Course Syllabus:

Math for Struggling Learners

Instructors
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Dates:
June 22, 23, 26 & 27, 2017 from 8:30 am-4:00 pm,
plus 2 half day follow-up dates October 23 and November 16, 2017

Texts:
Tapper, J. (2012). Solving for why: Understanding, assessing, and teaching students who struggle with math, Grades K-8. Sausalito, Calif: Math Solutions.

Overview:

This is a course for classroom teachers, special educators and math specialists on strategies to use for children who struggle with mathematics. It is designed to help Special Educators and classroom teachers meet HQT requirements.

The struggles that children encounter may be the result of cognitive learning challenges, background and experience, or previous instruction. The approach we'll take is to use a framework of assessments to understand student thinking, and to examine instructional strategies to help struggling students to be successful in the regular classroom. We'll look at components of inclusive math instruction, the role of cognitive development in supporting the struggling learner, assessing learner thinking, and ways to identify difficult content before struggles occur. This is not a "recipe" course, but rather a course on improving instructional practices and helping teachers to be more thoughtful about struggling learners in their classes.

Readings:
The readings for this class include pieces from the text as well as recent research on math difficulties. Some of the reading will be at a graduate level, though much is more accessible. Some of the reading will be done in-class as part of instruction. Participants will also be responsible for reading outside of class.

What will participants know and be able to do as a result of this course?
• Identify common barriers to learning mathematics and strategies to help learners overcome these barriers
• Use whole class and individual assessment tools to identify particular learning struggles

• Make sound instructional recommendations based on assessment gathered from a variety of sources
• Learn new instructional strategies for areas of mathematics that are particularly likely to cause struggles
• Understand the underlying reasoning – additive, multiplicative, and proportional – that supports mathematical thinking in the elementary school
• Be familiar and comfortable with a variety of alternative and/or student conceived algorithms for common problems involving number, especially related to fractions, decimals and percents

Assignments for Evaluation:

• Class Participation (50% of final grade)
This includes doing the reading and posting to the website when necessary.

• Student Interview (25% of final grade)
Participants will conduct a clinical interview using a predetermined problem solving task to ascertain student thinking and reasoning. The interview will provide data for participants to analyze, and make instructional recommendations.

• Concrete, Representational, Abstract, (CRA) Assessment (25% of final grade)
Participants will create a CRA assessment task, sort and report on outcomes, and make recommendations for future use.

Day 1

Big Idea for the day: Understanding why students struggle

• *Struggling learners are students who have difficulty fully understanding and engaging with particular mathematical content.*
Sometimes this is a temporary issue related to a specific domain of math learning (typical struggles).
Sometimes difficulties are persistent and resistant to intervention (learner-specific struggles).

• *Learner struggles can be seen from three different perspectives: the learner, the math, and the instruction.*
Learner struggles involve any learner-specific experiences or cognitive styles or dispositions
Math Content struggles are caused by important gaps in conceptual understanding
Instructional struggles are the result of a mismatch between instruction/curriculum and student needs.

• *Creating theories about why students struggle offers us the opportunity to understand their thinking and to create intervention.*

Day 2

Big Idea for the day: Understanding develops from models through strategies to algorithms

• *Models/strategies/algorithms are key to understanding student thinking and to designing appropriate intervention.*

• *CRA assessment requires the use of models to solve problems to explore student thinking on using models to solve problems (by using strategies and algorithms).*

• *Additive, multiplicative, and proportional reasoning are helpful ways to conceptualize students' development of number concepts and can be used to understand the ways models can be used for strategy development. Each type of reasoning demands the use of slightly different conceptual models.*

Day 3

Big Idea for the day: Student Interviews give insight into student thinking. Main Lesson/Menu lesson structure provides both inclusion and differentiation for math instruction.

• *Student interviews are complex tools for investigating student understanding. We investigate how to conduct and analyze them.*

• *Main Lesson/Menu lesson structure allows classroom teachers to meet the needs of a diverse classroom. We learn how to set up lessons this way.*

Sessions during the school year:

Session 1:
Sharing CRA from participants

Session 2:
Sharing Student Interviews from participants