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## ▶ 6

### Using Rubrics to Provide Feedback to Students

Learning increases, even in its serendipitous aspects, when learners have a sense of what they are setting out to learn, a statement of explicit standards they must meet, and a way of seeing what they have learned (Loacker, Cromwell, & O'Brien, 1986, p. 47).

Assessment requires [faculty] to articulate . . . explicit and public statements of criteria of performance. By doing so, faculty refine their own understanding of expected abilities, clarify for their colleagues the basis of their judgment, and enable students to understand what performance is re-

quired (Loacker, Cromwell, & O'Brien, 1986, p. 51).

A number of reasons are often cited for retaining "objective" tests (the design of which is usually quite "subjective"), among them: the unreliability of teacher-created tests and the subjectivity of human judgment. However, reliability is only a problem when judges operate in private and without shared criteria. In fact, multiple judges, when properly trained to assess actual student performance using agreed-upon criteria, display a high degree of inter-rater reliability (Wiggins, 1989, p. 710).

### Making Connections

*As you begin to read the chapter, think about the ideas and experiences you've already had that are related to rubrics . . .*

- What constitutes excellent work in your courses?
- Have you ever actually tried to describe the characteristics of excellent work—if only to yourself?
- Do your students know what you

consider to be excellent?

- How would it affect student learning if you told students what qualities you look for in their work?
- How would it affect student learning if you asked students what they consider to be excellent work?

*What else do you know about rubrics?*

*What questions do you have about rubrics?*

In previous chapters, we discussed learner-centered teaching as an approach that provides students with the guidance and feedback they need to learn to do important things. As learner-centered professors, we actively involve students in addressing enduring and emerging issues and problems in our disciplines, and we work in partnership with them so that they learn to produce high quality work (Chapter 2). We work with our academic program colleagues to gather information about how teaching and the curriculum can be improved (Chapter 3). In this environment, we are clear about what we expect students to know, understand, and do with their knowledge (Chapter 4). We ourselves seek continual feedback from students in our courses so that we can monitor student learning and make changes in pedagogy when needed (Chapter 5).

The focus of this chapter is on providing individual students with information they need to improve their work. In this chapter, as in Chapter 1, the terms “an assessment” or “the assessment” refer to an activity, assigned by the professor, that yields comprehensive information for analyzing, discussing, and judging a learner’s performance of valued abilities and skills. Typically, the activity takes place over a period of time and results in a performance, project, product, portfolio, paper, or exhibition that will be judged and graded (see Chapters 7 and 8). One assumption is that students both learn and reveal their learning in an assignment of this type. Another assumption is that all learning requires feedback.

## THE ROLE OF FEEDBACK IN STUDENT LEARNING

Chapter 5 presented numerous techniques that we can use to gather information to improve our teaching. Just as we need feedback to direct our learn-

ing, so students in our courses need feedback if they are to get better at what they’re trying to do. When learners try something new and get a sense of how they’re doing—either through their own observations or the comments of others—they use that information to improve their performance.

A key ingredient in learner-centered teaching is “active learning” (e.g., Silberman, 1996). The rationale for active learning is that students learn more and learn better when they explore a topic rather than when they watch and listen to a teacher. As authors, we agree—but we believe that more than activity is required. To be effective, students need feedback about how and what they’re doing. Most importantly, they must learn how to use that feedback to improve performance.

Can fledgling writers improve without knowing if readers understand? Can accounting students learn to keep accurate records without knowing if bottom line figures are correct? Can philosophy students develop logical reasoning ability without knowing if others can follow their train of thought? Can dancers learn to inspire without reaction from an audience? We think not.

As pointed out in Chapter 2, however, many of us have been locked into the traditional teaching paradigm in which we have not provided the kind of continuous feedback necessary for continuous improvement. Using traditional assessment methods has prevented us from reaching our goals because traditional assessments provide little information to enhance student learning.

For example, test scores tell a student where he or she stands in terms of the total number of possible points (Jane scored 80 out of 102 points) or in terms of other students in the class (Bill received a higher score than 65% of the class). But even with test scores, students can’t fully interpret them without looking at a variety of other factors. One factor is the difficulty of the test. What would Jane’s score of 80 out of 102 points mean to her if the test were very easy? Or if it were very difficult? Another factor to consider in interpreting a score is the competitiveness of the other students in the course. Bill might be quite satisfied scoring better than 65% of his peers if they were a very precocious group, but he would probably be quite disappointed in his score if his peers were low achievers.

Even when information about factors like test difficulty and competitiveness of peers is available to help students develop interpretations of their work, there is little information available in the scores themselves to tell students *how* to get better. This information is essential to improvement, and it is not usually available.

Similarly, through grades, we convey messages to our students about our judgment of their work; their work is excellent, very good, satisfactory, unsatisfactory, or failing. This is helpful information for students to have, but alone, it gives them little direction as to what to do next. In other words, test scores and grades help professors and students *monitor* learning, but they do little to *promote* learning.

### Reflections

*As you create your own meaning from the ideas in this section, begin to think about . . .*

- How can my students tell if they are learning well in my class?
- What kind of feedback do I give students about their performance?
- What do they learn from the feedback I give?
- How do I help students know how to improve?
- What else would students learn if they knew ahead of time the criteria for each major project?

## USING ASSESSMENT TO PROMOTE LEARNING

To promote learning, assessments must incorporate genuine feedback that learners can employ in redirecting their efforts. In other words, assessment information must *reveal* to learners an understanding of how their work compares to a standard, the consequences of remaining at their current level of skill or knowledge, as well as information about how to improve, if improvement is needed.

Viewing assessment as a tool for “revealing” hasn’t been typical. Many synonyms for assessment as we know it come to mind rather easily—information-gathering, testing, monitoring, evaluation. “Revelation,” however, is usually not among them. But in order to provide useful feedback to learners, we must reveal many things that heretofore have been unspoken, invisible, or assumed aspects of teaching activity. Key aspects of “revelation” must occur before, during, and after an assessment.

Learners first need a clear sense of what they are trying to accomplish and why it is important. What intended learning outcome does the assessment address? What does the assessment task consist of? Do they understand it well? What can they do already that will help them? What new learning is required? Is there special knowledge required? Have they mastered that knowledge? How will their ability to perform the task well help them after graduation? Who values the knowledge and skill that this task requires? As professors, we must answer these questions, preferably *before* they are asked.

For example, if an engineering professor assigns a project in which students must design an engine, the purpose of the project should be discussed at the outset. Is it primarily technical or are other skills involved? If the professor will evaluate skills in several areas like teamwork, oral and written communication skills, as well as engineering practice, it helps students to know this from the beginning. They should know if they’re expected to draw upon knowledge beyond that covered in the course. They should also know what the final product of the project will be—a paper, a diagram, a report and

presentation to a fictional committee, or something else. They should know whether there is one final deadline or whether portions of the project are due at several stages along the way. Most importantly, they should know that the skills involved are valued by and useful to engineers in the field and that they don’t just represent the idiosyncratic preferences of one particular professor.

Learners also need to know what constitutes good performance, not just in their courses, but in the adult and professional world. Addressing this issue provides professors with an opportunity to reveal to students the qualities and skills possessed by educated people and by professionals in their field. What is special about an excellent chemist or an excellent librarian? What are the standards of the profession students have chosen? These must be revealed in college courses.

Finally, as learners attempt to complete a task, they must receive ongoing information about the quality of their work vis-à-vis professional standards. They must also understand the consequences of operating at that level of quality. What happens when work is excellent? What happens when work is poor? Finally, they must know what to do next in order to improve.

### Reflections

*As you create your own meaning from the ideas in this section, begin to think about . . .*

- How well do my students know the standards against which their work will be compared?
- How could I explain to students the real-life consequences of doing excellent or poor work?
- How can I help my students know how to improve if they need to improve?
- When have I used assessment as an opportunity to reveal something to students?
- What do I reveal to students through assessment?

## RUBRICS DEFINED

This is where rubrics come in. What is a rubric? According to Webster, it is “an authoritative rule . . . an explanation or introductory commentary.” As applied to assessment of student work, a rubric reveals, if you will, the scoring “rules.” It explains to students the criteria against which their work will be judged. More importantly for our purposes, it makes public key criteria that students can use in developing, revising, and judging their own work.

Three sample rubrics are shown in Figures 6-1, 6-2, and 6-3. Figure 6-1 is a rubric used in assessing oral communication skills in a formal setting such as making a presentation to a group. It is an adaptation of a rubric developed by a graduate faculty committee in a Department of Educational Leadership (1998).

FIGURE 6-1 Rubric for Formal Oral Communication in a Graduate Program

Criteria	Levels of Achievement		
	3 Sophisticated	2 Competent	1 Not Yet Competent
<i>Organization</i>	Presentation is clear, logical, and organized. Listener can follow line of reasoning.	Presentation is generally clear and well organized. A few minor points may be confusing	Listener can follow presentation only with effort. Some arguments are not clear. Organization seems haphazard.
<i>Style</i>	Level of presentation is appropriate for the audience. Presentation is a planned conversation, paced for audience understanding. It is not a reading of a paper. Speaker is clearly comfortable in front of the group and can be heard by all.	Level of presentation is generally appropriate. Pacing is sometimes too fast or slow. The presenter seems slightly uncomfortable at times, and the audience occasionally has trouble hearing him/her.	Aspects of presentation are too elementary or too sophisticated for audience. Presenter seems uncomfortable and can be heard only if listener is very attentive. Much of the information is read.
<i>Use of Communication Aids (e.g., Transparencies, Slides, Posters, Handouts, Computer-Generated Materials)</i>	Communication aids enhance the presentation. They are prepared in a professional manner <ul style="list-style-type: none"> <li>• Font on visuals is large enough to be seen by all.</li> </ul>	Communication aids contribute to the quality of the presentation. Font size is appropriate for reading. Appropriate information is included. Some material is not	Communication aids are poorly prepared or used inappropriately. Font is too small to be easily seen. Too much information is included. Unimportant material
<i>Content</i>	<ul style="list-style-type: none"> <li>• Information is organized to maximize audience understanding.</li> <li>• Details are minimized so that main points stand out.</li> </ul>	supported by visual aids.	is highlighted. Listeners may be confused.
<i>Depth of Content</i>	Speaker provides an accurate and complete explanation of key concepts and theories, drawing upon relevant literature. Applications of theory are included to illuminate issues. Listeners gain insights.	For the most part, explanations of concepts and theories are accurate and complete. Some helpful applications are included.	Explanations of concepts and/or theories are inaccurate or incomplete. Little attempt is made to tie theory to practice. Listeners gain little from the presentation.
<i>Accuracy of Content</i>	Information (names, facts, etc.) included in the presentation is consistently accurate.	No significant errors are made. Listeners recognize any errors to be the result of nervousness or oversight.	Enough errors are made to distract a knowledgeable listener, but some information is accurate. The presentation is useful if the listener can determine what information is reliable.
<i>Use of Language</i>	Sentences are complete and grammatical, and they flow together easily. Words are chosen for their precise meaning.	For the most part, sentences are complete and grammatical, and they flow together easily. With a few exceptions, words are chosen for their precise meaning.	Listeners can follow the presentation, but they are distracted by some grammatical errors and use of slang. Some sentences are incomplete/halting, and/or vocabulary is somewhat limited or inappropriate.

Criteria	Levels of Achievement		
	3 Sophisticated	2 Competent	1 Not Yet Competent
Freedom from Bias (e.g., Sexism, Racism, Agism, Heterosexism, etc.)	Both oral language and body language are free from bias.	Oral language and body language are free from bias with one or two minor exceptions.	Oral language and/or body language includes some identifiable bias. Some listeners will be offended.
<i>Personal Appearance</i>	Personal appearance is completely appropriate for the occasion and the audience.	Personal appearance is generally appropriate for the occasion and audience. However, some aspects of appearance reflect a lack of sensitivity to nuances of the occasion or expectations of the audience.	Personal appearance is inappropriate for the occasion and audience.
<i>Responsiveness to Audience</i>			
Verbal Interaction	Consistently clarifies, restates, and responds to questions. Summarizes when needed.	Generally responsive to audience comments, questions, and needs. Misses some opportunities for interaction.	Responds to questions inadequately.
Body Language	Body language reflects comfort interacting with audience.	Body language reflects some discomfort interacting with audience.	Body language reveals a reluctance to interact with audience.

(Adapted from Department of Educational Leadership and Policy Studies, 1998)

FIGURE 6-2 Rubric for Engine Design Project

Criteria	Levels of Achievement			
	Excellent (A) 4 points	Good (B) 3 points	Needs Improvement (C, D) 2 points	Unacceptable (F) 1 point
<i>Formulation of Design Problem</i>				
Formulation and scope of problem	Design problem formulation is clear and well thought out. The problem scope is well defined.	The problem formulation is clear, but the scope is not well defined.	The problem formulation is unclear in some respects and does not appear to be well thought out.	The design problem is not formulated clearly.
Significance	The problem chosen represents a current challenge facing the engine industry. The potential market is large and clearly identified.	The problem represents a current challenge in the engine industry, but the potential market is small or is not clearly identified.	The problem does not represent a current challenge in the engine industry, and the market is small or is not clearly identified.	The problem does not represent a current challenge in the engine industry. There is no explanation about who would be interested in the product or why they should buy it. There is no evidence of the background work (e.g., market analysis) that is needed to design an engine.

Continued

FIGURE 6-2 Continued

Criteria	Levels of Achievement			
	Excellent (A) 4 points	Good (B) 3 points	Needs Improvement (C, D) 2 points	Unacceptable (F) 1 point
<i>Engineering Skill Utilization</i>				
Analysis	Engineering analysis is detailed and challenging and is used at every stage of the design process.	The engineering analysis is detailed and challenging, but some steps do not appear to be supported by calculations.	Some analysis is included, but it is not very detailed or challenging. Many steps are not supported by calculations.	Engineering analysis is infrequently used. When used, it appears trivial and leads to obvious conclusions.
Documentation	Documentation is thorough and complete.	There is some missing information in the documentation.	There is a great deal of missing information in the documentation.	Documentation is poor or nonexistent.
Assumptions	All assumptions are stated and justified.	Assumptions are stated, but some are not justified.	Assumptions are stated, but none are justified.	No assumptions are stated.
<i>Extension of Knowledge about Internal Combustion Engines</i>				
	Concepts beyond those in the prerequisite course are frequently used. The professor may have learned something new.	Prerequisite course content is used easily, and some material beyond the course is included.	Prerequisite course content is used, but new and unfamiliar areas are not introduced.	Prerequisite course content is not applied correctly. New areas are not included.

*Team Skills*

Group functioning	The group functions well. Peer review indicates good distribution of effort. All members are challenged and feel their contributions are valued.	The group functions fairly well. Some people in the group believe they are working harder (or less hard) than others, but everyone is contributing.	The group is still functioning, but each individual is doing his/her own work and ignoring the efforts of others. There are frequent episodes where one person's design will not fit with another's due to lack of communication.	The group functions poorly. All work is the product of individual efforts.
Regularity and productivity of meetings	The group meets regularly and the meetings are productive.	The group meets regularly, but meetings are not as productive as they could be. Some members are not prepared.	The group meets irregularly. Meetings are not as productive as they could be because several members are not prepared.	The group does not meet regularly, and when it does, some members are absent and no one is prepared.
Use of group problem-solving techniques	The group makes frequent use of brainstorming and group problem-solving techniques and documents the effect of these sessions.	The group uses brainstorming and group problem-solving techniques but does not always document the effect of these sessions.	Some attempt to use group problem-solving techniques is observed, but decisions are not based on results of problem-solving sessions.	No attempt to use group problem-solving techniques is made. Meetings are worthless.

*Written Communication*

Organization	Written work is well organized and easy to understand.	The organization is generally good, but some parts seem out of place.	The organization is unclear.	The report is disorganized to the extent that it prevents understanding of content.
Definition of terms	All new terms are defined.	Some terms are used without definition.	Many terms are used but not defined.	Terms are used without definition to the extent that understanding is inhibited.

Continued

FIGURE 6-2 *Continued*

Criteria	Levels of Achievement			
	Excellent (A) 4 points	Good (B) 3 points	Needs Improvement (C, D) 2 points	Unacceptable (F) 1 point
Integration of writing styles	The team developed a writing style that is uniform throughout the report. There is no indication that the report involved multiple authors.	There is some indication of multiple authors (e.g., different fonts, different paper, etc.).	There is ample indication of multiple authors (e.g., different fonts, different paper, etc.).	Report is clearly the work of multiple authors with different writing styles, margins, printer fonts, and paper types.
Grammar	The work has been thoroughly spell-checked and proofread by everyone in the group.	There are a few spelling and grammatical errors.	There is more than one spelling or grammatical error per page.	There are frequent misspelled words and serious grammatical errors, indicating that time was not taken to spell-check and proofread.
Use of appendices	Information is appropriately placed in either the main text or an appendix. Appendices are documented and referenced in the text.	Information is appropriately placed in either the main text or an appendix. Documentation and referencing in text are somewhat incomplete.	There is some misplacement of information in the text vs. the appendix. Appendices are poorly documented and referenced in text.	Considerable amount of material is misplaced. Appendices are not documented or referenced in text.
<i>Oral Communication</i>				
Interest/organization	Design presentation is clear, interesting, and well organized. It starts and ends well.	The design presentation is interesting, but some points are unclear. The introduction and/or conclusion are weak.	The design presentation has some interesting points but is difficult to follow. Either the introduction or conclusion is missing.	The design presentation is hard to follow and poorly organized. It appears to be off-the-cuff. There is no introduction or conclusion.
Visual aids	Visual aids are used frequently. They are easy to read and understand, and they are of professional quality.	Visual aids are good, but a few are sloppy or difficult to read.	Most visual aids are sloppy and hard to read.	There are too few visual aids, and those used are carelessly prepared.
Length	The presentation is within the assigned time limits.	The presentation is too short or too long by two minutes or more.	The presentation is too short or too long by five minutes or more.	The presentation is too short or too long by ten minutes or more.
Engineering analysis	Engineering analysis is presented with sufficient detail to be understood, but not so that it insults the audience.	Engineering analysis is poorly explained or so detailed that the audience falls sleep.	Engineering analysis consists of trivial calculations and is poorly explained.	No engineering analysis is presented.

(Van Gerpen, 1999)



FIGURE 6-3 Rubric for Economic Bill Writing Project

Criteria	Levels of Achievement			
	Exemplary 5-6	Proficient 3-4	Acceptable 1-2	Unacceptable 0
Understanding of Economic Principles	Your bill contains information which conforms to the correct application of principles of economics. The reader can tell that you understand these principles and have made them the central part of your bill.	Your bill contains information which conforms to the correct application of principles of economics. The reader can tell that you understand these principles but wishes you would have made more use of them to enrich your bill.	Your bill contains some references to principles, but they seem to be added as an attempt to include them without any obvious relationship to the point you are trying to accomplish.	No references to principles are found. The reader does not understand how your bill would affect the economy or the political situation concerning the economy.
Significance of Economic Problem	Your bill addresses a recognized economic problem which has macro application and would benefit the majority of the American people with its passage.	Your bill addresses a recognized economic problem, but it may be somewhat limited in impact, affecting only a small portion of people with its passage.	Your bill addresses an apparent economic problem, but it is not of sufficient importance to cause much impact on the economy with its passage. It could go unnoticed.	Your bill may have economic content, but it does not address a recognized or apparent economic problem. It would not be worth the time of Congress to consider it.
Feasibility of Proposed Bill	Your bill is realistic and workable. It takes into consideration current economic and political conditions and recognizes the limits to which the current situation can and will accommodate your recommendations.	Your bill is realistic and workable for the most part. You do consider current conditions, but you need to pay more attention to the limitations presented by current conditions.	Your bill is not unrealistic, but more consideration of current conditions would require revision of your bill before it would seem realistic to the reader. The reader is left with a feeling that the bill would not accomplish what you would like it to do.	Your bill is not realistic, either because it does not conform to actual situations or because it is too vague to help the reader understand how it would affect the political or economic situation.
Knowledge of Past Economic Decisions	Your bill reflects economic decisions which have worked in the past, is based on research involving comparisons of previous eras, and makes reference to actual events.	Your bill reflects economic decisions which have worked in the past, but your examples are limited. More examples would make your bill easily understood by the reader.	Your bill makes little reference to precedents from the past. You need to add some to help the reader decide if the bill would work and should be passed into law.	Your bill makes no reference to precedents from the past. The reader is left wondering if you know what past economic and political practice has been.
Knowledge of Procedures for Introducing a Bill	Your bill conforms to correct procedures for writing and introducing a bill as reflected in actual practice.	Your bill conforms to correct procedures for writing and introducing a bill with only a few minor omissions or commissions of error.	Your bill is presented with several errors in procedure. You need to observe rules more closely. Be sure you understand correct procedure.	You have not made an effort to follow accepted procedure for writing or presenting your bill. It does not receive consideration.
Factual Accuracy	No errors are made in fact. Your work will be very useful in aiding the reader to make a decision about whether this bill would make a significant contribution as a law to improve the economic situation within the current political arena.	No significant errors are made. The reader recognizes any errors as the result of hasty conclusions or oversights. Your work is usable for making economic/political judgments but would be considered more reliable if you were more careful in proofing your work.	Enough errors are made to distract the reader, but the reader is able to use the information to make some important judgments. The bill is useful if the reader is able to decide what evidence is reliable.	Your bill is rendered impossible because there are so many errors in fact. The reader cannot depend on this bill as a source of accurate information, or you have included so little information that the reader is not sure what the bill is all about. It will not be reported out of committee.

(Calvin, 1995)



Figure 6-2 is a rubric that Professor Jon Van Gerpen uses with his senior mechanical engineering students (Van Gerpen, 1999). The project he assigns requires a group of students to work as a team to formulate a problem that can be solved using a new engine. They then design an engine or an engine component to solve the problem, presenting their findings both orally and in writing.

Figure 6-3 is a rubric designed by Professor Linda Calvin for her high school integrated economics and government course (Calvin, 1995). The project requires senior honors students to develop a national economic program presented as a Congressional bill.

Rubrics are unfamiliar to most of us. They represent a way of evaluating student achievement that is radically different from the methods we have used in the past. However, shifting from teacher-centered courses to learner-centered courses is a change of culture that, at times, requires drastic modifications in the way fundamental activities are carried out. Making standards public facilitates a more trusting relationship between teacher and learners. No longer are grading criteria a secret that only perceptive learners can discover.

In Figures 6-1 through 6-3, there are two kinds of rubrics. One is a rubric describing a general ability, oral communication. The others are rubrics for particular assessments that professors have assigned. These rubrics include criteria that reflect general abilities and skills (like oral and written communication, teamwork, etc.). They also include criteria related to knowledge of content and some specific aspects of the assessment itself (e.g., designing an engine, writing a bill for Congress).

### Reflections

*As you create your own meaning from the ideas in this section, begin to think about . . .*

- What are my first reactions to the idea of a rubric?
- How would my teaching change if I used rubrics with my students?
- How could I use rubrics to reveal to students the caliber of their work?
- How could I use rubrics to give students feedback for improvement?

## ELEMENTS OF A USEFUL RUBRIC

There are several elements of useful rubrics, and each is discussed in turn below.

### Levels of Mastery

Notice that each of the rubrics has three or four columns. At the top of each column is a label describing the level of student work. Figure 6-1, the oral communication rubric adapted from the Educational Leadership graduate program, includes three columns labeled Sophisticated, Competent, and Not Yet Competent. Figure 6-2 has four columns describing achievement in Professor Van Gerpen's course: Excellent, Good, Needs Improvement, and Unacceptable. The four columns in Figure 6-3 are labeled Exemplary, Proficient, Acceptable, and Unacceptable to describe the quality of work in Professor Calvin's course.

### Dimensions of Quality

The rows of each figure list the dimensions of quality that the professor believes are important in reaching the goal of the project or program. These have been targeted as important for giving feedback. Note that the oral communication rubric (Figure 6-1) includes several aspects of oral communication from organization to responsiveness to audience. Professor Van Gerpen's rubric (Figure 6-2) includes both discipline specific characteristics (e.g., formulation of design problem, engineering skill utilization, and extension of knowledge in internal combustion engines), as well as characteristics related to general education (e.g., development of team skills, oral and written communication skills). Professor Calvin assesses a wide range of intellectual skills, from understanding economic principles and formulating a significant economic problem to knowledge of appropriate procedures for introducing a bill and knowledge of facts (Figure 6-3).

### Organizational Groupings

For five of the six areas to be assessed in his engine design project, Professor Van Gerpen has detailed several aspects to be evaluated (Figure 6-2). By grouping these aspects together, Van Gerpen reveals to students the underlying characteristics of good work. This helps students understand that they will be evaluated on complex abilities that are multidimensional. For example, in the area of team skills, they will be assessed on group functioning, regularity and productivity of meetings, and the use of group problem-solving techniques.

### Commentaries

For each aspect of quality, the rubric provides a commentary describing the defining features of work at each level of mastery. For example, in the commentaries, each professor describes excellent work. If students read all of the

paragraphs in the Sophisticated (Figure 6-1), Excellent (Figure 6-2), or Exemplary (Figure 6-3) columns, they have a rich description of the standard of work they should strive to emulate. The task they face is still formidable—to produce work with these qualities. But knowing clearly what the standard is provides them with direction and with information to help them continuously improve.

Similarly, by reading all of the paragraphs in the Not Yet Competent (Figure 6-1) or Unacceptable (Figures 6-2 and 6-3) columns, students know clearly the standard they must exceed in order to produce minimally acceptable work. Bluffing is less likely because the professors have provided a clear description of poor work, characteristic by characteristic, in each row of these columns.

The commentaries in the columns between the highest and lowest levels of achievement reveal some of the weaknesses that professors have observed in student work over the years. Attending carefully to these descriptions can help students avoid common pitfalls.

### Descriptions of Consequences

In many of the commentaries, the professors describe for students the likely consequences of performing at that level of quality in a real-life setting. Describing consequences is a form of feedback, encouraging students to think about what will happen in an applied setting if they perform at a particular level. This approach reveals to students that what they are learning will “count” after graduation. It helps them to develop goals beyond simply “getting a good grade.”

Professor Calvin (Figure 6-3) is especially good at revealing consequences to her students and teaching lessons about professionalism, as the following examples show.

*Rubric:* “Your bill . . . would benefit the majority of the American people with its passage” (Row 2, Column 1).

*Lesson:* Good work pays off many times over.

*Rubric:* “Your bill addresses an apparent economic problem, but it is not of sufficient importance to cause much impact on the economy with its passage. It could go unnoticed” (Row 2, Column 3).

*Lesson:* Apparently good work may benefit you in the short term (i.e., your bill will be passed), but others will benefit only if your work is genuinely good.

*Rubric:* “[Your bill] would not be worth the time of Congress to consider it” (Row 2, Column 4).

*Lesson:* Poor work wastes people’s time.

Professor Calvin’s descriptions about factual accuracy also reveal important consequences and lessons to students.

*Rubric:* “No errors are made in fact. Your work will be very useful in aiding the reader to make a decision about . . . this bill” and “Enough errors are made to distract the reader . . . The bill is useful if the reader is able to decide what evidence is reliable” (Row 6, Columns 1 and 3).

*Lesson:* In the world of work, people read written reports to acquire new knowledge to be used in making decisions. You can either help them or you can harm them.

*Rubric:* “Your work is usable . . . but would be considered more reliable if you were more careful in proofing your work” (Row 6, Column 2).

*Lesson:* Others will judge you by the quality of your work.

*Rubric:* “[Your bill] will not be reported out of committee” (Row 6, Column 4).

*Lesson:* Poor work doesn’t fly.

#### Reflections

*As you create your own meaning from the ideas in this section, begin to think about . . .*

- How would I go about writing a rubric?
- What materials do I already have that could be used in a rubric?
- What are my reactions to the elements of a rubric?
- What else would I need to do or prepare?

### USING RUBRICS TO REVEAL IMPORTANT INFORMATION

Carefully developed rubrics can be used to accomplish two broad aims: to educate students and to judge their work.

#### Educating with Rubrics

We can educate students with rubrics in several ways. First, we can use rubrics to reveal to students the standards of our disciplines. When we develop rubrics in such a way that they inform students about commonly accepted criteria for excellence in a profession or in society in general, we help students internalize standards they can aspire to reach throughout their lifetime. In this

way, we help students make connections between their current course of study and life after graduation.

Second, through rubrics, we can also inform students about the many qualities that comprise good—and poor—work, thus providing them with benchmarks for developing, judging, and revising their work. This enhances students' ability to self-assess and self-correct. By using rubrics in this way, we add a valuable feedback component to active learning.

Third, using rubrics can also involve students in *setting* standards (Wiggins, 1989). For example, prior to finalizing a rubric for a particular assignment, we can get students' input about what it should include. One way to do this is to share examples of good and poor work collected from previous students who have completed the same assignment. Then ask current students to examine and compare these examples and to identify the characteristics that distinguish them. We can then discuss these characteristics together and consider including them as criteria in the rubric.

A fourth way to educate with rubrics is to involve students in describing the criteria in the rubrics. The worksheet in Figure 6-4 shows one way to gather students' ideas about the properties of various criteria. These ideas can form the basis for class discussion and consensus building about the meaning of the criteria that will be used in assessment. As students develop descriptions of good vs. poor work, their descriptions can be included in the class rubric that will be used to both shape and judge their work. This focuses students on "how good" work should be, rather than simply on "how to" complete the assignment. Including students' ideas in the final rubric conveys respect for students as people and builds student ownership for learning.

Embedded in this approach is the need for us to take on a new role—becoming a repository for student work. This, of course, requires permission from the students whose work is shared with others. One professor we know includes the following on the syllabus she distributes at the first class meeting:

*When students have an opportunity to examine assignments that differ in quality, they usually find that their own work is enhanced. As a result, I have developed a file of previous students' work that is ungraded. Some examples represent excellent work, and others represent work that could be improved. In this course, you will have access to this file as you develop your own assignments.*

*Because it is important to keep the student file current, I seek your permission to include your work in the file. Accordingly, when you submit your work to me to be graded, please submit two copies if you are willing to contribute to the file. One will be graded and returned to you. The other will be placed ungraded in the student work file. (B. Licklider, personal communication, April 20, 1998)*

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Course: Mechanical Engineering Graduate Seminar

Directions:

You have developed a topic, an abstract, and a reference list for your research project. The intended audience for your paper is people whose knowledge base is the same as yours and that of your classmates in terms of technical subjects. This is similar to the general population of practicing engineers with B. S. degrees.

What criteria should be used in developing and judging your papers? I listed five below and left spaces for you to add more. For each criterion, list some attributes that would be evident in a paper that meets the criterion.

Criteria	Attributes:
----------	-------------

Appropriateness for audience	
------------------------------	--

Organization and logic	
------------------------	--

Objectivity	
-------------	--

Technical accuracy	
--------------------	--

Grammar and syntax	
--------------------	--


---

(Shapiro, 1998)

**FIGURE 6-4 Student Worksheet for Developing Assessment Criteria**

A fifth way to educate with rubrics is to use them to open channels of communication between us and our students and among students themselves. When we use a rubric as the basis of conversation with a student, we have an opportunity to engage in a mutual dialogue about learning. The student grows in understanding of course goals and standards of quality, and at the same time, the student can share information about how he or she learns best. We and our students can talk together, reflecting on the student's work and mutually assessing it using the rubric.

Conversations during the course of development of a project are particularly helpful to both us and our students. When students talk with us about their work as it is developing, we can use the rubric to help students understand how the work at its current stage differs from the target stage of devel-

opment described in the most proficient column in the rubric. Students thus gain insights and information in time for them to make changes in their work. Conversations during the development of a project also allow us to learn if the student uses feedback effectively to revise work, a quality needed for effectiveness after graduation.

Students can also use the class rubric to review each other's work. This increases their understanding of professional standards. The likelihood of the uninformed leading the uninformed is lessened when students judge their peers' work according to public standards as opposed to their own idiosyncratic standards.

A sixth way to educate with rubrics is to have a variety of individuals give feedback to students about their work using a rubric. Through the process of obtaining feedback from us, their peers, and perhaps others (e.g., advisors, mentors, employers, parents), students learn that different individuals have different perspectives and that, throughout life, their work will be judged in different ways.

The intent of the rubric, of course, is to minimize differences in ratings, to focus everyone reviewing the work on the same set of standards. As will be discussed in the next section, this is particularly important when rubrics are used to *make judgments* about student work, rather than to educate them about standards and about learning. An example is when multiple raters (e.g., a professor and two graduate assistants) are involved in final scoring leading to a course grade. In this case, consistency in judgment about the quality of a student's work is especially important because grades carry with them important consequences—whether or not the student can take the next course in a sequence, enter a particular major, and the like.

Nevertheless, the process of making human judgments cannot be completely standardized, and from *an educational point of view*, students can benefit from the different viewpoints that others bring to their work. As discussed in Chapter 8, Paulson and Paulson (1991) point out that when Siskel and Ebert reviewed movies for us on television, we benefited from their disagreements as well as from their agreements; that is, we knew more about the movie by virtue of their different viewpoints. Similarly, when developing their work, students can benefit from hearing various reactions to it. Each individual commenting on the work will have a unique perspective that causes him or her to focus on one or more aspects of the work. From a collection of reactions, then, students gain deeper insights into their work, much like a graduate student benefits from having a diverse graduate advisory committee. Consistency in judgment is not the ultimate goal in all life situations.

There are also several ways in which we ourselves can learn from using rubrics. For example, one educational benefit of using rubrics is that we gain information to use in rubric revision. Writing useful rubrics that clearly reveal the standards we may have kept private for so long is really difficult. One hallmark of using rubrics is that they are continuously being improved. When

students question the wording in part of a rubric, when students don't understand our rating on one dimension of the rubric, when we experience difficulty scoring student work using the rubric—these are signals that sections of the rubric are not clearly stated and must be revised.

Second, we can also share rubrics with our colleagues and use them in discussions about teaching, curriculum development, and assessment. In fact, when colleagues begin sharing rubrics, they often discover that they are looking for the same qualities in their students' work and they gain insights from talking with each other. This leads to collaboration in developing rubrics, a process that both saves the faculty time and effort and undoubtedly results in stronger rubrics.

Third, when we collaborate with our colleagues about developing rubrics, we also enhance student learning. For example, at an institution with common intended outcomes for general education, rubrics addressing those outcomes (e.g., written and oral communication, problem solving) can be developed and used institution-wide. This practice sends a strong, coherent message to students about the type of quality that professors expect in student work.

Within an academic program, common rubrics focusing on discipline-specific qualities can be developed as well. Not only can these rubrics be used within individual courses, but they can also be used by program faculty when they judge student work as part of their assessment at the program level. For example, when a group of faculty members are reviewing student portfolios or evaluating student products from a capstone course, common rubrics provide an organizing framework for judging and discussing student achievement.

Finally, we can use rubrics to inform audiences off campus—parents of students, practitioners in the field—about our intended learning outcomes and standards. This is something that multiple-choice test answer keys can never do. Unfortunately, few people usually know what happens in our courses, and this may be one reason for the public's current distrust of higher education. When we take a learner-centered approach in our courses and programs, involving our students in worthwhile activities that matter in the adult world, and when we hold students to high standards of achievement, important audiences should know about it.

### Reflections

*As you create your own meaning from the ideas in this section, begin to think about . . .*

- How would I go about developing standards for student work that reflect the values of my discipline or those of an educated citizenry?
- How would using rubrics change the culture of my courses?

*Continued*

**Reflections (continued)**

- What do I think about
  - ... having students review former students' work and identify standards of their own?
  - ... using rubrics as the basis for conversations with students?
- ... having students review each other's work using rubrics?
- ... sharing or developing rubrics with colleagues?
- ... using rubrics to reveal my standards to off-campus audiences?

**Judging with Rubrics**

We can also use rubrics to judge the quality of student work at various stages of development. We mentioned in Chapter 2 that in learner-centered courses professors take on the roles of coach and facilitator, guiding students as they attempt to achieve course goals. Providing useful feedback that students can use to improve the quality of their work is an important part of the coach/facilitator role. Although we have typically judged student work only when it was completed, we can help students know if they are on the right track by talking with them in the early stages of a project or by scoring earlier drafts or partially completed projects. This, of course, is useful only if students come away with information about how to improve. Whether or not they get that information depends on the quality of the rubric. Guidelines for developing useful rubrics are discussed in a subsequent section.

When feedback is given during the development of a project, it might be referred to as intermediate feedback as opposed to final feedback. Intermediate feedback can take different forms, all of which are consistent with the principles of continuous improvement.

For example, in the early stages of development of a project, we can provide guidance by informally discussing students' progress with them. A key goal in these discussions is to keep students focused on using the rubric as a guide in developing their work. This is particularly important if students are unfamiliar with rubrics, as most will be. Because students have spent many years developing work habits tailored to the traditional learning environment, they probably won't understand the role of the rubric. Until they get their first grade based on a rubric, it will be difficult for them to see that it matters.

Our own experience is that the rubric must be referred to consistently in class. We must intentionally bring it to students' attention many times during the course of a particular assessment. For example, we might take a few minutes at the beginning of each class to review one of the characteristics that will be graded using the rubric (i.e., one of the rows of the rubric). The goals are to remind students that this characteristic is an important quality to de-

velop in their work and to foster discussion leading to students' understanding of standards.

As mentioned in the previous section, when we provide examples of previous students' work, we also help clarify the different levels of achievement in the rubric. Examples serve as benchmarks or models for work that is unacceptable, acceptable, or excellent.

Another way to provide intermediate feedback is to rate students' work when it is almost completed but while there is still time to revise it. We advise that this be done only after students have made every effort to do the best they can. It is not good use of a professor's time if students make a quick first attempt at meeting requirements and then pass their work by the professor for a complete review.

In fact, one way to encourage students to take their work seriously is to require them to judge their own work using the rubric, handing in their ratings with their product. This practice sends a message to students that ownership of their own learning is respected and valued. It also helps them create a better final product.

Figure 6-5 is one example of a rating form that professors and students might use to record their evaluations of students' work. (Many other formats could be developed.) This sample form is intended to be used with the Engine Design Rubric (Figure 6-2), and on the top of the form, the rating scale from the rubric is listed. The first criterion, Engineering Skill Utilization, along with its three components (analysis, documentation, and assumptions) are also listed, along with descriptions of the most proficient performance for each component (taken from the rubric), a place to put the numerical rating, and a few lines for comments. (A real form would include all the criteria in the Engine Design Rubric, but in Figure 6-5, only Engineering Skill Utilization is shown.)

Using rubrics is clearly an example of how the professor's time is used differently in a learner-centered course than in a traditional course. Although we may be reluctant at first to devote time to scoring students' work before it is completed, the improvement in student learning that results should make the extra time worthwhile. Also, even though more time is spent evaluating student work during the project or course, evaluation at the end is more efficient. Because we become familiar with the work our students are doing during the project or course, each subsequent judging goes much faster than the previous one. In addition, by the end, the class as a whole should be producing higher quality work that is easier to evaluate and more pleasurable to read and review.

The ultimate use of the rubric is to generate a final score for the student's work. Using the numerical rating scale built into the rubric, we can rate each characteristic listed in the rubric and sum the ratings for a final score. Some characteristics may be more important than others, and these may be weighted

Use the following scale to rate how well the project achieves the following criteria.

- 4 Excellent
- 3 Good
- 2 Needs Improvement
- 1 Unacceptable

#### Criteria

##### *Engineering Skill Utilization*

*Analysis:* Engineering analysis is detailed and challenging and is used at every stage of the design process.

Rating: \_\_\_\_\_ Comments: \_\_\_\_\_

*Documentation:* Documentation is thorough and complete.

Rating: \_\_\_\_\_ Comments: \_\_\_\_\_

*Assumptions:* All assumptions are stated and justified.

Rating: \_\_\_\_\_ Comments: \_\_\_\_\_

**FIGURE 6-5 Sample Rating Form for Engine Design Project Rubric**

more heavily than others. The total score can be added to the set of other scores the student has earned in the course for eventual computation of the student's final course grade.

As mentioned in the previous section, when rubrics are used to judge students' work and more than one individual is involved in the judgment, (i.e., when the course is team-taught or when there are graduate assistants), it is important that the raters work together to develop the same perspective when grading. This is because grades carry with them important consequences for students. When students receive different scores, it should be because they have reached different achievement levels, not because their work was judged by different people. A high score should indicate high quality work, not a more lenient judge.

Herman, Aschbacher, and Winters (1992) point out that consistent scoring is best achieved by developing a scoring guide that includes the following:

- fully explicated scoring criteria (i.e., a carefully developed rubric);
- examples or models illustrating each level of achievement (these can be taken from the professor's file of past students' work);
- an abbreviated, one-page version of the criteria to refer to during actual rating; and
- a sample form for recording scores (see Figure 6-5).

Herman *et al.* (1992) also advocate training sessions in which raters discuss the criteria in the rubric to ensure a common understanding of their meaning. Raters should practice rating students' work together, discussing their judgments and resolving differences following the rating of each piece of work. They can also practice recording and summing scores as intended. When an acceptable level of agreement in rating has been reached, training sessions can end and actual rating begin.

#### Reflections

*As you create your own meaning from the ideas in this section, begin to think about . . .*

- Do I judge student work only when it's completed or do I review and critique it as it is being developed?
- How would I go about discussing rubrics with students during class?
- What benefits do I see in having students judge their own work with the rubric before turning it in for a grade?
- Am I confident that I apply the same criteria to all students' work when I grade or is there a possibility that my criteria shift as I work through the papers or projects? How would rubrics help?
- How would rubrics help standardize grading in multi-section courses?

#### DEVELOPING USEFUL RUBRICS

We suggest asking yourself the six questions in Figure 6-6 when attempting to develop useful rubrics. Answering these questions should allow you to create a rubric that can be used in a variety of situations to address a general ability or skill. The Oral Communication rubric in Figure 6-1 is an example of this type of rubric. When a rubric is being designed for a particular assessment that will introduce elements that are unique to the context created in the assessment task, additional questions should be asked, and we will discuss them subsequently.



Question	Action
1. What criteria or essential elements must be present in the student's work to ensure that it is high in quality?	Include these as rows in your rubric.
2. How many levels of achievement do I wish to illustrate for students?	Include these as columns in your rubric and label them.
3. For each criterion or essential element of quality, what is a clear description of performance at each achievement level?	Include descriptions in the appropriate cells of the rubric.
4. What are the consequences of performing at each level of quality?	Add descriptions of consequences to the commentaries in the rubric.
5. What rating scheme will I use in the rubric?	Add this to the rubric in a way that fits in with your grading philosophy.
6. When I use the rubric, what aspects work well and what aspects need improvement?	Revise the rubric accordingly.

FIGURE 6-6 Developing Useful Rubrics: Questions to Ask and Actions to Implement

Six Questions to Ask When Constructing a Rubric

1. What criteria or essential elements must be present in the student's work to ensure that it is high in quality? These should be the criteria that distinguish good work from poor work. Include these as rows in your rubric. Figure 6-7 illustrates this step using a subset of the criteria in Figure 6-3.

When answering this question, it is important to focus on components that contribute to quality (Johnson, 1996) and avoid simply identifying aspects that are easy to evaluate.

Wiggins suggests a rule of thumb for ensuring the quality of rubric criteria: If a student can achieve a high score on all the criteria and still not perform well at the task, you have the wrong criteria. For example, criteria for writing an analytical essay might focus on organization, mechanics, and accuracy. But if the finished piece doesn't have an impact on the reader through its novelty or insight, it hasn't really achieved its purpose (O'Neil, 1994, p. 5).

It is not uncommon to see first attempts at rubrics that include superficial criteria such as whether the student formatted a paper correctly or stayed within length guidelines. These may be good requirements to have, but conforming to them doesn't ensure excellent work.

In order to identify the way high quality work or performance is defined in your discipline, you might consider talking with colleagues or practition-

	Levels of Achievement			
Criteria				
Understanding				
Economic Principles				
Significance				
Analysis				
Quality				

FIGURE 6-7 Determining the Criteria that Characterize Excellent Work

ers in the field or doing a literature search. The article in the Appendix at the end of this chapter (Aldridge, 1997) is a brief discussion of teamwork that appeared in an engineering journal. It simply and clearly defines and describes eight components that comprise effective teamwork, a learning outcome that is becoming increasingly important in the education of engineers and students in many other fields. This article would be an excellent place to start when developing a rubric on teamwork.

Another strategy is to review samples of excellent work produced by experts in the field or even by your own students (Herman, Aschbacher, & Winters, 1992). Note the characteristics that make them exemplary and use them as criteria in your rubric.

Example: In his rubric (Figure 6-2), Professor Van Gerpen challenges his students to make oral presentations that interest and inform audiences. These qualities are central to effective public speaking, and Van Gerpen does not shy away from evaluating them. He also evaluates the number of visual aids and the length of the presentation, but he does not rely on these easy-to-measure characteristics alone.

Teamwork is another important process that students will use to complete the task, and developing skills in this area is important to Van Gerpen. Even though teamwork is difficult to evaluate, Professor Van Gerpen identifies several aspects that, in his opinion, make a difference between effective and ineffective teamwork. As he continues to teach and evaluate teamwork skills, his criteria may change over time. Factors that will help him understand more clearly the key components of teamwork include conferring with colleagues and reading available literature like the article by Aldridge (1997) in the Appendix.



2. How many levels of achievement do I wish to illustrate for students? Include these as columns in your rubric and label them. Figure 6-8 illustrates this step.

Although column headings should generally describe a range of achievement varying from excellent to unacceptable, a variety of descriptors can be used. Terms could be selected from sets like the following:

- sophisticated, competent, partly competent, not yet competent (NSF Synthesis Engineering Education Coalition, 1997);
- exemplary, proficient, marginal, unacceptable;
- advanced, intermediate high, intermediate, novice (American Council of Teachers of Foreign Languages, 1986, p. 278);
- distinguished, proficient, intermediate, novice (Gotcher, 1997);
- accomplished, average, developing, beginning (College of Education, 1997).

*Example:* As mentioned previously, Figures 6-2 and 6-3 include four levels of achievement. Most professors find it easiest to use the format in Figure 6-1 and begin with three levels of achievement, representing excellent, acceptable, and unacceptable work. After using the rubric, one can expand these levels in order to make finer distinctions.

3. For each criterion or essential element of quality, what is a clear description of performance at each achievement level? Include descriptions in the appropriate cells of the rubric. (See Figure 6-9 in which two cells have been completed.)

Criteria				
Understanding of Economic Principles				
Significance of Economic Problem				
Feasibility of Proposed Bill				

FIGURE 6-8 Deciding on the Levels of Achievement to Use

	Levels of Achievement			
Criteria	Exemplary	Proficient	Acceptable	Unacceptable
Understanding of Economic Principles	Your bill contains information which conforms to the correct application of principles of economics. The reader can tell that you understand the principles.			
Significance of Economic Problem				
Feasibility of Proposed Bill				

FIGURE 6-9 Developing Commentaries for Each Cell in the Rubric

When developing descriptions, avoid undefined terms (e.g., the student's work is "significant," "trivial," "shows considerable thought") or value-laden terms (e.g., the student's work is "excellent" or "poor") in the commentary sections of a rubric. Such undefined terms tell students where they stand with the person judging, but they give little guidance for getting better when needed. They also imply that there is a "right answer" that hasn't been revealed. Objective descriptions of characteristics of work are needed.

Also, try to determine the *qualitative* differences that characterize work or performance at the different levels of quality.

*Too often, rubrics suggest only that poor work has "less" of the same types of qualities as better work. "It's ultimately lazy just to use comparative language; it stems from a failure to keep asking for the unique features of performances," says Grant Wiggins (O'Neil, 1994, p. 5).*

**Example:** For the most part, the commentaries in Figures 6-1 through 6-3 include clear descriptions. For example, in the last section of Figure 6-2 (oral communication skills) Professor Van Gerpen successfully avoids describing the students' oral presentation in vague, undefined terms. Rather than telling students that their presentations are "effective," "somewhat effective," "somewhat ineffective," or "ineffective," he informs students about several specific characteristics of a good oral presentation. A good oral presentation is interesting and well organized. Visual aids are easy to read and understand, and they are used frequently. The presentation is not too long or too short. Engineering analysis is somewhat detailed but not to the point of insulting the audience. By giving students feedback on the dimensions of interest, organization, quality of visual aids, frequency of visual aids, length of presentation, and level of detail, Van Gerpen provides direction for improvement.

Another example, not shown in the figures, illustrates an attempt to avoid comparative language in favor of qualitative differences in levels of achievement. A graduate faculty representing several areas of education were developing a rubric on leadership and attempting to describe levels of achievement for the criterion "practicing the ethical standards of the chosen discipline." It was pointed out that comparative language such as "acts in a highly ethical manner," "acts in a somewhat ethical manner," and so on, would not reflect the professional demand to *always* act ethically. In a sense, in real life, there are only two meaningful levels of achievement—ethical and not ethical. After the professors discussed this issue at length, they were successful in developing the following *qualitative* descriptions of the criterion in a way that allowed them to differentiate among students while being true to the standards of the discipline.

### **Criterion: Practicing Ethical Standards of the Chosen Discipline**

**Exemplary:** Acts congruently with and advocates for the ethical standards of chosen discipline.

**Proficient:** Acts congruently with the ethical standards of chosen discipline.

**Marginal:** Acts within the ethical standards of chosen discipline. Any violations are relatively minor.

**Unacceptable:** Violates ethical standards of chosen profession. Violations are serious.

Professor Van Gerpen achieves a qualitative scale in the following descriptions.

### **Criterion: Team Skills—Group Functioning**

**Excellent:** The group functions well. Peer review indicates good distribution of effort. All members are challenged and feel their contributions are valued.

**Good:** The group functions fairly well. Some people in the group believe they are working harder (or less hard) than others, but everyone is contributing.

**Needs Improvement:** The group is still functioning, but each individual is doing his/her own work and ignoring the efforts of others. There are frequent episodes where one person's design will not fit with another's due to lack of communication.

**Unacceptable:** The group functions poorly. All work is the product of individual efforts.

Another example of qualitative differences in achievement is shown in Professor Calvin's rubric.

### **Criterion: Knowledge of Past Economic Decisions**

**Exemplary:** Your bill reflects economic decisions which have worked in the past, is based on research involving comparisons of previous eras, and makes reference to actual events.

**Proficient:** Your bill reflects economic decisions which have worked in the past, but your examples are limited. More examples would make your bill easily understood by the reader.

**Acceptable:** Your bill makes little reference to precedents from the past. You need to add some to help the reader decide if the bill would work and should be passed into law.

*Unacceptable:* Your bill makes no reference to precedents from the past. The reader is left wondering if you know what past economic and political practice has been.

4. *What are the consequences of performing at each level of quality?* Add descriptions of consequences to the commentaries in the rubric.

*Example:* In the descriptions inserted in Figure 6–9, note that consequences are included. Students are informed that if they apply economic principles correctly, their expertise will be apparent to readers. If they choose to address a significant economic problem with macro application, they will have succeeded in pursuing legislation beneficial to the majority of the American people.

Also notice that in the oral communication rubric (Figure 6–1), students are reminded that when oral presentations are not well organized or communication aids are not professional, listeners get confused. If the speaker’s understanding of content is superficial or inaccurate, listeners gain little information or may actually be misled. When language reveals bias, listeners will be offended. On the other hand, by deliberately attending to various elements of the rubric, students can design a presentation that helps listeners follow the reasoning, creates an atmosphere of comfort for all, and expands listeners’ knowledge.

5. *What rating scheme will I use in the rubric?* Add this to the rubric in a way that fits in with your grading philosophy. You may wish to weight some criteria in the rubric more than others.

*Example:* Returning to Figure 6–3, notice that Professor Calvin uses a rating scale from 0–6 (Figure 6–3). She gives no credit for unacceptable work, but she allows herself a two-point range within each of the levels of acceptable, proficient, and exemplary. Each of the six characteristics in the rubric is evaluated using this scale, providing for total scores that can range from 0 to 36.

For each of the criteria in his rubric, Professor Van Gerpen gives scores of 4, 3, 2, and 1, corresponding to letter grades of A, B, C/D, and F, for work that is Excellent, is Good, Needs Improvement, or is Unacceptable in quality (Figure 6–2). If Professor Van Gerpen wished to weight some criteria more than others, he could redesign the rubric so that each section would have its own rating scale. For example, he could give twice as much weight to the criteria in the first three sections related to use of disciplinary content (Formulation of Design Problem, Engineering Skill Utilization, and Extension of Knowledge About Internal Combustion Engines) by using the scale 8, 6, 4, and 2 for these sections, while rating the rest of the criteria with the 4, 3, 2, 1 scale.

Another way to achieve differential weighting is shown in Figure 6–10 in which weighting factors are built into a redesign of the rating form shown in Figure 6–5. In this figure, stating and justifying assumptions is weighted twice as heavily as documentation, and engineering analysis is weighted two and a half times as heavily as documentation.

Use the following scale to rate how well the project achieves the following criteria.

4

Excellent

3

Good

2

Needs Improvement

1

Unacceptable

Criteria

Engineering Skill Utilization

Analysis: Engineering analysis is detailed and challenging and is used at every stage of the design process.

Rating:  x 2.5 =  Comments:

Documentation: Documentation is thorough and complete.

Rating:  Comments:

Assumptions: All assumptions are stated and justified.

Rating:  x 2 =  Comments:

FIGURE 6–10 Incorporating Weighting Factors into Sample Rating Form for Engine Design Rubric

6. *When I use the rubric, what aspects work well and what aspects need improvement?* Revise the rubric accordingly.

One way to identify aspects of the rubric that need improvement is to use the rubric to evaluate a sample of student work. Does the rubric help you distinguish among the levels of quality in the sample? Do the criteria seem to be appropriate? Are there too many or too few levels of achievement specified? Are there any descriptions that are incomplete or unclear? Another approach to testing the rubric is to ask for a friendly review by a program advisory committee or an informal group of colleagues.

*Example:* After interviewing Vicki Spandel, a performance assessment trainer, O’Neil (1994) points out

The rubric Spandel uses to evaluate writing has been through 12 revisions. Originally, criteria for sentence fluency had teachers counting the number of complex and compound sentences in student work. "Hemingway wouldn't have gotten very far" with such criteria, Spandel points out. Now the criteria refer to such elements as variety of sentence beginnings and sentence length, and how the sentence plays to the ear. The criteria "are constantly being refined and reshaped just a little bit to more closely resemble what we actually see in student writers at work," Spandel says (p. 4).

Additional Questions to Consider

Frequently, rubrics are developed for use with specific assessments, as is illustrated in Figures 6-2 and 6-3. When this is done, the following additional questions, shown in Figure 6-11, should be asked.

1. What content must students master in order to complete the task well? Develop criteria that reflect knowledge and/or use of content and add them to the rubric.

Examine the intended learning outcomes you are assessing, as well as the specific assessment task you are assigning (e.g., performance, project, product, portfolio, paper, or exhibition). What do you intend students to know, understand, or be able to do?

Example: Professor Calvin's intended outcomes (1995) are as follows.

- Students will understand the relationship between economic concepts and informed political action and will use this knowledge in solving problems faced by active citizens in a democracy.

- Students will understand that economic and political actions affect society as a whole and that informed action requires a broad point of view rather than narrow self-interest.
- Students will analyze political and economic statements and actions carried out by leadership in various areas of the public and private sector and use this analysis to make informed choices (Calvin, 1995).

The task she assigns students is as follows:

Create a national economic program and present it to the class as a bill to be considered by Congress. In preparing the bill, compare and contrast economic programs during presidential administrations from Johnson through Clinton. Analyze the three branches of government as they have applied to national economic policies. Focus on the War on Poverty under Johnson, its modifications, and Clinton's "Contract with America" (Calvin, 1995).

Content areas specified in Professor Calvin's outcomes and assessed in her task include economic principles, economic problems and their significance, and economic programs from Johnson through Clinton.

2. Are there any important aspects of the task that are specific to the context in which the assessment is set? Identify skills and abilities that are necessary in this context and add related criteria to the rubric.

Example: Although Professor Calvin's chief goal in her assessment is to have students reveal their knowledge of economic principles and programs, she adds a real-life element to the assessment by having them formulate their ideas in a bill to be considered by Congress. Thus, students' knowledge in the area of writing bills is also evaluated in the rubric.

3. In the task, is the process of achieving the outcome as important as the outcome itself? Include and describe criteria that reflect important aspects of the process.

Example: Because the ability to work in teams is an important goal of engineering curricula, Professor Van Gerpen decides to assess his students' ability to work as a team throughout the development of their project.

Question	Action
1. What content must students master in order to complete the task well?	Develop criteria that reflect knowledge and/or use of content and add them to the rubric.
2. Are there any important aspects of the task that are specific to the context in which the assessment is set?	Identify skills and abilities that are necessary in this context and add related criteria to the rubric.
3. In the task, is the process of achieving the outcome as important as the outcome itself?	Include and describe criteria that reflect important aspects of the process.

FIGURE 6-11 Additional Questions/Actions When Developing Rubrics for Specific Assignments

Reflections

As you create your own meaning from the ideas in this section, begin to think about . . .

- How could I make the procedure for developing rubrics work for me?

- What materials do I already have that could be used in preparing rubrics?
- What questions do I have about rubrics?

## QUESTIONS THAT EMERGE AFTER USING RUBRICS

### *Do all rubrics have to look alike?*

The steps explained in the previous section result in well-developed rubrics that describe the defining characteristics of student work or performance at various levels of quality. This level of detail can be very helpful to students who are trying to understand what is desirable and undesirable about the work they have produced. For the novice, knowing the characteristics of work that is considered poor or unacceptable can be just as helpful as knowing the characteristics of work that is acceptable or exemplary.

As students become more familiar with the criteria used in judging their work, it may be possible to develop an abbreviated form of the rubric. The rating form in Figure 6-5 is, in effect, an abbreviated form of the rubric in Figure 6-2. In this shortened rubric, the characteristics of exemplary work are described, and students are judged on a Likert scale according to how well they have achieved this level. Of course, for students whose work does not correspond well with the description, there is little guidance about what the shortcomings are and how to correct them. The brief section for comments in Figure 6-5 might help in this regard because professors or peers could describe the type of improvements that are needed.

This abbreviated form could also be used in conjunction with a completely developed rubric. Both professors and students could have the completely developed rubric in their possession for reference, and the abbreviated form could be used for giving feedback more simply.

### *Do you even need rubrics in an advanced learner-centered culture?*

After students have taken many courses in a learner-centered culture, they will undoubtedly begin to internalize the standards against which their work is evaluated. This is especially true when faculty in a program or at an institution work together to develop common learner outcomes and common definitions of desirable characteristics in student work or performance—in other words, when faculty use common rubrics across courses. In this type of environment, less reliance on written rubrics will probably develop as students progress through the program.

As discussed in Chapter 4, faculty at Alverno College have developed an institutional learning environment in which common learning outcomes and common assessment criteria are considered extremely important. At Alverno,

*we find that students at the start need very explicit criteria. They are trying to figure out what they are supposed to do . . . While students see highly detailed directions as "picky," they see broader directions as vague."*

*After a semester or two, students begin . . . to recognize that the criteria are related, that they come together to define an ability . . . that making inferences and supporting them with data are not complete steps in themselves, but are part of the ability to think critically . . .*

*At more advanced stages . . . students have begun to develop their own understanding of an ability, and specified criteria serve to supplement what learners have internalized . . . At this level, criteria can be stated holistically. For example, a student might be told that "thorough analysis" is a criterion for her performance. Both student and teacher understand that "thorough analysis" means applying a framework, identifying elements and relationships, supporting inferences with evidence, and so on (Loacker, Cromwell, & O'Brien, 1986, pp. 51–52).*

Less reliance on external, formal rubrics in an advanced learner-centered culture is not a step back to a traditional teaching environment, however. In that environment, standards are private or unformulated, and students have to guess what they are. In an advanced learner-centered culture, standards are known and publicly shared to the point that they may not need to be written down.

### *Should the criteria in a rubric change as learners become more advanced in an area?*

If rubrics are based on the criteria that distinguish expert and novice work in a discipline, then they should not change as students progress. However, students' understanding of criteria may develop over time, as discussed by Loacker *et al.* (1996) in the previous section, and this will lead them to use rubrics in increasingly sophisticated ways.

On the other hand, if professors have not yet identified the key criteria distinguishing expert and novice work in their disciplines, they will find that they need to change the criteria in their rubrics as their understanding of the distinguishing characteristics of work in their field increases. It is not unusual to start developing and using rubrics, only to find that some students get relatively high ratings on the criteria in the rubric, even though their work is not really outstanding. As discussed in an earlier section, this is an indication that the criteria in the rubric are based on rather superficial aspects of quality, rather than on the characteristics that distinguish truly good work from truly inadequate work.

### ***Can rubrics be used to judge thinking processes and the affective component of learning, as well as skills and achievements?***

Marzano, Pickering, and McTighe (1993) have developed several rubrics that address the five categories of lifelong learning outcomes (they use the term lifelong learning standards) discussed in Chapter 4: complex thinking, information processing, effective communication, cooperation/collaboration, and effective habits of mind. Their rubrics clearly show that criteria can be developed for aspects of learning dealing with how students think and feel about learning.

For example, Marzano *et al.* (1993) view problem solving as an attempt to reach a desired outcome when there are obstacles or constraints blocking the way. When we solve problems, we try out strategies or products that will help us overcome the barriers.

According to the authors, problem solving involves four components. The first is accurately identifying the obstacles or constraints in our way, and the second is identifying a variety of feasible methods for overcoming them. The third is trying out the methods, and the fourth is being able to evaluate them. Evaluation includes describing the methods accurately, justifying why they were tried in the order chosen, and explaining their effectiveness in overcoming the obstacles or constraints. Figure 6-12 presents a rubric for these components. Note that there are four levels of achievement, but the authors chose not to label them.

In the area of Habits of Mind, Marzano *et al.* (1993) identify 15 cognitive and affective components listed in Chapter 4 of this book. Learners who have developed effective habits of mind exhibit intellectual and emotional dispositions that support learning. Developing habits of mind is related to the topic of metacognition discussed in Chapters 7 and 8.

Figure 6-13 is a rubric comprised of three of Marzano *et al.*'s (1993) components of Habits of Mind. The first criterion shown addresses the degree to which a learner is aware of his or her own thinking. Learners who are aware of how they think are more able to improve the way they learn. The second addresses the degree to which the learner is open-minded and receptive to new knowledge or differing points of view. The third addresses the extent to which learners carefully consider situations and the need for more information before taking action.

### ***Is it possible to drown in all the rubrics you might need to develop?***

As we begin to develop rubrics for a variety of applications in a variety of courses, we may find that we need some way to organize and manage them. Each rubric will have some criteria that overlap with those in other rubrics,

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#### ***Accurately identifies constraints or obstacles***

- 4 Accurately and thoroughly describes the relevant constraints or obstacles. Addresses obstacles or constraints that are not immediately apparent.
- 3 Accurately identifies the most important constraints or obstacles.
- 2 Identifies some constraints or obstacles that are accurate along with some that are not accurate.
- 1 Omits the most significant constraints or obstacles.

#### ***Identifies viable and important alternatives for overcoming the constraints or obstacles.***

- 4 Identifies creative but plausible solutions to the problem under consideration. The solutions address the central difficulties posed by the constraint or obstacle.
- 3 Proposes alternative solutions that appear plausible and that address the most important constraints or obstacles.
- 2 Presents alternative solutions for dealing with the obstacles or constraints, but the solutions do not all address the important difficulties.
- 1 Presents solutions that fail to address critical parts of the problem.

#### ***Selects and adequately tries out alternatives.***

- 4 Engages in effective, valid, and exhaustive trials of the selected alternatives. Trials go beyond those required to solve the problem and show a commitment to an in-depth understanding of the problem.
- 3 Puts the selected alternatives to trials adequate to determine their utility.
- 2 Tries out the alternatives, but the trials are incomplete and important elements are omitted or ignored.
- 1 Does not satisfactorily test the selected solutions.

#### ***If other alternatives were tried, accurately articulates and supports the reasoning behind the order of their selection and the extent to which each overcame the obstacles or constraints.***

- 4 Provides a clear, comprehensive summary of the reasoning that led to the selection of secondary solutions. The description includes a review of the decisions that produced the order of selection and how each alternative fared as a solution.
  - 3 Describes the process that led to the ordering of secondary solutions. The description offers a clear, defensible rationale for the ordering of the alternatives and the final selection.
  - 2 Describes the process that led to the ordering of secondary solutions. The description does not provide a clear rationale for the ordering of the alternatives, or the student does not address all the alternatives that were tried.
  - 1 Describes an illogical method for determining the relative value of the alternatives. The student does not present a reasonable review of the strengths and weaknesses of the alternative solutions that were tried and abandoned.
- 

(Source: McREL Institute)

**FIGURE 6-12 Problem-Solving Rubric**



### Is aware of own thinking.

- 4 Consistently and accurately explains in detail the sequence of thoughts he or she uses when faced with a task or problem, and provides analyses of how an awareness of own thinking has enhanced his or her performance.
- 3 Consistently and accurately describes how he or she thinks through tasks or problems and how an awareness of own thinking enhances his or her performance.
- 2 Sporadically but accurately describes how he or she thinks through tasks or problems and how an awareness of own thinking enhances his or her performance.
- 1 Rarely, if ever, accurately describes how he or she thinks through tasks or problems or how an awareness of his or her thinking enhances performance.

### Is open-minded.

- 4 Consistently seeks out different and opposing points of view and considers alternative views impartially and rationally.
- 3 Is consistently aware of points of view that differ from his or her own and always makes a concerted effort to consider alternative views.
- 2 Is at times aware of points of view that differ from his or her own and sporadically makes an effort to consider alternative views.
- 1 Rarely, if ever, is aware of points of view that differ from his or her own and seldom makes an effort to consider alternative views.

### Restrains impulsivity.

- 4 Consistently and carefully considers situations to determine if more study is required before acting; when further study is required, engages in detailed investigation before acting.
- 3 Consistently considers situations to determine whether more study is required before acting; when further study is required, gathers sufficient information before acting.
- 2 Sporadically considers situations to determine whether more study is required before acting; when further study is required, sometimes gathers sufficient information before acting.
- 1 Rarely, if ever, considers situations to determine whether more study is required before acting; when further study is required, usually doesn't gather sufficient information before acting.

(Source: McREL Institute)

FIGURE 6-13 Habits of Mind Rubric

as well as criteria that are unique to the application. Thus, it may be helpful to develop a population of criterion descriptions from which one can pick and choose when developing a new rubric. Strategic Learning Technologies has developed a software package called The Rubricator to assist with this process, and information about it can be found on the World Wide Web (<http://www.sltech.com/>).

### Reflections

*As you create your own meaning from the ideas in this section, begin to think about . . .*

- Which of the issues raised by these questions are the most significant for me?

- What other questions do I have about using rubrics that this chapter has not addressed?
- How can I modify my schedule so that I find time to develop rubrics?

## ENHANCING THE PROCESS OF GIVING FEEDBACK TO STUDENTS

This book has stressed the importance of creating learner-centered environments in which we treat students with respect as people and as learners. Increased dialogue between us and our students contributes to developing a respectful learner-centered environment. Rather than "giving" feedback to students, we engage in feedback discussions with them. Through these discussions, we coach and facilitate, helping students to construct their own understanding of their disciplines.

One of the most important discussions we can have with a student is a dialogue about the student's progress in learning. Just as we need feedback to improve our teaching (Chapter 5), so students need continuous feedback to acquire the information they need to improve. Rubrics can form the basis for many important conversations with our students in which we discuss progress toward known criteria.

However, as Wiggins (1997, 1998) points out, feedback is too often associated with criticism, and conversations in which students feel that they are being evaluated rather than guided inhibit their ability to "hear" the message being sent. Figure 6-14 presents 12 guidelines for participating in effective feedback discussions (Cormier & Cormier, 1985; Johnson, 1972; McKeachie, 1976; Stewart, 1997; Trotter, 1989; Wiggins, 1997, 1998). Although many derive from guidelines for counselors, they apply remarkably well to educational settings. Following these guidelines can help us carry on mutually satisfying conversations with students that lead to improved learning.

First and foremost, we should engage in feedback discussions with students, and our motivation should be to help, not hurt. A conversation in which we and our students share our perspectives about the student's progress and explore ways to improve is more satisfying and productive than one in which we give advice (Wiggins, 1997, 1998).

In addition, we should schedule feedback discussions in a timely manner, during as well as after assessment.



1. Engage in feedback discussions to help, not hurt.
2. Share information and explore alternatives. Don't give advice.
3. Schedule feedback discussions in a timely manner, during as well as after assessment.
4. Create a climate in which feedback is solicited rather than imposed.
5. Take into account the needs of the learner.
6. Share the amount of information the student can use. Avoid the temptation to share all the information you wish to send.
7. Focus on behaviors, not the person.
8. Focus on behaviors or characteristics you observe rather than those you infer.
9. Focus on specifics rather than on generalities.
10. Discuss behavior over which the student has control.
11. Ask questions that help students understand themselves as learners.
12. Be sure that you and the student have really understood each other. Paraphrase each other's ideas.

#### FIGURE 6-14 Guidelines for Effective Feedback Discussions

*The chief finding from the Harvard Assessment Seminar about the most effective courses at Harvard, as judged by students and alums, was the importance of quick and detailed feedback . . . A second major finding was that an overwhelming majority of students were convinced that their best learning takes place when they have a chance to submit an early version, get detailed feedback and criticism, and then hand in a final version (Wiggins, 1997, p. 35).*

When conversations with us are nonthreatening experiences in which students come away with insights about their learning and their progress, they are more likely to seek them out, making the feedback more useful.

Before a feedback discussion, we should review the student's current needs as a learner and plan to discuss only information the student can use at the time. After all, learners themselves must construct their own understanding of how they are doing and what they need to do next. According to Wiggins (1997, 1998), feedback is not the same as guidance; rather, feedback is conversation leading to a description of where students are relative to where they want to be. This means that, at times, we may have to avoid the temptation to share all the information and insights we have developed about students' progress.

During the discussion, the focus should be the student's work and behaviors rather than the student's personal characteristics. The behaviors should be those we observe rather than those we infer. It is helpful when feed-

back is specific—and thus more understandable—and if it is directed toward behavior that can be modified, behavior over which the learner has control. Following these guidelines minimizes any potential threat that students may perceive and allows them to become more fully engaged in the conversation.

Questioning is a powerful tool we can use to help students create their own understanding of their learning and progress. Questioning can also help us understand how and what students have learned. Figure 6-15 presents several types of questions that can be asked to help students consider not only issues related to the topic of their assignment (in this case, Business), but also issues related to completing the assignment (e.g., teamwork, use of the library, oral presentation of findings, and so forth).

Open-ended questions help us understand how students mentally organize information. They also prompt students to share their thoughts about, and reactions to, their work. Answers to diagnostic questions reveal whether or not, or to what extent, students have thought critically and insightfully about their work, and answers to information-seeking questions reveal students' knowledge of facts and concepts. Challenge questions require students to defend their arguments, and action questions and questions on priorities lead them to plan ahead. Prediction questions assist students in anticipating what will happen as a consequence of certain actions, and hypothetical questions help students look beyond their work to understand its implications. Questions of generalization prompt them to abstract some general principles about their discipline from their experiences or to develop a clearer understanding of themselves as learners.

Finally, it is important that we and our students really understand each other. Paraphrasing the other person's ideas helps ensure that we understood them. Summaries emphasize the most salient points of a discussion and bring it to closure.

#### Reflections

*As you create your own meaning from the ideas in this section, begin to think about . . .*

- On which characteristics do I need to improve?
- How skillful am I in using the questioning techniques in Figure 6-15?
- How could I get better?
- How do I tend to give feedback to students?
- Which of the guidelines for effective feedback discussions in Figure 6-14 describe what I typically do?

Open-ended questions	What are your reactions to the Microsoft case? What aspects of this problem were of greatest interest to you? Where should we begin? What are the most important environmental variables? In terms of your progress on this assignment, what are you particularly pleased about? What concerns do you have?
Diagnostic questions	What is your analysis of the problem? What conclusions did you draw from these data? Why do you think your team is having difficulty working together? Why were you so successful in developing this solution to the problem?
Information-seeking questions	What were interest rates at the time? What was the rate of inflation? What was the economic situation? How often did your team meet? What group problem-solving strategies did you use?
Challenge questions	Why do you believe that? What evidence supports your conclusion? What evidence is contrary to your argument?
Action questions	What needs to be done to implement this recommendation? Who needs to do what in order for it to work?
Questions on priorities	Given the limited resources, what step should be taken first? Second? Third? You mentioned that there are three aspects of your paper that you still need to work on. Which one will you address first? Why?
Prediction questions	How do you think employees would react to this action? What do you anticipate the board's response to be? How comfortable will you feel presenting your findings to the class?
Hypothetical questions	What would have happened if a strike had been called by the union? How do you think management might have reacted if there had not been a change in top leadership? How would your project be different if you had spent more time researching your topic in the library?
Questions of extension	What are the implications of your conclusions for the community in which this business is located? How would the business community react to your recommendations? If you succeed in developing your work so that it has all the "exemplary" qualities outlined in the rubric, what will that mean to you?
Questions of generalization	Based on your study of computer and telecommunications industries, what do you consider to be the major opportunities and threats? Based on the opportunities you have had to reflect on your learning, how do you assess your ability to complete a long-term project?

(Adapted from Christensen, 1991, p. 159)

**FIGURE 6-15** Questioning Techniques to Support Useful Feedback Discussions

## LOOKING AHEAD

Rubrics can be used with a variety of types of assessments. Chapter 7 discusses assessments that we can use to evaluate students' ability to think critically and solve real-world problems. Such assessments require that students master disciplinary content and demonstrate that they can use it by employing other important skills in the areas of inquiry, communication, and cooperation. The chapter presents characteristics of effective assessment tasks, as well as a step-by-step approach to developing them.

## TRY SOMETHING NEW

1. Using the procedure described in this chapter, develop a rubric you can use in your courses.
2. Involve students in critiquing and contributing to the rubric you develop.
3. Identify a situation in which you can use the rubric to *educate* students about the qualities of excellent work. After using the rubric, list some ways that the rubric can be improved and revise it accordingly.
4. Identify a situation in which you can use the rubric to *judge* student work. After using the rubric, list some ways that the rubric can be improved and revise it accordingly.
5. Review the guidelines for effective feedback discussions, and plan how you will implement them in an upcoming meeting with a student. After meeting with the student, reflect on the guidelines you used successfully and identify those areas in which you need to improve.
6. Review the different types of questions in Figure 6-15 that can be used for various purposes. Plan to use questions to engage students in the learning process.

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## APPENDIX

### Team Players

#### M. Dayne Aldridge

Effective teamwork doesn't just happen naturally, says M. Dayne Aldridge, associate dean of engineering at Auburn University, who along with seven other Auburn faculty members recently developed a course on interdisciplinary teaming. The Auburn group encourages its students to practice the following behaviors associated with effective teamwork.

**1. Collective Decision Making.** Effective teams discuss decisions that impact the team, and they generally reach decisions by consensus. Ineffective teams make decisions by fiat when one team member strongly asserts a position and no one objects verbally, even though some disagree silently.

**2. Collaboration/Interchangeability.** On effective teams, members help one another with the team's work, even when the tasks are outside a member's area of disciplinary expertise (this is known as interchangeability). On ineffective teams, members tend to work independently and will not do a task if it appears to fall outside their area of expertise or functional role.

**3. Appreciation of Conflicts/Differences.** Effective teams expect conflicts and differences of opinion and openly address and resolve them, using them as a way to explore alternatives and improve decisions. On ineffective teams, members avoid conflict in an attempt to preserve surface agreement.

**4. Balance of Participation.** On effective teams, members balance the team's time demands with their other responsibilities. Team members accept and help compensate for circumstances that require a team member to temporarily reduce his or her efforts. On ineffective teams, one or two members do most of the work, resent it, but never confront members whose level of effort is low.

**5. Focus.** Effective teams focus on their key goals and objectives and pace themselves accordingly. When the team falls behind in a certain area, everyone pitches in to get back on schedule. Ineffective teams spend too much time on early tasks and find they have little time when deadlines approach. When progress is not being made in a given area, everyone notices, but no one offers to help out.

**6. Open Communication.** Members of effective teams let each other know what is happening that might affect the team's work. They inform the team leader when they will miss a meeting or be late, and they keep other members informed about their progress or lack of progress. Communication is open and spontaneous in team meetings.

**7. Mutual Support.** Members of effective teams support each other. They let others know that they appreciate their efforts and ideas and that they will

help them as needed. On ineffective teams, members work on their own and show little interest in others' work unless it directly impacts their own efforts.

**8. Team Spirit.** Members of effective teams take pride in and feel loyalty for their teams. On ineffective teams, the team is just a place to work or, worse, an impediment to getting one's own goals accomplished by one's self.

(Aldridge, 1997)

## ▶ 7

### Assessing Students' Ability to Think Critically and Solve Problems

Familiarize students with ill-structured problems within your own discipline or areas of expertise. Do this even early in the educational experience. Such problems should not be viewed as the exclusive domain of seniors, senior seminars, or graduate courses. Students are usually attracted to a discipline because it promises a way of better understanding contemporary problems in a particular field, yet they are often asked to "cover the basics" for three or four years before they are permitted to wrestle with the compelling, unresolved issues of the day. Ill-structured problems should be viewed as essential aspects of undergraduate education (King & Kitchener, 1994, pp. 233, 236).

College students are wrestling with issues of certainty and uncertainty, and . . . they are struggling to find methods for resolving perplexity when they must make and defend judgments. Students need to learn the skills that will allow them to make judgments in light of that uncertainty; how to think about the relationship between evidence and a point of view, how to evaluate evidence on different sides of issues, how to conceive of objectivity and impartiality, and how to construct judgments in the face of complexity and uncertainty. Moreover, students need to understand the relevance and importance of these skills for their own lives—as effective citizens, consumers, or parents (King & Kitchener, 1994, pp. 256–257).