

Establishing Criteria and Standards for Student Work

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(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; Astraw
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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

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Grading Sheet for Students for First-Year Composition Essay

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 write 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 Aself@ or Aethos@ 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 *Aethos*@ 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 EWSE 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.

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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.

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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:

- An executive summary that states your position and summarizes the main reasons for your conclusion.
- 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)
- 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.
- 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

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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. Be.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

<p>Communication Some team members did not communicate clearly during meetings or phone calls.</p> <p>0 1 2 3</p>	<p>The team members always communicated clearly with employees during meetings and phone calls.</p> <p>4 5 6 7</p>	<p>The team members always made an extra effort to make sure they understood us and that we understood them during meetings and phone calls.</p> <p>8 9 10</p>
<p>Team=s Project Management Skills</p>		
<p>Plan Awareness No team member ever presented a plan to the firm about how to complete the project.</p> <p>0 1 2 3</p>	<p>The team presented a plan but some team members did not seem to follow it.</p> <p>4 5 6 7</p>	<p>All team members seemed to be aware of the plan and following it.</p> <p>8 9 10</p>
<p>Problem Definition The team=s definition of the problem was absent or vague.</p> <p>0 1 2 3</p>	<p>The problem was clearly defined. Data were provided measuring the scope of the problem.</p> <p>4 5 6 7</p>	<p>The problem=s importance and relationship to the firm=s goals were clearly stated.</p> <p>8 9 10</p>

<p>Plan FeasibilityThe plan that was presented was not feasible.</p> <p>0 1 2 3</p>	<p>The plan that was presented was feasible but needed improvement</p> <p>4 5 6 7</p>	<p>The plan was feasible and was regularly updated as necessary during the project.</p> <p>8 9 10</p>
<p>Plan Presentation A written plan was not presented.</p> <p>0 1 2 3</p>	<p>A clear plan with a Gannt chart was presented.</p> <p>4 5 6 7</p>	<p>The team was able to explain the relation=s of its plan to the firm=s goals.</p> <p>8 9 10</p>

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		
Clarity The team had no recommendations, or they were not understandable. 0 1 2 3	The team=s recommendations were reasonable given the problem examined. 4 5 6 7	The recommendations logically emerged from the problem statement and data analysis. 8 9 10
Impact The impact of	The recommendations are	The recommendations

<p>implementing the recommendation was not examined or was completely wrong.</p> <p>0 1 2 3</p>	<p>specific enough to serve as the basis for decisions by management</p> <p>4 5 6 7</p>	<p>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>

Team Members= Personal Skills		
Self-Confidence 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.	We are completely satisfied.	We are more than satisfied, we are

0 1 2 3	4 5 6 7	delighted with the team=s work! 8 9 10
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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).

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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.

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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 Abest.@ They must base their judgment on at least four experimental factors (e.g. A% 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 effective, quantifiable, 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 non-experimental 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 non-experimental 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.
- 3 - 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	Year 1	Year 2
Title	2.95	3.22
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

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