Jacqueline Stewart and Elizabeth Phillips, Connected Mathematics Project, Michigan State University

Using the Video "Teacher Reflections"

Some thoughts on ways to use this video to help teachers plan effectively:

Different Audiences, Different Goals

There are several ways to use the "Teacher Reflections" video. I have sometimes just used specific chapters of it to help answer participant questions about why Kathy chose a particular course of action. I have used it with coaches to help them think about what it would take to support a teacher as he/she becomes more reflective. Principals are not the intended audience for the workshop described below, though they also can benefit from watching "Teacher Reflections" and pondering the level of professionalism and dedication that Kathy displays. Their challenge is to figure out how to support their teachers to achieve a similar competence.

Learning to Plan

Note: I might ask participants to read the article "Orchestrating Productive Mathematical Discussions" (Smith et al, to be published in MTMS) which describes 5 practices that might be useful for thinking about planning. The italicized words in the list on page 4 reflect ideas from this article. (See Appendix)

One important use of the "Teacher Reflections" video is to help teachers, especially beginning teachers, **learn to plan**. In this scenario "Teacher Reflections" is used in conjunction with "Making Sense of the Concept and Representations of Exponential Decay, *Growing, Growing* 4.1 and 4.2."
On this video Kathy reflects each day on what happened in class, and where students are in the development of their understanding of a piece of mathematics; this naturally evolves into planning the next day. Kathy also indicates in her reflections that sometimes a class does not go exactly as planned, and she has to make adjustments immediately, based on what she hears students saying and sees them doing. Planning in this flexible way is not an easy thing to learn to do.

Beginning teachers are frequently daunted by the challenge of planning and executing lesson. I can encourage them by pointing out that Kathy has many years of experience, but that at one time she felt as unsure as they do. She encourages new teachers to concentrate on really knowing the mathematics and being confident about the mathematical goals for each lesson as a first step. Learning to plan happens at workshops but also "on the job."

Design of the Workshop: Overall Goals

Note: Teachers are sometimes resistant to teaching their peers. My task is to make the environment supportive.

The design for the workshop involves assigning small groups to plan a Lesson from *Growing, Growing Inv 4* outside of class time, using both the Student and Teacher editions; workshop time is then given to executing the plan with peers as "students", comparing the result with the video "Making Sense of the Concept and Representations of Exponential Decay," and then viewing "Teacher Reflections." The goal while watching *both* videos is to focus on learning to plan.

"Teacher Reflections"

LAUNCH:
Before viewing the videos "Teacher Reflections" and "Making Sense of the Concept and Representations of Exponential decay: *Growing, Growing* 4.1 and 4.1."

First Step; Do the Problems (outside of class time)

Each group is assigned a Problem (4.1 or 4.2) to plan to teach; the small group collaborates to explore and plan outside of class time. The first step in planning is to do the actual Problem in the student text, *Growing, Growing.* Doing the problem yourself is essential, but doing it with others will help to anticipate likely responses.

and Plan Collaboratively (outside of class time)

The questions below help to guide the planning process. The Teacher Edition should be available throughout.

- What mathematics will students bring to the Problem?
- What is the overall mathematical goal?
- What will you use for the Launch? What do you expect students to do/say in this phase?
- What will you look for and ask about during the Explore phase? What do you expect students to do/say in this phase?
- How will you organize the Summary? What do you expect students to do/say in this phase?
- Where do you expect the students to be in relation to the mathematical goal at the end of the Problem?

Next Step: Teach the Lesson

A small group takes the role of "teacher" (perhaps one person taking the responsibility for Launch, all members of the group circulating to ask questions during the Explore, and one person taking the responsibility for the Summary).

After the lesson the small group responds to peer questions about their plan.

All this is preparatory to students doing the same problem and critiquing the plan of the teacher on the video.

VIDEO: "Making Sense of the Concept and Representations of Exponential Decay: *Growing, Growing*, 4.1 and 4.2"

This is actually 2 videos, a total of 53 minutes in all. We should view only the part that shows students working on the same problem as participants in the workshop have just planned and executed.

EXPLORE: View a part or all of "Making Sense of the Concept and Representations of Exponential Decay, *Growing, Growing Inv.4*"

Focus Questions

After the Lesson has been taught the large group should view the relevant piece(s) of "Making Sense of the Concept and Representations of Exponential Decay." When viewing the video participants need to keep in mind the previous discussion about planning, and compare that to what Kathy did. Post the Focus Questions for easy reference during the video.

From what you can see on the video:

- How did Kathy's Launch differ from the Launch you planned? Did her Launch seem appropriate? Did it give too much away? Should she have added anything to the Launch?
- What did you see the teacher doing to support learning in any of the L-E-S stages? Did she seem to have *anticipated likely responses* and/or used the Explore phase effectively to *uncover different approaches?*
- How did Kathy's Summary differ from what you planned? Did you see evidence that she had *purposefully selected and sequenced* the student solutions? Did Kathy encourage students to compare, reflect, revise? Explain.
- Do you think Kathy used the Teacher Edition to plan? What is your evidence of this?
- Did students say anything unexpected in any of the Launch/Explore/Summary phases? Did Kathy take full advantage of what you heard students saying and doing in any of these phases?
- In the Summary for 4.1 Kathy highlights a misconception about the graph of an exponential decay relationship. How, if at all, does this relate to other helpful teacher practices? (*Predicting likely responses, monitoring approaches, selecting and sequencing and connecting student work*?) Is there some other incident that you would like to view through the prism of these 5 teacher behaviors?
- Where do the students seem to be in relation to the overall mathematical goal?
- What questions would you like to ask Kathy?

SUMMARIZE: Small group Debrief	**Small planning group(s) will want to discuss how well their plans worked**, and how they might change the plan, now that they have seen actual students working with the same Problems. • What did you learn about planning from your "peer" experience or the video? • What would you like to ask Kathy?
SUMMARIZE: Large group discussion on planning	After all groups have had an opportunity to execute their plan and discuss how well their plans worked, a large group discussion, with each small group contributing their insights on the planning process, sets the stage for viewing "Teacher Reflections." My role is to take notes on poster paper, particularly of the "questions for Kathy."

VIDEO: "Teacher Reflections" 20 minutes, 4 chapters.

This video shows the teacher reflecting after each lesson. We might view only the reflection relevant to the particular lesson planned and executed by participants in the workshop.

EXPLORE: While Viewing "Teacher Reflections"

Some focus questions for each of these Reflections are below. It helps the culminating discussion if each small group is asked to focus on particular reflections. Alternatively, each of Kathy's reflections can be viewed through the lens of the 5 practices described in the article "Orchestrating Productive Mathematical Discussions" (Smith et al)

Focus Questions for "Reflection for Day 1"

Day1 Topics: Homework, notebooks, grading, goals for Inv 4.1.

- Kathy talks about management issues in her reflection. What evidence did you see of management ideas playing an important role in any phase of the lesson (we saw the Launch, Explore and part of the Summary on video)?
- When you viewed "Making Sense of the Concept and Representations of Exponential Decay" you were asked to think about where students seemed to be in relation to the overall goal. Do you agree with Kathy's thoughts about where students are with respect to understanding exponential decay?
- What comment do you have about Kathy's use of evidence in her reflection about students' learning?
- How do the two ideas, *management* and *evidence*, relate to planning to teach a lesson?

Focus Questions for "Reflection for Day 2"

Day 2 Topics: Comparing Inverse Variation and Exponential Decay, Decay Rate vs Decay Factor in 4.2, Teacher Role in Explore Phase.

- Kathy chose to use considerable class time to continue with the Summary of 4.1. Do you agree with her decision? How does this decision relate to effective teacher behaviors (*predicting* responses, *monitoring* student exploration, *selecting* and *sequencing* student work, *connecting* student solutions)?
- When you viewed "Making Sense of the Concept and Representations of Exponential Decay: *Growing, Growing* 4.1" you were asked if students had said anything unexpected, and if Kathy had taken full advantage of what they said. After listening to Kathy would you amend or add to your thoughts?
- Kathy talks about what she planned to do/ask during the Explore phase for 4.2. Was her plan successful?
- What other comments do you have about planning for 4.1 or 4.2 after watching the video of students investigating these problems, and listening to Kathy reflecting on student solutions? Or about planning in general?

Note: The next two Reflections are not relevant to *Growing, Growing* 4.1 and 4.2. They are included on the video so that participants can see Kathy talking about where students are in relation to the goals for this Unit, and about plans for the rest of the Unit.

Focus Questions for "Reflection for Day 3"

Day 3 Topics: Developing Rules for Operating with Exponents, Planning to Use Student Work.

- Kathy explains she deliberately keeps 5.1 "open." How does she achieve this? Is this effective in motivating students to find relevant number patterns?
- Kathy talks about what she has observed in the Explore Phase of 5.1. How do her comments relate to effective planning behaviors (*predicting responses, monitoring student investigations, selecting and sequencing student solutions, connecting student solutions*)?

Focus Questions for "Reflection for Day 4"

Day 4 Topics: Goal for the day, Planning for the Lesson,

- Kathy posted all student work but did not use every student solution. How does this relate to her goal for the day?
- Kathy talks about how she grouped student work. How does this relate to effective planning behaviors? Was her plan successful, as far as you can tell?
- Kathy talks about her plans for the next day. Comment on Kathy's planning behavior.[Ω]

SUMMARIZE: Small group discussion

It helps the culminating discussion if participants have had an opportunity to discuss in their small groups the particular reflection(s) that are relevant to their own planning.

Each small group should choose one question from their "Teacher Reflection" focus questions to report on to the larger group.

SUMMARIZE: Culminating Discussion

I want to end on a positive note so, even though planning is hard and things don't always go according to plan, I want teachers to see themselves as learners. So my final questions to them should be:

- What was one thing that you learned from Kathy's reflections?
- What was the most challenging thing about planning?
- What suggestions do you have for me with respect to using these two videos to help teachers learn how to plan?"

[Ω] Listening to Kathy talk I can see how detailed and focused her expectations and plans are. One might then expect Kathy to be rigid in following her plans, but in fact we have lots of evidence that Kathy is extremely flexible. She re-organizes her plan between Day 1 and Day 2, to incorporate unexpected student comments about the similarity between the graphs of inverse variation and exponential decay relationships. We see her again adjust her plan, to follow student ideas for the definition of decay factor.