

## DePaul Center for Urban Education Research Base

### Making Math Verbal

| Core Element               | Connections Structure   | Basis in Research   | Relevant Research   |
|----------------------------|---|---|---|
| Students write their math. | Students write math examples, explanations, “Math Path”, problems, and glossaries for the math words of the week. | Writing in mathematics provides clarification of thinking and enhances students’ facility with math and language. | National Council of Teachers of Mathematics (NCTM), 2000. Martinez, 1998. Goldsby and Cozza, 2002. Mayher, Lester, and Pradl, 1983. Powell, 1997. |

The following research supports the emphasis on this element of the Connections structure:

Writing in mathematics can also help students consolidate their thinking because it requires them to reflect on their work and clarify their thoughts about ideas (NCTM, 2000). In addition, writing can indicate errors and enable students to attempt other solution methods (Martinez, 1998). In this study, one teacher stated, “the journals provide evidence of their thinking—how they viewed the problem. You can see the thinking, not just the execution of a method. The more they write, the better they are able to explain their thinking” (p. 517). Writing-to-learn strategies such as journals, problem creation and explanation, lend themselves effectively to mathematics. These writings can be a window into the mind of the student who is engaged in mathematical activities, providing the opportunity to “see” the why, not just the how, of the student’s thinking and enabling the student to clarify and extend that thinking (p.519).

D. S. Goldsby and B. Cozza, “Writing Samples to Understand Mathematical Thinking”, Mathematics Teaching in Middle School, 7(9), May 2002.

In this study in an urban school setting, after exploring techniques, students worked in small groups on problems and discussed how to solve problems. Afterward, each student wrote down what she or he understood about the idea. One student’s writing suggests that he has clarified, and claimed ownership of, the process. Subsequently, the same student attempts to internalize concepts and coordinates them with his prior understanding. Not only do we have a record of how he solves the problem, we have also captured a representation of his thinking. If we examine his prose carefully and respond appropriately, we could turn his journal writing into a dynamic vehicle for challenging and, thereby, augmenting his mathematical awareness.

We have also seen that writing helps students to acquire a rich, functional vocabulary and to use it in the context of their understanding of mathematics. Mayher, Lester, and Pradl (1983) make this point in regard to learning in general:

*Writing's capacity to place the learner at the center of her own learning can and should make writing an important facilitator of learning anything that involves language. Writing that involves language choice requires each writer to find her own words to express whatever is being learned. Such a process may initially serve to reveal more gaps than mastery of a particular subject, but even that can be of immense diagnostic value for teacher and learner alike. And as the process is repeated, real and lasting mastery of the subject and its technical vocabulary is achieved. (79)*

By providing students with opportunities to work with mathematical ideas in their own language and on their own terms, writing helps them to develop confidence in their understanding of mathematics and become more thoroughly engaged with mathematics.

A. B. Powell, "Capturing Examining, And Responding To Mathematical Thinking Through Writing", 71(1) Clearing House, 00098655, Sep/Oct 1997.