

Using an Analytic Rubric

Purpose:

Participants will compare and contrast the “*Problem Solving Solution Guide*” with an analytic rubric and discuss its uses in the assessment process. They will use an analytic rubric for scoring student work (middle school) involving problem solving.

Overview:

Participants will compare and contrast the components and characteristics of the “*Problem Solving Solution Guide*” with an analytic rubric designed with the four stages of the problem-solving model. They will independently score student work on problem solving (middle school) using the analytic rubric. They will state the evidence in the work for the score given on each criterion. Then they will discuss their scores within a small group and reach consensus on the scores for each criterion with supporting evidence. A whole group discussion will follow.

TExES Mathematics 4-8 Competencies. The beginning teacher:

- VI.019.A Demonstrates an understanding of the purpose, characteristics, and uses of various assessments in mathematics, including formative and summative assessments.
- VI.019.C Demonstrates an understanding of how to develop a variety of assessments and scoring procedures consisting of worthwhile tasks that assess mathematical understanding, common misconceptions, and error patterns.
- VI.019.E Understands the relationship between assessment and instruction and knows how to evaluate assessment results to design, monitor, and modify instruction to improve mathematical learning for all students, including English Language Learners.

Materials.

- Highlighters
- Paper for recording

Terms.

Formative assessment, summative assessment, feedback, rubric, analytic rubric, solution guide, criterion

Transparencies.

- *Analytic Rubric for Problem Solving*
- *High Flyin’ Transparency*

Activity Sheet(s).

- *High Flyin’ Activity Sheet*
- Sample work for Students A-D
- *Analytic Rubric for Problem Solving*
- *Problem Solving Solution Guide*

References:

TEXTEAMS Practiced-Based Professional Development: Middle School Assessments(2003).

Austin, TX: The Charles A. Dana Center.

Taylor, Catherine S. and Bidlingmaier, Barbara(1998). “Using Scoring Criteria to Communicate about the Discipline of Mathematics”(pp.416-425): *The Mathematics Teacher*, Volume 91, No.5.

<http://www.wccta.net/galley/fwr/loop/9611/1611210.htm>

<http://www.cloudnet.com/~edrbsass/edmath.htm>

Procedure:

Steps	Questions/Math Notes
1. Show the Transparency <i>Definition of a Rubric</i> on the overhead projector and discuss with participants. Show the Transparency <i>Rubrics can be...</i> on the overhead and explain that rubrics can be task-specific or general. Discuss attributes that make a rubric useful using the Transparency <i>Attributes of a Useful Rubric</i>.	Ask participants questions to stimulate their thinking about scoring rubrics in general and analytic rubrics specifically. <i>What does it mean for a rubric to be applied in a fair and consistent manner?</i> <i>If you were designing a rubric for middle school mathematics, which type would you design and why? (task-specific or general)</i> <i>What other attributes would you add to the list of "Attributes of a Useful Rubric" and why?</i>
2. Have participants compare and contrast the "Problem Solving Solution Guide" with the <i>Analytic Rubric Activity Sheet</i> for problem solving. Participants should note that both the solution guide and analytic rubric address the four stages of problem solving. However, the analytic rubric has scaled scores vs. no scores on the solution guide. Both can provide specific feedback to the student and can be used to inform instruction (formative assessment). Discuss the criteria on the analytic rubric for problem solving so that there is a common understanding of what each criterion means. Explain that students using a rubric need to understand what the expectations are and what they mean in order to apply them in problem-solving situations. Emphasize that teachers may only focus on one or two of the criteria initially with students.	<i>How are the solution guide and analytic rubric alike? How are they different?</i> <i>What type of feedback can you provide with the analytic rubric?</i> <i>How would a student demonstrate an understanding of the problem in order to score a 4 on that criterion?</i> <i>What would a student need to demonstrate to score a 3 on the criterion "Develops an appropriate problem-solving plan"?</i> <i>If a student scored a 4 on the criterion "Reviews the results", what did the student's work reflect?</i>
2. Put the Transparency <i>Rubric Scoring Process</i> on the overhead and discuss each bullet. Explain to participants that this is the process that they will be following as they score student papers. Inform them that the rich discussions they have with colleagues, after individually scoring student work, helps to ensure consistency in applying the rubric fairly and uniformly. Part of the validity in reporting data (scores) is tied to consistency in applying the rubric. While a teacher may not consistently agree with a colleague's scoring, the teacher needs to be consistent in his/her own scoring of student work. Discussions with	<i>What are some factors that could affect the implementation of this process on a campus?</i> <i>How could this process help to improve student achievement in mathematics?</i> <i>How could this process help to improve instruction?</i>

colleagues about the scoring of a common set of assessment tasks can lead to a better understanding of assessment and the implications for instruction.	
3. Put the Transparency <i>High Flyin'</i> on the overhead and inform participants that a group of regular 8th grade math students solved this problem on May 6, 2004 at a middle school located in the greater Houston area. They will be individually scoring samples of the student work using the analytic rubric. Students were given this rubric with explanation by their mathematics teacher about what the criteria meant before solving the problem. Participants have already solved this problem on Day 3 of this problem solving module and may need time to revisit the problem. Allow a few minutes for them to read the problem and reflect upon a possible solution. Have participants use the activity sheets <i>High Flyin'</i> and <i>Analytic Rubric</i> to individually score student work samples A-C. They are to write the evidence as to how the student(s) met each criterion on the rubric.	<i>What concepts and skills must a student have in order to solve this problem?</i> <i>What are other concepts and skills that a student might use to solve this problem?</i> <i>Would you require students to use a problem solving board to solve this problem? Why or why not?</i>
4. After participants have scored the student work, they are to discuss the scoring of each paper and the evidence in the work for assigning each score with colleagues in small groups. These discussions should lead to more consensus among the members of the groups. As groups complete the scoring and discussions, have them circle a "3" on one scored criterion and explain what it will take to bring this score up to a "4". Ask participants to consider a score of "2" on a criterion and describe what the student needs to do to bring this score up to a "3".	<i>Why did you assign a score of "3" to this student for that criterion? What is the evidence?</i> <i>What could this student have done to improve his/her score from a "2" to a "3"?</i> <i>How did you reach consensus on that score?</i>
5. Following the small group discussions, have a whole group discussion on the scoring. Ask participants to state the evidence for assigning a given score. Have participants discuss how a student could improve his/her score of a "3" on a criterion and bring it up to a "4". Also discuss what a student with a score of a "2" could do to bring it up to a "3".	<i>What insights do you have about student learning?</i> <i>How did your group reach consensus on the scores for the criteria?</i> <i>How can this type of assessment be used as a diagnostic tool?</i> <i>How does the use of an analytic rubric support "All kids can learn!"?</i>

6. Discuss the kind of feedback a teacher can provide and receive using an analytic rubric and the implications for instruction. Also discuss the importance of assessment and instruction being interrelated. Assessment should not be separate from instruction. Assessment can be used to inform instruction by helping the teacher monitor and adjust instruction based upon the feedback from an assessment of this type. Students ultimately benefit from this process through the feedback they receive about their work and what they can do to improve it. They also benefit from instruction that has improved through this process.	<i>How does this type of assessment compare with traditional testing methods?</i> <i>What can you learn about how a student is thinking in mathematics using an analytic rubric?</i> <i>What did you learn from your colleagues?</i> <i>What are the strengths of the papers? The weaknesses?</i> <i>What would you recommend as a group to inform instruction?</i>
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