Coaching Number Routines in the Classroom

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Share...discuss...reflect..

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Goal

Learn how to leverage a common instructional routine to increase teachers’ in-the-moment decision-making capacity. You will know you have achieved this goal if you can:

- Appreciate the critical role *intake* and *annotation* play in teachers’ capacity to enact effective math teaching practices.
- Articulate why instructional routines are powerful teacher development tools.
- Maybe even take the two activities, understand their purpose and run with them.
How we will spend our time

- Frame
- Experience *Contemplate then Calculate* routine
- Activity #1: In-taking student ideas in-the-moment
- Activity #2: Annotating student ideas in-the-moment
- Consider teacher learning contexts for these activities
Why focus on intake?

If we want:

1. Mathematical authority to reside in students
2. Students to co-construct understanding through discourse
3. Teachers to elicit and use evidence of student thinking to select and sequence ideas and pose purposeful questions
Why focus on annotation?

If we want:

1. Mathematical authority to reside in students
2. Students to understand, build on, refine and apply each others’ ideas
3. Teachers to facilitate math discourse and ensure that *every* student participates meaningfully in classroom conversations
Elicit and Responding to Student Ideas: One response

- Lurking behind leverage high teaching practices are some hidden capacities
- Use instructional routines to develop them
Instructional Routines that Develop Math Practice Avenues of Thinking

- Capturing Quantities (MP2)
- Connecting Representations (MP7)
- Recognizing Repetition (MP8)
- Three Reads (MP1)
- Decide and Defend (MP3)
- Contemplate then Calculate (MP7)

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Contemplate then Calculate

An Instructional Routine to Develop ALL Students’ Structural Thinking

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Contemplate then Calculate

- **WHAT:** Quick count by chunking, changing the form and connecting to math you know.

- **WHY:** To “think like mathematicians”, to use mathematical structure to find shortcuts.
Contemplate then Calculate

Notice
Find calculation shortcut
Share & study shortcut
Reflect on learning
What do you notice?

ASK YOURSELF:

What might be mathematically important?
What do you notice?
I noticed…

What did you notice?
Develop a counting shortcut

Find the total number of shaded circles without counting each one individually
Develop a counting shortcut
Find the total number of shaded circles
without counting each one individually
Share and study shortcuts

PRESENTER
- We noticed…so we…
- We knew...so we…

AUDIENCE
- They noticed…so they…
- They knew...so they…
Reflect on learning

a) To find a shortcut look for ____________.

b) Noticing ___________ helped count quickly because______________.

c) Knowing ___________ comes in handy when counting quickly because______________.
Contemplate Then Calculate

1. Launch Routine
   - THINKING GOAL
   - Reason structurally

2. Notice
   - Individual Think Time
   - Pairs
   - Share & Record

3. Develop Shortcut
   - Pairs

4. Discuss Shortcuts
   - Share, Discuss, & Annotate

5. Reflect on Your Thinking
   - Individual Write Time
   - Pairs
   - Share & Record
A variety of tasks can sit at the center of contemplation. Then calculate.
Two Teacher Development Activities

1. Intaking
2. Annotating

Goal: To build in-the-moment decision making

Vehicle: Contemplate then Calculate

Today’s Context: Professional Learning Community (PLC)
**Intake** is the process of making sense of ALL the thinking in a classroom in order to make purposeful decisions.

**Intake** is at the core of ambitious teaching.

**Intake** is impacted by:
1. Number of students sharing thinking
2. Modality of communication
3. Depth of idea shared
4. Amount of time
Why do we need to practice Intake?
Contemplate Then Calculate

1. Launch Routine
   THOUGHT GOAL
   Reason structurally

2. Notice
   Individual Think Time
   Pairs
   Share & Record

3. Develop Shortcut
   Pairs

4. Discuss Shortcuts
   Share, Discuss, & Annotate

5. Reflect on Your Thinking
   Individual Write Time
   Pairs
   Share & Record

Intake within CthenC
Intake during CthenC Noticings

**Intake** is impacted by:

1. Number of students sharing thinking *all, in partners*
2. Modality of communication *verbal & gestures*
3. Depth of idea shared *noticings - quick scan*
4. Amount of time 10-15 seconds

Ideal: Know which noticings you want shared, by whom, and possible order
Intake In-the-Moment Activity (count off at tables)

Roles:
Facilitator: Amy
Teacher: Lucky #3
Everyone else: Students

① Drop into the routine and begin
② Teacher reflects on intake process
③ Teacher has a redo
④ Change roles & repeat
⑤ All participants reflect
Contemplate then Calculate

- **WHAT:** Quick count by chunking, changing the form and connecting to math you know.

- **WHY:** To “think like mathematicians”, to use mathematical structure to find shortcuts.
Contemplate then Calculate

Notice
Find calculation shortcut
Share & study shortcut
Reflect on learning
What do you notice?

**ASK YOURSELF:**

What might be mathematically important?
What do you notice?
I noticed…

What did you notice?
In-takers reflection

• Did you hear key noticings you want shared in the full group?

• Are there pairs you did not hear?

• How did your physical positioning in the room help/hinder your intake?
Intake In-the-moment Activity

1. Drop into the routine and begin
2. Teacher reflects on intake process
3. Teacher has a redo
4. Change roles & repeat
5. All participants reflect
Everyone: Reflect on Learning

- The next time I am in-taking student ideas I will...because...

- When in-taking student ideas I have learned to ask myself...
Contemplate Then Calculate

1. Launch Routine
   - THINKING GOAL
     - Reason structurally

2. Notice
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   - Pairs

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   - Share, Discuss, & Annotate

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   - Individual Write Time
   - Pairs
   - Share & Record

Intake within CthenC

THINKING GOAL
- Reason structurally
Intake during CthenC ‘Develop Shortcuts’

**Intake** is impacted by:

1. Number of students sharing thinking **partners**
2. Modality of communication **verbal & gestures**
3. Depth of idea shared **shortcuts - ‘skim’**
4. Amount of time **30-60 seconds**

Ideal: Know the range and frequency of shortcuts in the room, which ones will be shared, in what order, & by whom.
Intake
In-the-Moment Activity

Roles:
Facilitator: Amy
Teacher: Lucky #4
Everyone else: Students

① Drop into the routine and begin
② Teacher reflects on intake process
③ Teacher has a redo
④ Change roles & repeat
⑤ All participants reflect
Intake during Develop Shortcuts

Intakers (#4) position themselves...

On your marks
Noticings

We Noticed...

Symmetry
Circles going
Chunks
Rows
Develop a counting shortcut
Find the total number of shaded circles without counting each one individually

We Noticed...
Symmetry
Circles going\(\uparrow\) \(\leftrightarrow\)
Chunks
Rows
In-takers: Consider the following questions and reflect at your tables.

- Did you hear student shortcuts? Do you know the range of shortcuts in the room? Do you have a sense of which shortcuts are most/least prevalent? Do you know which shortcuts you want shared and the order in which you want to share them? Do you know which students you want to share the shortcuts?

- Are there pairs you did not hear?

- How did your physical positioning in the room help/hinder your intake?
Intake
In-the-Moment Activity

Roles:
Facilitator: Amy
Teacher: Lucky #4
Everyone else: Students

1. Drop into the routine and begin
2. Teacher reflects on intake process
3. Teacher has a redo
4. Change roles & repeat
5. All participants reflect
Noticings

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Intake
In-the-Moment Activity

Roles:
Facilitator: Amy
Teacher:
Everyone else: Students

① Drop into the routine and begin
② Teacher reflects on intake process
③ Teacher has a redo
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⑤ All participants reflect
Everyone: Reflect on Learning

- The next time I am in-taking student ideas I will...because...

- When in-taking student ideas I have learned to ask myself...
**Annotation** is the process of highlighting important mathematical thinking shared by students during class discussions.

**Annotation** connects the verbal to the visual...
Off-line Practice

### Anticipate Student Goal and Anticipate Student Thinking

<table>
<thead>
<tr>
<th>Task</th>
<th>Student Goal: MP 7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quick count</td>
</tr>
<tr>
<td></td>
<td>- Chunking</td>
</tr>
<tr>
<td></td>
<td>- Changing the form</td>
</tr>
<tr>
<td></td>
<td>- Connecting Math</td>
</tr>
</tbody>
</table>

Possible Mathematical Noticings:

- Circles
- Extras Os
- Rectangles
- Squares
- Same size groups
- Rows/Columns
- Symmetry

Possible Shortcuts and Annotations:

- 2 Rectangles “chunks” and 3 extra Os
- Two 3 by 3 Os
- 2 x 4 0
- 10
- Chunking

- (3 x 4 + 10) doubled
- Plus 1 more

- Change the form

- 36 x 5 + 36 x 4
Why Practice Annotating On-Line?

- Annotation is more process than product
- Annotation is responsive to students’ evolving mathematical ideas
- Students often communicate their ideas in partial and less than precise mathematical language
### Annotating in-the-moment Activity

<table>
<thead>
<tr>
<th>Step</th>
<th>Activity</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Launch Routine</td>
<td><img src="launch_routine.png" alt="Diagram" /></td>
</tr>
<tr>
<td>2</td>
<td>Notice</td>
<td><img src="notice.png" alt="Diagram" /></td>
</tr>
<tr>
<td>3</td>
<td>Develop Shortcut</td>
<td><img src="developShortcut.png" alt="Diagram" /></td>
</tr>
<tr>
<td>4</td>
<td>Discuss Shortcuts</td>
<td><img src="discussShortcuts.png" alt="Diagram" /></td>
</tr>
<tr>
<td>5</td>
<td>Reflect on Your Thinking</td>
<td><img src="reflectOnYourThinking.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Contemplate Then Calculate**

- THINKING GOAL: Reason structurally
- Individual Think Time
- Pairs
- Share & Record
- Share, Discuss, & Annotate
- Individual Write Time
- Pairs
- Share & Record
Annotating In-the-Moment Activity

Roles:
Facilitator: Grace
Teacher: Y’all

1. We share shortcut AND Y’ALL POINT AND GESTURE.
2. We rephrase shortcut AND Y’ALL ANNOTATE.
3. Share and discuss annotations with a partner.
4. Share and discuss annotations at table.
5. Repeat steps 1-4 with a new shortcut(s).
6. Reflect on learning.
Share and study shortcuts

PRESENTER
• We noticed…so we…
• We knew...so we…

AUDIENCE
• They noticed…so they…
• They knew...so they…
Share and discuss annotating with a partner

- What was going through your mind while you were annotating?
- What were you trying to do as you were annotating?
- What would you do differently if you had a “redo”?
Share and discuss annotations in full group (i.e. at your table)

Consider the range of annotations at the table.

a. Which annotation do you think best captures student thinking and highlights the math goal?

b. Which annotation do you think best highlights the math goal?

c. How was color used to highlight mathematical thinking?

d. What words or phrases were captured to support language development and mathematical discourse?
# Annotating In-the-moment Activity

1. We share shortcut AND Y’ALL POINT AND GESTURE.
2. We rephrase shortcut AND Y’ALL ANNOTATE.
3. Share and discuss annotations with a partner.
4. Share and discuss annotations at table.
5. Repeat steps 1-4 with a new shortcut(s).
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Share and study shortcuts

PRESENTER
• We noticed…so we…
• We knew...so we…

AUDIENCE
• They noticed…so they…
• They knew...so they…
Share and discuss annotations with a partner

- What was the same / different about the two annotations?
- How does each annotation capture student thinking and highlight the mathematical goal?
- What mathematical ideas / thinking / language does the each annotation highlight?
- What were you trying to do with your annotation? What would you do differently if you had a “do over”??
Share and discuss annotations in full group (i.e. at your table)

Consider the range of annotations at the table. Which one do you think best honors student thinking, builds towards the math goal, and supports others understanding of the idea?

Shortcut
“We noticed we could change the shape into a rectangle.”

Rephrase
“They noticed that there were circles horizontal so they put two circles on the side and on top and bottom, and changed it on the other side.”
Reflect on Learning

Goal: Think structurally. Find shortcuts by chunking, changing the form and connecting to math you know.

- We noticed...
  - Symmetry
  - Circles going $\leftrightarrow$
  - Chunks
  - Rows

Reflecting on Annotating

1. A new annotation technique I'll try is ______________________ because I can use it to ______________________

2. The next time I annotate a student idea I will ______________________ because ________

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Teaching in the Moment

- Leverage an instructional routine to work on teaching practices.
- Shift some teacher development time to in-the-moment capacity building, e.g., intake, annotation.
- Test drive the Intake or Annotation activities
- Give us feedback
Evaluation

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