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### **Learn and Reflect Strand**

**Session 129:** Using Desirable Difficulties to Motivate Reasoning and Challenge Thinking

**Scheduled for:** Thursday, April 18, 2013

11:00AM – 12:00 PM

Convention Center 401/402

We can't make our students into seekers if we aren't seekers ourselves. In this research-based, practice-oriented session we explore the benefits of creating desirable difficulties to help students shake up naïve or loose thinking and to construct "new" knowledge by encouraging transfer of related knowledge to new situations.

#### **Abstract:**

Not everyone can be a mathematician, but everyone can want to be a mathematician. But being good at mathematics is not evidenced by how many answers you know. Being good at mathematics is evidenced by what you do when you don't know the answers. We must help students to construct their own "new" knowledge, and apply new knowledge in ways that are different from the situation in which it was learned.

Using the sage principle that "No matter what IT is, the chances of finding IT are dramatically increased if you're looking for IT" in this session we will explore techniques to encourage and reinforce mathematics as a way of thinking. The ideas we gather are like so many pieces of colored glass at the end of a kaleidoscope. They may form a pattern, but if you want something new, different, and beautiful, you'll have to give them a twist or two. You experiment with a variety of approaches. You follow your intuition. You rearrange things, look at them backwards, and turn them upside down. You ask "what if" questions and look for hidden analogies. You may even break the rules or create new ones.

Sometimes learners express a reluctance to look at mathematics in an alternative way to their initial exposure to the topic. Pleas of "You're going to confuse me!" may actually signal an unrecognized confusion that is ALREADY present.

There are many benefits to be gained by creating DESIRABLE DIFFICULTIES designed to encourage thinking about mathematics as well as enhancing both long-term retention and transfer. Out of apparent chaos and confusion emerges a deeper understanding and appreciation.

Recognizing that we can't make our students into seekers if we aren't seekers ourselves, in this session we will explore several examples of creating desirable difficulties that motivate discourse and reasoning.

We will also discuss certain "connecting tasks designed to promote the connectedness of mathematical knowledge with respect to mathematical concepts from different branches of mathematics and different representations of mathematical concepts.