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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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
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
## Communication Contexts

<table>
<thead>
<tr>
<th>CC1</th>
<th>CC2</th>
<th>CC3</th>
<th>CC4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working in a small group</td>
<td>Reporting out to the whole class</td>
<td>Student writes a solution</td>
<td>Written description in a textbook</td>
</tr>
</tbody>
</table>
## Language Spectrum (MDISC, 2017; Gibbons, 2002)

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

Mathematics Discourse in Secondary Classrooms
A Practice-Based Resource for Professional Learning

Beth Herbel-Eisenmann • Michelle Cirillo •
Michael D. Steele • Samuel Otten • Kate R. Johnson

Includes:
- seven professional learning modules (constellations)
- downloadable participant guides
- streaming videos and audio clips
- presentation files

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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
Available at MathSolutions.com or at Amazon.com

Attendees at this session can use code BOOKS40 to save 40%

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