The Language Spectrum in Mathematics Classrooms

Supporting Instruction that Empowers Students in Multiple Contexts

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Members of the Mathematics Discourse in Secondary Mathematics (MDISC) Team

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Math Solutions.

Session Overview

Quick Introductions

Sorting Student Work

Discussing the Language Spectrum

MDISC Professional Development

Introductions

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Introductions

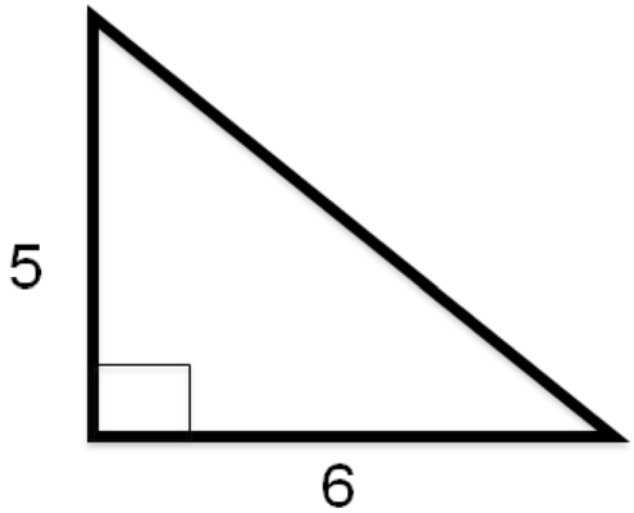
Please greet your neighbors

- Your Name
- Your School/Institution and Role
- Challenges you have seen with regard to mathematical language

Sorting Student Work

Sorting Student Work

- In this activity, students working on a geometry unit were asked whether triangles with the same area also had the same perimeter.
- The class was given a right triangle with base 6 units and height 5 units as a starting point and asked to consider if all triangles with base 6 and height 5 also had the same perimeter.



Adapted from *Connected Math* (Lappan et al., 2006)

Sorting Student Work - 6 solutions (*3 written, 3 spoken*)

All of the solutions are correct so focus on the ways in which the students express their understandings through language.

Arrange the various explanations according to the ways in which the **students communicate their thinking**.

Sorting Student Work - Discussion

What did you notice in the students' use of language?

Vocabulary, Grammar, Representations?

The language we use can (and should!) change according to our communication context.

Language Spectrum

Language Spectrum (MDISC, 2017; Gibbons, 2002)

Communication Contexts

CC1	**CC2**	**CC3**	**CC4**
Working in a small group	Reporting out to the whole class	Student writes a solution	Written description in a textbook

Language Spectrum (MDISC, 2017; Gibbons, 2002)

CC1	**CC2**	**CC3**	**CC4**
Gesturing (with “it,” “this,” “here”) Language refers to common experience Some imprecision but people often “know what you mean”	Increased use of technical vocabulary Audience was not there in the small group “I” and “we” pronouns are used, work is often recounted chronologically	Increased use of technical vocabulary and denser phrases Audience is now external Pronouns are often removed and chronology is replaced with logical connectors	Precise and dense Audience is generic No human actors Symbols are integrated into the text

Language Spectrum (MDISC, 2017)

Provides a lens for assessing your students' progress and their challenges (e.g., a student using context-dependent references in their written explanations).

It is an equitable practice to make the different language demands explicit.

Language Spectrum (MDISC, 2017)

Goal: NOT forcing everyone to the right. Rather, we want to support students in a variety of communication opportunities and make explicit to them the varying language demands.

Small-Group Discussion

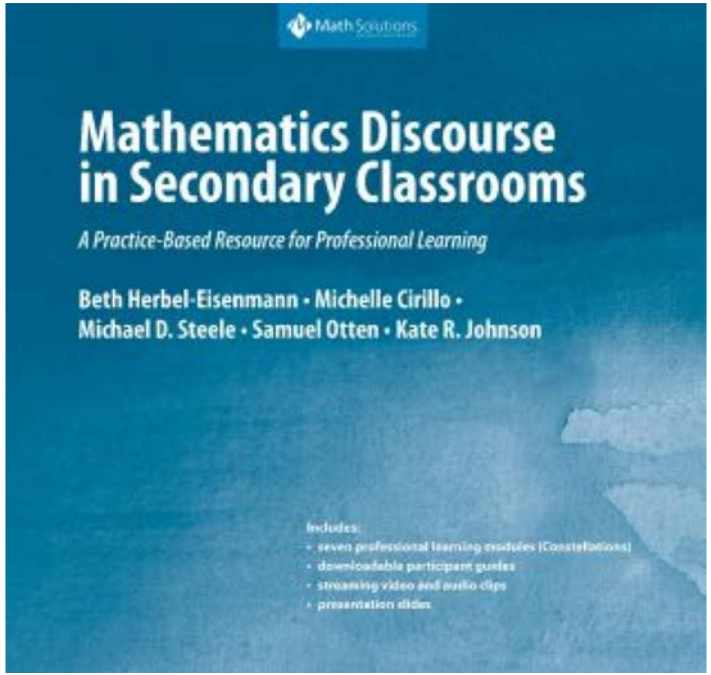
- Thinking about your classroom and your students…
  - When/How have you supported students in shifts to the right?
  - When/How have you supported students in shifts to the left?

Language Spectrum (MDISC, 2017)

Implications for teachers in thinking about the language spectrum:

- Be comfortable with less formal language & track shifts over time
- Consider the interactions between the context and precision
- Make use of contexts intentionally to better understand language use
- Consider how the *task* and the *instructions given to students* for work and discussion match what you hope to learn about students' thinking

MDISC Professional Development



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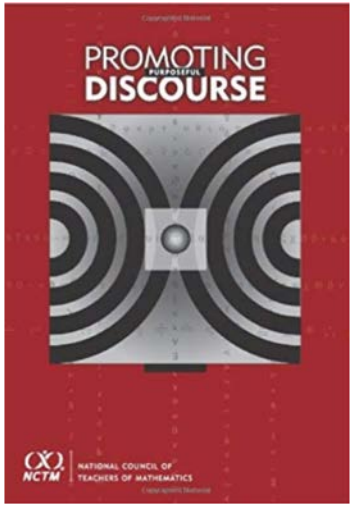
MDISC Professional Development - IMPETUS

- Rich classroom discourse can…
  - Increase student learning
  - Motivate students
  - Provide teachers with ample assessment opportunities
  - Shift mathematical authority from teacher to community

MDISC Professional Development - AUTHORS

Beth Herbel-Eisenmann (Michigan State), Michelle Cirillo (Delaware), Michael Steele (Wisconsin-Milwaukee), Samuel Otten (Missouri), & Kate Johnson (Brigham Young) *and many others*



Based on a 5-year collaboration with 8 math teachers in Iowa

- See *Promoting Purposeful Discourse* (Herbel-Eisenmann & Cirillo, 2009)

MDISC Professional Development

Overarching Goals

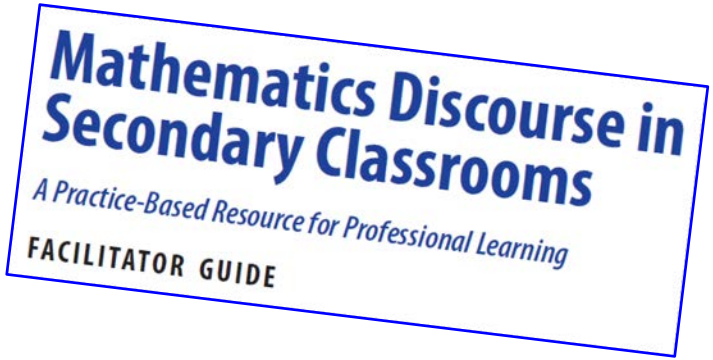
- Productive Discourse
- Powerful Discourse
- Purposeful Discourse

Organization

- Introduction
- 5 Constellations of Activities
- Conclusion / Extension

PD Commitments

- Connected to Practice
- Professionally Collaborative
- Adaptable



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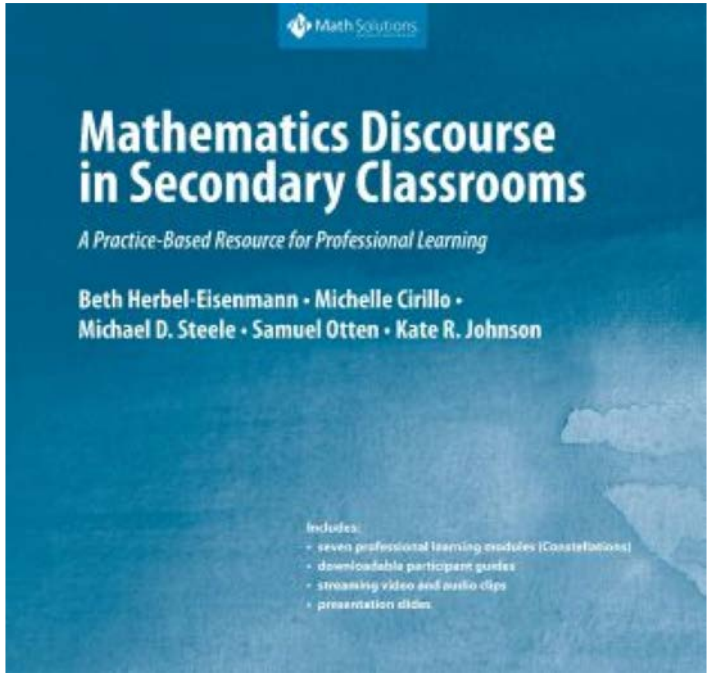

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