Fostering Productive and Powerful Mathematics Classroom Discourse: A Discussion of Research and Professional Education Perspectives

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Session Structure

- Supporting changes in teacher discourse practices: perspectives from two projects 15
- Small-group discussions of issues related to supporting change in teacher discourse 30
- Reporting out from small groups and synthesis of directions for future work 15
Framing the Issue

- Language choices in the classroom influence students’ opportunities to learn
- Engaging in rich mathematical discourse can improve student learning
- CCSS’ Standards for Mathematical Practice embody rich discourse
- But, teachers often teach as they were taught
- And, we know that Initiate-Respond-Evaluate is still the dominant discourse pattern in mathematics classrooms.
Focusing on discourse moves

- Observable and identifiable for novice and expert teachers
- Important in charting the direction of the mathematical storyline of a class
- Common site for discussion of classroom practice
Project Contexts

- Developing instructional modules for use in mathematics content courses for preservice elementary school teachers
  *Elementary Preservice Teachers Mathematics Project (EMP)*

- Developing case-based professional development materials for secondary mathematics teachers
  *Mathematics Discourse in Secondary Classrooms (MDISC)*
EMP Goals

- Develop prospective teachers’ knowledge of the mathematics needed for teaching
- Create course materials for prospective teachers and instructors that emphasize specialized content knowledge (SCK)
- Focused use of discourse to develop students’ ability to explain, justify, and use mathematical vocabulary.
## Original Talk Moves

<table>
<thead>
<tr>
<th>Talk Move</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revoice</td>
<td>Did you say ….. Is that what you meant?</td>
</tr>
<tr>
<td>Restate/repeat</td>
<td>Could someone else explain this?</td>
</tr>
<tr>
<td>Add on</td>
<td>What do others think about this question?</td>
</tr>
<tr>
<td>Press for reasoning</td>
<td>Do you agree with his reasoning? Why or why not?</td>
</tr>
<tr>
<td>Wait</td>
<td>What conclusions can we draw? What is the evidence?</td>
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Chapin, O’Connor, & Anderson, 2009
EMP — Using Talk Moves To:

- Help individuals give good explanations (which include the use of mathematical language);
- Help everyone in the class understand each other’s explanations;
- Help individuals provide solid justification with evidence for their statements;
- Help everyone evaluate the truth of the arguments presented.
PSTs work in a group on a subset of questions that are part of the task.

PSTs begin to identify and abstract key ideas, moving toward generalization. PSTs return to next subset of questions in the task.

Each small group of PSTs talks about the Discussion Questions.

Many PSTs contribute; they build on each other's explanations and justifications.

Instructor facilitates a whole-class discussion of the Discussion Questions.

Implementation of Task — Discussion Cycles

Adapted from Simon, 1994
EMP—What’s Happening

- 26 80-minute lessons created, piloted, revised; used at 15+ institutions
- Preliminary feedback:
  - Instructors say they need more help using discourse to facilitate tasks.
  - Preservice teachers see positive changes in their ability to explain and justify mathematical ideas.
  - Preservice teachers say this is a “wonderful” way to learn mathematics but do not say that this is the way to teach.
- Future plans: investigate what is necessary for experiences like this to influence how preservice teachers will use discourse when they are teaching.
MDISC: Scope and Goals

- Case-based professional development materials for use with secondary teachers
  - Narrative and video cases
  - Authentic secondary classroom tasks
  - Small- and large-scale action research
- Overarching goal: for secondary teachers to become more purposeful about fostering classroom discourse that is both productive and powerful for students
Talk Moves ➔ Teacher Discourse Moves

- Waiting
- **Inviting** student participation
- Revoicing
- **Asking** students to revoice
- **Probing** a student’s thinking
- **Creating** opportunities to engage with another’s reasoning

Fostering Productive & Powerful Discourse
AMTE 2012
<table>
<thead>
<tr>
<th>Opportunities to Learn (Cobb &amp; Gresalfi, 2006)</th>
<th>Discourse that is…</th>
<th>When, how, &amp; why one might use the TDMs</th>
</tr>
</thead>
<tbody>
<tr>
<td>access to mathematical content and discourse practices</td>
<td>“productive”</td>
<td>Math Register/Language Spectrum</td>
</tr>
<tr>
<td>access to (positional) identities as knowers and doers of mathematics</td>
<td>“powerful”</td>
<td>Positioning</td>
</tr>
</tbody>
</table>
MDISC: The Story So Far

- Three pilot groups in DE, MI
- Early reflections from teachers are promising:
  - Practicing teachers observing, noticing features of discourse in each others’ practice
  - Practicing teachers noting that they need to be more proactive in planning questions, using teacher discourse moves, and anticipating student responses
  - Supervisors noticing stronger discourse with preservice teachers
Small-Group Discussion

- In what ways have you worked with practicing teachers in professional development to support their discourse practices?
- In what ways might we integrate specific work on classroom discourse into preservice mathematics teacher education?
- What are the challenges related to classroom discourse at the secondary level?
- What tools have been used to measure teacher classroom discourse and conceptualize change in discourse practices?
- In what ways can teachers specifically plan for classroom discourse?
- What research questions should the field of mathematics education be addressing related to teacher discourse practices?
Reporting out

Sharing perspectives & charting a path forward