Using Math Errors to Advance Understanding

Summary: While teachers often use errors as 'teachable moments,' there is great value in planning lessons around common and expected math errors. In an article for *Teaching Children Mathematics*, University of Central Florida instructor Wendy Bray outlines best practices for maximizing the learning potential of mistakes in math.

Practical Applications

Bray suggests a framework with multiple parts:

- **Selecting Mathematical Tasks:** It is important to choose problems that focus on a particular math concept you are trying to teach, and that have multiple approaches and routinely trip up students (Bray uses the example of a word problem involving the fractional sharing of two brownies amongst three brothers). You may actually want to "tweak task features (contexts, numbers) to provoke misconceptions."

- **Planning for Instruction:** When planning the lesson, the teacher should anticipate the most common misconceptions that will arise. The teacher should also plan for "the two essential elements … 1) students actively engage in attempts to unpack the mathematics underlying the errors, and 2) the teacher facilitates public discussion of ideas such that key concepts are emphasized."

- **Implementing the Lesson – student work:** As students are working on the problem individually or in groups, the teacher should be checking in to get a sense of what errors are surfacing. The teacher should select a few students who are showing examples of the common misconceptions and request their help in sharing out to the class.

- **Implementing the Lesson – public discussion:** When planning for public discussion, be sure to:
  - Identify the "flawed and correct solutions that will be focused on in the public discussion";
  - Identify the order and way in which those solutions will be presented
  - Identify the concepts each solution is intended to demonstrate

  It is also important to emphasize a culture of mistake-making and respect.

Conclusion and Citation

Planning lessons with errors in mind rather than just responding to errors in the moment is a powerful way to advance students' conceptual understanding of math, to say nothing of their comfort with the idea that making mistakes is OK.

Bray, W. "How to Leverage the Potential of Mathematical Errors" *Teaching Children Mathematics*, 19.7 (March 2013) pp. 425-431. http://bit.ly/14cnhCH (subscription only).