1.4.2 Fundamentals of Rubrics

by   *Sandy Bargainnier (Kenesiology, The Pennsylvania State University)*

High-quality assessment and evaluation of any performance depends on the accurate and reliable measurement of key performance factors. One can easily detect low-level understanding by using simple, quantitative tools, such as multiple-choice tests, true-or-false quizzes, and vocabulary definitions. However, more sophisticated measurement schemes are needed to assess or evaluate systems thinking, procedural knowledge, and attitude formation. By explicitly stating significant performance criteria, rubrics classify and organize performance observations with respect to different skill levels, behaviors, and/or product quality. This module outlines the attributes of a quality rubric and contrasts the purposes of holistic rubrics with analytic rubrics in performance measurement.

The Purpose and Use of Rubrics

Measuring a performance, a work product, or a learning skill can prove to be challenging if one does not have the appropriate measurement tool. Rubrics are tools that can help multiple instructors come to similar conclusions about construction of higher-level conceptual knowledge, performance skills, and attitudes. Basic facts and concepts, also referred to as "declarative knowledge" (Angelo, T. 2002; Bloom, 1956; Anderson & Krathwohl, 2001), can be measured with selected-response methods. However, higher-order thinking, procedural knowledge, and enduring understanding require more open-ended, complex, and authentic types of assessment and evaluation (Wiggins & McTighe, 2005; Angelo, 2002). Assessments and evaluations that require students to "construct" knowledge (called constructed-response) cannot be scored easily with an answer key.

Rubrics are designed to help instructors measure students' ability to use and apply factual, conceptual, procedural, and metacognitive knowledge (Angelo, 2002; Anderson et al., 2001; Bloom, 1956). For example, if an instructor wants to measure a student's ability to use a math formula to solve a biomechanics problem, the quality of a dance performance, or an attitude as reflected in journal writing, a rubric can help make the measurement more objective and meaningful.

Types of Rubrics

There are several types of rubrics. A generic rubric is used to assess or evaluate a process (i.e., problem solving) across disciplines, whereas a task-specific rubric is applicable only for a specific, defined task (Table 1).

After selecting either a generic or a task-specific rubric, the facilitator needs to choose either a holistic or an analytic rubric, depending on what he or she wants to assess or evaluate. Analytic rubrics work better when students self-assess a complex performance, product, process, or learning skill. Analytic rubrics help both learner and measurer identify strengths and areas for improvement. However, analytic rubrics may take longer to score than do holistic rubrics (Table 1).

Table 1 **Dribbling Rubric (Task-Specific, Analytic)**

Point Level	Description of Dribbling Ability
0 points	Is unable perform the skill.
1 point	Is able to control a ball through four cones three feet apart in more than ten seconds.
2 points	Is able to control a ball through four cones three feet apart in ten seconds.
3 points	Is able to control a ball through four cones three feet apart in seven seconds.
4 points	Is able to control a ball through four cones three feet apart in five seconds.

A holistic rubric (Table 2) requires the measurer to score the overall process or product as a whole, without judging the components separately (Nitko, 2001). Performance expectations and criteria that are holistic in nature (i.e., problem-solving) are best measured and evaluated using a holistic rubric. Holistic rubrics are quick to use and provide the measurer with a snapshot of the performance at hand. They are limited in that they do not allow the measurer to provide detailed and specific feedback of the performance.

The Role of Rubrics in Instruction

Cognitive learning theory and its constructivist approach to knowledge suggests that one look not for what students can repeat or mimic, but for what they can generate, demonstrate, and exhibit (Brooks & Brooks, 1999). Active learning suggests that students demonstrate what they know and are able to do. Rather than measuring discrete, isolated knowledge, authentic assessment emphasizes the

application and use of knowledge. Authentic assessment includes the holistic performance of meaningful, complex tasks in challenging environments that involve contexualized problems (Montgomery, 2002).

Rubrics are the tools that provide the criteria and levels of performance to assess student work that is not traditional, such as performances, portfolios, papers, or teamwork. When used for assessment, rubrics help both student and instructor identify strengths and areas for improvement in the learning process. A rubric should accompany all nontraditional assignments from the beginning.

The sample rubric is used in a variety of undergraduate courses that use oral presentations as a method of evaluation. The rubric is distributed with the assignment. Discussion about the use of the rubric occurs at the beginning of the assignment. Students use the rubric for self-assessment. Peers use the same rubric to provide specific feedback on strengths and areas for improvement.

Analytic rubrics, which include specific and detailed criteria, can help the learner, peers, and instructors assess the learner's progress in a performance, work product, or learning skill. When students know the performance criteria, there is no mystery about "what is most important" to learn, and quality learning can begin.

The Role of Rubrics for Evaluation

When analytic rubrics are used for evaluation purposes (i.e., a grade, pass-or-fail for certification), the criteria are clear, and the scoring process publicly reflects the expectations of a high-quality performance. Students know the expectations and do not question scores as much when the performance criteria are clear and are outlined at the beginning of an assignment. Processes of converting rubric scores to grades vary as much as rubrics.

A holistic rubric is best suited for a summative evaluation of a performance, product, or process; the student receives an overall score based on overall performance. A holistic rubric provides a quick snapshot of a performance or achievement. The holistic rubric does not tell students where strengths and weaknesses lie, so it may not be as useful to them as an analytic rubric (Table 2).

Attributes of a Quality Rubric

A novice user may be daunted by the plethora of types and styles of rubrics available (Coxon, 2004). The following attributes of a quality rubric can help novices and experts alike to assess the quality of a rubric (Arter et al., 2001; Wiggins, 1998).

1. **Clear Criteria**

   The rubric must have clear criteria. Wiggins (1998) states that we must be careful to ensure that the criteria are necessary and, as a set, be sufficient for meeting the targeted achievement. The criteria should define a comprehensive set of behaviors that make up the performance. The criteria defining each level of performance must be significant and should be mapped according a consistent scale.

   Before deciding on the performance criteria, it is important to clearly define what will be measured, and then to research the best criteria (or best practices) in the areas to be measured. For example, the measurer has to determine what the "problem-solving experts" would identify as high-performing and low-performing criteria about this skill. The same holds true for any performance, work product, or learning skill.

   It is important that the rubric covers the features that indicate quality performance because the relationship between performance criteria and rubrics is key to improved student learning (Arter et al., 2001; Huba & Freed, 2000). For example, a rubric designed to assess a student's ability to write a persuasive paragraph should not be designed predominately around the number of grammar, spelling, and typographical errors.

2. **Rich, Descriptive Language**

   The rubric must include rich and descriptive language. Students and multiple instructors need to understand the definitions, indicators, and samples of work (Arter et al., 2001) so that they can use the rubric to improve learning and assessment. The descriptors that differentiate quality should be user-friendly to students. A rubric should always describe the different levels of performance in tangible, qualitative terms in each descriptor. Therefore, when using comparative language to differentiate quality, the rubric must compare a relative quality, not an arbitrary quantity (Wiggins, 1998).

   The organization of a rubric should be effectively sequenced to flow with the natural steps in the performance. Related aspects should be clustered. Descriptive labels for levels of performance enhance the creation and application of rubrics.

Table 2   ***Problem-Solving Rubric (Generic, Holistic)***

Level 1—Totally Dependent Individuals

1. Hardly ever see anything besides surface factors of a problem, and their understanding of the problem always stays unclear

2. Miss most key issues and important assumptions

3. Are disorganized, without priorities, and accept quick solutions without testing and validating

4. Use information without assessment and take foolish risks, or become immobilized

5. Use other peoples' solutions and never learn from past efforts

Level 2—Individuals Who Rely on Others

1. Identify problems from how they feel and clarify them through expressing emotions

2. State issues concerning personal needs and identify assumptions others make about them

3. Are emotional and reactive to daily issues and test to see whether solutions make them comfortable

4. Use information provided and will do what others ask

5. Modify other peoples' solutions and occasionally see patterns in how they use them

Level 3—Self-Reliant Individuals

1. Can identify and clarify their key problems so they can focus on the most important ones

2. Identify several of the key issues and some of the important assumptions

3. Are semi-organized with some priorities and make sure they are satisfied with the solution

4. Make use of available information and take needed risks to get what they really want

5. Produce acceptable solutions and sometimes reuse the most obvious solutions

Level 4—Professional Consultants

1. Can help others see problems they overlooked and clarify them to others' satisfaction

2. Identify most key issues concerning context, constraints and needs, and most important assumptions

3. Are more systematic and have priorities and criteria, which they use to test and validate solutions

4. Access extensive information so they can take the risks others will not

5. Are strong at modeling problems and at times generalize solutions for future reuse

Level 5—Premier Problem Solvers

1. Can see hidden problems others overlook and clarify them so others can see their importance

2. Identify all key issues concerning context, constraints and needs, and important assumptions

3. Are systematic, and apply clear priorities and quality criteria to test and validate both the process and solution

4. Access all critical information so they can take the risks required at minimal cost

5. Are excellent at modeling problems, taking time to generalize for future use and appropriate reuse

3. **Positive Attainment**

The rubric should focus on the attainment of the desired performance. The rubric should also describe the levels of performance in positive language. The narrative should clearly describe positive attainment rather than lack of attainment. For example, instead of stating that a performer is "inaudible," the rubric should state that the performer "needs to project his or her voice loudly so all in the audience can hear." The description for each level should help both the learner and measurer to clearly distinguish the differences in levels of performance.

4. **Differentiation of Performance, Product, and Effort**

The rubric should clearly measure the desired performance (i.e., problem-solving, dribbling, oral communication) and not just the effort. This requires very clear and specific performance criteria and observable descriptors at each level of performance. One should not confuse effort or product with actual performance. For example, in physical education, it is common to see rubrics that make shooting three out of four foul shots an exemplary performance. This rubric example is describing the product: the student made the foul shot.

What the above description does not capture is the quality of the performance. A description that helps the measurer distinguish between levels of performance might include proper technique, hand placement, location on the court, etc. Based on a "quantity versus quality" description, the student could have kicked the ball into the hoop with his or her feet to complete three out of four foul shots. Rubrics should clearly state the evidence that will be used to measure the performance. This evidence should distinguish between "just doing it" (a yes/no checklist type performance) and being able to differentiate quality levels of performance.

5. **Universal Validity and Reliability**

A rubric should be easy for both instructors and students to interpret. Both should be able to use the rubric for instruction, assessment, and evaluation. Rubrics should be valid and reliable. A valid rubric measures key aspects central to the quality of the performance. A reliable rubric yields consistent results for different users. Reliability is increased by using rich, descriptive language. A rubric should also be fair to all students in regards to reading level, language, and examples.

Concluding Thoughts

The consistent use of well-designed rubrics significantly improves the facilitation of learning by providing both students and instructors with clarity and commonality of purpose. Students can better validate their own progress, and instructors can fairly and consistently document the students' skills and growth. Using rubrics across programs and/or course sequences can also ensure consistent measurement of quality of performance by students who have different instructors. Rubrics can provide a well-founded measurement system for improving teacher performance and collecting data for research projects. It is well worth the considerable time and effort involved to create and use quality rubrics.

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