Guide to Handouts from Peggy Maki

This chart provides examples of verbs that describe what you expect students to demonstrate at cognitive levels that move towards creativity. Keep in mind that the context in which you use these verbs establishes the cognitive level, not just the verbs themselves.

This sheet can become a way for you and colleagues in a program to document the range of trouble spots you see in student work or performances, such as enduring patterns of conceptual difficulties. This kind of documentation may prompt you and others to develop a research or study question that you will track in samples of program-level work. Alternatively, at certain times in the curriculum colleagues may want to sit down to share the results of these sheets as a way to monitor students' progress.

These questions are meant to prompt faculty and other educational professionals to develop a question worth exploring in a course or across a program of study or to prompt collaborative agreement among colleagues about what you want to focus on when you collect student work and chronologically apply your scoring rubrics or your test standards. For example, in your course or educational experience you may want to assess how well a new pedagogy improves or advances students' ability to analyze data. Similarly, at the program-level you might assess how well students transfer their analytical abilities from one course to another course or from a course to an experiential opportunity.

These annotated examples illustrate ways to develop your scholarly approach to a research or study question you have raised.

Designed for individual faculty, for all program-level faculty, or for other professional educators, this list Identifies methods to assess student learning outcomes. Individuals can use this list to consider alternative ways to assess outcome(s) in a course or other educational experience so long as methods align with your outcome(s) and educational practices and feedback. Direct methods to assess student learning consist of the actual work students produce—texts, performances, recitals, research, for example—or the evidence they provide, such as in think alouds, about their learning or meaning making processes. Indirect methods to assess student learning consist of students' perceptions or views of their learning, such as collected in surveys or focus group interviews. It is best practice to use two sources of evidence to identify patterns that need to be improved in students' work or to identify patterns that have improved in student work after you have implemented innovative or changed pedagogies. Relying on students' perceptions of their learning may or may not align with the work they produce. Thus, it is important to assess students' work along with their perceptions of learning.

This form illustrates one way to seek student consent in your scholarly work and acknowledges the importance of students' contributions.

This handout serves as a guide for developing scoring rubrics for an individual course or for collaboratively developing scoring rubrics that will be used to assess student work at the program level. Key to the development of program-level scoring rubrics is collaboration among full- and part-time faculty so that there is agreement about what criteria and standards will be used to score student work. Without that agreement, it will be difficult to score program level student work and report on results. The individual in a program who has responsibility for bringing full- and part-time faculty together to design or agree upon program-level scoring rubrics would use the strategies listed in this handout.

This handout also outlines steps to norm scorers in preparation for actual soring of samples of program-level student work. Again, the individual in a program who has responsibility for bringing full- and part-time faculty together to score program-level student work can use the strategies listed in this handout. Scorers do not necessarily have to be full- or part-time faculty; some institutions norm advisory board members or emeritus faculty, for example.

1. Verbs in Bloom’s Revised Taxonomy (Lorin, et als.)

From L.W. Anderson, D.R. Krathwohl, P.W. Airasian, K.A. Cruikshank, R.E. Mayer, P.R. Pintrich, J. Raths, M.C. Wittrock. (2000). *A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom’s Taxonomy of Educational Objectives*. Pearson.

Know	Understand	Apply	Analyze	Evaluate	Create
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize
recall	convert	complete	order	convince	integrate
reproduce	demonstrate	construct	point out	defend	modify
tabulate	estimate	dramatize	prioritize	estimate	organize
tell	express	interpret	subdivide	find errors	prepare
copy	identify	manipulate	survey	grade	produce
discover	indicate	paint	advertise	measure	rearrange
duplicate	infer	prepare	appraise	predict	rewrite
enumerate	relate	produce	break down	rank	role-play
listen	restate	report	calculate	score	adapt
observe	select	teach	conclude	select	anticipate
omit	translate	act	correlate	test	arrange
read	ask	administer	criticize	argue	assemble
recite	cite	articulate	deduce	conclude	choose
record	discover	chart	devise	consider	collaborate
repeat	generalize	collect	diagram	critique	collect
retell	give examples	compute	dissect	debate	devise
visualize	group	determine	estimate	distinguish	express
	illustrate	develop	evaluate	editorialize	facilitate
	judge	employ	experiment	justify	imagine
	observe	establish	focus	persuade	infer
	order	examine	illustrate	rate	intervene
	report	explain	organize	weigh	justify
	represent	interview	outline		make
	research	judge	plan		manage
	review	list	question		negotiate
	rewrite	operate	test		originate
	show	practice			propose
	trace	predict			reorganize
	transform	record			report
		schedule			revise
		simulate			schematize
		transfer			simulate
		write			solve
					speculate
					structure
					support
					test
					validate

2. Taxonomy of Errors, Weaknesses, or Fuzzy Thinking

From Maki, P. (2010). 2nd Ed. *Assessing for Learning: Building a Sustainable Commitment across the Institution*. Sterling, VA: Stylus Publishing.

Identify types of weaknesses, errors, or fuzzy thinking	**Identify context of errors or weaknesses**	**If possible, identify possible causes with the assistance of students**
1. For example: conceptual, mathematical, analytical, computational, grammatical, fuzzy recall, procedural, linguistic, pattern discernment, interpretive, reasoning (such as analysis),inability to apply to new or unfamiliar contexts, etc.		
2.		
3.		

3. Some Representative Research or Study Questions That Promote Department-, Program-, or Institution-level Identification of Related Research or Study Questions

From Maki, P. (2010). *Assessing for Learning*: *Building a Sustainable Commitment Across the Institution.* Sterling, VA: Stylus Publishing.

I. **Learner-focused questions**

What…

- approaches to learning do students take as they shift from one disciplinary course to another or from introductory courses to higher level courses in their program of study?
- gaps in skill level occur as students transition into subsequent courses or learning experiences?
- kinds of erroneous ideas, concepts, or misunderstandings predictably interfere with students' abilities to learn new content?
- approaches do successful and unsuccessful learners take to solve representative disciplinary problems?
- patterns of weakness continue to surface or persist in students' work, such as weak reading abilities, analytical abilities, or computational skills?
- kinds of processes, problems, tasks typically stump students?
- strategies do successful and unsuccessful students draw up to read and interpret different kinds of visual or written texts in different media?
- kinds of overgeneralizations or over simplifications do learners carry with them as they move to higher-level courses?
- kinds of misunderstandings, misinterpretations, missing steps, or under developed concepts manifest themselves in the work students' produce?
- strategies do students use to restructure naïve or intuitive theories?
- conceptual or computational obstacles inhibit students from shifting from one form of reasoning to another form, such as from arithmetic reasoning to algebraic reasoning?
- successful alternative ways of understanding do learners use or develop to learn a new concept, principle, complex content?
- kinds of mental or visual models do successful learners develop to achieve enduring learning?
- kinds of changes in thinking are taking place when students reposition their understanding—belief revision, conceptual change, restructured knowledge?

- kinds of learning obstacles, such as lack of understanding of vocabulary or lack of appropriate reading strategies (for reading texts or visual material) prohibit students from interpreting, analyzing or summarizing written or visual texts?

How or How Well do…

- students represent new learning to themselves?
- students' representations or demonstrations of learning in lower level, prerequisite, or required courses prepare them to develop increasingly more complex conceptual understanding or cognitive development that is expected in consecutive or upper level courses?
- skills-based courses prepare students for consecutive or higher level courses that require students to build on or integrate those skills?
- students chronologically build layers of complexity across the curriculum and co-curriculum, such as cognitive complexity?
- students reposition, modify, or change altogether long-held misconceptions, misunderstanding, or beliefs?
- students integrate new learning into previous learning, draw on previous learning in the progression of their studies, or apply previous learning to new contexts?
- students' professional or disciplinary dispositions develop along the chronology of their studies?
- students' beliefs affect conceptual development?
- students' levels of cognition affect their conceptual development?
- students transfer learning from their general education program of study into their major program of study?
- students transfer their general education or core curricular learning or major program learning into the life outside of the class such as in community service?
- students build their own knowledge based on the use of instructional multi-media designs?
- students initially construct meaning in a field or discipline that enables them to continue to succeed?

II. Teaching-focused Questions

How do…

- time restrictions or demands for increased program "coverage" inhibit students' abilities to develop deep sustained learning?

- various kinds of pedagogy (problem-based, experiential, didactic, for example) promote complex problem solving?
- various modes of instruction promote complex problem solving?
- experiential learning opportunities offered in the curriculum and co-curriculum promote or deepen learning?

What…

- kinds of representational models develop complex conceptual understanding?
- forms of animation or non-verbal communication enable students to overcome learning barriers?
- kinds of visual representations are conducive to learning in a particular discipline?
- strategies enable students to transition from thinking arithmetically to thinking algebraically?
- kinds of out-of-course assistance, such as online tutorials or software, promote desired student outcomes?
- kinds of approaches to teaching enable students to overcome typical learning barriers or obstacles?
- kinds of abilities are students developing under current experiential learning opportunities?
- kinds of contexts or content promote creativity?
- kinds of mental images in disciplinary learning do students transfer?
- chronological educational practices promote the following abilities?

    - recall and recognition
    - comprehension
    - application
    - synthesis
    - analysis
    - evaluation
    - habits of mind
    - ways of knowing
    - ways of seeing and interpreting
    - transfer
    - integration
    - creativity

How or How Well do…

- stand-alone skills based courses, such as mathematics or writing courses, prepare students to integrate or apply those skills into disciplinary or professional courses?
- digital dialogue games or other forms interactive technology foster students' reasoning or conceptual abilities?
- effective are hypermedia technologies in fostering complex problem solving?
- online interactive discussions help students construct knowledge?

4. Two Examples of SOTL Projects

From Maki, P. 2010. *Assessing for Learning: Building a Sustainable Commitment across The Institution.* Sterling, VA: Stylus Publishing.

A. Making the Invisible Visible in Physics

Context of the Problem: To assess physics students' entering knowledge state of mathematics and physics concepts, as well as to continue to monitor students' future knowledge and understanding of these concepts, physics faculty often use concept inventories, tests designed to identify and classify errors in students' thinking. Typically, results of these concept inventories for matriculating students have documented that entering students do not have a coherent understanding of physics and mathematical concepts. According to Halloun and Hestenes, students bring with them erroneous kinds of ideas about physics concepts such as force, or weight, or buoyancy, that interfere with their ability to correctly learn physics content. Specifically, students form their own "personal understanding "or "initial knowledge state" (Halloun and Hestenes, 1985, p. 1043) that inhibits them from developing more complex knowledge as they move into subsequent courses. Initially, they carry qualitative, common sense beliefs that form their own personal system of beliefs and intuitions. In turn, this system functions for them as a common sense theory of the physical world through which they continue to interpret their past and new experiences. This belief system effects students' future performance in physics, often interfering with what students actually hear in a physics course and then deterring them from making progress in their future courses despite faculty efforts to position them to restructure their personal learning. Concept inventories predictably show some of the kinds of misconceptions and understanding that entering first year students demonstrate. Historically, lectures, demonstrations, laboratories, exercises and models have been ineffective in restructuring entering physics students' initial knowledge states and belief systems. For example, when presented with different scenarios that can be explained by the same underlying concept, students often apply different conceptual explanations, including some that have been proven historically incorrect.

What is the Driving Question? Recognizing that conventional teaching methods, laboratories, lectures, demonstrations, for example, were not typically successful in correcting students' conceptual misunderstandings, Carl Wieman and colleagues from the Physics Department at the University of Colorado asked: "How can we effectively restructure entering students' naïve understanding?" Wieman recalled how consistently his diverse public lecture audiences learned the physics in his talks through the simulations he incorporated. He recalls:

> …sims would be the primary thing people would remember from my talk, and based on their questions and comments, it appeared that they consistently learned the physics represented in the sims. What was particularly remarkable was that my audiences found the sims engaging and educationally productive whether the talk was a physics department colloquium, or a presentation to a middle school class. I had never seen an educational medium able to effectively address such a wide range of backgrounds, and so when I received support through the NSF Distinguished Teaching Scholars program in 2001, I used it to start the PhET project to systematically develop and research interactive sims for teaching physics (Wieman, Adams, and Perkins, October, 2008, 682-683).

What's the Solution? With initial support from the National Science Foundation, Wieman and his team turned to research on learning, specifically *How People Learn* (Bransford, 1999) to learn more about the kinds of obstacles that were impeding student learning. Drawing on these sources and his experiences with audiences in his talks, he and his team designed initial sets of interactive computer simulations that allowed each student to "see" what experts know and positioned each student to engage with online scenarios as a strategy for them to learn concepts as well as restructure erroneous naïve understanding. The design of every simulation is an iterative process that includes student "think-aloud" interviews to learn about and verify that the interface is intuitive and that students learn only correct science from the simulations
http://phet.colorado.edu/simulations/sims.php?sim=Circuit_Construction_Kit_DC_Only.

Interactive computer simulations, such as the one for electricity and circuits, position students to arrive at their own explanation and application of concepts, restructuring erroneous learning as well as reinforcing learning. Periodic use of concept inventories documents that students carry their new restructured learning into future courses so that they build coherent conceptual knowledge. These inventories function as a way to diagnose students initially as well as to assess their future performance to assure that they have corrected misconceptions or misbeliefs and are building on their restructured learning. Identifying obstacles in student learning, including students' inability "to see" what physics faculty know or understand, such as visualizing a standing wave on the string of a violin, and positioning students to become engaged in their learning through interaction with real-life phenomena and scientific concepts in real time has led to an alternative way to ground and advance students' conceptual learning in physics (Wieman, Perkins, and Adams, April, 2008).

Works Cited

Bransford. J., et. als. (1999). *How People Learn.* Washington, D.C.: National Academy Press.

Halloun, I.A., and Hestenes, D. (November, 1985). The Initial Knowledge State of College Physics Students. *American Journal of Physics*. pp. 1043-1048.

Wieman, C.E, Adams, W.K., and Perkins, K.K. (October, 2008). PhET Simulations That Enhance Learning. *Science.* Vol. 322, pp. 682-683.

Wieman, C.E., Perkins, K.K., and Adams, W.K. (April,2008). Oersted Medal Lecture 2007: Interactive Simulations for Teaching Physics: What Works, What Doesn't and Why. *American Journal of Physics*. Vol 76, Issue 4, pp. 393-399.

B. Shifting to a New Paradigm in Engineering

Context of the Problem: In the engineering program at Northwestern University faculty continued to find that students were unable to transfer writing principles fostered in required writing courses to writing assignments in engineering courses. Originally, students were required to take a stand-alone course in writing offered by communication experts outside the program. A curricular development in succeeding years required students to take writing-intensive courses in the university's writing-across- the-curriculum program. Yet, despite these requirements, faculty continually documented that students were unable to transfer writing principles in these courses to the kinds of required writing in engineering courses.

What's the Driving Question? Recognizing this chronologically consistent pattern, faculty asked: "How, then, can we effectively develop students' writing abilities?" Reading about how students learn to write, they were struck by Turner and Thomas's (1996) claim that writing skills are most successfully taught when they are integrated with genuine (rather than contrived) activities that build on past learning, create a real need for the new skills, and offer an op- opportunity to learn those skills. "Intellectual activities," Turner and Thomas claim, "lead to skills, but skills do not generate intellectual activities" (Turner, M and Thomas, F. (1996) *Clear and Simple as The Truth: Writing Classic Prose*. Princeton, NJ: Princeton University Press, p. 4).

What's the Solution? Coming to terms with this claim led faculty to shift to a new paradigm— one that integrated writing and other modes of communication important for students to develop over time, such as visual and oral communication, into students' first engineering course, Engineering Design and Communication (EDC). Inviting communication faculty to work with them, engineering faculty designed students' first EDC course to integrate writing, speaking, and visual communication into engineering content. Seeing the positive results of students' writing in their first course—that students grounded their writing in what they were learning and that writing itself strengthened and clarified students' professional thinking, such as in explaining an engineering process or concept design to a real client—prompted faculty to integrate writing in all other engineering courses leading to the capstone project. That is, faculty found that intellectual immersion in a discipline or field of study not only fosters disciplinary knowledge and ways of thinking and knowing, but also necessary communication skills. Reflecting on this new model, the Northwestern University report concludes:

Students in EDC—and faculty too—see that communication in engineering is a multifaceted activity. Engineering communication combines written, oral, interpersonal, graphical, and mathematical communication. Like engineers in industry, students in EDC talk, write, and sketch to share ideas, and they use new communication technologies and tools, such as Visio and SolidWorks, as part of the communication enterprise. This approach to communication is vastly different from students' experience in stand-alone writing courses or the writing intensive courses that came out of WAC. It is a new, integrated paradigm for communication instruction. (Hirsch, Kelso, Shwom, Troy, & Walsh, 2001)

This case was developed based on Hirsch, Kelso, Shwom, Troy, and Walsh (2001).

5. Direct and Indirect Assessment Methods

Direct Methods: Products

- Test of knowledge of facts, processes, procedures, concepts, etc.
- Case Study/Problem that requires students to demonstrate how one has integrated outcome-based learning into his or her work
- Chronological use of a case study at significant points in your curriculum to assess students' abilities to transfer and apply new knowledge, concepts, etc., to a complex, muddy problem
- Student summary from homework assignment; student summary after a segment of lecturing or other pedagogical method
- Description of what one already knows before movement into a new topic or focus
- Group work that emerges from material covered with self-analysis and analysis of others
- Team projects that emerge from material covered
- Student self-reflection on what student does and does not understand or on what student has learned
- Written assignment that explores a distinctive critical perspective or problem
- Critical incident response
- Representative disciplinary or professional work assignments
- Capstone Project that positions students to integrate learning

- Smaller Projects over Time that Lead to a Final "Capstone Project"
- Thesis
- Research Project
- Situated Experiences along the Chronology of Learning
  - Community-based projects (research) launched in the first year
  - Internships
  - Experiments
  - Research launched in the first year to solve a relevant problem
  - Research with faculty beginning in first year
  - Solo or team projects launched in the first year
  - Co-designed projects with a mentor or mentors (curricular-co-curricular projects, for example)
- Interpretation of unidentified pieces of discourse or artifacts to ascertain how well students can make inferences about when documents or artifacts were written or created and about the beliefs or concepts that underlie each artifact or document
- Event analysis
- Interpretation of video clips or visual materials
- Debates
- Case study or studies examined over time as students move through courses and educational experiences (provides evidence of learning over time)
- Oral examination
- E Portfolio—collection of student work based on selected assignments in the curriculum
- Concept, knowledge or process maps (visual representation)
- Concept inventories, such as in physics and in chemistry
- Knowledge surveys
- Agreed upon embedded assignments or common assignments you will sample such as in a final examination
- Writing, to speaking, to visual presentation
- Case study with analysis—use of parallel case studies over time
- Self-reflective writing—especially useful after students have received feedback or have engaged in a sub-task or task
- Externally or internally reviewed student projects

- Locally developed tests or other instruments
- Standardized exams
- Problem with solution and ask for other solutions
- Mining of data such as learning objects at Merlot: students make inferences about original work from a particular period of time, such as from literature, painting, letters and other historical documents
- Observation of a debate (particularly useful for a focus on ethical issues)
- Virtual simulations
- Milestone exams
- Complex problems that can be approached from many perspectives or disciplines
- Revisiting a problem over time to track learning
- Knowledge, decision, or procedural maps http://classes.aces.uiuc.edu/aces100/mind/c_
    - Visualization or representation of a problem, issue, situation
- Chronological Use of Complex Problems that necessitate the integration of Quantitative Literacy, such as "the ability to discriminate between good and bad data or development of the disposition to use quantitative information to think through complex problems—these are capacities that educators across fields should be helping students develop." From: Burke, Michael C. (October, 2007). "A Mathematician's Proposal." *Carnegie Perspectives*. www.carnegiefoundation.org/perspectives/sub.asp?key=245&subkey)

Direct Assessment Methods via Technology

- Team work across media (digital media and interfaces) and modes of communication
- Authorship of a simulation or a webpage
- Performance in virtual environments—virtual reality
- Data mining online
- Creation of wikis
- Podcasts
- Clickers to assess transfer of or new application of learning
- Online exercises
- Online journals

Direct Methods: Learning Processes

- Interactive computer simulated tasks that provide data on patterns of actions, decisions, etc. (for example, eCollege claims it provides these kinds of data); Intelligent Technology
- Gaming accompanied with one's analysis
- Threaded discussions online
- Logbook or journal tasks that explore concepts or problems or situations over time or explore learning against pedagogy such as interactive simulations
- Discussion of how one may have changed his or her understanding based on learning more about a topic or engaging in research on a topic
- Think Alouds
- Results of flipping classrooms (observe students solving problems or appoint a group leader to identify obstacles students confronted)
- E-portfolio entries that discuss what specific work demonstrates about a student's learning or development over time.
- Examination of places within e-portfolios, such as students' Personal Learning Environments, where students store and record results of research such as through "tagging."
- Observations of interactions, decision making, simulations
- Analysis of Word Edit Bubbles

Indirect Methods of Assessment

- Surveys, questionnaires
- Interviews
- NSSE (National Survey of Student Engagement)
- SALG: Student Assessment of Their Learning Gains: www.salgsite.org
- SGID—small group instructional design

Institutional Data That May Provide Additional Evidence

- Course-taking patterns
- Audit of syllabi
- Engagement in co-curricular programs
- Other data for DePaul?

6. Example of Student Consent Form

CONSENT FORM FOR CRITICAL THINKING STUDY

Student Participation at Washington State University

Your instructor is participating in a study that is further implementing and developing an assessment instrument, a "Critical Thinking Rubric," originally designed at WSU. This rubric provides a measure of student progress in achieving critical thinking over the course of students' college careers. This study is a component of the grant received by General Education, the Center for Teaching, Learning and Technology, and the Campus Writing Programs from the Fund for the Improvement of Post-Secondary Education.

The researchers for this project will collect student papers from this class and evaluate them using a group of trained faculty readers to determine the effectiveness of the Critical Thinking rubric. Your instructor will collect assignments from at least two points in the semester.

Data collected will be strictly confidential and your name will not be recorded. Only the research team will have access to the data. Your performance in your class will have no relation to your participation in this study.

By participating in this project, you will help WSU faculty refine instructional and evaluative methods that will encourage higher intellectual skills over the course of students' college careers. ***Washington State University, the Center for Teaching, Learning and Technology, Campus Writing Programs, and our General Education Program support the practice of protection of the rights of research participants. Accordingly, this project was reviewed and approved by the WSU Institutional Review Board.*** The information in this consent form is provided so that you can decide whether you wish to participate in our study. It is important that you understand that your participation is considered voluntary. This means that even if you agree to participate you are free to withdraw from the experiment at any time, without penalty.

Critical Thinking Study Principal Investigator Diane Kelly-Riley, Campus Writing Programs

Consent Statement:

I have read the above comments and agree to participate in this project. I understand that if I have any questions or concerns regarding this project I can contact the investigator at the above location or the WSU Institutional Review Board.

____ Participant's Signature

____ Print Name

____ Date

____Course Name and Number

Source: Diane Kelly-Riley, WSU, and the Washington State University Critical Thinking Project. Used with permission in Maki, P. (2010). *Assessing for Learning*: *Building a Sustainable Commitment Across the Institution.* Sterling, VA: Stylus Publishing

7. Basic Strategies for Developing Scoring Rubrics

1. Research disciplinary or professional organizations' current work on developing scoring rubrics, such as AAC&U's work on the VALUE rubrics.
2. Research current literature on learning in a discipline or field of study to ascertain what that research revels about indicators of learning.
3. Adapt or use existing scoring rubrics such as those you find online or those included in Stevens and Levi (2005) book, *Introduction to Rubrics*, a Stylus publication.
4. Create your own rubrics based on the work you asked students to produce that aligns with your outcomes and pedagogies.
   i. Identify a range of student responses to your assignments that range from high to low levels of achievement.
   ii. Define descriptors of what you expect to see in student work, such as the ability to integrate disciplinary perspectives, for example. Describe, based initially on high and then low-level work, what performance at those levels looks like. Then develop levels in-between those levels so that you have a four-to five-point spread of performance.
5. Experiment with colleagues by applying your initial rubric draft to samples of student work so everyone has a chance to understand the criteria and levels of performance, as well as to suggest edits or revisions to your rubric. This collaborative process is important to develop a shared understanding of what colleagues will look for in student work.
6. Share and discuss your rubrics with students and attach them to assignments or post them on your website. Because students need to learn how to look at their own work and the work of peers, sharing your rubrics with them and sharing results of your scoring are useful strategies to help them learn about their patterns of strength and weakness and track their achievements over time.

Strategies for Norming Scorers Using Rubrics

Once a core group has reached consensus about a scoring rubric, raters go through a calibration process to ascertain ho well they consistently apply that rubric to samples of student work that were handed in to an assignment. Use the following process to ensure inter-rater reliability before a team of scorers undertakes a formal scoring process:

1. Ask raters to independently score a set of student samples that reflects the range of texts or products students produced in response to a direct method of assessment.
2. Bring raters together after their independent scoring of student work to review their responses and to identify both consistent and inconsistent responses. If you have access to clickers, you can use them to identify those patterns so that the group of raters can "see" those patterns flashed up on the clicker board screen.
3. Discuss and then reconcile inconsistent responses, such as confusion about vocabulary used in the rubric that might require developing a glossary for scorers or confusion about the distinctions among and between the levels of achievement.
4. Repeat steps 1-3 with a new set of student texts or products produced in response to the same direct method of assessment.

5. Again, bring all scorers together to review their responses to identify any inconsistent scoring patterns.
6. Discuss and then reconcile inconsistent responses until there is agreement among the scorers.
7. When formal scoring begins, always have on hand a third party to resolve any discrepancies in scoring that may emerge or establish a discrepancy panel to resolve those lasting discrepancies.

Two Rules:

1. There should be two raters for each piece of student work that is scored.
2. Over a long period of scoring, it's usually important to re-norm the group because fatigue sets in. If there is a time span between one scoring session and another one, you also should re-norm again just before you begin another scoring session to keep people focused on how to apply the rubrics. They can forget.