FCR-STEM Observation Protocol for Formative Assessment in Mathematics
TRAINING MANUAL

Florida Center for Research in Science, Technology, Engineering and Mathematics (FCR-STEM)
Learning Systems Institute (LSI)
Florida State University

The FCR-STEM Observation Protocol for Formative Assessment in Mathematics (OPFAM) is an observation instrument that can be used to assess the degree to which teacher practice associated with formative assessment and differentiated instruction is occurring in the classroom. The FCR-STEM OPFAM was also designed to assess fidelity of implementation with the Mathematics Formative Assessment System (MFAS), as measured by use of MFAS tasks and rubrics in the classroom.[1]

The FCR-STEM OPFAM is the result of several iterations of classroom observation protocols undertaken by the FCR-STEM research team to develop and refine an observation instrument for use in the 2010 MFAS feasibility trial (Lang, Hawthorne, Sakon, Reta and Schoen, 2011; Lang, Schoen, Howell, & Davis, 2010), 2012 MFAS pilot study (Lang, Schoen, LaVenia & Oberlin, 2013), and 2013 full-scale trial.

Structural revisions were guided by Wiliam and Thompson's (2008) and Wiliam's (2010) six formative assessment strategies:

1. clarifying and sharing learning intentions and criteria for success,
2. engineering effective classroom discussions and tasks that elicit evidence of learning,
3. providing feedback that moves learners forward,
4. activating students as instructional resources for one another,
5. activating students as the owners of their own learning and, importantly,
6. adjusting the instructional plan based on formative assessment results when the evidence of learning indicates it is warranted.

We drew from across the work of many others in our selection and development of items and development of this Training Guide. Forefront among those for whom acknowledgement is due are (in alphabetical order): Berry, Rimm-Kaufman, Ottmar, Walkowiak, and Merritt's (2011) The Mathematics Scan measure of mathematics instructional quality; Boston and Wolf's (2006) Instructional Quality Assessment toolkit; Franke et al.'s (2007, 2009) scholarship on teacher questioning to elicit students' mathematical thinking; Heritage, Jones, Pastore, and Osmundson's (2011) Coaching Rubric for Formative Assessment Implementation; Jacobs and Ambrose's (2008) scholarship on supporting and extending student mathematical thinking; Piburn et al.'s (2000) Reformed Teaching Observation Protocol; Secada and Lee's (2000) classroom visitation guidelines for the study of highly effective Urban Systemic Initiative schools; and Shute's (2008) scholarship on formative feedback.

Those most involved in the effort of item selection and development and rubric development for the FCR-STEM Observation Protocol for Formative Assessment in Mathematics were Laura Lang (LSI, Director), Robert C. Schoen (FCR-STEM, Associate Director), Mark LaVenia (LSI, Methodologist), and Maureen Oberlin (MFAS, Project Manager). We wish to thank the observers first trained on this protocol for their input on places where greater clarification was needed within the Training Guide in order for them to know what factors to take into consideration and how to address various contingencies.

[1] MFAS is a free, Web-based electronic performance support system, available at www.floridastandards.org/resource/mfas.aspx, providing mathematics tasks, rubrics and formative assessment professional development modules for teachers in grades K-3. MFAS R&D team: PI, Laura Lang; Co-PI, Valerie Shute; and Co-PI Robert Schoen.

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Background Information

Date of observation:_____ Observer: _____

Start time:_____ District: _____

End time:_____ School: _____

Teacher:_____ Room: _____

Grade:_____

Mathematical topic of the lesson: _____

_____

Classroom Context

Number of students in class: _____

Number of adults working with students in the class: _____

Description of setting: _____

_____

_____

_____

_____

Directions: Indicate rating by circling numeral 4, 3, 2, 1, or 0 for each item. For any item rated as N/A , provide the reason in the Comment section at the end of the score sheet. See Training Manual for definitions and rubrics.

Clarifying and sharing learning intentions and criteria for success						
1. Teacher communicates *learning goal*(s) to students.	**4**	**3**	**2**	**1**	**0**	**N/A**
2. Teacher communicates *success criteria* to students.	**4**	**3**	**2**	**1**	**0**	**N/A**
3. Teacher refers to *success criteria* during the lesson.	**4**	**3**	**2**	**1**	**0**	**N/A**
4. *Success criteria* are aligned to *learning goal*(s).	**4**	**3**	**2**	**1**	**0**	**N/A**
5. *Success criteria* relate to what students will say, do, make or write to show *evidence* of learning.	**4**	**3**	**2**	**1**	**0**	**N/A**
6. The enacted lesson aligns with the *learning goal*(s).	**4**	**3**	**2**	**1**	**0**	**N/A**

Engineering classroom discussion and tasks that elicit evidence of learning						
7. Teacher presents tasks that promote student mathematical analysis.	**4**	**3**	**2**	**1**	**0**	**N/A**
8. Teacher observes students in the practice of doing mathematics and listens to their mathematics conversations.	**4**	**3**	**2**	**1**	**0**	**N/A**
9. Teacher poses problems and prompts students to share their thinking about the mathematics and how they are approaching the problem.	**4**	**3**	**2**	**1**	**0**	**N/A**
10. Teacher uses wait-time to provide adequate time for cognitive processing.	**4**	**3**	**2**	**1**	**0**	**N/A**
11. Teacher follows up student responses by eliciting student explanations and reasoning.	**4**	**3**	**2**	**1**	**0**	**N/A**
12. Teacher ensures that the student understands the problem.	**4**	**3**	**2**	**1**	**0**	**N/A**
13. Teacher explores what the student has already done.	**4**	**3**	**2**	**1**	**0**	**N/A**
14. Teacher uses revoicing strategies.	**4**	**3**	**2**	**1**	**0**	**N/A**

Providing feedback that moves learners forward						
15. Teacher feedback provides suggestions to students about what they can do to progress from their current learning status toward the desired *learning goal*.	**4**	**3**	**2**	**1**	**0**	**N/A**
16. Teacher feedback is limited to manageable units.	**4**	**3**	**2**	**1**	**0**	**N/A**
17. Teacher feedback attends to details in the student's reasoning, strategy, or algorithm.	**4**	**3**	**2**	**1**	**0**	**N/A**
18. Teacher feedback to students emphasizes effort.	**4**	**3**	**2**	**1**	**0**	**N/A**
19. Teacher feedback turns learner mistakes into learning opportunities.	**4**	**3**	**2**	**1**	**0**	**N/A**
20. Teacher reminds the student to use other strategies.	**4**	**3**	**2**	**1**	**0**	**N/A**
21. Teacher feedback is presented in more than one modality (e.g., text, visual/graphic, verbal).	**4**	**3**	**2**	**1**	**0**	**N/A**

Activating students as instructional resources for one another						
22. Teacher facilitates the sharing of students' thinking to contribute to group talk and help peers.	**4**	**3**	**2**	**1**	**0**	**N/A**
23. Teacher provides opportunities for students to explain their thinking to other students and think about other students' reasoning, strategies, or algorithms.	**4**	**3**	**2**	**1**	**0**	**N/A**
24. Teacher provides opportunities for students to give elaborated peer feedback.	**4**	**3**	**2**	**1**	**0**	**N/A**
25. Teacher provides opportunities for students to use peer feedback to improve their learning.	**4**	**3**	**2**	**1**	**0**	**N/A**
26. Students' contributions link to and build on each other.	**4**	**3**	**2**	**1**	**0**	**N/A**

Activating students as the owners of their own learning						
27. Teacher provides a system that encourages students to monitor their own learning in relation to the *learning goal*.	**4**	**3**	**2**	**1**	**0**	**N/A**
28. Teacher promotes student reflection on the reasoning, strategy, or algorithm the student just used.	**4**	**3**	**2**	**1**	**0**	**N/A**
29. Students demonstrate productive engagement with mathematics.	**4**	**3**	**2**	**1**	**0**	**N/A**
30. Students reflect on and monitor their learning in relation to the *learning goal*.	**4**	**3**	**2**	**1**	**0**	**N/A**

Adjusting the instructional plan based on formative assessment results						
Support student thinking before a correct answer is given:						
31. Teacher provides increased support for students who have the lowest level of knowledge in relation to the *learning goal*.	**4**	**3**	**2**	**1**	**0**	**N/A**
32. Teacher changes the mathematics in the problem to match the student's level of understanding.	**4**	**3**	**2**	**1**	**0**	**N/A**
33. Teacher provides linguistic scaffolding and supports cultural congruence, where appropriate.	**4**	**3**	**2**	**1**	**0**	**N/A**
Extends student thinking after a correct answer is given:						
34. Teacher encourages the student to explore multiple strategies and their connections.	**4**	**3**	**2**	**1**	**0**	**N/A**
35. Teacher connects the student's thinking to symbolic notation.	**4**	**3**	**2**	**1**	**0**	**N/A**
36. Teacher generates follow-up problems linked to the problem the student just completed.	**4**	**3**	**2**	**1**	**0**	**N/A**

Implementation of MFAS Tasks and Rubrics

*Circle **Y** (Yes), **N** (No), or **N/A** (Not Applicable)*

Does the teacher record *evidence* of student understanding? **Y** **N**

Is it apparent that one or more MFAS Tasks are used? **Y** **N**

If yes, are the MFAS Tasks used during instruction? **Y** **N** **N/A**

Is it apparent that MFAS Rubrics are used? **Y** **N**

If yes, does it appear that MFAS Rubrics are used to guide instruction? **Y** **N** **N/A**

Classroom Context (cont.)

Fill in the blank when prompted

*Circle **Y** (Yes), **N** (No), or **N/A** (Not Applicable)*

Grouping strategies employed:

Whole-group **Y** **N**

Small-group **Y** **N**

If small-group, approximately how many students per group: _____

One-on-one **Y** **N**

If more than one grouping strategy is observed, indicate which one is predominant:

(*circle only one*) Whole-group Small-group One-on-one

Is furniture arranged so that the teacher can work with a small group of students? **Y** **N**

Does the classroom have learning centers/stations? **Y** **N**

If centers/stations are present, are students using them? **Y** **N** **N/A**

Well-established classroom procedures:

Do students appear to know <u>with which materials</u> they are to work? **Y** **N**

Do students appear to know <u>where</u> they are supposed to work? **Y** **N**

Do students appear to know <u>with whom</u> they are supposed to work? **Y** **N**

Do students appear to know <u>how</u> to work with the materials? **Y** **N**

Do students appear to know what to do when they get stuck or have a question? **Y** **N**

Does the teacher use cues or signals understandable to the students <u>and</u> do the students respond accordingly? **Y** **N**

Comments

For Items # 1-36, provide reason for each designation of N/A (enumerate reasons by Item #): __

_____

_____

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Additional comments: _____

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_____

Annotated
FCR-STEM Observation Protocol for Formative Assessment in Mathematics

Background Information

Date of observation: _____ Observer: _____

Start time: _____ District: _____

End time: _____ School: _____

Teacher: _____ Room: _____

Grade: _____

Mathematical topic of the lesson: _____

_____

Background Information: This section prompts the observer to record background information used to identify the instructor, the observer, the site, the focus of the lesson, the date and duration of the observation. For the line, Mathematical topic of the lesson: the more specific, the better; with the identification of the particular mathematics standard(s) being ideal.

Classroom Context

Number of students in class: _____

Number of adults working with students in the class: _____

Description of setting: _____

_____

_____

_____

_____

Classroom Context: This section prompts the observer to describe the setting. This may include noting whether it is in a conventional classroom, or if it is in an unconventional local, such as the Media Center or outside. Also, the observer may note whether students are sitting at individual desks, tables, study carrels, etc. Some notation may also be made about educational materials and resources that appear available to students. This description need not be exhaustive, but should capture what is most salient to the observer.

Definitions (Note: Superscripts throughout this annotation reference specialized vocabulary, defined below.)

[a]A **Learning Goal** is a concept, process, and/or skill that students are expected to learn during the course of a lesson (a lesson can be several periods). A learning goal is broader than finding the correct solution to any particular problem

[b]**Success Criteria** are the indicators for meeting a learning goal[a]. Success criteria relate to what students will say, do, make or write to show evidence[c] of learning. They are the guides or benchmarks to learning while the students are engaged in the learning tasks that students can check their progress against and strive toward demonstrating.

[c]**Evidence** results from the teacher's interpretation of the data (what a student says, does, makes or writes). It is used to determine whether, and to what degree, a student meets the identified learning goal[a] based on the success criteria[b].

[e]**Responsive Action** is what teachers do, based on evidence[c], with the intention of moving student learning forward.

Note on interactions and activities to consider when rating items: Observers may encounter classrooms where multiple instructional personnel are working with students simultaneously. For example, there may be co-teachers or an intern and a classroom teacher rotating small groups of students between them. Alternatively, a paraprofessional may be in the classroom working with students requiring extra practice with skills and more one-on-one attention. Or a specialist may be in the classroom working with only a select group of students requiring special services. In all of these cases, the observer will have to make a judgment on what interactions to consider when rating protocol items. We assume that the instructional practices within the classroom are generally under the classroom teacher's influence. Accordingly, interns or paraprofessionals are operating under the aegis of the classroom teacher; correspondingly, intern and paraprofessional practices may be considered in the ratings. As a general rule, weight ratings toward those interactions that are *broadly* applicable to what students in that classroom experience. Thus, in the case of a specialist working with only one or a few select students, those interactions may receive very little or no weight. In the case of a paraprofessional, his or her practices might be considered in the rating, but maybe not to the same degree as the classroom teacher's practices. In the case of the intern and classroom teacher, their respective interactions might receive near equal weight with a slight emphasis placed where the primacy of instruction appears to be occurring.

Similarly, the teacher might strategically use classroom centers as places to give students practice at the appropriate level of cognitive complexity or to facilitate peer- and self-assessment. Accordingly, student activity occurring at classroom centers may be considered when rating protocol items. At the observer's discretion, ratings may be weighted toward those activities that are *broadly* applicable to what students in that classroom experience.

Directions: Indicate rating by circling numeral 4, 3, 2, 1, or 0 for each item. For any item rated as N/A , provide the reason in the Comment section at the end of the score sheet. See Training Manual for definitions and rubrics.

Note on the rating scale: The intent of this observation instrument is to be descriptive, not evaluative. That is, a rating of high or low values should not be construed as indicative of good or bad instructional practice. Rather a high rating should indicate the clarity or frequency with which a practice is demonstrated, sparing any judgment that it is good or bad for that practice to have been demonstrated clearly or frequently.

When an observer is rating the clarity or consistency with which a teacher's practice is indicative of the practice described in each item, the observer may at times need to consider the ratio of demonstration-relative-to-opportunities-for-demonstration. For example, rating Item 19 (Teacher feedback turns learner mistakes into learning opportunities) would involve rating the consistency/frequency with which the teacher capitalized on learner mistakes; however, given a scenario where few learner mistakes are made, the teacher would have few opportunities to demonstrate this practice. Thus, observer should consider which what consistency/frequency did the teacher demonstrate this practice given the opportunities to have done so. That said, for other items, such as Item 8 (Teacher observes students in the practice of doing mathematics and listens to their mathematics conversations), the onus is on the teacher to create such opportunities, which the rubric notes and rating descriptions will reflect. For example, the observer might give Item 8 a rating of 0 (Teacher does not engage students in tasks that elicit conversations about mathematics.).

When an observer is considering giving a rating of 4 for an item, a question he or she might consider is, is this exemplary of the practice described in the item. If the observer cannot say comfortably, yes, this is exemplary of the practice described in the item, then the observer might consider if the rubric's description for a 3 adequately describes the classroom practice being rated. Before rating an item as N/A (Not Applicable), refer to the item's rubric and verify that a rating of 0 would not be suitable.

The phrase, "A factor possibly contributing to a high [or low] rating," used throughout the annotation is intended to illustrate practices that may indicate a high (i.e., rating of 4 or 3) or low (i.e., rating of 2, 1, or 0) rating, but should not be interpreted as deterministic of a high or low rating. Thus, they reference what are likely sufficient, but not necessary, conditions for giving a high or low rating.

Observers are encouraged to use the full range of the scale, as appropriate. By so doing, the observer can minimize the occurrence of **Leniency bias** (rating all teachers as higher than their demonstrated practice warrants/avoiding giving low ratings); **Severity bias** (rating all teachers as lower than their demonstrated practice warrants/avoiding giving high ratings); and **Central tendency bias** (treating all teachers as equal by rating all teachers in the middle of the scale/avoiding giving high and low ratings). The observer should avoid unwarranted spillover across items, such as occurs with **Halo bias** (allowing a very high rating on one item to influence the ratings on other items to be higher than is warranted); and **Horns bias** (allowing a very low rating on one item to influence the ratings on other items to be lower than is warranted). The observer should avoid inter-teacher comparisons, as occurs with **Contrast bias** (rating a teacher in comparison to other teachers, rather than the rubrics).

Clarifying and sharing learning intentions and criteria for success

1. Teacher communicates *learning goal*(s) to students. **4 3 2 1 0 N/A**

Rubric 1: Communicates Learning Goal	
Note on High Rating	A factor possibly contributing to a high rating on this item is the learning goal[a] is clearly explained and written in language students can clearly understand. Rating of communication clarity should not be based solely on what is communicated at the outset of the lesson, but should allow for the teacher to roll-out the explanation of learning goal(s)[a] as the lesson progresses.
4	Learning goal[a] is clearly explained to students.
3	Learning goal[a] is mostly explained to students.
2	Learning goal[a] is somewhat explained to students.
1	Learning goal[a] is not communicated to the students (neither verbally stated nor in writing).
0	There does not appear to be a mathematics learning goal[a] intended for the activity.
Note on Low Rating	A factor possibly contributing to a low rating on this item is the learning goal[a] is not written, even though it clearly would be appropriate to do so with these students (e.g., are of reading age, without visual impairment).

2. Teacher communicates *success criteria* to students. **4 3 2 1 0 N/A**

Rubric 2: Communicates Success Criteria	
Note on High Rating	A factor possibly contributing to a high rating on this item is the success criteria[b] are clearly explained and written in language students can clearly understand. Rating of communication clarity should not be based solely on what is communicated at the outset of the lesson, but should allow for the teacher to roll-out the explanation of success criteria[b] as the lesson progresses.
4	Success criteria[b] are clearly explained to students.
3	Success criteria[b] are mostly explained to students.
2	Success criteria[b] are somewhat explained to students.
1	Success criteria[b] are not communicated to the students (neither verbally stated nor in writing).
0	There do not appear to be mathematics success criteria[b] that the teacher is looking for.
Note on Low Rating	A factor possibly contributing to a low rating on this item is the success criteria[b] are not written, even though it clearly would be appropriate to do so with these students (e.g., are of reading age, without visual impairment).

Note on subsequent items that reference the learning goal[a] and success criteria[b]: If the learning goal(s)[a] or success criteria[b] are not explicitly stated (i.e., only vaguely, or not at all, explained), the observer may use his or her inferred understanding of the learning goal[a] or success criteria[b] in order to rate subsequent item that reference learning goal(s)[a] or success criteria[b]. For example, an observer may determine that success criteria[b] are clearly and effectively aligned to learning goal(s)[a] (viz., Item 4, Rating of 4) even if a rating of 1 was given for Items 1 and 2. That is, the observer is able to infer the learning goal[a] or success criteria[b] (even though they were not communicated) when rating their alignment. However, if the observer gives a rating of 0 to Items 1 or 2 (i.e., determines that were no learning goal(s)[a] or success criteria[b] related to mathematics), then subsequent items that reference learning goal(s)[a] or success criteria[b] should also receive a rating of 0.

3. Teacher refers to *success criteria* during the lesson. **4 3 2 1 0 N/A**

Rubric 3: Frequently refers to Success Criteria	
Note on High Rating	A factor possibly contributing to a high rating on this item is the success criteria[b] are emphasized as clear benchmarks by which the teacher expects students to continually check their progress against and strive toward demonstrating.
4	Success criteria[b] are consistently referred to during the course of the lesson
3	Success criteria[b] are frequently referred to during the course of the lesson.
2	Success criteria[b] are sometimes referred to during the course of the lesson.
1	Success criteria[b] are not referenced during the course of the lesson.
0	There do not appear to be mathematics success criteria[b] that the teacher is looking for.

4. *Success criteria* are aligned to *learning goal*(s). **4 3 2 1 0 N/A**

Rubric 4: Success Criteria/Learning Goal-Alignment	
Note on High Rating	A factor possibly contributing to a high rating on this item is the student demonstration of success criteria[b] represents certain progress toward achieving the expressed learning goals[a].
4	Success criteria[b] are clearly and effectively aligned to learning goal(s)[a].
3	Success criteria[b] are mostly aligned to learning goal(s)[a].
2	Success criteria[b] are vaguely aligned to learning goal(s)[a].
1	There is no alignment between success criteria[b] and learning goal(s)[a].
0	There does not appear to be a mathematics learning goal[a] intended for the activity or there do not appear to be mathematics success criteria[b] that the teacher is looking for.

5. *Success criteria* relate to what students will say, do, make or write to show *evidence* of learning. **4 3 2 1 0 N/A**

Rubric 5: Success Criteria Show Evidence of Learning	
Note on High Rating	A factor possibly contributing to a high rating on this item is the success criteria[b] clearly and effectively reflect ways for students to indicate their current learning status in relation to the learning goal[a]. In order for success criteria[b] to be clear benchmarks by which the teacher can check their progress against, they need to be specific, with their connection to the learning goal[a] being generally self-evident. Thus, useful and helpful success criteria[b] are user-friendly for the students and unambiguous in how they are used and interpreted.
4	Success criteria[b] clearly and effectively relate to what students will say, do, make or write to show evidence[c] of learning.
3	Success criteria[b] mostly relate to what students will say, do, make or write to show evidence[c] of learning.
2	Success criteria[b] somewhat relate to what students will say, do, make or write to show evidence[c] of learning.
1	Success criteria[b] do not relate to what students will say, do, make or write to show evidence[c] of learning.
0	There does not appear to be a mathematics learning goal[a] intended for the activity or there do not appear to be mathematics success criteria[b] that the teacher was looking for.

6. The enacted lesson aligns with the *learning goal*(s). **4 3 2 1 0 N/A**

Rubric 6: Enacted Lesson/Learning Goal-Alignment	
Note on High Rating	A factor possibly contributing to a high rating on this item is the student demonstration of productive engagement with the activities and content involved in the lesson will result in certain progress toward achieving the expressed learning goal(s)[a].
4	Lesson is clearly and effectively aligned to learning goal(s)[a].
3	Lesson is mostly aligned to learning goal(s)[a].
2	Lesson is vaguely aligned to learning goal(s)[a].
1	There is no alignment between the enacted lesson and learning goal(s)[a].
0	There does not appear to be a mathematics learning goal[a] intended for the activity.

Engineering classroom discussion and tasks that elicit evidence of learning

7. Teacher presents tasks that promote student mathematical analysis. **4 3 2 1 0 N/A**

Rubric 7: Mathematical Analysis	
Note on High Rating	A factor possibly contributing to a high rating on this item is the use of tasks or learning activities that require searching for mathematical patterns, making mathematical conjectures, and justifying those conjectures. Tasks or learning activities that promote high levels of use of mathematical analysis may also require organizing, synthesizing, evaluating, speculating, arguing, hypothesizing, describing patterns, making models or simulations, and inventing original procedures. The teacher may support student mathematical analysis by providing the opportunity for students to use appropriate mathematical tools (e.g., calculators, pattern block, fraction strips, counters, virtual tools) that enable the students to represent abstract mathematical ideas. High levels of tools involve students' use of the tools to investigate concepts, solve problems, and making connections between the tools and the mathematical concepts.
4	Tasks consistently promote mathematical analysis.
3	Tasks frequently promote mathematical analysis.
2	Tasks sometimes promote mathematical analysis.
1	Tasks do not promote mathematical analysis.
0	There do not appear to be any mathematics involved in what students were doing.
Note on Low Rating	A factor possibly contributing to a low rating on this item is, even though the task or learning activity had the potential to provoke mathematical analysis, the students did not (or only moderately) demonstrated behaviors indicative of mathematical analysis. Thus, this item is to be rated according to the task's or learning activity's ability to effectively promote the exercise of mathematical analysis—not merely if it had the potential to get students to exercise these behaviors.

8. Teacher observes students in the practice of doing mathematics and listens to their mathematics conversations. **4 3 2 1 0 N/A**

Rubric 8: Listening to Mathematics Conversations	
Note on High Rating	A factor possibly contributing to a high rating on this item is the use of tasks or learning activities that prompt rich conversations about mathematics, where students talk through their process of searching for mathematical patterns, making mathematical conjectures, and justifying those conjectures. The teacher then appears to use these conversations as a window through which to gather evidence[c] on students' thinking and understanding of the mathematics. This may include the taking of written notes by the teacher; however it may still be apparent that the teacher is listening intently and gathering evidence even without making written records.
4	Teacher consistently engages students in tasks that elicit conversations about mathematics and listens intently.
3	Teacher frequently engages students in tasks that elicit conversations about mathematics and listens intently.
2	Teacher sometimes engages students in tasks that elicit conversations about mathematics and listens intently.

1	Teacher engages students in tasks that elicit conversations about mathematics but does not listen intently.
0	Teacher does not engage students in tasks that elicit conversations about mathematics.

9. Teacher poses problems and prompts students to share their thinking about the mathematics and how they are approaching the problem. **4 3 2 1 0 N/A**

Rubric 9: Prompts Students to Share their Thinking	
Note on High Rating	A factor possibly contributing to a high rating on this item is the problems posed and questions asked provide opportunities for students to reveal details about their thinking that indicate their current learning status in relation to the learning goal[a].
4	Teacher consistently poses problems and prompts students to share their thinking about the mathematics and how they are approaching the problem.
3	Teacher frequently poses problems and prompts students to share their thinking about the mathematics and how they are approaching the problem.
2	Teacher sometimes poses problems and prompts students to share their thinking about the mathematics and how they are approaching the problem.
1	Teacher does not pose problems and prompts students to share their thinking about the mathematics and how they are approaching the problem.
0	There does not appear to be any mathematics tasks or problems presented to students for them to respond to or attempt to solve.

10. Teacher uses wait-time to provide adequate time for cognitive processing. **4 3 2 1 0 N/A**

Rubric 10: Wait-time	
Note on High Rating	A factor possibly contributing to a high rating on this item is that it is clear that the teacher is attempting to provide adequate time for cognitive processing by consciously managing the duration of pauses after solicitations and providing regular intervals of silence during explanations (Tobin, 1987). Also, teacher adjusts the amount of time in accordance with the level of cognitive complexity of the given prompt (i.e., high complexity prompts are followed by longer pauses than low complexity prompts).
4	Teacher consistently waits 3 to 5 seconds for a student to begin responding to a teacher-posed question.
3	Teacher frequently waits 3 to 5 seconds for a student to begin responding to a teacher-posed question.
2	Teacher sometimes waits 3 to 5 seconds for a student to begin responding to a teacher-posed question.
1	Teacher does not wait 3 to 5 seconds for a student to begin responding to a teacher-posed question.

0	Teacher does not give students prompts that require a verbal, graphical (e.g., writing, drawing), or physical (e.g., hand-gesture, use of manipulative) response related to mathematics.
Note on Low Rating	A factor possibly contributing to a low rating on this item is that the teacher allows students to respond immediately, rather than insisting that they think about the question and their response for a few seconds before responding.

11. Teacher follows up student responses by eliciting student explanations and reasoning. **4 3 2 1 0 N/A**

Rubric 11: Follow up to Elicit Student Explanations and Reasoning	
Note on High Rating	The focus of this item is on the teacher-follow-up aspect of triadic (Initiate-Respond-Follow-up) discourse (Lemke, 1990), where the teacher's follow-up to the student's response is designed to generate data in relation to the success criteria[b] and evoke evidence[c] that provides a level of detail that can generally inform responsive action[e]. High level teacher follow-up typically consists of specific questions that effectively prompt students to provide explanations that focus on conceptual understanding of the topic, rather than merely the procedural steps undertaken. According to Franke et al. (2009), specific questions "prompt the students to elaborate a particular aspect of their initial explanations; clarify ambiguous, incomplete, or incorrect parts of explanations; or consider other important elements of the problem. A factor possibly contributing to a high rating on this item is the teacher strategic use of probing sequences of specific questions. As found in Franke et al.'s (2007) observation of discourse in elementary mathematics classrooms, probing sequences provided students with multiple opportunities to express their thinking and provided teachers with multiple opportunities to hear student thinking. Students had an opportunity (through the feedback given by the teacher) to see how their explanations were interpreted and used by the teacher. The students then had the opportunity to adjust their explanations, by changing their language, highlighting a key idea, or clarifying a previously confusing statement. (p. 27)
4	Teacher consistently follows up student responses by eliciting student explanations and reasoning.
3	Teacher frequently follows up student responses by eliciting student explanations and reasoning.
2	Teacher sometimes follows up student responses by eliciting student explanations and reasoning.
1	Teacher does not follow up student responses by eliciting student explanations and reasoning.
0	There does not appear to be any mathematics tasks or problems presented to students for them to respond to or attempt to solve.
Note on Low Rating	A factor possibly contributing to a low rating on this item is that the teacher's follow-up is not persistent enough to reveal details of student's understanding that the teacher can use to determine whether, and to what degree, a student meets the identified learning goal[a]. Triadic discourse, such as Initiate-Respond-Evaluate (IRE), does not constitute the kind of follow-up targeted in this item; discourse consisting exclusively of IRE would be rated 0 for this item.

12. Teacher ensures that the student understands the problem. **4 3 2 1 0 N/A**

Rubric 12: Student Understanding of the Problem	
Note on High Rating	The intent of this item is to rate the extent to which the teacher seeks to determine if incorrect student responses are the result of their misunderstanding of the task or problem and makes adjustments to correct the misunderstanding if one is identified. Associated instructional practices include the following: teacher follows up incorrect student responses by a) asking the student to explain problems in his or her own words, b) asking the student to explain what he or she knows about the problem, c) rephrasing or elaborating the problem, and d) using a more familiar or personalized context in the problem. Teachers may provide some of these supports even before an incorrect student response is given, providing extra supports based on what he or she already knows about the student.
4	Teacher consistently ensures that the student understands the problem.
3	Teacher frequently ensures that the student understands the problem.
2	Teacher sometimes ensures that the student understands the problem.
1	Teacher does not ensure that the student understands the problem.
0	There are no mathematics tasks or problems presented to students that prompt their response.

13. Teacher explores what the student has already done. **4 3 2 1 0 N/A**

Rubric 13: What the Student has Already Done	
Note on High Rating	The intent of this item is to rate the extent to which the teacher follows up incorrect student responses by eliciting student thinking on the task or problem in order to inform the teacher choice of responsive action[e]. Associated instructional practices include the following: a) asking the student to explain a partial or incorrect reasoning, strategy, or algorithm or b) asking specific questions to explore how what the student has already done relates to the quantities and relationships in the problem, such as "Can you tell me how you solved it" or "What did you do first?" (follow-up questions should include asking about the details of a child's reasoning, strategy, or algorithm). Teachers may ask some of these questions even before an incorrect student response is given, closely monitoring students for whom the teachers already knows extra support will likely be needed.
4	Teacher consistently explores what the student has already done.
3	Teacher frequently explores what the student has already done.
2	Teacher sometimes explores what the student has already done.
1	Teacher does not explore what the student has already done.
0	There are no mathematics tasks or problems presented to students that prompt their response.

14. Teacher uses revoicing strategies. **4 3 2 1 0 N/A**

Rubric 14: Revoicing	
Note on High Rating	Revoicing strategies include repeating, rephrasing, summarizing, elaborating, or translating students' utterances; revoicing may include non-verbal representations. A factor possibly contributing to a high rating on this item is that the teacher's use of revoicing allows the listener to reframe the speaker's utterance in a way that can be evaluated by the original speaker as well as by other listeners. In this way, listeners can try to clarify a speaker's utterance by articulating presupposed information, by substituting technical vocabulary for less precise linguistic items, or by further explicating the speaker's intentions. (Forman & Ansell, 2002, pp. 258-259)
4	Teacher consistently uses revoicing strategies.
3	Teacher frequently uses revoicing strategies.
2	Teacher sometimes uses revoicing strategies.
1	Teacher does not uses revoicing strategies.
0	There does not appear to be any mathematics tasks or problems presented to students for them to respond to or attempt to solve.
Note on Low Rating	A factor possibly contributing to a low rating on this item is that the teacher rarely, if ever, uses revoicing strategies beyond repeating students' utterances. Moreover, the sophistication of the revoicing strategies employed should also be taken into consideration; consistently restating student's utterances would not constitute a high rating on this item.

Providing feedback that moves learners forward

15. Teacher feedback provides suggestions to students about what they can do to progress from their current learning status toward the desired *learning goal*. **4 3 2 1 0 N/A**

Rubric 15: Feedback Provides Suggestions	
Note on High Rating	A factor possibly contributing to a high rating on this item is the teacher's use of elaborated feedback, which relates to the provision of an explanation about why a specific response was correct or not and may allow the learner to review part of the instructions. In order for feedback to be considered "elaborated," it must do more than verify correct responses or locate mistakes; elaborated feedback typically provides clues, hints, or suggestions to students about what they can do to progress from their current learning status toward the desired learning goal[a] and may reference success criteria[b] as benchmarks against which students can check their progress and strive toward demonstrating.
4	Teacher consistently provides suggestions to students about what they can do to progress from their current learning status toward the desired learning goal[a].
3	Teacher frequently provides suggestions to students about what they can do to progress from their current learning status toward the desired learning goal[a].
2	Teacher sometimes provides suggestions to students about what they can do to progress from their current learning status toward the desired learning goal[a].

1	Teacher does not provide suggestions to students about what they can do to progress from their current learning status toward the desired learning goal[a].
0	Teacher does not provide feedback to students about their mathematics or there does not appear to be a mathematics learning goal[a].
Note on Low Rating	A factor possibly contributing to a low rating on this item is that the teacher rarely, if ever, provides feedback that is more elaborated than the verification of correct response or location of mistake. Moreover, the helpfulness of the feedback and potential for the suggestions to move student learning forward should also be taken into consideration when rating this item.

16. Teacher feedback is limited to manageable units. **4 3 2 1 0 N/A**

Rubric 16: Feedback Limited to Manageable Units	
Note on High Rating	A factor possibly contributing to a high rating on this item is the teacher employs a stepwise presentation of feedback that offers the possibility to control for mistakes and gives learners sufficient information to correct errors on their own. The intent of this item is to answer the question: When the teacher gives feedback, a) does the feedback provide explanations and/or suggestions and b) are these explanation/suggestions in small enough pieces so that it is not overwhelming to the student? For an observer to determine for Item 14 that "Teacher feedback generally provides explanations and/or suggestions," the observer needed to have given a rating of 2 (i.e., sometimes provides suggestions) or higher for Item 13.
4	Teacher feedback generally provides explanations and/or suggestions and is consistently in small enough pieces so that it is not overwhelming to the student.
3	Teacher feedback generally provides explanations and/or suggestions and is frequently in small enough pieces so that it is not overwhelming to the student.
2	Teacher feedback generally provides explanations and/or suggestions and is sometimes in small enough pieces so that it is not overwhelming to the student.
1	Teacher feedback generally provides explanations and/or suggestions but is not in small enough pieces so that it is not overwhelming to the student.
0	Teacher feedback generally does not provide explanations and/or suggestions related to mathematics or teacher does not provide feedback to students about their mathematics.

17. Teacher feedback attends to details in the student's reasoning, strategy, or algorithm. **4 3 2 1 0 N/A**

Rubric 17: Feedback Attends to Details	
4	Teacher feedback consistently addresses specific features of the students' work in relation to the task.
3	Teacher feedback mostly addresses specific features of the students' work in relation to the task.
2	Teacher feedback vaguely addresses specific features of the students' work in relation to the task.
1	Teacher feedback does not address specific features of the students' work in relation to the task.
0	Teacher does not provide feedback to students about their mathematics.

Note on Low Rating	A factor possibly contributing to a low rating on this item is the exclusive (or near exclusive) use of praise as feedback, which may direct the student's attention to the "self" and away from the task and consequently away from learning.

18. Teacher feedback to students emphasizes effort. **4 3 2 1 0 N/A**

Rubric 18: Feedback Emphasizes Effort	
Note on High Rating	A factor possibly contributing to a high rating on this item is the teacher's explicit emphasis on effort and practice over talent and innate ability; whereby, the celebration of performance is secondary to the celebration of learning. Teacher feedback that emphasizes effort conveys that a) ability and skill can be developed through practice, b) effort is critical to increasing skill, and c) mistakes are part of the skill acquisition process. Moreover, teacher feedback that emphasizes effort tends to follow an incremental motivational framework. The table below (adapted from Blackwell, Trzesniewski, & Dweck, 2007) summarizes the response in the face of setbacks associated with an incremental framework, contrasted with the associated response of a fixed-ability framework: <u>Incremental framework (effort-based)</u> • Feedback focuses more on learning goals (goals aimed at increasing ability) • Feedback promotes mastery oriented strategies (effort escalating or strategy change) <u>Fixed-ability framework (entity-based)</u> • Feedback focus more on performance goals (goals aimed at documenting ability) • Feedback promotes helpless strategies (effort withdrawal or strategy perseveration)
4	Teacher feedback to students <u>consistently</u> emphasizes effort.
3	Teacher feedback to students <u>frequently</u> emphasizes effort.
2	Teacher feedback to students <u>sometimes</u> emphasizes effort.
1	Teacher feedback to students <u>does not</u> emphasize effort.
0	Teacher <u>does not</u> provide feedback to students about their mathematics.
Note on Low Rating	A factor possibly contributing to a low rating on this item is the use of feedback that aligns with a fixed-ability framework—the most likely of which to be observed being a focus on performance rather than learning. Moreover, to the extent that the feedback to students predominantly emphasizes and solely values getting the correct answer—and very little of the feedback emphasizes what students have learned throughout the course of the lesson and the progress they have made as a result of their focus and hard work—this item would be rated down. Remarks that may indicate that feedback fits within a fixed-ability, rather than an incremental) framework, are remarks that celebrate correct answers—noting how smart the students are, rather than celebrating how hard they have worked or how much they have learned.

19. Teacher feedback turns learner mistakes into learning opportunities. **4 3 2 1 0 N/A**

Rubric 19: Feedback turns Learner Mistakes into Learning Opportunities	
Note on High Rating	A factor possibly contributing to a high rating on this item is teacher feedback attends to how students solve problems even when an incorrect response is given. Accordingly, teachers approach incorrect student responses with curiosity, not disappointment. In this way, incorrect student responses are handled by the teacher, not as dead ends, but as opportunities for students to examine the nature of their errors in order to deepen their understanding of the given concept. It should be recognized that what is here termed "mistakes" may include the explorations undertaken in the discovery process. Thus, when rating this item, learner mistakes may include perfectly appropriate (and possibly beneficial) student explorations of mathematics. The practice of interest for this item, however, is to what extent the teacher quickly a) redirects the student without promoting reflection (indicative of a low rating); or b) encourages the student to examine what the student just did and engenders insight into why/how the student's reasoning, strategy, or algorithm was in error in order to deepen understanding (indicative of a high rating).
4	Teacher feedback consistently includes the use of discussion prompts or questions that guide students to examine the nature of their errors in order to deepen their understanding of the given concept.
3	Teacher feedback frequently includes the use of discussion prompts or questions that guide students to examine the nature of their errors in order to deepen their understanding of the given concept.
2	Teacher feedback sometimes includes the use of discussion prompts or questions that guide students to examine the nature of their errors in order to deepen their understanding of the given concept.
1	Teacher feedback does not include the use of discussion prompts or questions that guide students to examine the nature of their errors in order to deepen their understanding of the given concept.
0	Teacher does not provide feedback to students about their mathematics.

20. Teacher reminds the student to use other strategies. **4 3 2 1 0 N/A**

Rubric 20: Use other Strategies	
Note on High Rating	The intent of this item is to rate the extent to which the teacher follows up incorrect student responses by prompting the student to apply a different strategy or approach to the task or problem. Associated instructional practices include the following: a) asking the student to consider using a different tool, b) asking the student to consider using a different strategy, or c) reminding the student of relevant strategies he or she has used before. Teachers may provide some of these suggestions even before an incorrect student response is given, providing extra supports based on what he or she already knows about the student.
4	Teacher consistently reminds the student to use other strategies.
3	Teacher frequently reminds the student to use other strategies.
2	Teacher sometimes reminds the student to use other strategies.
1	Teacher does not remind the student to use other strategies.

0	There <u>are no</u> mathematics tasks or problems presented to students that prompt their response.

21. Teacher feedback is presented in more than one modality (e.g., text, visual/graphic, verbal). **4 3 2 1 0 N/A**

Rubric 21: Feedback in more than one Modality	
Note on High Rating	For this item, it might be useful for the observer to discriminate between teacher instruction and teacher feedback: To be feedback, it must constitute responsive action[e], on the part of the teacher, that is formed based on an evidence-based determination of student current understanding and crafted to move student learning forward. Accordingly, A factor possibly contributing to a high rating on this item is the teacher's apparently deliberate selection (or change) of modality, based on what appears most appropriate, given the particulars of the student response to which the feedback is directed.
4	Teacher <u>regularly</u> varies the modality of feedback as appropriate <u>and</u> utilizes an array of modalities to deliver feedback.
3	Teacher <u>regularly</u> varies the modality of feedback as appropriate, though is somewhat limited in the modalities employed (e.g., uses written text/numerals and verbal modalities, but never uses graphics/illustrations or manipulatives to model concepts in the delivery of feedback).
2	Teacher <u>somewhat</u> varies the modality of feedback.
1	Teacher <u>never</u> varies the modality of feedback.
0	Teacher <u>does not</u> provide feedback to students about their mathematics.
Note on Low Rating	A factor possibly contributing to a low rating on this item is the teacher does not alternate between modality of feedback, even though it is clear that it would be appropriate and likely beneficial to the student if the teacher were to do so.

Activating students as instructional resources for one another

22. Teacher facilitates the sharing of students' thinking to contribute to group talk and help peers. **4 3 2 1 0 N/A**

Rubric 22: Sharing of Student Thinking	
Note on High Rating	A factor possibly contributing to a high rating on this item is the teacher encourages students to publicly expound upon their understanding of the mathematics of a given task or problem, which the teacher then uses to leverage the understanding of other students. It is clear that the teacher is putting forward an exhibit of student thinking for the other students to consider and with which the other students are to reconcile their own understanding. In this way, the teacher facilitates conversations on mathematics, whereby artifacts (e.g., worked problem, drawing, manipulatives) and ideas shared by students are available as tools for other students to solidify or advance their understanding of mathematics pertaining to the task. Further, the teacher may facilitate this process by connecting students' contributions to each other and showing how ideas/positions shared during the discussion relate to each other. A high rating may still be given on this item, if this process of sharing and student-to-student helping occurs with minimal intervention on the part of the teacher. That is, it counts as facilitation if the teacher provides the opportunity and the students respond productively.
4	Teacher consistently facilitates the sharing of students' thinking to contribute to group talk and help peers.
3	Teacher frequently facilitates the sharing of students' thinking to contribute to group talk and help peers.
2	Teacher sometimes facilitates the sharing of students' thinking to contribute to group talk and help peers.
1	Teacher does not facilitate the sharing of students' thinking to contribute to group talk and help peers.
0	There is no student-to-student talk about mathematics.

23. Teacher provides opportunities for students to explain their thinking to other students and think about other students' reasoning, strategies, or algorithms. **4 3 2 1 0 N/A**

Rubric 23: Opportunity to Explain Thinking and Think about Other's Thinking	
Note on High Rating	Providing an opportunity for mathematics discourse means giving students time to explain their mathematical thinking to one another and to think about one another thinking. To the extent that students do not engage in productive discussion during this time, the teacher will provide structure and guidance as necessary.
4	Teacher consistently provides opportunities for students to explain their thinking to other students and think about other students' reasoning, strategies, or algorithms.
3	Teacher frequently provides opportunities for students to explain their thinking to other students and think about other students' reasoning, strategies, or algorithms.
2	Teacher sometimes provides opportunities for students to explain their thinking to other students and think about other students' reasoning, strategies, or algorithms.

1	Teacher does not provide opportunities for students to explain their thinking to other students and think about other students' reasoning, strategies, or algorithms.
0	There is no student-to-student talk about mathematics.
Note on Low Rating	A factor possibly contributing to a low rating on this item is the teacher provides time for student-to-student discussion on mathematics, but does not provide (or provides only minimal) structure and guidance, when it is apparent that considerable structure and guidance is needed for students to engage in productive discussion.

24. Teacher provides opportunities for students to give elaborated peer feedback. **4 3 2 1 0 N/A**

Rubric 24: Opportunity for Students to give Elaborated Peer Feedback	
Note on High Rating	A factor possibly contributing to a high rating on this item is that it is clear that the teacher facilitates the exchange of elaborate peer feedback among students as an integral part of the teacher's design for learning. In order for peer feedback to be considered "elaborated," it must do more than verify correct responses or locate mistakes; elaborated feedback typically provides suggestions to peers about what they can do to move their learning forward. To the extent that students do not provide feedback to their peers that is elaborated enough to be helpful to the recipient, the teacher will provide structure and guidance as necessary. High quality elaborated peer feedback will make reference to the success criteria[b], which, students are apparently checking their progress against and striving to demonstrate.
4	Teacher consistently provides opportunities for students to give elaborated peer feedback.
3	Teacher frequently provides opportunities for students to give elaborated peer feedback.
2	Teacher sometimes provides opportunities for students to give elaborated peer feedback.
1	Teacher does not provide opportunities for students to give elaborated peer feedback.
0	There is no student-to-student talk about mathematics.
Note on Low Rating	A factor possibly contributing to a low rating on this item is the teacher provides time for student-to-student discussion on mathematics, but does not provide (or provides only minimal) structure and guidance, when it is apparent that considerable structure and guidance is needed for students to provide feedback that is elaborated and includes suggestions to peers about what they can do to move their learning forward.

25. Teacher provides opportunities for students to use peer feedback to improve their learning. **4 3 2 1 0 N/A**

Rubric 25: Opportunity for Students to use Peer Feedback	
Note on High Rating	A factor possibly contributing to a high rating on this item is that it is clear that the teacher facilitates the use of peer feedback by students as an integral part of the teacher's design for learning. To the extent that students do not appear to know how to make use of peer feedback to improve their learning, the teacher will provide structure and guidance as necessary.
4	Teacher consistently provides opportunities for students to use peer feedback to improve their learning.

3	Teacher frequently provides opportunities for students to use peer feedback to improve their learning.
2	Teacher sometimes provides opportunities for students to use peer feedback to improve their learning.
1	Teacher does not provide opportunities for students to use peer feedback to improve their learning.
0	There is no peer feedback exchanged between students about mathematics.
Note on Low Rating	A factor possibly contributing to a low rating on this item is the teacher provides time for student-to-student discussion on mathematics, but does not provide (or provides only minimal) structure and guidance, when it is apparent that considerable structure and guidance is needed for students to use peer feedback that was given with the intent to move their learning forward. Using peer feedback means more than receiving it. Thus, to the extent to which the teacher does not provide students with the time to consider, make adjustments, and apply peer feedback, this item would be rated down.

26. Students' contributions link to and build on each other. **4 3 2 1 0 N/A**

Rubric 26: Student Contributions Link to and Build on Each Other	
Note on High Rating	A factor possibly contributing to a high rating on this item is the discussion of mathematics involves sharing ideas where students explain themselves or ask one another questions in complete sentences and respond directly to the previous speakers' comments. The dialogue builds coherently on participants' ideas to promote improved, shared understandings of mathematics pertaining to the task or problem. When this is working well, students connect their contributions to each other and show how ideas/positions shared during the discussion relate to each other. Further, students will use their shared understanding of mathematics achieved through group (or student-to-student paired) discussion to generalize mathematical relationships, properties, formulas, or procedures—rather than the teacher determining the validity of answers, strategies or ideas. Discourse patterns where this occurs often involve students engaged in active communication with one another about mathematics, where clear progress is made in furthering their understanding of the problem or concept through their exploration and exchanging of ideas—even without any (or minimal) intervening or moderating by the teacher.
4	Students' contributions consistently link to and build on each other.
3	Students' contributions mostly link to and build on each other.
2	Students' contributions somewhat link to and build on each other.
1	Students' contributions do not link to and build on each other.
0	There is no student-to-student talk about mathematics.

Activating students as the owners of their own learning

27. Teacher provides a system that encourages students to monitor their own learning in relation to the *learning goal*. **4 3 2 1 0 N/A**

Rubric 27: System for Student Self-Monitoring	
Note on High Rating	The intent of this item is to rate the degree to which the teacher provides students with tools, guides, routines, and structures that support their meta-cognitive activity in relation to the learning goal[a]. For rating this item, the observer should ask him or herself, to what extent does the teacher a) incorporate student self-monitoring within his or her design for learning; b) provide students the tools and guides to successfully monitor their own learning in relation to the learning goal[a]; and c) support students with the time, structure, and routines that reinforce their meta-cognitive activity regarding their current status in relation to the learning goal[a]. Clear and specific success criteria[b] and consistent reinforcement on how students are to use success criteria[b] as benchmarks against which they can gauge their progress, might be an example of tools and guides provided to the students to support their meta-cognitive activity. Although, having clear success criteria[b] might indicate a system is at least somewhat in place, in order for a system to be considered as generally or clearly in place, the guides for how students are to use the success criteria along with routines that promote their use, also need to present. One such guide might be the teacher's provision of an advanced organizer for the lesson that serves as a visual reference for the students to check their progress against. However, an advanced organizer is not in itself a system; it must provide structure and support to students use of success criteria and be embedded within student routines, in order to rate this item any higher that 2 (i.e., A system is <u>somewhat</u> in place).
4	A system is <u>clearly</u> in place that encourages students to monitor their own learning in relation to the learning goal[a]
3	A system is <u>mostly</u> in place that encourages students to monitor their own learning in relation to the learning goal[a]
2	A system is <u>somewhat</u> in place that encourages students to monitor their own learning in relation to the learning goal[a]
1	A system <u>is not</u> in place that encourages students to monitor their own learning in relation to the learning goal[a]
0	There <u>does not</u> appear to be a mathematics learning goal[a] intended for the activity <u>or</u> there <u>does not</u> appear to be any expectation for students to reflect on their learning in relation to the learning goal[a]
Note on Low Rating	A factor possibly contributing to a low rating on this item is the teacher provides a system for students to monitor their own learning in relation to the learning goal[a], but the system does not provide (or provides only minimal) structure and guidance, when it is apparent that considerable structure and guidance is needed before student can monitor their learning with special attention given to the success criteria[b], against which, the students check their progress and strive to demonstrate.

28. Teacher promotes student reflection on the reasoning, strategy, or algorithm the student just used. **4 3 2 1 0 N/A**

Rubric 28: Promotion of Student Reflection on Reasoning, Strategy, or Algorithm just Used	
Note on High Rating	A factor possibly contributing to a high rating on this item is the teacher guides the student to give close attention to the reasoning, strategy, or algorithm the student used. For example, the teacher might ask the student explain his or her reasoning, strategy, or algorithm or asks the student specific questions to clarify how the details of his or reasoning, strategy, or algorithm are connected to the quantities and mathematical relationships in the problem. This item is to be rated based on the teacher's frequency and tenacity with promoting student reflection, not necessarily on the effectiveness of those efforts in producing what appears to be student reflection.
4	Teacher consistently promotes student reflection on the reasoning, strategy, or algorithm the student just used.
3	Teacher frequently promotes student reflection on the reasoning, strategy, or algorithm the student just used.
2	Teacher sometimes promotes student reflection on the reasoning, strategy, or algorithm the student just used.
1	Teacher does not promote student reflection on the reasoning, strategy, or algorithm the student just used.
0	There does not appear to be any mathematics tasks or problems presented to students for them to respond to or attempt to solve.

29. Students demonstrate productive engagement with mathematics. **4 3 2 1 0 N/A**

Rubric 29: Productive Engagement with Mathematics	
Note on High Rating	A factor possibly contributing to a high rating on this item is that student engagement with the mathematics of the lesson or task is characterized by on-task behavior that signal a serious psychological investment in class work; these include attentiveness, doing the assigned work, and showing enthusiasm for this work by taking initiative to raise questions, contribute to group tasks and helping peers. Productive engagement is characterizes by "hand-on" and "minds-on" active participation. High levels of engagement throughout the class means almost all students (90% or more) are deeply involved, almost all of the time (90% or more), in pursuing the substance of the mathematics lesson or undertaking the mathematics task.
4	Students consistently demonstrate productive engagement with mathematics.
3	Students mostly demonstrate productive engagement with mathematics.
2	Students somewhat demonstrate productive engagement with mathematics.
1	Students do not demonstrate productive engagement with mathematics.
0	There does not appear to be any mathematics tasks or problems presented to students for them to attend to.

30. Students reflect on and monitor their learning in relation to the *learning goal*. **4 3 2 1 0 N/A**

Rubric 30: Student Reflection and Self-Monitoring of Learning	
Note on High Rating	A factor possibly contributing to a high score on this item is students are observed doing more than just pausing and thinking; rather, there is some indication (e.g., cues in what students say, patterns in work activity that suggest the working of things out and revision of thinking) that students reflect on and monitor their learning—particularly, in reference to the success criteria[b]
4	It is clearly apparent that students reflect on and monitor their learning in relation to the learning goal[a].
3	It is mostly apparent that students reflect on and monitor their learning in relation to the learning goal[a].
2	It is somewhat apparent that students reflect on and monitor their learning in relation to the learning goal[a].
1	It is not apparent that students reflect on and monitor their learning in relation to the learning goal[a].
0	There does not appear to be a mathematics learning goal[a] intended for the activity or there does not appear to be any expectation for students to reflect on their learning in relation to the learning goal[a]

Adjusting the instructional plan based on formative assessment results

Support student thinking before a correct answer is given:

31. Teacher provides increased support for students who have the lowest level of knowledge in relation to the *learning goal*. **4 3 2 1 0 N/A**

Rubric 31: More Support for Students who have the Lowest Level of Knowledge	
Note on High Rating	A factor possibly contributing to a high rating on this item is the teacher uses evidence[c] of student understanding to identify those students most challenged by the success criteria[b] and structures the class so that those students receive additional teacher support. Additional support may come in the form of increased structure or time. The teacher's use of small-group grouping strategies is one indicator that this may be happening; however, a high rating on this item should be given only if it is clear that instruction is differentiated across groups and increased scaffolding and/or additional time is afforded to those groups with the lowest level of knowledge in relation to the learning goal[a]. The teacher may also accomplish this by working with students in whole-group and provide increased support to students who have the lowest level of knowledge in relation to the learning goal[a] by providing them enhanced structure or allocating additional teacher time. The teacher may also strategically pair-up a less knowledgeable student with a more knowledgeable peer as a means of increased support.
4	Teacher responsive action[d] includes the provision of clear and effective support to students that are struggling to demonstrate success criteria[b] related to the learning goal[a].

3	Teacher responsive action[d] includes the provision of general support to students that are struggling to demonstrate success criteria[b] related to the learning goal[a].
2	Teacher responsive action[d] includes the provision of limited support to students that are struggling to demonstrate success criteria[b] related to the learning goal[a].
1	Teacher responsive action[d] does not provide support to students that are struggling to demonstrate success criteria[b] related to the learning goal[a].
0	There does not appear to be a mathematics learning goal[a] intended for the activity.

32. Teacher changes the mathematics in the problem to match the student's level of understanding. **4 3 2 1 0 N/A**

Rubric 32: Changes the Mathematics	
Note on High Rating	The intent of this item is to rate the extent to which the teacher follows up incorrect student responses by modifying the mathematical difficulty or complexity of a task or problem in order to provide extra support to students where it appears such modifications might be helpful. Associated instructional practices include the following: a) changing the problem to use easier numbers or b) changing the problem to use an easier mathematical structure. Teachers may provide some of these supports even before an incorrect student response is given, making modifications based on what he or she already knows about the student.
4	Teacher consistently changes the mathematics in the problem to match the student's level of understanding.
3	Teacher frequently changes the mathematics in the problem to match the student's level of understanding.
2	Teacher sometimes changes the mathematics in the problem to match the student's level of understanding.
1	Teacher does not change the mathematics in the problem to match the student's level of understanding.
0	There are no mathematics tasks or problems presented to students that prompt their response.

33. Teacher provides linguistic scaffolding and supports cultural congruence, where appropriate. **4 3 2 1 0 N/A**

Rubric 33: Linguistic Scaffolding and Cultural Congruence	
Note on High Rating	The intent of this item is to rate the extent to which the teacher integrates students' language development and background in math instruction, such as using students' home language as appropriate and communicating at and slightly above students' level of communication to enhance understanding. The teacher may employ linguistic modifications based on elements of the English language that are particularly challenging to ELL students; such elements include, • conditional sentences; • complex sentences; • passive voice; • past tense; • slang or abbreviated words, uncommon terms, idioms, ambiguous words, and unnecessary words with multiple meanings; • hyphenated and compound words; • gerunds; • words that are both nouns and verbs; and • complex sentence structure (Sato, Rabinowitz, Gallagher, & Huang, 2010) The teacher may employ linguistic scaffolding to accommodate students' language development. Instructional practices associated with linguistic scaffolding include, • non-verbal gestures and communication to explain difficult concepts, such as total physical response, modeling, and demonstration; • peer tutoring among students; • transition from concrete to abstract thinking or ideas; • reduction of difficult language to essential vocabulary or to smaller amount of language in meaningful ways; • multiple modes of representation using non-verbal, oral, and written communication; and • use of realia (demonstration of real objects or events). In addition, the teacher may promote cultural congruence by integrating students' cultural background in math instruction. Teacher may promote cultural congruence with their students, by understanding and incorporating the following during instruction: • students' lives at home and in the community; • cultural artifacts and community resources; • culturally relevant examples and analogies; • culturally based interactional patterns; and • culturally based communication patterns. For this item, the term language does not need to be restricted to non-English languages; rather teachers may incorporate linguistic scaffolding for English speaking students who would benefit from the additional support. Furthermore, the term culture does not need to be restricted to ethnicity-based cultures; rather, teachers may incorporate cultural congruence by understanding and integrating the class/SES-based, or even regionally-based, cultures of students in the classroom.

4	Teacher consistently provides linguistic scaffolding and supports cultural congruence, where appropriate.
3	Teacher frequently provides linguistic scaffolding and supports cultural congruence, where appropriate
2	Teacher sometimes provides linguistic scaffolding and supports cultural congruence, where appropriate
1	Teacher does not provides linguistic scaffolding and supports cultural congruence, where appropriate
0	There is no mathematics instruction or mathematics tasks or problems presented to students.
Note on Low Rating and N/A	If the teacher provides no linguistic scaffolding and does not support cultural congruence and there was not a single student for whom linguistic scaffolding or culturally congruent practices would have been appropriate, then this item should be rated N/A. The observer should be asking, of the times that it was appropriate for these practices, with what consistency did the teacher employ them. The observer should understand that the teacher may employ these practices for reasons that are not apparent to the observer. Therefore, if the teacher employs these practices, the observer should assume that it was appropriate to do so. The observer should only rate this item down if it appeared to be appropriate for the employment for these practices and the teacher did not employ them.

Extends student thinking after a correct answer is given:

34. Teacher encourages the student to explore multiple strategies and their connections. **4 3 2 1 0 N/A**

Rubric 34: Multiple Strategies and their Connection	
Note on High Rating	The intent of this item is to rate the extent to which the teacher follows up correct student responses by prompting the student to explore multiple strategies and their connections. Associated instructional practices include the following: a) asking the student to try any second strategy, b) ask the student to try a second strategy connected to his or her initial strategy in deliberate ways (e.g., more efficient counting or abstraction of work with manipulatives), or c) asking the student to compare and contrast strategies. The teacher may support student's exploration of multiple strategies by promoting the use of multiple representations (models, drawings, graphs, symbols, concrete materials, manipulatives, etc.) to illustrate ideas and concepts and guiding the student on how to select, use, and translate among (go back and forth between) mathematical representations in an appropriate manner.
4	Teacher consistently encourages the student to explore multiple strategies and their connections.
3	Teacher frequently encourages the student to explore multiple strategies and their connections.
2	Teacher sometimes encourages the student to explore multiple strategies and their connections.
1	Teacher does not encourage the student to explore multiple strategies and their connections.
0	There are no mathematics tasks or problems presented to students that prompt their response.

35. Teacher connects the student's thinking to symbolic notation. **4 3 2 1 0 N/A**

Rubric 35: Symbolic Notation	
Note on High Rating	The intent of this item is to rate the extent to which the teacher follows up correct student responses by prompting the student to connect his or her thinking to symbolic notation. Associated instructional practices include the following: a) asking the student to write a number sentence that "goes with" the problem or b) asking the student to record his or her reasoning, strategy, or algorithm.
4	Teacher consistently connects the student's thinking to symbolic notation.
3	Teacher frequently connects the student's thinking to symbolic notation.
2	Teacher sometimes connects the student's thinking to symbolic notation.
1	Teacher does not connect the student's thinking to symbolic notation.
0	There are no mathematics tasks or problems presented to students that prompt their response.

36. Teacher generates follow-up problems linked to the problem the student just completed. **4 3 2 1 0 N/A**

Rubric 36: Follow-up Problems	
Note on High Rating	The intent of this item is to rate the extent to which the teacher follows up correct student responses with prompts that advances and deepens the student's understanding of the mathematical topic. Associated instructional practices include the following: a) asking the student to solve the same or a similar problem with numbers that are more challenging or b) ask the student to solve the same or a similar problem with numbers that are strategically selected to promote more sophisticated strategies.
4	Teacher consistently follows-up problems linked to the problem the student just completed.
3	Teacher frequently follows-up problems linked to the problem the student just completed.
2	Teacher sometimes follows-up problems linked to the problem the student just completed.
1	Teacher does not follows-up problems linked to the problem the student just completed.
0	There are no mathematics tasks or problems presented to students that prompt their response.

Implementation of MFAS Tasks and Rubrics

*Circle **Y** (Yes), **N** (No), or **N/A** (Not Applicable)*

Does the teacher record *evidence* of student understanding?	**Y**	**N**	
Is it apparent that one or more MFAS Tasks are used?	**Y**	**N**	
If yes, are the MFAS Tasks used during instruction?	**Y**	**N**	**N/A**
Is it apparent that MFAS Rubrics are used?	**Y**	**N**	
If yes, does it appear that MFAS Rubrics are used to guide instruction?	**Y**	**N**	**N/A**

Implementation of MFAS Tasks and Rubrics: The teacher's recording of evidence may take several forms; the intent of this item is to indicate whether it appears that the teacher is taking notes of any kind on students' ability and understanding in relation to mathematical focus for the lesson or activity. These notes might then be used to inform future instructional decisions. Remaining items in this section is intended to record whether and how MFAS tasks and rubrics are used by the teacher. For each MFAS feature (Tasks and Rubrics), the primary question is intended to determine whether they are being used. Each sub-question is intended to distinguish whether they are used as assessment strategies isolated from instruction or assessment strategies embedded within the teacher's delivery of instruction. In other words, is the implementation of formative assessment best characterized as a *test* or a *process*?

Classroom Context (cont.)

Fill in the blank when prompted
*Circle **Y** (Yes), **N** (No), or **N/A** (Not Applicable)*

Grouping strategies employed:

Whole-group **Y** **N**

Small-group **Y** **N**

If small-group, approximately how many students per group: _____

One-on-one **Y** **N**

If more than one grouping strategy is observed, indicate which one is predominant:

(*circle only one*) Whole-group Small-group One-on-one

Is furniture arranged so that the teacher can work with a small group of students? **Y** **N**

Does the classroom have learning centers/stations? **Y** **N**

If centers/stations are present, are students using them? **Y** **N** **N/A**

Well-established classroom procedures:

Do students appear to know <u>with which materials</u> they are to work? **Y** **N**

Do students appear to know <u>where</u> they are supposed to work? **Y** **N**

Do students appear to know <u>with whom</u> they are supposed to work? **Y** **N**

Do students appear to know <u>how</u> to work with the materials? **Y** **N**

Do students appear to know what to do when they get stuck or have a question? **Y** **N**

Does the teacher use cues or signals understandable to the students <u>and</u> do the students respond accordingly? **Y** **N**

Classroom Context (cont.): This section is intended to record information on strategies, materials, and procedures that can be facilitative of formative assessment. Note: Students working in groups does not necessarily constitute small-group grouping strategy. Likewise, helping students individually does not necessarily constitute one-on-one grouping strategy. Moreover, the teacher walking around the classroom, informally answering questions or interacting with individuals or groups of students as needed, does not constitute a one-on-one or small-group grouping strategy. To be rated as a grouping strategy, it should be clear that the teacher has students grouped in those units deliberately in order to deliver instruction that is targeted (in the case of one-on-one or small group) or broadly applicable (in the case of whole-group). Thus, the observer will determine the grouping strategies employed by the teacher based, not necessarily on the unit size(s; whole-, small-, or individual-) in which students may work, but rather on the unit sizes to which the teacher presents tasks, provides instruction, and actively facilitates learning opportunities.

Comments

For Items # 1-36, provide reason for each designation of N/A (enumerate reasons by Item #): __

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Additional comments: _____

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Comments: For any item rated as N/A, the observer needs to provide the reason in this first comment section The Additional comments section, is intended to record any other features of the classroom that the observer found salient or important to know in order to properly contextualize why certain ratings were given.

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Robert C. Schoen, Ph.D.
Associate Director, FCR-STEM
Learning Systems Institute
University Center C4600
The Florida State University
Tallahassee, Florida 32306-2540
850.644.2570
rschoen@lsi.fsu.edu www.lsi.fsu.edu