ORCHESTRATING PRODUCTIVE DISCOURSE IN THE CLASSROOM

CGI NATIONAL CONFERENCE

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WHAT DOES CGI LOOK LIKE IN THE CLASSROOM?

• Problem solving is the focus of instruction; teachers pose a variety of problems

• Many problem-solving strategies are used to solve problems. Children decide how they should solve each problem.

• Children communicate to their teachers and peers how they solve the problems.

• Teachers understand children’s problem-solving strategies and use that knowledge to plan instruction.
TODAY’S OBJECTIVE

- Teachers will understand the importance of teacher moves that will increase the levels of student engagement.
## Levels of Classroom Discourse

<table>
<thead>
<tr>
<th>Level</th>
<th>Teacher Role</th>
<th>Questioning</th>
<th>Explaining Mathematical Thinking</th>
<th>Mathematical Representations</th>
<th>Building Student Responsibility Within the Community</th>
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<tbody>
<tr>
<td>Level 0</td>
<td>Teacher is at the front of the room and dominates conversation.</td>
<td>Teacher is only questioner. Questions serve to keep students listening to teacher. Students give short answers and respond to teacher only.</td>
<td>Teacher questions focus on correctness. Students provide short answer-focused responses. Teacher may give answers.</td>
<td>Representations are missing, or teacher shows them to students.</td>
<td>Culture supports students keeping ideas to themselves or just providing answers when asked.</td>
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<td>Level 1</td>
<td>Teacher encourages the sharing of math ideas and directs speaker to talk to the class, not to the teacher only.</td>
<td>Teacher questions begin to focus on student thinking and less on answers. Only teacher asks questions.</td>
<td>Teacher probes student thinking somewhat. One or two strategies may be elicited. Teacher may fill in an explanation. Students provide brief descriptions of their thinking in response to teacher probing.</td>
<td>Students learn to create math drawings to depict their mathematical thinking.</td>
<td>Students believe that their ideas are accepted by the classroom community. They begin to listen to one another supportively and to restate in their own words what another student has said.</td>
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<td>Level 2</td>
<td>Teacher facilitates conversation between students, and encourages students to ask questions of one another.</td>
<td>Teacher asks probing questions and facilitates some student-to-student talk. Students ask questions of one another with prompting from teacher.</td>
<td>Teacher probes more deeply to learn about student thinking. Teacher elicits multiple strategies. Students respond to teacher probing and volunteer their thinking. Students begin to defend their answers.</td>
<td>Students label their math drawings so that others are able to follow their mathematical thinking.</td>
<td>Students believe that they are math learners and that their ideas and the ideas of their classmates are important. They listen actively so that they can contribute significantly.</td>
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<td>Level 3</td>
<td>Students carry the conversation themselves. Teacher only guides from the periphery of the conversation. Teacher waits for students to clarify thinking of others.</td>
<td>Student-to-student talk is student initiated. Students ask questions and listen to responses. Many questions ask “why” and call for justification. Teacher questions may still guide discourse.</td>
<td>Teacher follows student explanations closely. Teacher asks student to contrast strategies. Students defend and justify their answers with little prompting from the teacher.</td>
<td>Students follow and help shape the descriptions of others’ math thinking through math drawings and may suggest edits in others’ math drawings.</td>
<td>Students believe that they are math leaders and can help shape the thinking of others. They help shape others’ math thinking in supportive, collegial ways and accept the same support from others.</td>
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ORCHESTRATING CLASSROOM DISCOURSE

- **Design of Instruction**: writing or selecting a problem or task
- **Anticipating** likely student responses to cognitively demanding mathematical tasks
- **Monitoring** students’ responses to the tasks during the explore phase
- **Selecting** particular students to present their mathematical responses during the discuss-and-summarize phase
- Purposefully **sequencing** the student responses that will be displayed
- Helping the class make mathematical connections between different students’ responses and between students’ responses and key ideas

Purposeful Pedagogy Model (TDG; Cognitively Guided Instruction) and Orchestrating Classroom Discourse (Stein et al.)
MODEL OF TEACHING THAT IS RESPONSIVE TO CHILDREN’S MATHEMATICAL THINKING

Understanding CGI research around Problem Solving Trajectory

Occur in the Moment “Informed Spontaneity”

Based on the work of Victoria Jacobs & Susan Empson, 2016
What strategies do you use to keep your students engaged during mathematical discussions?
WHILE VIEWING...

Take note of:

• What questions/moves is the teacher doing to keep students engaged and to help students make mathematical connections?
• How do the students respond?
• What commendations would you offer this teacher?
• What Next Steps would you suggest?
$2 \times 7 = 14$

$7 + 7 = 14 \quad 7 \times 2 = 14$

$0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 14$

$3, 4, 6, 8, 10, 12, 14$

$3 + 2 + 3 + 2 + 3 + 2 = 14$

$1 \times 7 = 7 + 7 = 14$

$5 \times 7 = 35$

$5, 10, 15, 20, 25, 30, 35$

$\square \square \square \square \square \square \square \square = 35$

$\square \square \square \square \square \square \square \square \square \square \square \square \square \square \square = 35$

$7 \times 7 = 49$

$35 + 14 = 49$
WHAT DID YOU NOTICE?
$2 \times 7 = 14$

$7 + 7 = 14$ \hspace{1cm} 7 \times 2 = 14$

$8 \times 8 = 64$

$3, 4, 6, 8, 10, 12, 14$

$a + a + a + a + a + a + a + a = 14$

$1 \times 7 \Rightarrow 7 + 7 \Rightarrow 14$

$5 \times 7 = 35$

$5, 10, 15, 20, 25, 30, 35$

$\square \square \square \square \square \square \square = 35$

$\square \square \square \square \square \square \square = 35$

$7 \times 7 = 49$

$35 + 14 = 49$
groups of

commutative property of multiplication

$2 \times 5 = 10$

$5 \times 5 = 25$

$10 \times 5 = 50$

$15 \times 5$

Natalie

$5 \times 15$

Distributive property

Break it down

$13 \times 5$

$5 \times 13 \rightarrow (5 \times 10) + (5 \times 3)$

$50 + 15 = 65$

$50 + 25 = 75$

$65$
WHAT DID YOU NOTICE?

• What questions/moves did the teacher do to keep students engaged and to help students make mathematical connections?
• How did the students respond?
• What commendations would you offer this teacher?
• What Next Steps would you suggest?
MAKING CONNECTIONS

• In what ways are your students allowed to bring "their whole selves" to the learning of mathematics in your classroom and school?

• What do you know about the cultural and lived experiences of the students in your mathematics classroom? (How can you broaden your knowledge?)

• How does your mathematics classroom interrupt and/or reinforce narratives of who is and who is not capable mathematically? (How could your classroom become more interruptive vs. reinforcing of these narratives?)
YOUR TURN

Cassie has 252 books. She donated 138 books to Miss Kayla for the school library. How many books does she have left?
**ANTICIPATING LIKELY STUDENT RESPONSES**

- Considering a 3rd grade class, how do you think students might approach this task?
  - How might students interpret the problem?
  - What strategies, both correct and incorrect, might students use?
  - As a teacher, what strategies would you like your students to learn for this problem?
What are some questions that could be posed to engage the children in making sense of each other’s strategies?

- Keeping in mind what we know about each child’s understanding
How are your strategies the same?

N, where is the 120 in M’s strategy in your picture?

M, is there another place where the 120 is in N’s picture?

N, where is the crossing 50 out and making it a 40 in M’s strategy in your picture?

M, where is the 13 – 7 in N’s picture?
YOU TRY IT!

In pairs

• Look at the written work for the library problem
• Select 2 strategies for discussion
• Consider
  – Questions to explore each student’s thinking
  – Questions to engage the children in making sense of each other’s strategies
2ND GRADE END OF YEAR
REFLECTION

What ideas from this session are you planning on implementing in your classroom or with the teachers you work with?
THANK YOU!

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