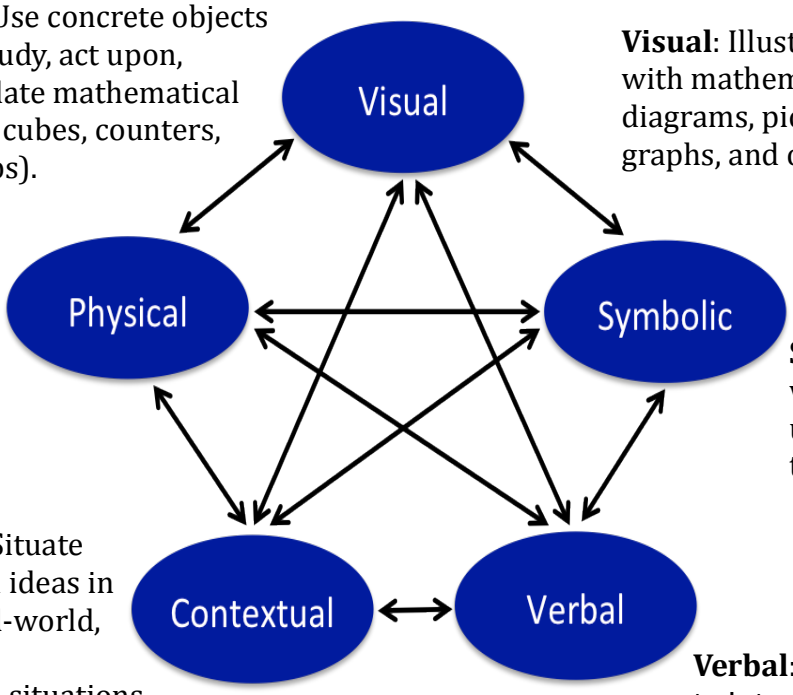
High-leverage Teaching Practice #3

***Use and Connect Mathematical Representations***

**Physical**: Use concrete objects to show, study, act upon, or manipulate mathematical ideas (e.g., cubes, counters, paper strips).




**Visual**: Illustrate, show, or work with mathematical ideas using diagrams, pictures, number lines, graphs, and other math drawings.

**Symbolic**: Record or work with mathematical ideas using numerals, variables, tables, and other symbols.

**Contextual**: Situate mathematical ideas in everyday, real-world, imaginary, or mathematical situations and contexts.

**Verbal**: Use language (words) to interpret, state, define, or describe mathematical ideas.

Huinker, D. (2015). Representational competence: A renewed focus for classroom practice in mathematics. *Wisconsin Teacher of Mathematics, (67)*2, 4-8.

# Use and Connect Mathematical Representations

*Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.*

Effective mathematics teaching includes a strong focus on using varied mathematical representations. NCTM (2000) highlighted the important role of mathematical representations in the teaching and learning of mathematics by including the Process Standard for Representation in *Principles and Standards for School Mathematics*. Representations embody critical features of mathematical constructs and actions, such as drawing diagrams and using words to show and explain the meaning of fractions, ratios, or the operation of multiplication. When students learn to represent, discuss, and make connections among mathematical ideas in multiple forms, they demonstrate deeper mathematical understanding and enhanced problem-solving abilities (Fuson, Kalchman, and Bransford 2005; Lesh, Post, and Behr 1987).

Principles to Actions (NCTM, 2014, p. 24)