Using a Structured Protocol for Analyzing and Learning from Student Work

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Looking at student work is an important aspect and a large component of the work of teachers. However, this is often an isolated activity. School reformers propose that one way to improve instruction and student learning is by bringing teachers together through the use of agreed upon structures and guidelines ("protocols") for collaboratively analyzing and learning from student work (Blythe, Allen, & Powell, 1999; Cushman, 1996; Dune, 2000; Langer, Colton, & Goff, 2003). This article discusses a structure for bringing teachers together to collaboratively examine student work and to discuss and reflect on issues of teaching and learning.

> *Every time I've had a chance to participate in the protocol, I've been able to get some new prospective on my students, and really get some other teachers' ideas on how the work I'm doing in my classroom relates to the (district) learning targets and the learning to the state descriptors. ---MPS Math Teacher Leader*
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> *At our school we've been using the protocol for about 3 months now—within grade level meetings, within the math committee, and across grade level meetings—which has been very helpful at providing a tool for teachers to look at the student work and where they can make improvements in student learning and how we can go about improving student learning based on what we see from the work. The protocol is pretty easy to follow and it seems to keep the conversations focused and effective. ---MPS Math Teacher Leader*

Background

The Milwaukee Public Schools (MPS) in collaboration with the University of Wisconsin-Milwaukee and the Milwaukee Area Technical College was awarded a Math and Science Partnership grant from the National Science Foundation in 2003 for the *Milwaukee Mathematics Partnership* (MMP). The purpose of the grant is to build the capacity of schools for continuous improvement toward student success in mathematics. Each MPS school was asked to identify a "Math Teacher Leader" (MTL) who would participate in monthly professional development and share their learning with school-based learning teams and colleagues. One of the topics being explored is the use of a protocol for bringing teachers together to collaboratively looking at student work.

The MMP Protocol for analyzing student work was developed by DeAnn Huinker, University of Wisconsin-Milwaukee, adapted from the Collaborative Assessment Conference, Harvard's Project Zero (Seidel et al., 1997). The Protocol was introduced in MPS two years ago when we were thinking about formative ways to use classroom assessments based on standards (CABS) to inform classroom practice in the teaching and learning of mathematics. During the process of developing the Protocol, we shared and received feedback from lead educators in multiple venues—MTL meetings, assessment meetings, principal meetings, learning team meetings, and national and state mathematics conferences.

> The goal is to foster a common understanding of student learning expectations for mathematics as well as to establish a collaborative forum for examining student work to inform mathematics instruction.

The purpose of the MMP Protocol is to provide a set of guidelines for structuring conversations among teachers about student work. The goal is to foster a common understanding of student learning expectations for mathematics as well as to establish a collaborative forum for examining student work to inform mathematics instruction.

To accompany the MMP Protocol, a DVD training video with a CD holding the support materials (Huinker & Freckmann, 2005), was developed in order to provide teachers with a visual representation of the process of analyzing student learning. The training video features four MPS teachers engaged in a conversation about students' developmental levels in posing and solving a story problem and instructional strategies that support and develop students' mathematical knowledge. Teacher leaders were given opportunities to practice the Protocol at their monthly meetings and then encouraged to use the Protocol in their schools.

An MMP survey of topics emphasized in school-based professional development was completed by the MTLs at the end of the 2005-2006 school year. As shown in Table 1, 88% of schools reported use of the Protocol by teachers in their schools. Thus, teachers in approximately 87 schools in MPS are talking about or using the MMP Protocol

Table 1. School-based use of the MMP Protocol in 2005-2006					
In your school, how much emphasis was given to:	Number of Schools Responding	Not Yet	Beginning Conversations	Some Emphasis	Major Emphasis School-Wide
Protocol for Analyzing and Learning from Student Work	99	11%	31%	42%	15%

to discuss the teaching and learning of mathematics through student work.

The Protocol for Analyzing and Learning from Student Work

An overview of the protocol structure is shown in Figure 1.

Figure 1. Overview of Protocol Structure for Examining Student Work

Protocol
Analyzing and Learning from Student Work

1. Getting Started
   - Facilitator identified.
   - Volunteer presents student work.
   - Participants review the work silently.

2. Discussing the Work
   - Round 1. Describe: What do you notice about the student work?
   - Round 2. Interpret: What do the students understand?
   - Round 3. Question: What questions do you have about the work?

3. Reflections from the Presenting Teacher
   - Comments on the student work and responds to questions.
   - Shares insights from surprising or unexpected comments.

Repeat Steps 1–3 with another presenting teacher.

4. Suggestions for Teaching and Learning
   - Based on the discussion of the students' performance, what might you suggest doing next with the class?
   - Describe ways the assessment did or did not give students an opportunity to demonstrate what they knew.

5. Debriefing
   - What are we learning through this process?
   - How can the process be improved?

This succinct overview provides a first look or a snapshot to get the big picture of the process of analyzing student work. In this section, we discuss the specific details that support each of the steps of the Protocol and share excerpts from the conversation among the four teachers on the DVD as they examined work from a second grade classroom. We have also included an elaborated Protocol in Figure 2 that includes more detail on each of the steps and which can be used as a guide during protocol sessions with teachers and administrators.

In general, the process involves a teacher presenting a few pieces of student work from a specific task (often a classroom based assessment). This teacher then listens as the other teachers begin by describing what they see, next they make interpretations about the students' understanding, and then they can ask questions about the work. Now the presenting teacher joins the conversation and responds to what she or he has heard. If another teacher has given the same task and brought student samples, Steps 1, 2, and 3 are repeated. Otherwise, they proceed to Step 4 and discuss suggestions or ideas for ways to further the students' understanding and performance. Finally, the teachers take a few moments to debrief the process in order to make it more effective the next time they get together.

1. Getting Started

Each teacher should bring three or four samples of student work from the same assessment. The work samples should reveal a range of responses from low to middle to high performance (e.g., not there yet, almost there, got it).

The group chooses a facilitator for the session. This person should participate in the discussion, but also needs to keep the group focused. The facilitator can refer to and move the group through the steps in the process, prompt individuals to elaborate on his or her comments, and ensure that everyone gets a chance to join into the discussion, and as well as paraphrase and summarize what was said during each step. The next time the group gets together, the facilitator role should be assigned to another individual until it has rotated among all group members.

One person volunteers to present three to five work samples from his or her students that show a range of reasoning. The presenting teacher displays the work where everyone can see it or distributes copies to the other participants. This teacher says very little if anything about the work, the context, or the students until later in the process. The other teachers take a few moments to review the student work in silence. They may take notes for use during the discussion.

In our group of four teachers, Elnore agreed to present her work fist. She began by saying, "Well, I'm glad we're meeting again and I brought some samples of what my students have been doing. We've been working on double-digit addition and writing story problems." Elnore brought the four samples of student work shown in Figure 3. The task was "Write a story problem for 25 + 8 and show how you would solve this problem."

Figure 2. The MMP Protocol for Collaboratively Examining Student Work

MMP Protocol
Analyzing and Learning from Student Work

This protocol is a set of guidelines for structuring conversations among teachers about student work. The goal is to foster a common understanding of student learning expectations for mathematics and to provide a collaborative forum for examining student work to inform mathematics instruction.

Each teacher brings three samples of student work from the same assessment. The work samples should reveal a range of responses from low to middle to high performance (e.g., not there yet, almost there, got it).

1. **Getting Started**
   - The group chooses a facilitator who keeps the group focused.
   - One person volunteers to present three to five work samples from his or her students that show a range of reasoning. The presenting teacher displays the work where everyone can see it or distributes copies to the other participants. The teacher says nothing about the work, the context, or the students until Step 3.
   - The participants review the student work in silence. They may take notes for use during the discussion.

2. **Discussing the Work**
   The work is discussed in three rounds. It is important that remarks are made without judgments or personal preferences. The participants take turns speaking, varying the speaking order for each round. Individuals are free to pass. There is no cross-dialogue. Comments are kept short (if you hear yourself saying "and" you've probably said too much). The facilitator may choose to insert clarifying questions. The presenting teacher does not take part in the discussion, but listens carefully and often takes notes .
   - Round 1. Describe: The facilitator asks, "What do you notice about the student work?"
   - Round 2. Interpret: The facilitator asks, "What do the students understand?"
   - Round 3. Question: The facilitator asks, "What questions do you have about the work?"

3. **Reflections from the Presenting Teacher**
   - The facilitator invites the presenting teacher to share his or her reflections and reactions to the discussion.
   - The presenting teacher comments on the student work, reacts to observations, and responds to questions.
   - The presenting teacher also shares insights gained from the discussion and reacts to surprising or unexpected comments from the other participants.

   Repeat Steps 1–3. If other teachers have student work from the same task, repeat steps 1–3 with another presenting teacher. Continue the cycle as time allows, leaving sufficient time to move to steps 4 and 5.

4. **Suggestions for Teaching and Learning**
   The facilitator invites everyone (the participants and the presenting teachers) to relate key ideas raised in the discussion to suggestions for teaching and ways for supporting students' learning.
   - Based on the discussion of the students' performance, what might you suggest doing next with the class?
   - Describe ways the assessment did or did not give students an opportunity to demonstrate what they knew.

5. **Debriefing**
   The group reflects on the experience of using the protocol as a whole or to particular parts of it.
   - What are we learning through this process?
   - How can the process be improved?

Figure 3. Student Work Samples

Student 1

On the lines below write a story problem for 25 + 8.

25 basck ball peo ple new how to play 8 people didn't Know how to play.

In the box below, show how you would solve this problem:

65
+29

$60 + 20 = 70 + 14 = 84$

Student 2

On the lines below write a story problem for 25 + 8.

Oast night Miontrel bout 25 bags of chips. He bout 8 more bag, How many bag of chips did montrel buy?

In the box below, show how you would solve this problem:

65
+29
94

6 5
+2 4

Student 3

On the lines below write a story problem for 25 + 8.

Ben had 25 vido game his friend gave him 8 vido games how many vido game does Ben have now.

In the box below, show how you would solve this problem:

65
+29
94

First I added the 5 and the 9. Next I the 60 and the 20 and got my awser.

On the lines below write a story problem for 25 + 8.

Me and my brother ate 25 candy bar. We eat 8 scooby Doo Snocks.

In the box below, show how you would solve this problem:

65
+29
94

I had to regoup.

Jennifer agreed to be the facilitator for this session. She stated, "As we agreed, we will use the protocol and use the student work and see if we can give Elnore some feedback as to what we see here. So, we're going to first look at the work she has for us and then we will have some discussion." The teachers quietly passed the student samples among each other, studying each for a few moments.

2. Discussing the Work

The work is discussed in three rounds. It is important that remarks are made without judgments or personal preferences. The participants take turns speaking, varying the speaking order for each round. Individuals are free to pass. There is no or very little cross-dialogue. Comments are kept short (e.g., if you hear yourself saying "and" you've probably said too much).

The facilitator starts and ends each round by using the provided focus question or one similar to it and may choose to prompt others for clarification or elaboration of comments. It is also helpful if the facilitator summarizes the comments before moving on to the next round. The presenting teacher does not take part in the discussion, but listens carefully and often takes notes.

The following are excerpts from the conversation among the four teachers. The comments have been condensed and slightly edited to illustrate the types of comments made in each round.

Round 1. *Describe: What do you notice about the student work?*

Jennifer: What I would like to do is talk about what we see here, and the work that Elnore has brought for us to look at, so, what do you see?

Michelle: Well, I see nice story problems here, but two of them didn't really have a question. It wasn't clear what you were supposed to do with the numbers that the kids were using, 25 basketballs and 8 people and the Scooby Doo snacks and the candy bars.

Ingrid: What I see is that every student attempted to do both parts of the task so everyone does have a story problem and everyone did attempt the computation, and I also see a variety of strategies for explaining how they solved the computation problem.

Jennifer: I also see that some students used place value… and that they know to incorporate both numbers into the story problem. It's just like you have mentioned, they had difficulties with the questions at the end sometimes.

Round 2. *Interpret: What do the students understand?*

Jennifer: What do you see that the students understand through these artifacts?

Michelle: Both of these students (Student #1 and #3) are breaking the numbers apart and grouping the tens even though there are some mathematical errors here (Student #1) with adding and use of the equals sign. However I wasn't clear what Student

#3 did then. It just says, "I got my answer," but not how the student got to 94.

Ingrid: Student #2 has a correct answer and they can effectively use a picture but, when you are doing double digit addition, it doesn't seem the most effective way to do that problem. They understand ones, but do they understand grouping of numbers. So I see that students can use a variety of strategies in the classroom from tally marks to place value, but what might we do to help the child with the tally marks to have a more efficient strategy?

Round 3. *Question: What questions do you have about the work?*

Jennifer: That is something we will continue to talk about here. As far as the artifacts, are there any questions that we have for Elnore?

Michelle: Well, I'm wondering how much work you have done with writing story problems, and how you are helping the students to develop story problems, especially including an appropriate question.

Jennifer: One thing that I am wondering, that goes with what has been said about a variety of strategies here, is how many opportunities are the students given within the classroom to share their strategies.

Ingrid: One of our learning targets is to have the students communicate with and interpret symbols and that the equal sign denotes the relation between two equal quantities. So, it's really good that this child (Student #1) understands place value, but it's also important that we make sure that he understands that both sides of the equal sign have to balance out. So I wonder if you've had much discussion with students on what the equal sign means.

3. Reflections from the Presenting Teacher

In Step 3, the facilitator invites the presenting teacher to share his or her reflections and reactions to the discussion. The presenting teacher comments on the student work, reacts to observations, and responds to questions. The presenting teacher also shares insights gained from the discussion and reacts to surprising or unexpected comments from the other participants. Here is an excerpt from Elnore's reflections:

It is interesting that you're talking about story problems because we do work a lot with story problems every week and they have to explain their thinking orally…. They know they have to ask a question when they write a story problem. This is something we are working on, so I was impressed with their attempts to ask a question.

If other teachers have student work from the same task, repeat steps 1–3 with another presenting teacher. Continue the cycle as time allows, leaving sufficient time to move to steps 4 and 5.

4. Suggestions for Teaching and Learning

Step 4 is the most important step of the Protocol process and it is critical that the facilitator push through the previous steps in order to allow sufficient time to discuss implications for classroom practice, even if it means that not all teachers share the student work they have brought. The facilitator invites everyone (the participants and the presenting teachers) to relate key ideas raised in the discussion to suggestions for teaching and ways for supporting students' learning. Some of the general focus questions the facilitator might ask are: *Based on the discussion of the students' performance, what might you suggest doing next with the class?* or *Describe ways the assessment did or did not give students an opportunity to demonstrate what they knew*.

The following excerpts from the conversation have been condensed and edited to illustrate highlights of the conversation. Notice how the facilitator, Jennifer, chose to begin the discussion by concentrating on a particular issue that emerged in Step 3.

Jennifer: We might want to discuss some strategies to help those students that are still using tally marks to move to more efficient strategies.

Michelle: What I see is, with the 29, it would be beneficial to make 29 with tally marks or with cubes and then they can put those cubes together to see how many groups of 10 and then what's left over, what those extra nine look like and how far away they are from a multiple of ten. Then focus on how to add ten as a chunk rather than add on ten ones.

Ingrid: I think we could probably work with numbers that end in nine for awhile because they are close to groups of ten and then we could transfer them to the hundreds chart and then have those children work on moving up and down that hundred chart in groups of 10 and then taking away one, or maybe adding one.

At this point in the conversation, the facilitator chose to change the topic and again steer the conversation to a particular issue that had been raised earlier.

Jennifer: I think that another area that we can look at building with the students is when you are writing a word problem, making sure that it is ending with a question.

Elnore: This is hard for my students. How do you all get your students to put a question in at the end when you're teaching story problems?

Ingrid: A favorite method of mine is to have the students write their story problems on a transparency and then we put it on the overhead.

The other kids start reading it, and right away they will say, "What do you want me to do?" So it turns into a discussion and the kids take over and start saying things like, "You didn't ask me to do anything," or "It's supposed to be adding so we need to put things together." So I like to let the kids have that discussion on their own with the teacher just helping out.

Jennifer: Right, I think what you said is really true. You know besides feedback from a teacher, that peer feedback is really important in developing this idea.

To close this step of the conversation, it is also helpful for the facilitator to summarize the main points of discussion.

Jennifer: From the discussion, I'm hearing, there are really three main points that have been brought up. Working with the equal sign and realizing that there needs to be a balance in the numbers on either side of the equal sign in order to write an accurate equation was one of the main ideas that was brought up. Also, writing word problems, making sure that there was a question at the end, kind of using both teacher feedback and peer feedback. And, the final main point is for the students who are using tally marks, to really work at trying to get them to make representations that look at breaking the numbers apart into tens and ones.

Elnore: I really thank you all for helping me with this. This really was a very engaging session today. And I am going to be leaving with ideas of moving this student, in particular, to chunking with 10s, looking to make sure all my students write accurate equations, and also when we are doing the story problems, work more on asking the question at the end.

5. Debriefing

In the final debriefing step, the group reflects on the experience of using the Protocol as a whole or to particular parts of it. Some of the focus questions the facilitator might ask are: *What are we learning through this process?* and *How can the process be improved?* Here the teachers might also make plans for their next Protocol session.

Closing Comments

Teachers and administrators across our district are engaging in deeper levels of conversations about the teaching and learning of mathematics. Use of the Protocol has changed the nature of grade level or staff meetings by providing a structure that focuses discussions centered on student work.

Well, <u>what we did before</u> is teachers used to get together in a group and we would call it analysis of student work … but, once we all got together after school, it was like relaxation time, we never stayed on topic, and we never pulled out big math

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> Teachers and administrators across our district are engaging in deeper levels of conversations about the teaching and learning of mathematics.

ideas. <u>Now with this protocol</u> we're able to stay on task. We actually have questions to ask ourselves and each other about what do we see and what do the students understand, and then what questions can we raise for this child. So it's a really structured system that really helps keep everyone on task.   ---MPS Math Teacher Leader

The Protocol is proving beneficial to teachers as a form of professional development in which they learn from their colleagues. As teachers engage in discussions, they create a common understanding of the mathematics that we expect students to learn (i.e., what students should know) and a common vision of student performance (i.e., what students should be able to do). This then leads to identifying specific strategies and mathematical ideas to target with students.

I would say some of the benefits are that it's a non-threatening way to look at student work, and in doing so it allows people to get together and discuss strategies that normally we don't have an opportunity to do. So it has actually been very beneficial in our building.   ---MPS Math Teacher Leader

The successes were that the teachers really seemed to like the format of the Protocol, and they felt that this was something they would be able to use in grade level meetings to examine work their students have done. They liked the fact that the Protocol did not have to be used for Math only, but that it could be used for other subject areas as well. They also liked that it was a non-threatening way to receive feedback about their students' work, and also a way to get new or different teaching ideas for areas in which their students were struggling.   ---MPS Math Teacher Leader

Using the Protocol has served as a springboard for several related courses of action. Examining how students responded to a common classroom assessment (CABS) sometimes led to looking at the assessment itself. Teachers found that assessing the assessment—that is, looking for alignment between the prompt and the grade level descriptors from the *Wisconsin Mathematics Assessment Framework* (Wisconsin DPI, 2005) and examining the thinking level of the prompt—is a critical piece of the puzzle. We are also beginning to work with descriptive feedback (versus evaluative feedback) to the students after analyzing their work.

In summary, as our Superintendent William Andrekopoulos contends, we need to move out of the mindset that we are isolated practitioners of our craft and move toward more professional collegiality to a professional learning community. We have witnessed teachers using the MMP Protocol for analyzing student work and have gotten energized from the in-depth conversations that are impacting the teaching and learning of mathematics.   Ω

Resources

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