Working with Mathematics Vocabulary in Context

He or she who does the talking, does the learning.

Children do not learn by doing . . . They learn by thinking, discussion, and reflecting on what they have done. – William Speer (NCSM, 1997)

- Social communities provide the rich environments for developing deep understanding of mathematics.[1]
- In mathematics class, cognitive conflict is created as students present their ideas and solution methods, defend them in the face of questions, and question others' ideas.[1]

- Reflecting on mathematics in a way that leads to understanding depends on encountering tasks that invite reflection, tasks that provide something interesting and intriguing and perplexing on which to reflect.[1]

- I'm a word person. Numbers don't mean anything to me unless there are words behind them – reasons I can verbalize (Anne, eighth grade).[2]

- Mathematics vocabulary has a profound effect on performance and contributes to better problem solving ability.[2]

- Vocabulary instruction supports learning new concepts, deeper conceptual understanding, and more effective communication.[2]

- Tracing the use of terminology by students is one of the ways we have of assessing conceptual development and understanding.[2]

- Mathematical communication requires more than mastery of numbers and symbols. It requires the development of a common language, using vocabulary that is understood by all.[2]

- Unlike other subjects, mathematical language may play little part in preschool home conversations. Most children need particular help with language in mathematics.[2]

- According to mathematician Zalman Usiskin, mathematics is a language, but if it were treated as a native language rather than a foreign language, using repeated exposure and immersion, "*everyone* could learn a significant amount of mathematics."[2]

- Research over the years has continued to show that brief practice sessions, distributed over time, result in significantly better memory and recall than long concentrated periods of practice.[2]

- It makes sense to look on "knowing" a word as a continuous process that can be affected by meaningful encounters with words and by instruction aimed at helping learners develop a network of understanding. (Camillle Blachowica and Peter Fisher)[2]

- Studying vocabulary is *not* looking up a list of terms or consulting the glossary. Strong vocabulary development requires students to be immersed in words, to make connections between words and experiences, to personalize word learning and definitions.[2]

- Various kinds of classroom talk cause misconceptions to surface.[3]

- When a teacher succeeds in setting up a classroom in which students feel obligated to listen to one another, to make their own contributions clear and comprehensible, and to provide evidence for their claims, that teacher has set in place a powerful context for student learning.[3]

- Teachers must be diligent in providing experiences that allow varied forms of communication. Students should use the language of mathematics to express mathematical ideas precisely. The use of mathematical symbols should follow, not precede, other ways of communicating mathematical ideas.[4]

- Teachers should look for, and take advantage of, opportunities to introduce mathematical terms. Good questioning, models and engaging tasks provide opportunities for understanding and conversations.[4]

[1] Heibert, James, Thomas P. Carpenter, Elizabeth Fennema, Karen C. Fuson, Diana Wearne, Hanlie Murray, Alwyn Oliver, and Piet Huan. (1997) *Making Sense: Teaching and Learning Mathematics with Understanding.* Heinemann www.heinemann.com

[2] Murray, Miki. (2004). *Teaching Mathematics Vocabulary in Context: Windows, Doors and Secret Passageways.* Heinemann www.heinemann.com

[3] Chapin, Suzanne H., Catherine O'Connor and Nancy Canavan Anderson. (2003). *Classroom Discussions: Using Math Talk to Help Students Learn.* Math Solutions Publications www.mathsolutions.com

[4] NCTM. (2000) *Principles and Standards for School Mathematics.* www.nctm.org