

Feedback during Math Explorations

Summary: Part of a teacher's job is to give feedback to students as they work. However, in an article for the *Journal of Educational Psychology*, university researchers demonstrate that not all feedback is created equal, and that when it comes to math exploration, the key question is how much prior knowledge a student has about the topic at hand.

Practical Applications

The authors looked at classes in which elementary school students were receiving math instruction about new topics. The instruction involved a period of open exploration of the topic (in this case, equivalencies such as “ $3 + 4 + 6 = 8 + \underline{\quad}$?”) where students were free to try different strategies, followed by direct instruction. The researchers set out to discover the impact of giving feedback to students during this open exploration phase. What they found was that the amount of prior knowledge students brought to the task was key. In particular:

- For students with low prior knowledge (i.e. they did not know any strategies to attempt), procedural feedback was beneficial in increasing their knowledge of strategies and performance. Feedback purely on the correctness of answers had little impact.
- For students with moderate prior knowledge (i.e. they knew at least one strategy to attempt), feedback actually *reduced* their performance. This may be because students' thinking was being constrained. Both types of feedback – focusing on strategies or focusing on the rightness of outcomes – had the same negative effect.

The authors generate the following conclusions:

- Not all students need the same level of feedback and, in fact, giving the wrong amount or type of feedback can be harmful to students' achievement.
- Teachers should consider how much background knowledge each student has and differentiate their feedback during the exploratory phase accordingly. Specifically, students that come in with a decent amount of prior knowledge “benefit more from exploring independently without feedback before explicit instruction.”

Conclusion and Citation

Perhaps surprisingly, there appear to be times during guided math exploration lessons when feedback is not called for. Students who start with little or no prior knowledge absolutely still require feedback even during open exploration, but their peers that bring more background to the lesson may benefit more from being left to their own explorations.

DeCaro, M., Fyfe, E. & Rittle-Johnson, B. “The Effects of Feedback During Exploratory Mathematics Problem Solving: Prior Knowledge Matters” *The Journal of Educational Psychology* (Nov. 2012), pp. 1094-1108. <http://bit.ly/TvDGKH> (subscription only).