

# High Quality Math Instruction

# Components of a Balanced Mathematics Program

- Conceptual Understanding
- Problem-Solving
- Computation/Mental Math
- Math Facts
- Explicit Vocabulary Instruction
- Common Formative Assessment

# Conceptual Understanding

*Concepts are the entry points to understanding mathematics, and are often the most challenging component to teach.*

*Often students come with inaccurate understanding of concepts, which leads to struggles in other components.*

# What would we observe in a quality conceptual lesson?

- Can use concrete or visual models
- Can use literature
- Can see teachers modeling with concrete or visual models
- Can see students manipulating concrete or visual representations
- Can hear students and teachers discussing mathematical ideas with appropriate terminology

# Problem Solving

Problem solving involves

- Understanding which pieces of information are needed to answer questions about a given situation
- translating a situation described in words into mathematical number sentences and/or representing the situation visually
- analyzing if any calculations result in a reasonable solution to the given problem

# What would we observe in a quality problem-solving lesson?

- Students creating visual models to represent the problems
- Students and teachers discussing possible methods for solving the problems
- Students and teachers analyzing results from calculations
- Calculators or addition/subtraction tables and multiplication/division tables available as resources
- Few questions, but much thought

# Computation & Mental Math

- Computational skills build upon conceptual understanding.
- Computational skills also build upon prerequisite computational skills.
- Students should be encouraged to do as much computation mentally as possible.
- Backmapping recently learned skills to connect them to prior knowledge helps students to gain deeper understanding.

# What would we observe in a quality computation lesson?

- Fewer problems and more discussion
- Linking computation to other standards to give a context, such as measurement, geometry or data analysis
- The use of engaging tools, such as dice, cards and dominoes, that provide visual models
- Student justification of thinking



# Math Facts

From Elementary and Middle School Mathematics: Teaching Developmentally

by John Van der Walle

*Fortunately, we know quite a bit about helping children develop fact mastery, and it has little to do with quantity of drill or drill techniques. Three components or steps to this end can be identified:*

- 1. Help children develop a strong understanding of the operations and of number relationships.*
- 2. Develop efficient strategies for fact retrieval through practice.*
- 3. Then provide drill in the use and selection of those strategies once they have been developed.*

# What would we observe in quality math facts instruction?

- Preassessment to determine entry points
- Instruction with visual models
- Emphasize patterns
- Emphasize connections between addition/subtraction & multiplication/division
- Drill and practice through games
- Periodic assessment
- Partnering of students based upon appropriate levels of development

# What does quality explicit Vocabulary Instruction look like?

- Using the word lists selected for academic vocabulary at each grade level helps to focus instruction on key terms.
- Introducing terms in practical context with visuals
- Utilize the vocabulary notebooks to document student understanding with linguistic and non-linguistic representations
- Utilize games for review of terms
- Emphasize student discussion and proper use of terminology in context (both written and oral)

# Common Formative Assessment

- Frequency of assessments should be high so that adjustment of instruction is made when needed (minimum 2 week increments).
- Assessments should focus on key concepts, skills and vocabulary terms.
- Feedback on formative assessments should be timely and specific.
- Only summative assessments should be graded.