Making Math Meaningful in Grade 3
Bridging the CCSS Content and Practice Standards in the Classroom

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Introductions

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● 3rd Grade teachers in CHCCS (5 years)
● Math District Planning Team (2 years)

Getting to Know You!
KID SNIPPETS: MATH CLASS
Objectives

● Teachers will understand a task based lesson structure.

● Teachers will understand the role of the teacher and students in a task based lesson.

● Teachers will use assessing and advancing questions to facilitate a discussion that focuses on content and mathematical practices.
Task-Based Workshop Structure

Set-up of the Task

The Explore Phase
Private Work Time

The Explore Phase
Small-Group Problem Solving

Share, Discuss, and Analyze
Linking to Research/Literature: The QUASAR Project

The Mathematical Tasks Framework

- **TASKS** as they appear in curricular/instructional materials
- **TASKS** as set up by the teachers
- **TASKS** as implemented by students

Student Learning

Today’s Task:
Justin is replacing the carpet in his bedroom. His bedroom is shaped liked this:

How can Justin find the amount of carpet he needs to order? Use numbers, words, and/or pictures to explain your thinking.
Explore Phase
Private Work Time

Take this time to work on the task independently.

About 3-5 minutes.
Explore Phase
Partner Problem Solving

Talk with a neighbor about your strategy for solving this problem.

Display solution on chart paper and hang on the wall.
Share, Discuss, and Analyze Phase

Now we will take a look at some strategies that you all chose to solve this task.

Be thinking:

How are these solutions similar? Different?
## A Closer Look:

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1. Set Up of the Task (Choosing)

- identify which CCSS the task needs to address
- select a higher-level demand task
  - These types of tasks tend to be open-ended, have multiple solutions, require student self-monitoring, and may cause students to struggle to make meaning of the task.
- anticipate student solutions and misconceptions
The Mathematical Task Analysis Guide

Lower-Level Demands

Memorization Tasks
• Involves either producing previously learned facts, rules, formulae, or definitions OR committing facts, rules, formulae, or definitions to memory.
• Cannot be solved using procedures because a procedure does not exist or because the time frame in which the task is being completed is too short to use a procedure.
• Are not ambiguous — such tasks involve exact reproduction of previously seen material and what is to be reproduced is clearly and directly stated.
• Have no connection to the concepts or meaning that underlie the facts, rules, formulae, or definitions being learned or reproduced.

Procedures Without Connections Tasks
• Are algorithmic. Use of the procedure is either specifically called for or its use is evident based on prior instruction, experience, or placement of the task.
• Require limited cognitive demand for successful completion. There is little ambiguity about what needs to be done and how to do it.
• Have no connection to the concepts or meaning that underlie the procedure being used.
• Are focused on producing correct answers rather than developing mathematical understanding.
• Require no explanations, or explanations that focus solely on describing the procedure that was used.

Higher-Level Demands

Procedures With Connections Tasks
• Focus students’ attention on the use of procedures for the purpose of developing deeper levels of understanding of mathematical concepts and ideas.
• Suggest pathways to follow (explicitly or implicitly) that are broad general procedures that have close connections to underlying conceptual ideas as opposed to narrow algorithms that are opaque with respect to underlying concepts.
• Usually are represented in multiple ways (e.g., visual diagrams, manipulatives, symbols, problem situations). Making connections among multiple representations helps to develop meaning.
• Require some degree of cognitive effort. Although general procedures may be followed, they cannot be followed mindlessly. Students need to engage with the conceptual ideas that underlie the procedures in order to successfully complete the task and develop understanding.

Doing Mathematics Tasks
• Requires complex and non-algorithmic thinking (i.e., there is not a predictable, well-rehearsed approach or pathway explicitly suggested by the task, task instructions, or a worked-out example).
• Requires students to explore and to understand the nature of mathematical concepts, processes, or relationships.
• Demands self-monitoring or self-regulation of one’s own cognitive processes.
• Requires students to access relevant knowledge and experiences and make appropriate use of them in working through the task.
• Requires students to analyze the task and actively examine task constraints that may limit possible solution strategies and solutions.
• Requires considerable cognitive effort and may involve some level of anxiety for the student due to the unpredictable nature of the solution process required.

1. Set Up of the Task (presenting)

- Present the task, but do not explain mathematics
- As needed, discuss any cultural references
- Engage students by linking quickly to previous learnings
2. Explore Phase - Private Work Time

- Students take about 5-8 minutes to independently work on the task

- Teachers monitor their progress:
  - have they gotten started?
  - have they used models?
  - are they using equations?
  - did students use specific vocabulary?
  - are they finished?
3. Explore Phase - Small Group Problem Solving

- Students share their work and thinking with a partner or small group
  - Teach accountable talk stems to support discussion
- Teachers monitor and **select** students to share during Phase 4.
- Teachers **sequence** student solutions in a meaningful way.
4. Share, Discuss, and Analyze Phase

- Students come together as a class and teacher has first pre-selected student share his/her work.
- The student walks the class through his/her thinking.
- Teacher uses different talk moves to facilitate a discussion.
4. Share, Discuss, and Analyze Phase

- Teacher has another student share that builds upon first strategy. Class discusses.
- May only have 2 or 3 students present.
- Teacher’s job to help make connections and pull out mathematical content.
4. Share, Discuss, and Analyze Phase

- Teacher facilitates learning through **assessing** and **advancing questions**
  - **Assessing Questions** - determines what the student knows and understands
  - **Advancing Questions** - moves the student towards the target mathematical goal
4. Share, Discuss, and Analyze Phase

Assessing Questions
- What do those numbers represent? How are they related to Justin’s room?
- How did making rectangles help you?
- Why did you use addition?

Advancing Questions
- Can you label the dimensions of Justin’s room?
- Can you write a multiplication equation that matches what you drew?
- Can you think of other ways to break his room into rectangles? Will this always work?
Practice Writing Assessing and Advancing Questions

- Take a look at the work posted around the room.
- For one solution presented, write one assessing and one advancing question you would ask that student.
Analyzing Our Assessing Questions

- How are the assessing questions similar to or different from each other?
- What are some general characteristics of assessing questions?
  - Based closely on the work the student has produced.
  - Clarify what the student has done and what the student understands about what s/he has done.
  - Provide information to the teacher about what the student understands.
Analyzing Our Advancing Questions

● How are the advancing questions similar to or different from each other?
● What are some general characteristics of advancing questions?
  • Use what students have produced as a basis for making progress toward the target goal.
  • Move students beyond their current thinking by pressing students to extend what they know to a new situation.
  • Press students to think about something they are not currently thinking about.
Analyzing Our Questions

- Do you notice any patterns among our questions?
- Did we ask more questions about content standards or about mathematical practices?
Mathematical Practice Questions

● What is a question you use in your classroom now?

● What is a question you would like to try this school year?
4. Share, Discuss, and Analyze Phase

- This phase is where the typical “mini-lesson” teaching can take place.
- Create class anchor chart.
- Students respond to question in journal or complete an exit ticket.
Reviewing Objectives

- Teachers will understand a **task based lesson structure**.
- Teachers will understand the **role** of the **teacher** and **students** in a task based lesson.
- Teachers will use **assessing** and **advancing questions** to **facilitate a discussion** that focuses on content and mathematical practices.
Questions???

- Do you have any questions about what we’ve learned today?
Reflection and Feedback Form

- Please fill out the half-sheet before you leave today

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References:

Institute For Learning

http://ifl.pitt.edu/index.php/home