Task Planning Framework

Analyzing the task:

1. Identifying the mathematical content and instructional purpose
    - Do the task yourself.
    - What is the mathematics that students are supposed to be working on?
    - What is your instructional purpose for using the task?

2. Anticipating student thinking
    - What knowledge or skills will students need in order to do the task?
    - What methods are students likely to use? What solutions or responses are students likely to generate?
    - What misconceptions are students likely to have? What errors do you anticipate they will make?

Planning its enactment:

1. Setting up the task
    - How will you present the task to students?
    - What materials will you and the students need?
    - If needed, how will you familiarize students with representations used in the task?
    - What should students do if they finish the task?

2. Monitoring student work
    - What will you look for or listen for to determine if students are engaging with the task?
    - What will you do to learn about and keep track of what students do as they engage with the task (e.g. what strategies students are using, errors they are making, etc.) that might inform how you lead the discussion?
    - What questions or variations will you pose if students finish quickly or have trouble getting started?

3. Launching the discussion
    - How will you start the discussion of students' solutions and strategies? (i.e., What specific question, example, or idea will you use?)

4. Orchestrating the discussion
    - *Student strategies:* What are some prompts you will use to elicit, probe, and connect students' solutions and strategies?
    - *Focal mathematical ideas:* What might you ask to support students' reasoning about the important mathematical ideas in the task? *(Include examples of how you will respond to anticipated student errors or incomplete solutions.)*
    - *Interactions:* What will you say or do to encourage students to consider the thinking of others and respond to each other in the discussion?

5. Concluding the discussion
    - What specific statement will you use to begin wrapping up the discussion? *(It is possible that you will need to close the discussion before a natural place to stop presents itself, so consider how you will make this shift near the end of your time.)*
    - What mathematical ideas do you want to summarize at the end of the discussion?

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Example from Teaching "Tool Box": Beginning Repertoire of Teacher Questions [selected examples]

1. **Initial eliciting of students' thinking**
   - *Please raise your hand when you are ready to share your solution.*
   - *What have you found so far?*
   - *Can someone explain the first step they took to solve the problem?*
   - *How did you begin working on this problem?*
   - *Would anyone be willing to explain one of the solutions they found?*

2. **Probing students' answers**
   a. **Trying to figure out what a student means or is thinking when you don't understand what they are saying**
   b. **Checking whether right answers are supported by correct understanding**
   c. **Probing wrong answers to understand student thinking**
      - *Can you repeat that?*
      - *Can you explain how you got [that answer]?*
      - *So what you're saying is _____?*
      - *[Name], can you restate what [name] has said?*
      - *How do you know?*
      - *Could you use [materials] to show us how that works?*
      - *Walk us through your steps. Where did you begin?*

3. **Focusing students to listen and respond to others' ideas**
   - *Do you agree or disagree with [name's] idea/answer/conjecture?*
   - *[Name] said _____. Now what do you think?*
   - *What do other people think?*
   - *Would someone be willing to add on to what [name] said?*
   - *How does what [name] said go along with what you were thinking?*
   - *Can you repeat what [name] just said in your own words?*
   - *Who can explain this using [name's] idea?*
   - *Can anybody see what method [name] might have used to come up with that answer?*

4. **Supporting students to make connections (e.g., between a model and a mathematical idea or a specific notation)**
   - *How is [name's] method similar to (or different from) [name's] method?*
   - *How does [one representation] correspond to [another representation]?*
   - *How does that match what you wrote on the board?*
   - *Can you use the [representation] to explain what you are thinking?*
   - *What part of the problem/solution does this [pointing to a particular part of representation] represent?*

5. **Guiding students to reason mathematically (e.g., make conjectures, state definitions, generalize, prove)**
   - *Can you explain why this is true?*
   - *Does this method always work?*
   - *Why does that work in this case?*
   - *How do you know it works in all cases?*
   - *When do you think that would be true?*
   - *What do these solutions have in common?*
   - *Have we found all the possible answers?*
   - *What about [counterexample]?*

6. **Extending students' current thinking, and assessing how far they can be stretched**
   - *What happens if you plug in different numbers?*
   - *How would you explain that to a ___ grader?*
   - *Can you think of a situation where that wouldn't be true?*
   - *Would it still be true if ____?*
   - *What would happen if the numbers were changed to _____?*
   - *If someone said [wrong answer], how would you respond?*
   - *Can you think of another problem that could be solved with this method?*

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Example from Teaching "Tool Box": The Work of Setting Up a Mathematics Task

Goal of a Set Up: Get students ready to engage in productive mathematical work with an instructional purpose

Before students arrive:

Set up the classroom & materials

- Gather and organize materials & equipment
- Determine when/how you will display public work (overhead, board, etc.) and who will display it (e.g., teacher record, students come up to board, or give students blank overheads)
- Arrange the room/tables to fit the task
- Remove distractions from room and/or tables
- Determine seating plan
- Determine when/how to distribute materials

When setting up the task with the students:

Establish the work environment

- Make sure students know where to sit
- Do introductions (if needed)
- Give clear, explicit instructions
- Establish expectations for work
    - Explain materials students will use and how they should record their work
    - Establish who students will work with (individually, with partner, in group, etc.)
    - Explain what will be done with the work that is finished (e.g., Tell students they will be asked to explain their thinking.)
    - Establish time frame (e.g., how long students will have to work, that they will be discussing their solutions, etc.)
    - Explain what students should do if they finish
    - How students signal when they need help or want to ask a question

Set the tone

- Enthusiasm and energy, but not over the top
- Attend to your language (positive, mathematically precise, etc.)
- Talk clearly and more slowly than you typically do

Get students into the task without doing the work for them

- Articulate what the task is that they will be working on
- Emphasize the most important parts with repetition
- Make connections to previous work
- Introduce or review any language, tools, and/or representations that students need to understand or be able to use to do the task
- Ask if there are any questions about the task or what students are supposed to do
    - Could ask someone to say what they are supposed to be doing in their own words
    - Could ask if someone has an idea for how they might get started (without saying their answer)
- Have a back up plan if many students don't understand the task (e.g., be ready to explain it again or do an example together (one that is different from their problems)); otherwise, be prepared to scaffold individual students while monitoring
- Use examples that don't give away "too much" of the mathematics; try to ask questions or do examples that leave students with mathematical thinking to do

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Distribute materials

- Establish routines/techniques for distribution
- Pass out materials when you want students to start working

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