Mathematics Education Workshop Series
With
Professor Mahesh Sharma
Spring 2017 Workshop Series Session 2

Several professional national groups, the *National Mathematics Advisory Panel* and the *Institute for Educational Sciences*, in particular, have concluded that all students can learn mathematics and most can succeed through Algebra 2. However, the abstractness and complexity of algebraic concepts and missing precursor skills and understandings—number conceptualization, arithmetic facts, place value, fractions, and integers may be overwhelming to many students and teachers.

Being proficient at arithmetic is certainly a great asset when we reach algebra; however, how we achieve that proficiency can also matter a great deal. The criteria for mastery, Common Core State Standards in Mathematics (CCSSM) — sets for arithmetic for early elementary grades are specific: students should have (a) understanding (efficient and effective strategies), (b) fluency, and (c) applicability and will ensure that students form strong, secure, and developmentally appropriate foundations for the algebra that students learn later. The development of those foundations is assured if we implement the Standards of Mathematics Practices (SMP) along with the CCSSM content standards.

In these workshops, we provide strategies; understanding and pedagogy that can help teachers achieve these goals.

Monday, March 27, 2017: Organizational Meeting 8:00 a.m. – 10:30 a.m.
Title: What should Administrators know about Professional Development in Mathematics?

As educators, our goal is not only to improve mathematics education by offering professional development to teachers and administrators, but to explore professional development itself. That means how to create and facilitate math-specific professional development that works for teachers and students. We envision professional development that results not only in higher achievement in mathematics for our teachers, but also in an appreciation and admiration of the beauty and power of mathematics and its tools. We want teachers to enjoy teaching mathematics in meaningful ways to all children. And, to demonstrate their fidelity to two key components: (a) children - all of them realize their potential, and (b) teaching mathematics with

rigor. The key areas that need focused attention for any meaningful and realistic professional development:

(a) Understanding how children learn mathematics—its language, concepts, and procedures.
(b) Understanding why learning problems occur—their causes, etiology, and nature (i.e., specific learning problems in mathematics, such as dyscalculia to language related problems contributed by dyslexia and other general learning disabilities).
(c) Exploring, understanding, and implementing methods of teaching and learning that meets the needs of ***all children*** with learner differences (from gifted and talented children to children with learning disabilities).

We are truly interested in identifying the issues, problems, and the priorities that reflect the reality in your schools—the needs of your system, teachers, children, and parents.

Cost $29.00 Includes Breakfast

Workshop Number 1: Friday March 31 2017 8:30 a.m. – 3:00 p.m.
<u>Title: Numeracy 1</u> Additive Reasoning: Number Concept, Numbersense—addition, subtraction and place value.
Who should attend: K through grade four teachers.

Workshop Description
Number concept is the basis of arithmetic and numeracy. In this workshop, Professor Sharma focuses on: How to teach (and remediate, and intervene) number concept, addition and subtraction concepts, procedures and applications.

Cost: $49.00 Includes Breakfast, Lunch and Materials

Workshop Number 2: Friday April 7 2017 8:30 a.m. – 3:00 pm.
<u>Title: Numeracy 2</u> Multiplicative Reasoning: Number Concept, Numbersense—multiplication, division and place value.
Who should attend: K through grade five teachers.

Workshop Description
Multiplication and division are the basis of extending arithmetic and numeracy to fractions, rational numbers and algebra. In this workshop, Professor Sharma focuses on: How to teach (and remediate, and intervene) number concept, multiplication and division concepts, procedures and their applications

Cost: $49.00 Includes Breakfast, Lunch and Materials

Workshop Number 3: Friday
April 14 2017 8:30 a.m. – 3:00 pm. Title: Proportional Reasoning: Number Concept, Numbersense - Fractions, decimals, percent's and extension of place value.
Who should attend: K through Ninth grade teachers

Workshop Description
The concept and operations on fractions is the gateway to algebra. In this workshop, Professor Sharma focuses on: How to teach (and remediate, and intervene) number concept, concepts, procedures and applications of fractions. Professor Sharma will use vertical approach to teaching fractions.

Cost: $49.00 Includes Breakfast, Lunch and Materials

Workshop Number 4: Friday April 28 2017 8:30 a.m. – 3:00 pm.
Title: Arithmetic to Algebra: Developing algebraic thinking for grades 4 through 9
Who Should Attend: Teachers (Regular and Special Educators)

Workshop Description
The mathematics education reform movement, including Common Core State Standards (CCSS-M) and Standards of Mathematics Practices (SMP) have emphasized that by the eighth grade children should be ready for a rigorous algebra course. To achieve this aim, it is important that the teachers teaching the lower grades know how to prepare their children for this type of abstract mathematics thinking required and teachers teaching algebra know how to build and connect algebraic concepts to students' understanding of arithmetic concepts and procedures. They should know how to expand arithmetic concept schemas into algebraic schemas and procedures. From one perspective algebra is generalized arithmetic and through this understanding, students can gain access to meaningful mathematics, including algebra and be prepared for higher mathematics its applications.

In this workshop, we develop: language, models and pedagogic approach that begins with considering and choosing a simple concept in arithmetic (e.g., multiplication and division) and to take it to the algebraic level (multiplying and dividing algebraic expressions). This involves the development of consistent and efficient conceptual models that can be generalized to work for whole numbers, fractions, decimals, integers, and then for algebraic expressions. This approach is called Vertical Acceleration. By this approach, a teacher can help make up students' arithmetic gaps and take them to algebra and other higher mathematics concepts in accelerated manner with comprehensive understanding and proficiency.

Cost: $49.00 Includes Breakfast, Lunch and Materials

Workshop Number 5: Friday May 5 2017 8:30 a.m. – 3:00 pm.
Title: Tool-kit for Special Educators
Who Should Attend: Teachers and School Administrators

In this workshop, we focus on the problems that children's difficulties and disabilities pose in learning mathematics. Most teachers and administrators come to special education through language arts, it is important to know the specific nature of mathematics learning problems and their remedial strategies. We will focus on diagnostic and remedial strategies for learning problems in mathematics, including dyslexia and mathematics, dyscalculia and mathematics anxiety. Forty percent of dyslexics also have difficulties with mathematics. Participants will learn informal and formal methods of diagnosing and remediation learning problems in mathematics. What should be the role of special education specialists in narrowing the gap in mathematics achievement? We will discuss an effective model called "vertical acceleration."

Cost: $49.00 Includes Breakfast, and Materials

Workshop 6: Friday: May 12 2017 8:30 a.m. – 3:00 pm.
Title: Mathematics as a Second Language: Teaching Problem solving, including word problems.
Who should attend: Teachers and Administrators of grades K through 8th grade.
Workshop Description
Every mathematics idea has three components: linguistic, conceptual and procedural. Mathematics is a language first; it is truly a second language. It has its own alphabet, symbols, vocabulary, syntax, and grammar. Numeric and operational symbols are its alphabet; number and symbol combinations are its words and expressions. Equations and mathematical expressions are the sentences of this language.

Proficiency in this language –its acquisition, understanding, and use is demanded by a technological society. Acquiring proficiency in mathematics and solving mathematics word problems means learning this language well. It is a second language for most children and for some it might even be a third or a fourth language. To learn this new language, one has to acquire its vocabulary, syntax, and its rules of translation.

Some children have difficulty in mathematics because of its language. This is true not just for dyslexics, but for many others. In this workshop, we will focus on:

- The development of the language of mathematics—vocabulary, syntax, and translation from English to Math and from Math to English.
- How language effects conceptualization of mathematical ideas and applications, particularly word problem solving?
- How to help children feel confident about the language of mathematics?

Cost: $49.00 Includes Breakfast, Lunch and Materials

Register for all six workshops for $274.00