1. Analyzing Students' Math Thinking

Summary: A key to effective math instruction is being able to interpret student understanding and misunderstanding and adapt instructional techniques to match. In an article for *Mathematics Teacher Education and Development*, two professors from San Diego State University and the University of Wisconsin – Eau Claire discuss ways teachers can boost their skill in this area.

Practical Applications

In their study, the authors worked with a set of new middle school math teachers and engaged them in professional development that included:

- Modeling from university mathematics teacher educators
- Teachers reflecting on their experiences as students in class as a frame for thinking about the way their own students make meaning
- Discussing particulars of students' learning in the grade and content area
- Site-based support for attempting new instructional strategies

Over time, the researchers found through interviews that teachers evolved their practice in the following ways:

- *View of the Teacher's Role*. Initially, many teachers had trouble anticipating possible student responses, either only stating where students might generally have difficult (e.g. with fractions) or focusing only on "what a teacher should do." With development and practice, however, by the second interview "all teachers were able to articulate possible student responses," and their responses were from the perspective of the students instead of the teacher.
- *Perception of What it Means for Students to Understand Mathematics*. At the beginning, teachers valued formal answers (e.g. an algebraic equation) and did not feel that students needed to provide additional justification of their answer if they had solved it formally. Later on, teachers began to learn to generate series of questions they would ask students to better probe their true understanding. Moreover, teachers were able to speak to how students had solved problems and what was underlying the students' strategies and thought processes.
- *Differentiating and Choosing Instructional Strategies*. Initially, teachers had a limited set of strategies to use when following up with students, mainly focusing on one-on-one dialogue. By the second interview, teachers were proposing more varied strategies such as pairing students that would be used depending on students' individual math responses.

Conclusion and Citation

The more a teacher shifts towards thoughtfully analyzing students' math work, the more effective they will be. This study suggests that there are steps all teachers can take to dive deeply into math problems in order to anticipate student responses, plan for ways to assess true understanding and selecting instructional strategies that are appropriate for each student.

Masarik, D. & Nickerson, S. "Assessing Teachers' Developing Interpretive Power: Analyzing Student Thinking." Mathematics Teacher Education and Development, 12.1 (2010), pp. 19-29. http://tinyurl.com/67wvneg (free).