 3: Multiplication	Whole Numbers and Fractions Fractions and Whole Numbers
Level 4: Division	Common Denominators Fractions and Whole Numbers Different Denominators



Log onto [www.ceilearning.com](http://www.ceilearning.com) to download *Why MLS Works: Its Scientific, Theoretical, and Evaluation Research Base* for a comprehensive report on the research findings, along with documentation of how *MLS* applies those findings in its content, lesson designs, instructional strategies (including multi-sensory processing), and implementation support features.

## Implications for Reducing the Dropout Rate

The relationship between retention in grade and the dropout rate is well-established in scientific studies. Once a student fails, his/her chances of becoming a dropout increase dramatically. Two retentions almost make it a certainty. We are beginning to see research that verifies that the subject area causing most retentions is mathematics, so there is already evidence that improved performance in algebra is critical to a school's efforts to decrease its dropout rate.

## Results

CEI recently conducted a study that examined the performance of schools (according to their AYP status) that use *MLS*. We found that 100% of the elementary and middle schools using *MLS* achieved their AYP in 2005-06, and 94% of schools at all levels did so.

We also monitor the pre/post test gains on the *Diagnostic Screening Test: Mathematics (DST:M)* that is provided for each *MLS* lab. We typically see growths of about two years for one year of instruction, with the most significant growth almost always being in fluency, long-division, and fractions — the three critical areas.

CEI has the winning formula for student success in Algebra I and for reduction of the dropout rate. Call **888.511.4194** for more information about how your school's students can begin their journey to improvement.

## Mastery of Fact Fluency

+ Long Division Concept and Algorithm

+ Fraction Concepts and Operations

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= Algebra Achievement