

CEI's *Mathematical Learning Systems (MLS)* and NCTM's *Curriculum Focal Points (2006)*: A Correlation

The National Council of Teachers of Mathematics published in September 2006 an important new document, *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence*. They explain in their introduction that “An approach that focuses on a small number of significant mathematical ‘targets’ for each grade level offers a way of thinking about what is important in school mathematics that is different from commonly accepted notions of goals, standards, objectives, or learning expectations” (p. 1). They continue:

The curriculum focal points presented here offer both immediate and long-term opportunities for improving the teaching and learning of mathematics. They provide ideas that may kindle fruitful discussions among teacher leaders and teachers about areas to emphasize as they consider the developmental needs of their students and examine a year’s program of instruction (p. 1).

NCTM makes it clear in this document that they believe that “When instruction focuses on a small number of key areas of emphasis, students gain extended experience with core concepts and skills. Such experience can facilitate deep understanding, mathematical fluency, and an ability to generalize” (p. 5). This position is exactly the position of Creative Education Institute (CEI) in its design of *Mathematical Learning Systems (MLS)*. The focus of *MLS*’ content has been on the “core concepts and skills” identified in research as areas in which students with learning difficulties or disabilities are most likely to have problems and the areas important to success in higher-level mathematics, such as algebra (See *Why MLS Works: Its Scientific, Theoretical, and Evaluation Research Base*, Chapter IV, CEI, 2006). Thus, *MLS* emphasizes both concepts and procedures, carefully integrating them so that an understanding in one area helps to build understanding in the other. Fluency is further emphasized since without it students never develop good problem-solving strategies.

NCTM states that “A curriculum for pre-K—8 based on a connected set of such focal points could provide a solid mathematical foundation for high school mathematics” (p. 6). Again, CEI agrees. Its research indicates that there are two major reasons that students fail algebra: lack of fact fluency and lack of understanding of fractions. Peeling back the onion, so to speak, a major reason for student’s failure to understand fractions is that they never understood the concept of long division. *MLS*, therefore, devotes two of its five units to fractions, one level of another to division, and a whole strand of activities to develop rapid and accurate recall of math facts (fluency).

Another important point made in the NCTM document is that

These curriculum focal points should be considered as major instructional goals and desirable learning expectations, not as a list of objectives for students to master. They should be implemented with the intention of building mathematical competency for all students, bolstered by the pedagogical understanding that not every student learns at the same rate or acquires concepts and skills at the same time (p. 10).

Again, CEI agrees. *MLS*, a therapeutic intervention for struggling learners, is not designed by grade-levels. The concepts and skills included are prerequisite knowledge and skills required for access to grade-level instruction. The lessons that an individual student may need depend not on the grade he/she is in, but on the developmental level. *MLS* can be used by any school to supplement the core curriculum to ensure mastery as topics are taught; as reinforcement to the classroom teacher's instruction; as re-teaching for students who have not mastered; and/or as a Tier II or Tier III intervention for students who continue to struggle to learn mathematics.

The following correlation shows the relationship between NCTM's curriculum focal points for grades prekindergarten—6 and *MLS*' content. The correlation is strong for all the focal points having to do with Number and Operations, including those that prepare students for algebra. *MLS* does not include instruction on geometry, measurement (except as it pertains to time and money), or decimals (although the foundation for decimals in fractions is thoroughly covered). Information on *MLS*' content, lesson design, instructional strategies, assessments, implementation features, and results, as well as their research-base, can be reviewed in *Why MLS Works: Its Scientific, Theoretical, and Evaluation Research Base* (CEI, 2006).

Each set of *MLS*' concept lessons is taught using the concrete—semiconcrete—abstract (CSA) lesson sequence that is verified as effective, especially for students who struggle to learn mathematics. Manipulatives and a working mat are used in the concrete lessons; representations of those manipulatives and the mat appear on the computer screen for the semi-concrete lessons. At the abstract level, the students work with the numbers and words to solve real-world problems. As they are deciding how to solve a word/story problem, students also receive instruction on how to eliminate irrelevant information. Each set of lessons concludes with an assessment lesson, providing ongoing data for feedback to both the student and teacher.

MLS' comprehensive assessment system is another feature that is critical to its success. It includes two third-party assessments, CEI's *MLS Placement Test*, continuous progress monitoring, an assessment lesson in each set of lessons, and a summative assessment for use in student and program evaluation. Teachers have ample data to enable them to adapt/modify lesson settings so that the program is totally individualized and differentiated for each learner.

References

- Creative Education Institute (2006). *Why MLS Works: Its Scientific, Theoretical, and Evaluation Research Base*. Waco, TX: Creative Education Institute.
- National Council of Teachers of Mathematics (2006). *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence*. Reston, VA: National Council of Teachers of Mathematics.

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NCTM's Curriculum Focal Points, PreK-6	CEI's Mathematical Learning Systems
<p>Prekindergarten: Number and Operations: Developing an understanding of whole numbers, including concepts of correspondence, counting, cardinality, and comparison.</p>	<p>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 and Counting 0-20 Comparison 0-20</p>
<p>Kindergarten: Number and Operations: Representing, comparing, and ordering whole numbers and joining and separating sets.</p>	<p>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 and Counting 0-20 Comparison 0-20</p> <p><i>Drawing Conclusions</i> <i>Math Magic</i></p>
<p>Grade 1: Number and Operations: Developing and understanding of whole number relationships, including grouping in tens and ones.</p>	<p>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 and Counting 0-20 Comparison 0-20</p> <p><i>Drawing Conclusions</i> <i>Math Magic</i></p> <p>Unit 2: Number Operations Students use Base-Ten blocks in developing conceptual understandings of number operations.</p>
<p>Grade 1: Number and Operations and Algebra: Developing understandings of addition and subtraction and strategies for basic addition facts and related subtraction facts.</p>	<p>Unit 2: Number Operations Level 1: Addition Single Digits Addition Fluency Level 2: Subtraction Single Digits Subtraction Fluency</p> <p><i>Digit's Widgets</i> <i>Flash Cards</i> <i>Fact Match</i> <i>Drawing Conclusions</i> <i>Math Magic</i></p>

NCTM's Curriculum Focal Points, PreK-6	CEP's Mathematical Learning Systems
	<p>Unit 3: Using Whole Numbers Level 2: Time To the Hour In Hours and Minutes Level 3: Estimation Rounding to the Nearest Ten Rounding to the Nearest Hundred</p>
<p>Grade 2: Number and Operations: Developing an understanding of the base-ten numeration system and place-value concepts,</p>	<p>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 and Counting 0-20 Comparison 0-20 Level 3: Numbers 21-99 Place Value 21-99 Patterns and Counting 21-99 Comparisons 21-99 Level 4: Numbers 100-999 Place Value 100-999 Patterns and Counting 100-999 Comparison 100-999</p> <p><i>Drawing Conclusions</i></p> <p>Unit 2: Number Operations Students use Base-Ten blocks to develop conceptual understandings of number operations.</p>
<p>Grade 2: Number and Operations and Algebra: Developing quick recall of addition facts and related subtraction facts and fluency with multidigit addition and subtraction.</p>	<p>Unit 2: Number Operations Level 1: Addition Single Digits Double Digits Triple Digits Addition Fluency Level 2: Subtraction Single Digits Double Digits Triple Digits Subtraction Fluency</p> <p><i>Digit's Widgets</i> <i>Fact Match</i> <i>Flash Cards</i> <i>Drawing Conclusions</i> <i>Math Magic</i></p>
<p>Grade 3: Number and Operations and Algebra: Developing understandings of multiplication and division and strategies for basic multiplication facts and related division facts.</p>	<p>Unit 2: Number Operations Level 3: Multiplication Single Digits Level 4: Division Single Digits</p>

NCTM's Curriculum Focal Points, PreK-6	CEI's Mathematical Learning Systems
	<i>Digit's Widgets</i> <i>Fact Match</i> <i>Flash Cards</i> <i>Drawing Conclusions</i> <i>Math Magic</i>
Grade 3: Number and Operations: Developing an understanding of fractions and fraction equivalence.	Unit 4: Understanding Fractions Level 1: Fraction Identification Less than One or Equal to One Level 2: Equivalent Fractions Using Larger or Smaller Denominators <i>Drawing Conclusions</i>
Grade 4: Number and Operations and Algebra: Developing quick recall of multiplication facts and related division facts and fluency with whole number multiplication.	Unit 2: Number Operations Level 3: Multiplication Single Digits Single and Double Digits Double Digits Multiplication Fluency Level 4: Division Single Digits Division Fluency <i>Digit's Widgets</i> <i>Fact Match</i> <i>Flash Cards</i> <i>Drawing Conclusions</i> <i>Math Magic</i>
Grade 4: Number and Operations: Developing an understanding of decimals, including the connections between fractions and decimals.	Unit 3: Using Whole Numbers Level 1: Money Pennies, Nickels, and Dimes Pennies, Nickels, Dimes, and Quarters
Grade 5: Number and Operations and Algebra: Developing an understanding of and fluency with division of whole numbers.	Unit 2: Number Operations Level 4: Division Single Digits Single and Double Digits Double Digits Division Fluency <i>Digit's Widgets</i> <i>Fact Match</i> <i>Flash Cards</i> <i>Drawing Conclusions</i> <i>Math Magic</i>
Grade 5: Number and Operations: Developing an understanding of and fluency with addition and subtraction of fractions and decimals.	Unit 4: Understanding Fractions 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

NCTM's Curriculum Focal Points, PreK-6	CEP's Mathematical Learning Systems
	<p>Unit 5: Fraction Operations Level 1: Addition Common Denominators Different Denominators Level 2: Subtraction Common Denominators Different Denominators</p> <p><i>Drawing Conclusions</i></p>
<p>Grade 6: Number and Operations: Developing an understanding of and fluency with multiplication and division of fractions and decimals.</p>	<p>Unit 4: Understanding Fractions 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</p> <p>Unit 5: Fraction Operations Level 3: Multiplication Whole Numbers and Fractions Fractions and Whole Numbers Level 4: Division Common Denominators Fractions and Whole Numbers Different Denominators</p> <p><i>Drawing Conclusions</i></p>
<p>Grade 6: Number and Operations: Connecting ratio and rate to multiplication and division.</p>	<p>Unit 5: Fraction Operations Level 3: Multiplication Whole Numbers and Fractions Fractions and Whole Numbers Level 4: Division Common Denominators Fractions and Whole Numbers Different Denominators</p> <p><i>Drawing Conclusions</i></p>
<p>Grade 6: Algebra: Writing, interpreting, and using mathematical expressions and equations.</p>	<p>Problem-solving lessons in the abstract phase of each lesson cycle involving concept development Addition Fluency Subtraction Fluency Multiplication Fluency Division Fluency <i>Digit's Widget's</i> <i>Drawing Conclusions</i> <i>Fact Match</i> <i>Flash Cards</i> <i>Math Magic</i></p>