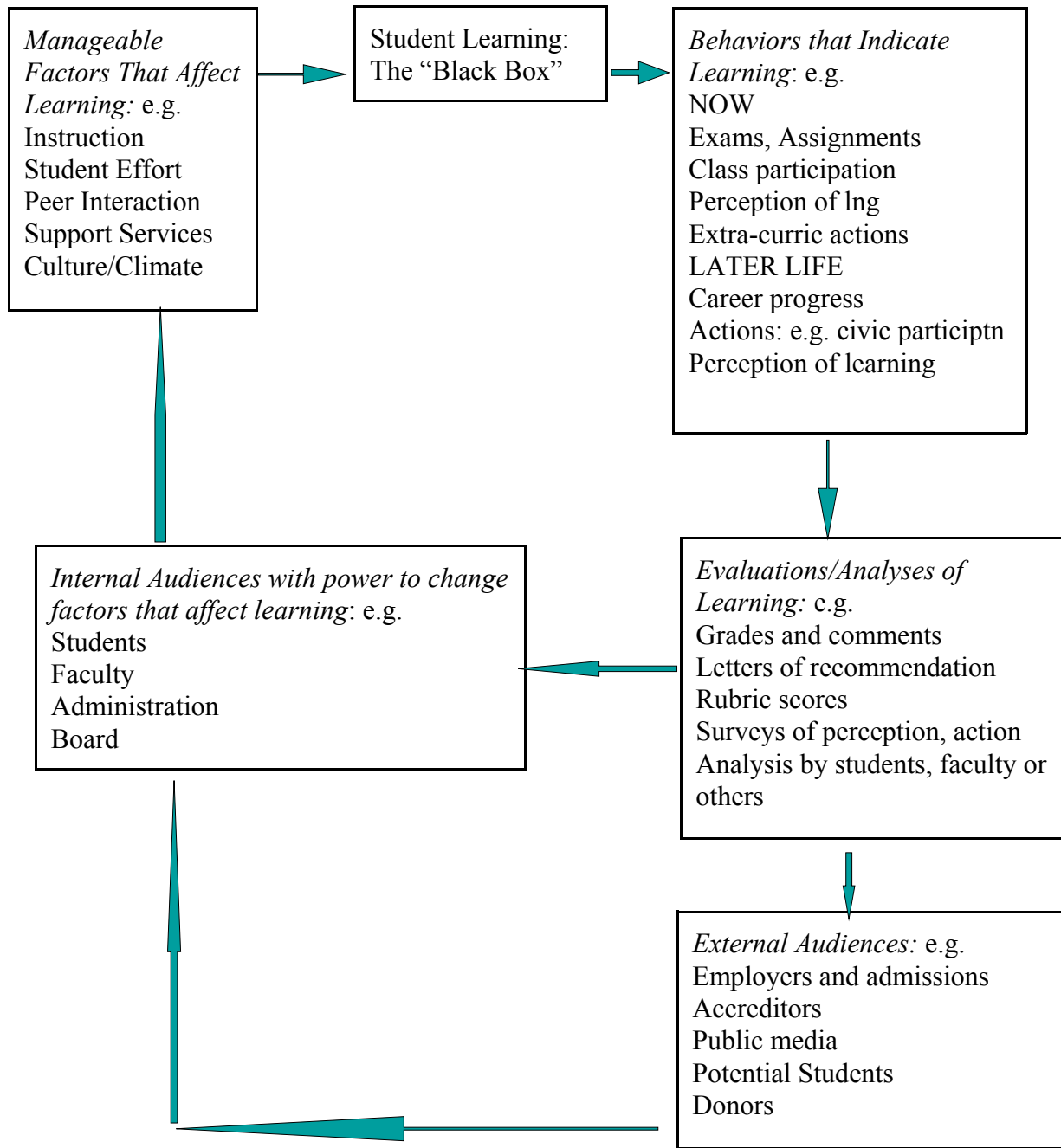

**Making the Grading Process Fair,
Time-Efficient, and Useful for
Student Learning
AND
Using the Grading Process
For Departmental Decisions**

Barbara E. Walvoord, Ph.D.
Fellow of the Institute for Educational Initiatives
Concurrent Professor of English
Coordinator of Notre Dame's Self-Study for North Central Accreditation
Director Emerita of the Kaneb Center for Teaching and Learning
University of Notre Dame
Notre Dame, IN 46556
574-631-0101
Walvoord@nd.edu

1. The Ideal System for Information-Gathering and Improvement of Student Learning



In the Ideal System

1. Exams, assignments, and classroom participation are valid indicators of the actual learning that the teacher desires
2. Evaluations/analyses accurately reflect learning and are appropriately diagnostic and explicit for their purposes
3. The system promotes healthy motivation and fair treatment at every level
4. Evaluations/analyses are communicated appropriately to their various audiences and serve their purposes
5. The system is efficient: no valuable information is lost; no useless information is communicated
6. The system is sustainable in terms of time and resources
7. Appropriate autonomy is protected at every point

Goal of This Session: To Address the Most Problematic Issues and Questions About Grading

1. How do I ensure that my grades actually reflect the learning I most want for my students?
2. How can I make grading fair and consistent for all my students?
3. How can we make grading consistent across sections of the same course?
4. How can we deal effectively with “grade inflation”?
5. How can we help students focus on the learning, not just on the grade?
6. How can we make grading time-efficient?
7. How can we use classroom evaluation of student learning for departmental and program-level improvement?

1. Ensuring that Grades Reflect the Desired Learning

1. Research suggests that faculty may test below their own aspirational goals
2. Read the institutional, college, and departmental mission and learning-goal statements, as well as guidelines from your professional association. Challenge yourself to address the highest learning aspirations appropriate for your students
3. Express your learning goals in this format: “When they complete this course, I want my students to be able to...”
 - a. Use specific verbs (e.g. “Explain, “synthesize,” “analyze,” or “apply” rather than the broader terms like “know” or “understand”)
 - b. Avoid passive voice verbs (e.g. “I want students to be exposed to...”)

Examples:

History: I want students to be able to:

- Identify and describe major historical events and concepts
- Construct historical arguments: State a position on a debatable historical

issue, support the position with historical data, and raise and answer counter-arguments

Chemistry: I want students to be able to:

- View science as questions that are constantly being reframed and investigated
- Possess the chemical tools to build further knowledge
- View chemistry problems as unique, requiring problem-solving skills
- Be interested and confident enough to read and explore independently

Swine Management

- Identify and describe major swine diseases and their control/management
- Construct a financial plan for a swine management operation
- [Other similar goals]
- Appreciate the pig!

4. Include these goals in your syllabus.
5. On the first class day, share your goals with students and elicit THEIR goals.
6. Check again periodically on whether they perceive they are reaching the goals.
7. Check that assignments and exams really test these goals

2. Plan Assignments and Exams to both Teach and Demonstrate Achievement of your Course Goals

1. Begin with goals: “what they will learn to do,” not “what I will cover”
2. Construct a course skeleton showing goals and major assignments in the weeks they are due

Example:

Introductory sociology: few students will be sociology majors; most are fulfilling their gen-ed requirement for social science.

Course skeleton (shows learning goals and majors exams/assignments that test student achievement of those goals):

Goals: Faculty member says, “I want students to be able to use sociological perspectives to interpret what they see around them daily in their own society.”

Assignments/Exams

Week 1	Week 6	Week 10
Week 2	Week 7: Midterm exam,	Week 11
Week 3	Mult/ch & essay	Week 12
Week 4	Week 8	Week 13: Term paper
Week 5	Week 9	Week 14: Final exam:

3. Ask:

- Do the assignments/exams test the goals?
- Are the assignments engaging to students?
- Is the workload manageable?

3. Establish and Communicate Criteria and Standards for Student Work

1. Even in intuitional grading (“It feels like a B”) there are criteria at work, which can be stated
2. Do not be afraid to express your highest goals in the clearest language you can
3. Deal with grade inflation and pressure from students for higher grades

Examples: see Appendix A

4. Deal with Issues of Motivation Around Grades

- It’s not that people do things for no reward; it’s that they place heavier emphasis on different kinds of rewards, e.g. intrinsic vs. extrinsic, grades vs. learning.
- Research suggests combination of “grade orientation” and “learning orientation” in your classroom. What does a “learning oriented” person do? Reward it. Ensure that “what I have to do to get an ‘A’” is the same as what I have to do to learn well.
- Use multiple systems of reward and encouragement, both intrinsic and extrinsic.
- Grades are the elephant in the classroom; ignoring them or withholding them may be counterproductive. Instead, talk about grades frequently; shape values around them; guide your students’ thinking.
- Grades are the focus of strong emotion; use it for learning.
- Leave room in your course for pass/fail or ungraded work and reward it strongly in other ways.
- Pay attention to issues of ascription: how students explain failure or success to themselves.

5. Help Students Learn What They Need to Meet the Criteria and Standards

1. Consider carefully how you name your assignments: “term paper,” “essay exam,” etc. all have complex meanings for students
2. Guide and check your students’ understanding of the tasks they are being asked to do, the process they should follow, and the learning they are expected to achieve

Example: At beginning of “term paper” assignment, student complete:

Before this class, term papers I wrote for other classes required me to:

I understand that this term paper assignment will require me to:
From completing this term paper, I expect to improve my
ability to:

Plan and timeline for completing this term paper:

My first step will be _____ completed by _____

My next step will be _____ completed by _____

3. Provide ongoing guidance and feedback, not to spoonfeed but to enhance learning
4. To the extent possible, integrate teaching methods that research suggests are most effective for higher-order reasoning (see Appendix B)
5. Consider how you use in-class and out-of-class time, and how much time students contribute (See Appendix C)

6. Make the Grading Process Time-Efficient

1. Focus your full-scale commenting-grading process on only a few assignments; use less time-intensive ways to reward other work
2. Leverage the greatest amount of student learning into the smallest written product
3. When multiple choice will produce what you need to know, use it
4. Make your criteria and standards explicit from the beginning
5. Provide student self-check and peer-check points (see Appendix D)
6. Ensure that your comments will be well-used
7. Don't spend the most time on the worst papers; just comment on the basic misunderstandings or difficulties that led to the disaster
8. Use early guidance to prevent disasters in the first place
9. Ensure that students have spent enough time to merit your attention
10. Require students to organize their work for your efficiency
11. Separate commenting from grading and use them singly or in combination according to your purpose and student needs
12. Use only as many grading levels as you really need
13. Don't give every student what only a few students need
14. Comment in different ways for different situations
15. Use what the student knows
16. Delegate the work
17. Use technology to save time and enhance results

7. Discover WHY Students Do What They Do, and What Helps Them

1. Require "logs" of how papers and exams were generated
2. Ask your students frequently about their learning experience
Example: see Appendix E

8. Use Classroom Information about Learning to Improve Your Own Teaching

1. Keep a log throughout the course, with a major evaluative entry at the end. Reread the log before teaching the course again
2. Seek help from a teaching/learning center or knowledgeable colleague
3. Watch other people teach, examine other syllabi, etc.
4. Use the literature on teaching and learning

9. Use Classroom Information about Learning to Assist Departmental and Institutional Decision-Making

1. What information do I have about my students' strengths and weaknesses, and about the factors that influence their learning, that has implications for what the department or institution does?
2. How might I best present that information to the department or institution?

Example: Political Science faculty mentoring senior undergraduate theses reported to the department that students were weak in their ability to formulate a question for inquiry in the discipline. The department took steps to build those skills earlier in the curriculum.

Example: Each department in an institution held an annual meeting, in which each faculty member shared one assignment that tested students' "critical thinking" skills as that discipline defined it, the criteria-standards that the faculty member used to evaluate critical thinking on that assignment, and a report of student strengths and weaknesses. Action was taken at the department level as relevant, and then results were sent on to the general-education committee, which identified common cross-disciplinary concerns and took institutional action to address them.

Appendix A: Sample Grading Sheets/Rubrics

(Note: these examples are actual classroom documents developed by faculty; they are not perfect; I chose them because they raise important issues)

Grading Sheet for First-Year Western Civilization Course Required as Part of Gen Ed, by John Breihan, History, Loyola College in Maryland

The scale describes a variety of common types of paper but may not exactly describe yours; my mark on the scale denotes roughly where it falls. More precise information can be derived from comments and conferences with the instructor [Breihan would offer written comments on the paper, in addition to his mark on this scale.]

Grade:

1. The paper is dishonest
- F 2. The paper completely ignores the questions set.
3. The paper is incomprehensible due to errors in language or usage.
4. The paper contains very serious factual errors.
- D 5. The paper simply lists, narrates, or describes historical data, and includes several factual errors
6. The paper correctly lists, narrates, or describes historical data but makes little or not attempt to frame an argument or thesis.
7. The paper states an argument or thesis, but one that does not address the question set.
- C 8. The paper states an argument or thesis, but supporting subtheses and factual evidence are:
 - a. Missing
 - b. Incorrect or anachronistic
 - c. Irrelevant
 - d. Not sufficiently specific
 - e. All or partly obscured by errors in language or usage
9. The paper states an argument on the appropriate topic, clearly supported by relevant subtheses and specific factual evidence, but counterarguments and counterexamples are not mentioned or answered.
- B 10. The paper contains an argument, relevant subtheses, and specific evidence; counterarguments and counterexamples are mentioned by not adequately answered:
 - A. Factual evidence incorrect or missing or not specific
 - B. Linking subtheses either unclear or missing
 - C. Counterarguments and counterexamples not clearly stated; “straw man”
- A 11. The paper adequately states and defends an argument, and answers all counterarguments and counterexamples suggested by:
 - A. Lectures
 - B. Reading assignments: specific arguments and authors are mentioned

by name
C. Common sense

* * * *

Grading Sheet for Students for First-Year Composition Essay

-Barbara Walvoord, classroom use

Assignment: To write an essay that explores an idea or insight within a topic area studied in readings and class discussion.

A Range

Originality of thesis: The author develops an authentic, fresh insight that challenges the reader's thinking. The essay shows a complex, curious mind at work.

Clarity of thesis and purpose: The thesis and purpose are clear to the reader

Organization: The essay is organized in a way that fully and imaginatively supports the thesis and purpose. The sequence of ideas is effective, given the writer's thesis and purpose. The reader always feels that the writer is in control of the organization, even when the organizational plan is complex, surprising, or unusual. The sub-points serve to open up and explore the writer's insight in the most productive way.

Support: The writer offers the best possible evidence and reasoning to convince the reader. No important pieces of available evidence and no important points or reasons are omitted. It is clear that the writer is very well informed, has searched hard and effectively for appropriate evidence, and has thought about how evidence may be used for the argument. Evidence presented is always relevant to the point being made. Through telling detail, the writer helps the reader to experience what the writer is saying.

Use of sources: The writer has used sources to support, extend, and inform the ideas but not to substitute for the writer's own development of an idea. The writer has effectively combined material from a variety of sources, including, as relevant and needed, personal observation, scientific data, authoritative testimony, and others (This is not to say that the writer must use a certain number or type of sources. Need and relevance should be the determining factors.) The writer uses quotations to capture a source's key points or turns of phrase but does not overuse quoted material to substitute for the writer's own development of an idea. Quotations, paraphrase, and citation are handled according to accepted scholarly form.

Ethos: The writer creates a "self" or "ethos" that sounds genuine, that is relevant to the writer's purpose, and that is consistent throughout the essay.

Style: Language is used with control, elegance, and imagination to serve the writer's purpose. The essay, when read aloud, pleases the eye and ear.

Edited Written Standard English (ESWE): Except for deliberate departures (the quoted speech of a person, a humorous purpose, and so on), the writer uses ESWE forms of grammar, punctuation, spelling, and syntax.

Presentation: The essay looks neat, crisp, and professional. If submitted electronically, it is appropriately formatted.

B Range:

Falls short of the A range in one or more ways.

C Range

Originality of Thesis: The thesis may be obvious or unimaginative

Clarity of thesis and purpose: The thesis and purpose are clear to the reader

Organization: The essay is organized in a way that competently supports the thesis and purpose. The sequence of ideas is effective, given the writer's thesis and purpose. The reader almost always feels that the writer is in control of the organization, even when the organizational plan is complex, surprising, or unusual. The subpoints serve to open up and explore the writer's insight in a productive way.

Support: The writer offers solid evidence and reasoning to convince the reader. No important pieces of available evidence and no important points or reasons are omitted. It is clear that the writer is well informed and has thought about how evidence may be used for the argument. Evidence presented is usually relevant to the point being made.

Use of Sources: The writer has used sources to support, extend, and inform the ideas but not to substitute for the writer's own development of an idea. The writer uses quotations to capture a source's key points or turns of phrase but does not overuse quoted material to substitute for the writer's own development of an idea. Quotations, paraphrase, and citation are handled with reasonable consistency, according to accepted scholarly form.

Ethos: The writer creates a "self" or "ethos" that sounds genuine, that is relevant to the writer's purpose, and that is generally consistent throughout the essay.

Style: Language is used competently, though it may be awkward at times. There are few or no sentences that confuse the reader or are incomprehensible.

Edited Standard Written English (ESWE): Except for deliberate departures (the quoted speech of a person, a humorous purpose, and so on) the writer generally uses ESWE forms of grammar, punctuation, spelling, and syntax. There are not more than an average of two departures from ESWE per page in any combination of the following areas: sentence boundary punctuation, spelling and typos, use of apostrophe and plural, ESWE verb and pronoun forms, ESWE agreement between subject-verb and pronoun-antecedent.

Presentation: The essay looks neat, crisp, and professional. If electronically submitted, it is appropriately formatted.

D-F Range

Any one of the following may result in a D or F:

- The thesis is obvious, cut-and-dried, trite.
- The reader cannot determine the thesis and purpose
- The organization is not clear to the reader
- The organizational plan is inappropriate to the thesis: it does not offer effective support or explanation of the writer's ideas.
- The writer has neglected important sources that should have been used.
- The writer has overused, quoted, or paraphrased material to substitute for the writer's own ideas.

- The writer has used source material without acknowledgment (this may also result in the kinds of penalties attached to plagiarism. See Student Handbook)
- The language is so muddy that the reader is frequently at a loss to understand what the writer is trying to say.
- The use of ESWE falls below the standard established above for a C.

* * * *

Grading Sheet for Journals in Beginner's Spanish III, by Dorothy Sole, Univ. Cincinnati

- 4 - The content of the journal is by and large comprehensible. Although there are errors, verb tenses sentence structure, and vocabulary are in the main correctly used. The author has taken some chances, employing sentence structures or expressing thoughts that are on the edge of what we have been studying. The entries are varied in subject and form.
- 3 - There is some use of appropriate verb tenses and correct Spanish structure and vocabulary, but incorrect usage and/or vocabulary interferes with the reader's comprehension.
- 2 - The reader finds many of the entries difficult to understand, and/or many entries are simplistic and/or repetitious.
- 1 - The majority of the entries are virtually incomprehensible.

In addition to this scale, part of the grade is based on the number of entries and their length.

* * * *

Example: Assignment Sheet for Economics 101

Philip Way, Professor of Economics, University of Cincinnati

Due Date: Nov. 30

Objective:

The aim of this assignment is to teach you how to carry out economic research, much as you would if you were employed in an entry-level economist position. Essentially, you will learn how to use economic theory and empirical data to analyze a policy issue.

Your Role:

You are an aide to Congresswoman Thompson, who has not taken an economics course since 1962. She must, therefore, delegate economic analyses to you. Whenever you perform economic analyses for her, bear in mind that she is concerned with advocating policies that improve economic growth, efficiency, employment, price stability, and equity.

The Research Issue:

Congress is considering amending the Fair Labor Standards Act of 1938 to raise the minimum wage to \$4.75 per hour from its current level of \$4.25 per hour. You are told to analyze the proposal using economic theory and data. You must decide whether Congresswoman Thompson should support or oppose the proposal and justify your position in a report addressed to her.

The Report:

Your report should contain the following elements:

- o An executive summary that states your position and summarizes the main reasons for your conclusion.
- o A definition of the criteria you are using to assess the implications of the change in the minimum wage. You should also indicate the relative weighting (importance) of the criteria (Hint: remember the congresswoman's concerns)
- o A theoretical analysis that supports your position. Examine the likely impact of the increase in the minimum wage on the criteria you have selected in (2). You should analyze the effects in terms of a minimum of three different diagrams:
 - A production possibility frontier (perhaps to illustrate the effect on efficiency or growth)
 - A supply-and-demand diagram (perhaps to illustrate the effect on unemployment or prices or equity)
 - A production costs-supply diagram (perhaps to illustrate the effect on costs and prices or output)Make sure you label your diagrams and explain the implications of your diagrams in terms of the assessment criteria.
- e. An analysis of economic data that support your position. Quantitative and qualitative information concerning the effect of the increase in the minimum wage can be gathered from newspapers, magazines, reports by other economists, interviews, phone calls, and so on. A number of readings that may assist you in your research have been placed on reserve in the library. Make sure you summarize the evidence accurately, noting differences of opinion where they exist. Assess the reliability of the evidence. Reference your sources.

You should be succinct in your writing. Your paper should be 2-3 double-spaced typed pages plus diagrams. Style and grammar will be graded. You may find a style manual or the writing center helpful.

Note that the way in which you reach a position and the order in which you present the material need not be the same. I suggest that in order to form an opinion, you (1) set criteria, (2) weight the criteria, (3) gather information, and (4) reach a conclusion.

Checklist

In order to ensure the quality of your work, it is suggested that you carefully proofread your paper and that you ask several of your classmates to review it as well in the light of the following list of hallmarks of a good paper:

- A clear identification of the criteria used to justify your position
- A weighting scheme for the criteria
- A clear theoretical analysis of the impact of the increase in the minimum wage using three different diagrams
- A clear analysis of empirical data from primary or secondary sources
- A clear link between the theoretical and empirical analysis and the assessment criteria
- A clear stance on the minimum wage issue that is supported by the analysis
- Properly labeled and titled graphs
- Correct spelling and grammar
- Clear section headings
- Evidence of original thought; that is, your analysis is not simply a summary of others' opinions or analyses but rather your own evaluation of the proposals in light of the criteria and weighting scheme you have chosen.

Grading

Executive Summary

- | | |
|---|--|
| 5 | Clearly states the position of the researcher; summarizes the main reasons for this conclusion |
| 4 | Clearly states the position of the researcher; provides information as to why the conclusion was reached |
| 3 | Clearly states the position of the researcher |
| 2 | Position of the researcher is present in the Summary but must be identified by the reader |
| 1 | Fails to identify the position of the researcher |

Criteria

- | | |
|---|---|
| 3 | Student clearly and correctly defines the criteria used to assess the implications of the research question |
| 2 | Student provides the definitions of the criteria used to assess the implications of the research question, but the presentation is unclear or at least one definition is not factually correct. |
| 1 | Student fails to define correctly the criteria used |

Relative Weighting of the Criteria

- | | |
|---|---|
| 3 | Student indicates the relative weighting (importance) of the criteria |
| 2 | Student's weighting scheme, although present, is unclear |
| 1 | Student fails to identify the relative weighting (importance) of the criteria |

Production Possibility Diagram

- | | |
|---|---|
| 5 | Student clearly presents and fully explains the impact of the proposed change in terms of a production possibility frontier (PPF) diagram. Graph is appropriately drawn and labeled. Discussion is in terms of identified criteria. |
|---|---|

- 4 Student presents and explains the impact of the proposed change in terms of a PPF diagram. Either the explanation or the graph is less than clear, although they do not contain factual errors.
 - 3 Student presents and explains the impact of the proposed change in terms of a PPF diagram, but the presentation contains some factual errors.
 - 2 Student presents and explains the impact of the proposed change in terms of a PPF diagram. Presentation contains serious factual errors.
 - 1 Student does not present the impact of the proposed change in terms of a PPF diagram
- etc.

* * * *

Student Self-Report on Discussion in Literature Class

Note: These self-reports are used to determine part of the grade for the course (based on percentage of class sessions for which the student has received credit by checking all the items on this list)

Name _____ Date _____

To receive credit for this class session, you must honestly be able to check all of the following:

- ___ 1. I made every effort to come to class on time (lateness that was not your fault is excused—e.g. the previous professor held the class overtime. Oversleeping is NOT excused)
- ___ 2. I had read all the assigned works carefully before I came
- ___ 3. I brought to class my written notes on the works we read
- ___ 4. I had prepared for class by being well-rested, well-nourished, alert, and mentally ready
- ___ 5. I contributed at least once to class discussion today
- ___ 6. I did not too heavily dominate the class, but gave others a chance to contribute
- ___ 7. I listened actively to others at all times, and I showed by my face and body posture that I was listening
- ___ 8. My goal was to contribute effectively to the high quality of the GROUP’s discussion and learning, rather than just to demonstrate my own excellence. As in team sports, I played for the well-being of the team
- ___ 9. My contributions tended to do the following:
 - Start the group on a rich, productive track by posing a question or position that is not too obvious, but richly debatable, dealing with a significant question or aspect of the work
 - Respond to others’ contributions by:
 - Asking for clarification or evidence
 - Helping to support the point by contributing evidence and examples
 - Linking the point creatively to other readings or issues
 - Pointing out unspoken assumptions behind the other person’s point
 - Raising a problem or complication for the other person’s point
 - Synthesizing or pulling together the discussion so far, in order to help

- the group see where they are
- Stating a different point of view and backing it up
- Talking about how this literature has helped to develop my own appreciation of self, society, and nature, and my understanding of the diversity of human experience

___ 10. When I had a genuine question that seemed stupid or simple, I asked it anyway

The following questions do not count for credit, but they help me to assess how well the discussions are going and how we can improve:

11. I thought the discussion today went
 ___ extremely well ___ very well ___ quite well ___ not at all well

Why did you answer as you did?

12. What could the professor have done to make the discussion more successful?

13. What could I, the student, have done to make the discussion more successful?

* * * *

Rubric for Employers to Evaluate Student Teams Working in a Firm

Lawrence D. Fredendall, Management, Clemson University

Assignment: Student teams work with a firm to identify problems and offer recommendations. To be completed by members of the business firms in which student teams work, this sheet is given to students and to members of the firm from the very beginning of the project.

Team's Customer Satisfaction Skills		
Punctuality Some team members missed appointments or did not return phone calls. 0 1 2 3	All team members arrived on time for appointment and returned all phone calls promptly 4 5 6 7	All team members were always early. 8 9 10
Courtesy Some team members were not respectful of some firm employees 0 1 2 3	All team members were always courteous and respectful of all firm employees 4 5 6 7	All employees felt that the team members were very respectful and courteous and fully elicited their ideas. 8 9 10
Appearance		

Sometimes some team members were inappropriately dressed. 0 1 2 3	All team members were always appropriately dressed. 4 5 6 7	All team members adjusted their attire to match the attire used in our firm. 8 9 10
Enthusiasm Some team members did not seem interested in the project. 0 1 2 3	All team members appeared enthusiastic and eager to work on the project 4 5 6 7	The enthusiasm of the team members to complete the project was contagious and inspired others at our firm. 8 9 10
Communication Some team members did not communicate clearly during meetings or phone calls. 0 1 2 3	The team members always communicated clearly with employees during meetings and phone calls. 4 5 6 7	The team members always made an extra effort to make sure they understood us and that we understood them during meetings and phone calls. 8 9 10
Team's Project Management Skills		
Plan Awareness No team member ever presented a plan to the firm about how to complete the project. 0 1 2 3	The team presented a plan but some team members did not seem to follow it. 4 5 6 7	All team members seemed to be aware of the plan and following it. 8 9 10
Problem Definition The team's definition of the problem was absent or vague. 0 1 2 3	The problem was clearly defined. Data were provided measuring the scope of the problem. 4 5 6 7	The problem's importance and relationship to the firm's goals were clearly stated. 8 9 10
Plan Feasibility The plan that was presented was not feasible.	The plan that was presented was feasible but needed	The plan was feasible and was regularly updated as

0 1 2 3	improvement 4 5 6 7	necessary during the project. 8 9 10
Plan Presentation A written plan was not presented. 0 1 2 3	A clear plan with a Gannt chart was presented. 4 5 6 7	The team was able to explain the relation of its plan to the firm's goals. 8 9 10
Team's Data Analysis		
Data Collection The team did not use any apparent method to determine which data to gather. 0 1 2 3	The data were gathered in a systematic manner. 4 5 6 7	The team was able to explain clearly why it collected certain data and did not collect other data. 8 9 10
Collection Method The team's data collection method was haphazard and random. 0 1 2 3	The team had a clear plan they followed to collect the data. 4 5 6 7	The data collection methods simplified the data analysis. 8 9 10
Analysis Tools The team used no tools to analyze the data, or the tools seemed to be randomly selected. 0 1 2 3	The team used all the appropriate tools for data analysis. 4 5 6 7	The team fully explained why it selected certain tools and did not use others for data analysis. 8 9 10
Results Analysis The team did no e3valuation of the validity of its data analysis results. 0 1 2 3	The team validated its results by checking with the appropriate staff for their insight. 4 5 6 7	The team validated its results by conducting a short experiment. 8 9 10
Team's Recommendations		

<p>Clarity The team had no recommendations, or they were not understandable.</p> <p>0 1 2 3</p>	<p>The team's recommendations were reasonable given the problem examined.</p> <p>4 5 6 7</p>	<p>The recommendations logically emerged from the problem statement and data analysis.</p> <p>8 9 10</p>
<p>Impact The impact of implementing the recommendation was not examined or was completely wrong.</p> <p>0 1 2 3</p>	<p>The recommendations are specific enough to serve as the basis for decisions by management</p> <p>4 5 6 7</p>	<p>The recommendations include an implementation plan that is feasible to implement.</p> <p>8 9 10</p>
<p>Qualities of the Team's Paper</p>		
<p>Executive Summary There was no executive summary.</p> <p>0 1 2 3</p>	<p>The executive summary was well written and captured key goals, problems, analysis, steps, and recommendations.</p> <p>4 5 6 7</p>	<p>The executive summary is as good as those usually presented in our firm.</p> <p>8 9 10</p>
<p>Organization The paper is difficult to follow.</p> <p>0 1 2 3</p>	<p>The paper is easy to follow and read.</p> <p>4 5 6 7</p>	<p>All relationships among ideas are clearly expressed by the sentence structures and word choice.</p> <p>8 9 10</p>
<p>Writing Style The paper is sloppy, has no clear direction, and looks as if it were written by several people.</p> <p>0 1 2 3</p>	<p>The format is appropriate with correct spelling, good grammar, good punctuation, and appropriate transition sentences.</p> <p>4 5 6 7</p>	<p>The paper is well written and is appropriate for presentation in the firm.</p> <p>8 9 10</p>
<p>Team Members' Personal Skills</p>		
<p>Self-Confidence</p>		

Some team members' mannerisms made them look as if they were not confident of their abilities. 0 1 2 3	All the team members always seemed confident. 4 5 6 7	All team members were confident and would be able to lead in this organization. 8 9 10
Knowledge Some team members did not seem to understand what they were doing. 0 1 2 3	All team members seemed to have adequate knowledge or ability to learn the necessary material. 4 5 6 7	All team members were proactive about identifying skills they needed and obtaining them in advance. 8 9 10
Reliability Some team members did not follow through with their commitments. 0 1 2 3	All team members fulfilled all commitments they made to staff here. 4 5 6 7	The work the team completed more than met my expectations. 8 9 10
Your Satisfaction with the Product		
Project Completion The team did not do a reasonable amount of work on the project. 0 1 2 3	The team completed a reasonable amount of work on the project. 4 5 6 7	The work the team completed more than met my expectations. 8 9 10
Project Recommendations The recommendations provide no insight. 0 1 2 3	The recommendations are useful and will be examined in detail by our firm. 4 5 6 7	The recommendations will be implemented in full or in part. 8 9 10
Satisfaction We are not satisfied. 0 1 2 3	We are completely satisfied. 4 5 6 7	We are more than satisfied, we are delighted with the team's work! 8 9 10

Your name: _____

Would you sponsor another team project? _____

What do you recommend that the department do to improve the project?

(From Walvoord and Anderson, *Effective Grading: A Tool for Learning and Assessment*, 1998, pp. 212-215).

* * * *

Rubric for Architecture Senior Studio Project

Cara Carroccia, University of Notre Dame

Program Plan

- 4 The assigned program is carefully analyzed and developed. The architect has not omitted any portion of the program and has in fact added to the program
- 3 The architect provides some insight or depth of understanding of the assigned program. However, the internal logic and character of the work needs to be more clearly established and developed.
- 2 The development of the program is generalized and lifeless. Mainly surface relationships are provided. The program has not been developed much beyond the level of bubble diagram.
- 1 The architect communicates no real understanding or development of the assigned program.

Clarity of Concept and Design Objectives

- 4 The architect's concept is organized and unified and has logical transitions between the urban and intimate scale.
- 3 The design objective is mainly clear to the viewer because the architect has tried to order his/her objectives. The link between the urban and architectural realms is not fully explained graphically.
- 2 Although there may be some attempt at presenting design objectives in a thoughtful manner, the work is confused and disjunctive.
- 1 The project has no discernible concept.

Style

- 4 The architect demonstrates a quality of imagination and rigor that results in a distinctive project. The work shows a personal exploration.
- 3 The architect includes refining details, but a portion of the work remains general. The overall composition is pleasing.
- 2 The architect does not invest himself or herself into the work. The style seems bland, guarded, flat and not very interesting.
- 1 The architect demonstrated no recognizable individualistic or historic style

Development of the Small Scale; Detailed Information

- 4 Character, detail and scale are clearly expressed in plan and section.

- 3 Some details are thoughtful and vivid. However, the character of the plan and/or section is not developed.
- 2 Simplistic details are used in a typical way. Repetition of these details distracts from the work. The plan and section together describe a reasonable, believable building, but little information about or attention to detail is developed.
- 1 Development of the character of the plan and/or section is limited and immature.

Development of the Urban Scale

- 4 The development of the urban scale shows a confident control of the project and communicates a clear parti. The work “reads” smoothly from urban scale to the intimate scale. Coherent development at this level makes the project clear and easy to understand.
- 3 The architect shows some control in the development of an urban parti, and has only a few elements at the urban scale that are awkward or perfunctory.
- 2 The architect has definite problems with parti: in simplistic terms, the big idea. Most of the urban plan is simplistic in conception, and immature in its development.
- 1 There is no discernable urban idea. All is perfunctory.

Knowledge of Construction

- 4 There are not obvious errors in construction. The architect shows he/she is familiar with the building materials and their appropriate use.
- 3 A few errors in construction practices appear in the project, showing the architect is still learning about the building materials that were chosen. These errors do not substantially detract from the overall impression of the work.
- 2 Errors or omissions in the use of the chosen building materials are so numerous that they are distracting to the viewer.
- 1 Errors or omissions in standard building practices are serious enough and frequent enough to interfere with meaning.

Graphic Presentation

- 4 The project is presented in a complete and compelling manner.
- 3 The project is compelling but incomplete.
- 2 Required drawings are missing, and the presented work is not legible due to the lightness of the drawings or the haphazard method of presentation.
- 1 Little effort was invested in the graphic communication of the assigned project.

* * * *

Rubric for Scientific Experiment in Biology Capstone Course, by Virginia Johnson Anderson, Towson University, Towson, MD

Assignment: Semester-long assignment to design an original experiment, carry it out, and write it up in scientific report format. Students are to determine which of two brands of a commercial product (e.g. two brands of popcorn) are “best.” They must base their judgment on at least four

experimental factors (e.g. “% of kernels popped” is an experimental factor. Price is not, because it is written on the package).

Title

- 5 - Is appropriate in tone and structure to science journal; contains necessary descriptors, brand names, and allows reader to anticipate design.
- 4 - Is appropriate in tone and structure to science journal; most descriptors present; identifies function of experimentation, suggests design, but lacks brand names.
- 3 - Identifies function, brand name, but does not allow reader to anticipate design.
- 2 - Identifies function or brand name, but not both; lacks design information or is misleading
- 1 - Is patterned after another discipline or missing.

Introduction

- 5 - Clearly identifies the purpose of the research; identifies interested audiences(s); adopts an appropriate tone.
- 4 - Clearly identifies the purpose of the research; identifies interested audience(s).
- 3 - Clearly identifies the purpose of the research.
- 2 - Purpose present in Introduction, but must be identified by reader.
- 1 - Fails to identify the purpose of the research.

Scientific Format Demands

- 5 - All material placed in the correct sections; organized logically within each section; runs parallel among different sections.
- 4 - All material placed in correct sections; organized logically within sections, but may lack parallelism among sections.
- 3 - Material placed in right sections but not well organized within the sections; disregards parallelism.
- 2 - Some materials are placed in the wrong sections or are not adequately organized wherever they are placed.
- 1 - Material placed in wrong sections or not sectioned; poorly organized wherever placed.

Materials and Methods Section

- 5 - Contains effectively, quantifiably, concisely organized information that allows the experiment to be replicated; is written so that all information inherent to the document can be related back to this section; identifies sources of all data to be collected; identifies sequential information in an appropriate chronology; does not contain unnecessary, wordy descriptions of procedures.
- 4 - As above, but contains unnecessary information, and/or wordy descriptions within the section.
- 3 - Presents an experiment that is definitely replicable; all information in document may be related to this section; however, fails to identify some sources of data and/or presents sequential information in a disorganized, difficult pattern.
- 2 - Presents an experiment that is marginally replicable; parts of the basic design must be inferred by the reader; procedures not quantitatively described; some information in Results or Conclusions cannot be anticipated by reading the Methods and Materials section.

- 1 - Describes the experiment so poorly or in such a nonscientific way that it cannot be replicated.

Non-experimental Information

- 5 - Student researches and includes price and other nonexperimental information that would be expected to be significant to the audience in determining the better product, or specifically states non-experimental factors excluded by design; interjects these at appropriate positions in text and/or develops a weighted rating scale; integrates nonexperimental information in the Conclusions.
- 4 - Student acts as above, but is somewhat less effective in developing the significance of the non-experimental information.
- 3 - Student introduces price and other non-experimental information, but does not integrate them into Conclusions.
- 2 - Student researches and includes price effectively; does not include or specifically exclude other non-experimental information.
- 1 - Student considers price and/or other non-experimental variables as research variables; fails to identify the significance of these factors to the research.

Designing an Experiment

- 5 - Student selects experimental factors that are appropriate to the research purpose and audience; measures adequate aspects of these selected factors; establishes discrete subgroups for which data significance may vary; student demonstrates an ability to eliminate bias from the design and bias-ridden statements from the research; student selects appropriate sample size, equivalent groups, and statistics; student designs a superior experiment.
- 4 - As above, but student designs an adequate experiment.
- 3 - Student selects experimental factors that are appropriate to the research purpose and audience; measures adequate aspects of these selected factors; establishes discrete subgroups for which data significance may vary; research is weakened by bias OR by sample size of less than 10.
- 2 - As above, but research is weakened by bias AND inappropriate sample size
- 1 - Student designs a poor experiment.

Defining Operationally

- 5 - Student constructs a stated comprehensive operational definition and well-developed specific operational definitions.
- 4 - Student constructs an implied comprehensive operational definition and well-developed specific operational definitions.
- 3 - Student constructs an implied comprehensive operational definition (possibly less clear) and some specific operational definitions.
- 2 - Student constructs specific operational definitions, but fails to construct a comprehensive definition.
- 1 - Student lacks understanding of operation definition.

Controlling Variables

- 5 - Student demonstrates, by written statement, the ability to control variables by experimental control and by randomization; student makes reference to, or implies,

factors to be disregarded by reference to pilot or experience; superior overall control of variables.

- 4 - As above, but student demonstrates an adequate control of variables.
- 3 - Student demonstrates the ability to control important variables experimentally; Methods and Materials section does not indicate knowledge of randomization and/or selected disregard of variables.
- 2 - Student demonstrates the ability to control some, but not all, of the important variables experimentally.
- 1 - Student demonstrates a lack of understanding about controlling variables.

Collecting Data and Communicating Results

- 5 - Student selects quantifiable experimental factors and/or defines and establishes quantitative units of comparison; measures the quantifiable factors and/or units in appropriate quantities or intervals; student selects appropriate statistical information to be utilized in the results; when effective, student displays results in graphs with correctly labeled axes; data are presented to the reader in text as well as graphic forms; tables or graphs have self-contained headings.
- 4 - As 5 above, but the student did not prepare self-contained headings for tables or graphs.
- 4 - As 4 above, but data reported in graphs or tables contain materials that are irrelevant and/or not statistically appropriate.
- 2 - Student selects quantifiable experimental factors and/or defines and establishes quantitative units of comparison; fails to select appropriate quantities or intervals and/or fails to display information graphically when appropriate.
- 1 - Student does not select, collect, and/or communicate quantifiable results.

Interpreting Data: Drawing Conclusions/Implications

- 5 - Student summarizes the purpose and findings of the research; student draws inferences that are consistent with the data and scientific reasoning and relates these to interested audiences; student explains expected results and offers explanations and/or suggestions for further research for unexpected results; student presents data honestly, distinguishes between fact and implication, and avoids overgeneralizing; student organizes non-experimental information to support conclusion; student accepts or rejects the hypothesis.
- 4 - As 5 above, but student does not accept or reject the hypothesis.
- 3 - As 4 above, but the student overgeneralizes and/or fails to organize non-experimental information to support conclusions.
- 2 - Student summarizes the purpose and findings of the research; student explains expected results, but ignores unexpected results.
- 1 - Student may or may not summarize the results, but fails to interpret their significance to interested audiences.

Student Scores for Science Reports, Before and After Anderson Made Pedagogical Changes

Trait	Before	After
Title	2.95	3.22

Trait	Before	After
Introduction	3.18	3.64
Scientific Format	3.09	3.32
Methods and Materials	3.00	3.55
Non-Experimental Info	3.18	3.50
Designing the Experiment	2.68	3.32
Defining Operationally	2.68	3.50
Controlling Variables	2.73	3.18
Collecting Data	2.86	3.36
Interpreting Data	2.90	3.59
Overall	2.93	3.42

* * * *

Rubric for Journals in English Literature General-Education Course, Used for Departmental and Gen-Ed Committee Discussion of Students’ Ability to Connect Literature to Their Own Lives and Values

Trait: Connecting literature to students’ own lives and values

- 1 Journal entry merely summarizes the literature OR merely reflects on the student’s own life and values
- 2 Journal entry summarizes the literature AND reflects on the student’s life and values, but makes little or no explicit connection between the two
- 3 Entry uses the literature in a very simple way to draw “lessons” to apply to his/her own life
- 4 Entry makes thoughtful links between the literature and his/her own life and values. It uses the literature as a vehicle for pushing and exploring the student’s own life and values. It recognizes the complexity both of the literary work and of life and values.

* * * *

Rubric for Statistical Investigation Course, Used for Departmental Discussion of Students’ “Critical Thinking and Quantitative Reasoning”

William Marsh, Raymond Walters College of the University of Cincinnati (two-year, open admissions)

Assignment: Conduct a statistical investigation, including identifying a problem, developing an hypothesis, obtaining a random sample, measuring variables, analyzing data, and presenting conclusions. The rating sheet below contains only three of the factors that affect the grade. These factors were separately and carefully analyzed and shared with colleagues, to identify progress on college's gen-ed goal of "critical thinking and quantitative reasoning."

Methodology

- 5 Correct statement of problem with accompanying null and alternative hypothesis.
Well-defined population with appropriate random sample.
Data collection is free of bias and contamination
- 4 One part of the 5 level is not as high as it should be, and overall the quality of the methodology is just slightly lower than the highest level.
- 3 All the necessary parts of the methodology are present, but the quality level is only adequate
- 2 There is a serious deficit in the methodology in the form of poorly performed tasks or some portions simply omitted. The results are compromised and may be unusable.
- 1 There is a total failure to understand the task. The results will be invalidated because the methodology is erroneous.

Data Analysis

- 5 Uses appropriate statistical test with correct results
Provides an interval estimation of the values of the parameter.
Includes a hypothesis test and gives accompanying p -level stating probability of type 1 error.
- 4 Provides most of level 5, but one of the characteristics is missing or unclear.
- 3 Uses correct statistical test, but estimation or interpretation is omitted.
- 2 Uses correct statistical tests, but there are errors in calculation and other work.
- 1 Incorrect statistical test. Data are erroneous or missing.

Conclusion

- 5 A complete presentation of results with conclusions, estimations, and p -levels for type 1 errors. Identifies possible threats to the study and also any areas in need of additional study.
- 4 As in 5, but one characteristic could be improved.
- 3 The presentation is only adequate. Conciseness and clarity are lacking.
- 2 Conclusions are vague and inaccurate. There has been an effort by the student, but there is an obvious lack of understanding and thoroughness.
- 1 A failure to make the necessary conclusions and implications

* * * *

Analysis for Mathematics Class

Learning Goal: Solve and demonstrate an understanding of a dual problem and its meaning.

	Exam #2 Q 14	Exam #2 Q 20	Homework #8	Final Exam Q 7	Mean for Each Individual Student
Student#1	75	64	63	80	70
Student#2	64	48	44	74	56
Student #3	91	79	89	85	86
And So On					
Mean for Each Question/ Problem	76	64	65	80	71

(From Walvoord and Anderson, *Effective Grading: A Tool for Learning and Assessment*, 1998, p. 139).

For other examples of scoring sheets in various disciplines, see B. E. Walvoord and V. J. Anderson, *Effective Grading* (Jossey-Bass, 1998).

Appendix B: Ten Teaching Strategies Suggested by Research

1. Have students write about and discuss what they are learning
2. Encourage faculty-student contact, in and out of class
3. Get students working with one another on substantive tasks, in and out of class
4. Give prompt and frequent feedback to students about their progress
5. Communicate high expectations
6. Make standards and grading criteria explicit
7. Help students to achieve those expectations and meet the criteria
8. Respect diverse talents and ways of learning
9. Use problems, questions, or issues, not merely content coverage, as points of entry into the subject and as sources of motivation for sustained inquiry
10. Make courses assignment-centered rather than merely text- and lecture-centered. Then focus on helping students successfully complete the assignments.

Appendix C: Using Time and Space for Learning

	Students with Teacher (Class)	Student "Study" Time	Teacher Alone
Using Class for First Exposure	first exposure	process	response
Using Class for Process and Response	process, response	first exposure	

Aspects of the Learning Process:

First Exposure: Student first hears/reads/view new information/concepts

Process: Student memorizes, synthesizes, evaluates, applies the information

Response: Student receives feedback from teacher, peers, or others

Case Histories:

Course	Problem	Low-tech mode: How the teacher moved first exposure to student time	How might other technologies enhance this process?
History: Western Civ: 40 students, very selective comprehensive univ., no T.A.. Goal: teach students to argue about historical issues	Students did not read before lecture. Most did not contribute to discussion. Written exams and papers were largely recap of lectured and textbook material. Students needed practice in argument.	Required students to bring to class, almost daily, two copies of a 1-2-page written response to reading, which then became the basis for in-class process and response. Students handed in one copy and kept the other at their seats. Prof. ensured that students, in class, wrote comments on their own copies of the assignments. After class, he merely gave credit to the students, using the other copy, taking 2-4 seconds per paper.	

Course	Problem	Low-tech mode: How the teacher moved first exposure to student time	How might other technologies enhance this process?
Physics: intro: 60 students, Research I public university. TA's as needed.	Students asked few questions during lecture, but then could not do homework problems. Students needed teacher's help when they struggled with a problem.	Videotaped his own lectures, and required students to view them out of class. In class, students in teams did homework problems. Prof. checked team's homework before they left the room.	
Psych 101: 120 students, access institution, private undergrad, no T.A.	Students needed to master large amounts of facts, concepts, and vocabulary, but also to experience psychology as inquiry into human behavior. Many students were reluctant or unskilled readers, or ESL.	"Little engine that could" system in which students were to read the text, use the teacher's handout to help them, and then take 8 multiple-choice tests over the material. In class, prof. spent first 20 minutes answering any questions students had about the reading material, and then turned the class into a "lab," guiding students through a small psychological inquiry, which they turned in toward the end of the course.	

Appendix D: Student Self-Check

Checksheet for paper of literary analysis

This sheet must be included at the front of your essay. I will not accept any essays without the checksheet fully completed.

___ I have read the poems at least three times

I have spent _____ hours on research and writing this paper

___ I have had at least one other person read the paper and offer suggestions

___ I have reread the paper at least twice for grammar, punctuation, and spelling

___ I have used the spellcheck

___ The paper is presented in the format described on p. 2 of the assignment

___ A reader of my paper could tell what my thesis is

___ My thesis is a challenging, yet defensible, interpretation of some aspect of the poems

___ etc. [self-check items related to criteria and standards for the paper]

If I had more time to spend on this paper, I would: _____

(Adapted from Barbara E. Walvoord and Virginia J. Anderson, *Effective Grading: A Tool for Learning and Assessment*. Jossey-Bass, 1998.)

Appendix E: Student Survey on Teaching Methods

Madan Batra, Indiana University of Pennsylvania

Course: International Marketing

Assignment: In groups, students complete a project in which they research and propose export feasibility for a particular product to a particular country. The semester-long project requires collecting information from various organizations such as libraries, domestic governmental agencies, consulting firms, export intermediaries, shipping companies, and international agencies. Then, the information is to be analyzed and presented in the form of a professional report for a hypothetical business executive.

Questionnaire administered to all students in class at the end of the semester:

Section A: Tools and Techniques

Please use the scale shown below to fill in the blanks at the end of statements:

Write 4 if you “strongly agree” with the statement

3 if you “agree”

2 if you “disagree”

1 if you “strongly disagree”

9 if you are unable to judge

1. Project Outline

You were provided an outline of the project along with the syllabus during the first week of the semester.

This tool:

- a. Contributed substantially to the overall quality of the project _____
- b. Enables every group member to pull his/her fair share of the workload to the project__
- c. Assisted group members to contribute innovative ideas _____
- d. Contributed to the timely completion of the project _____
- e. Helped me to become involved in the project _____
- f. Helped me to analyze the nature of the project _____
- g. Helped the group members pace their work _____
- h. Is recommended for similar group projects offered by the instructor in the future _____
- i. Contributed substantially to the overall learning from the course _____

2. Initial Intensive Guidance

The instructor spent considerable time (3-4 class sessions) in the beginning of the semester to explain various sources of information for the project, tactics to be pursued for gathering relevant information, and methods to handle likely problems.

This technique:

[choices as #1]

3. Work Allocation Sheet (Information-Gathering State)

By the third week of the semester, you were asked to allocate work (information-gathering part) required to complete the project among the team members. Your group submitted a work allocation sheet.

This technique:
[choices as #1]

4. Internalization of the Project Outline

In the early semester you were given an exercise to identify a minimum of 25 questions that your project would answer.

This technique:
[choices as #1]

5. Written Progress Report

During the mid-semester, your group was asked to submit a progress report indicating every team member's efforts and the extent of their success in gathering information. You were then required to discuss the progress report with the instructor.

[choices as #1]

6. Assistance from Peer Group

Toward the latter part of the semester, you were asked to submit one-to-two-page summary of two major sections—environment analysis and marketing strategy—of the project. The summary was reviewed by another class team who provided you their feedback and additional suggestions.

[choices as #1]

7. First Draft of the Project

Toward the end of the semester, you were given an opportunity to submit an initial draft of the project. The draft was returned to you with the instructor's reactions and comments.

[choices as #1]

8. Oral Presentation

Toward the end of the semester, you were given an opportunity to make an oral presentation to the class. The observations of the instructor and the class could be addressed in the final revised project.

[choices as #1]

9. Personal Journal

Each group member was required to maintain and submit a personal journal indicating the nature of efforts, quality of learning, and number of hour spent on the project.

[choices as #1]

Section B: Open-Ended Suggestions

Please specify any other techniques that would improve the individual contribution and equity in group projects:

Section C: Other Information

- 1. Are you (a) a junior _____ (b) senior _____
- 2. Have you been involved in other group projects? Yes _____ (b) No _____

If yes, how does the learning experience from this course project compare to other group projects? Check one of the following: Better _____ About the same _____ Worse _____

Compared to other group projects, did the group members in your project put in a fair share of the work? Yes _____ No _____

- 3. What is your major? _____

Appendix F: Sample Departmental Assessment Plans

Majors, Department of Biology

(Note: similar matrices would be produced for general-education and graduate programs in the department)

Learning Goals for Majors

- Describe and apply basic biological information and concepts
- Conduct original biological research and report results orally and in writing to scientific audiences
- Apply ethical principles of the discipline in regard to human and animal subjects, environmental protection, use of sources, and collaboration with colleagues

Are these on the web or otherwise readily available to students and faculty? _____

<i>Measures</i>	<i>Goal 1</i>	<i>Goal 2</i>	<i>Goal 3</i>	<i>Use of the information</i>
Standardized test given to all seniors AND Final exams of three basic biology courses required of all majors	X			Data are reported to the department annually by the standardized exam committee and the instructors of the three basic courses. The department supports and encourages the instructors, takes any appropriate department-level actions, and reports meeting outcomes to dean or other body which has resources to address problems, and to those composing reports for accreditation or other external audiences. All data are reviewed as part of program review every seven years.
In senior capstone course, students complete an original scientific experiment, write it up in scientific report format, and also make an oral report to the class. The instructor(s) use explicit criteria to evaluate student work.	X	X	X	Annually, the senior capstone instructor(s) share students' scores with the department. The department takes action as above.
Alumni survey asks how well alums thought they learned to conduct and		X	X	Data reviewed annually by department for action, as above

<i>Measures</i>	<i>Goal 1</i>	<i>Goal 2</i>	<i>Goal 3</i>	<i>Use of the information</i>
communicate scientific research				
Sample of regional employers gathered two years ago to reflect how well our majors are doing and give advice to dept.	X	X	X	Data reviewed by department for action, as above

Examples of Changes Based on Assessment

- Two years ago, our advisory council of regional employers recommended that our majors had a good level of biological knowledge but needed stronger skills in actually conducting biological research. Data from the alumni survey also mentioned this problem. We instituted the required capstone course, which requires students to conduct original scientific research, and we asked the instructor(s) annually to report to the department on student research and communication skills demonstrated by their capstone projects. In three years, when several cohorts of majors have passed through the capstone, we will again survey alumni and employers to see whether student skills have increased, and we will review data from all years of the capstone projects.
- The capstone instructor(s) last year reported low graphing skills in seniors; we arranged with the mathematics department for greater emphasis on graphing in the required math course and for assessment of graphing skills during that course, working closely with the capstone instructor(s). The capstone instructor(s) will report next year whether graphing skills are stronger. Prof. Brody is currently developing a rubric to assess graphing skills more systematically.

Recommendations for Improving Assessment Processes

- Standardized national test is costly and time-consuming to administer, has low student motivation in its current format, and results are difficult to map to our curriculum. Committee should review usefulness of the national test.