

Promoting Mathematical Fluency

Sevasti Tagaris and Leah A. Nillas*

Educational Studies Department, Illinois Wesleyan University

Research Questions

- How can I use reading, writing, and speaking the language of mathematics to promote mathematical fluency?
- What activities help students become “fluent” in mathematics?
- Which activities accomplish targeted learning goals such as initial learning or reinforcement?

Methodology

- 40 students from two sections of Algebra II classrooms in a Central Illinois urban high school
- Implemented activities, reviewed student work, and analyzed reflective teacher journals
- Lessons emphasized and assessed reading, writing, and speaking mathematics
- Math-Talk community framework was used to analyze how I promote mathematical discourse (Hufferd-Ackles, Fusin, & Sherin, 2004)

Literature Review

- NCTM (2000) identified learning to communicate mathematically as a major goal for students. When required to justify, students are challenged to think and reason.
- Shield and Swinson (1996) used writing as a means of organizing ideas through “link sheet” activity.
- Huinker and Laughlin (1996) considered the benefit of classroom discourse in exploring concepts with “think-talk-write” activity.
- Discourse aids in writing or writing aids in discourse? Literature lacked evidence on the benefits of the activities.

Results and Data Analysis

- **Matrix Activity:** By design, this writing activity required justification and encouraged questioning because students’ interactions were limited to writing. This activity reinforced concepts.
- **Board Work:** Students’ work and explanations demanded precision. Through reflection, I noted students’ reluctance to question or be incorrect in front of peers. Board work activities reinforced and assessed understanding.
- **Partner Work:** Students were more comfortable exploring and asking questions during group work. This activity reinforced concepts.

Activities’ relevance to themes

Activities \ Math-Talk Themes	Matrix Activity	Board Work	Partner Work
Questioning	+	-	+
Explaining	+	+	+
Source of Ideas	-	-	+
Responsibility for Learning	+	+	+ / -

Conclusion

- Continuing to draw from literature as inspiration and modifying lessons I’ve implemented, there are a number of activities that allow students to practice using math as a language.
- Activities that require written explanations and oral justifications help students develop “fluency.”
- Given more time, I would use levels described in the Math Talk framework to quantify progress across themes.
- In the future, I want to determine through assessment which activities help achieve certain learning goals.

Figure 1. The extent to which implemented activities accomplished goals or themes.