Student writing and learning

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Modified after an EC Handout by Rachel Beane

How writing is often included in coursework

- Final research project at end of course (last day of classes?)
- Students complete this at the last possible moment
- You frantically grade at end of semester to meet deadline
- Minimal feedback returned to student, no chance for students to learn or iterate

What are our big picture goals for teaching writing?

- Allow students to revise work iteratively to learn how to improve their writing
- Encourage them to extend the time horizon for work
- Encourage them to learn to self-evaluate/edit in a real and meaningful way
- Teach them what the reader needs to interpret their writing

Plan carefully for your specific course and needs

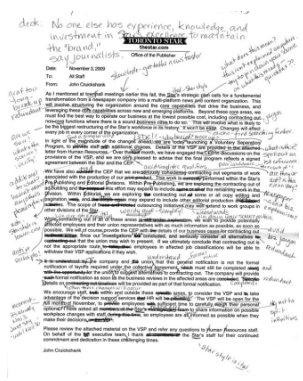
- Is this a general science course and you want to teach good basic analysis and writing skills?
- Is this a majors course where you are trying to teach fundamental aspects of science writing?
- Is this a capstone course where you are emphasizing highly technical writing?
- What is the length and depth of the assignment?
- The nature of your assignment may influence the appropriate approach to take

Some thoughts and approaches

- Teach writing and your expectations explicitly (what are your goals—share them with your students)
- Minimize line-by-line editing
- Rubrics
- Peer review
- Low-stakes short writing assignments
- Annotated bibliography
- Scaffolding long writing assignments
- Provide “model” examples (strong &/or weak)

Teach writing explicitly

- When are students learning about good writing?
- It may be they haven’t had explicit training as often as you might think
- Take one lecture (or more) to teach what good writing means to you and why writing is important
- Emphasize the goals of writing and the needs of the reader
  - Highlight significance of problem
  - State a thesis
  - Clear and logical flow of ideas from one section to the next, etc.
- Highlight science/earth science formats and conventions, as students may be unfamiliar with these
- Cover citation style and give examples of why we do this
- Craft your assignment carefully and be explicit about your expectations



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Minimize line-by-line editing

- Tempting to do this
- Often to justify our grades?
- Cons likely outweigh benefits
- This is overwhelming!
- Mixes the small and big problems
- Highlight one example of a problem rather than each instance
- Direct students to a writing center if there are extensive problems or…
- Sit down one-on-one to highlight issues

Use a rubric

Name:_____

Research Paper Rubric

	4	3	2	1
Content and Focus	• Exceptionally clear, focused, interesting thesis. • Strong, rich supporting details and examples that prove thesis. • Compelling conclusion explaining the importance of the research and how it can be used.	• Clear thesis which maintains a consistent focus from beginning to end. • Specific supporting details and examples. • A clear conclusion as to why the research is important.	• Contains thesis but with inconsistent focus. • Generalized supporting details that lack clarity. • Conclusion tends to summarize research.	• Thesis statement lacks clarity and focus. • Inadequate or missing supporting details. • Missing a summarizing conclusion.
Organization	• Strong introduction and conclusion. • Well-developed coherent logical progression. • Uses clear and skillful transitions.	• Clear introduction and conclusion. • Maintains clear consistency and shows some logical progression. • Uses clear transitions.	• Introduction and conclusion is present but weak. • Shows some attempt of consistency and order. Paper shows attempt of transitions between paragraphs.	• Unable to clearly identify introduction and conclusion. • Lack of consistency and order. • Paper shows little or no attempt of transitions between paragraphs.
Style	• Writes in formal language (avoids slang completely). • Elaborate and colorful language. • Consistently strong and appropriate word choice. • Direct quotes support student's ideas. • Paper written in student's own words.	• Majority of paper written in formal language. • Language appropriate to topic. • Words convey intended meaning. • Direct quotes support student's ideas. • Majority of paper written in student's own words.	• Some use of formal language recognized, informal language is dominant. • Most language is appropriate to topic. • Able to get vague idea of message. • Some parts of paper written in student's own words.	• Paper frequently uses informal language. • Language is not appropriate to topic. • Message is unclear. • Paper is not student's original work.
Sources/Format	Follows MLA guidelines: • Uses 5 or more cited sources. • Sources meet the guidelines for 'types of sources.' • All parenthetical documentation is MLA correct (author's name, pg. #). • Works Cited page is MLA correct. • All researched info is documented.	Follows MLA Guidelines with few exceptions: • 3-4 cited sources used. • Sources meet the guidelines for 'types of sources.' • Few errors noted in parenthetical documentation. • Majority of Works Cited page is MLA correct. • Most research info is documented.	Inconsistent use of MLA style guidelines: • Less than 3 cited sources used. • Majority of parenthetical documentation done incorrectly. • Works Cited MLA documentation. • Rarely documents sources.	Fails to follow MLA style Guidelines: • Less than 3 cited sources used/little or no parenthetical documentation. • Works Cited page is not understandable.
Conventions	Superior editing. Rarely makes errors in the following areas: • Spelling and mechanics. • Correct usage and grammar.	Careful editing. Makes few errors in the following areas: • Spelling and mechanics • Correct usage and grammar	Some evidence of editing: • Extensive spelling and grammatical errors.	Poor editing: • Spelling and grammatical errors make it difficult to read paper.

Score:_____ / 4

Evaluated by:_____ Date:_____

Advantages

- Sets clear expectations
- Allows students to focus on key writing concepts
- Makes grading faster/easier for you and more transparent for the student

Considerations

- How many focus items?
- How complex is the scaling?

Peer review of drafts

Pros:

- Students can learn better writing by editing their peers' work
- Students may be more receptive to evaluation from their peers (but sometimes not!)
- Can save instructor time

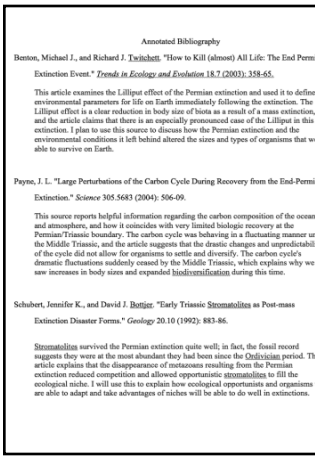
Possible cons:

- Student evaluations may under or overshoot your own expectations, leading to confusion
- Students may not do a thoughtful review
- Students might be mean or insensitive

Issue clear guidelines about your expectations for the peer reviews. Consider collecting and editing reviews prior to returning comments.
Consider grading the quality of the student review to add accountability.

Short, low-stakes writing assignments

- Allows practice and feedback without major grade implications
- Quick turn-around on feedback
- Could take numerous forms:
  - Short response to a scientific paper or news article
  - Writing a caption to a figure or image
  - An analysis of a geologic theme or concept



Annotated Bibliography

Benton, Michael J., and Richard J. Twitchett. "How to Kill (almost) All Life: The End Permian Extinction Event." *Trends in Ecology and Evolution* 18.7 (2003): 358-65.

This article examines the Lilliput effect of the Permian extinction and used it to define environmental parameters for life on Earth immediately following the extinction. The Lilliput effect is a clear reduction in body size of biota as a result of a mass extinction, and the article claims that there is an especially pronounced case of the Lilliput in this extinction. I plan to use this source to discuss how the Permian extinction and the environmental conditions it left behind altered the sizes and types of organisms that were able to survive on Earth.

Payne, J. L. "Large Perturbations of the Carbon Cycle During Recovery from the End-Permian Extinction." *Science* 305.5683 (2004): 506-09.

This source reports helpful information regarding the carbon composition of the oceans and atmosphere, and how it coincides with very limited biologic recovery at the Permian/Triassic boundary. The carbon cycle was behaving in a fluctuating manner until the Middle Triassic, and the article suggests that the drastic changes and unpredictability of the cycle did not allow for organisms to settle and diversify. The carbon cycle's dramatic fluctuations suddenly ceased by the Middle Triassic, which explains why we saw increases in body sizes and expanded biodiversification during this time.

Schubert, Jennifer K., and David J. Bottjer. "Early Triassic Stromatolites as Post-mass Extinction Disaster Forms." *Geology* 20.10 (1992): 883-86.

Stromatolites survived the Permian extinction quite well; in fact, the fossil record suggests they were at the most abundant they had been since the Ordivician period. The article explains that the disappearance of metazoans resulting from the Permian extinction reduced competition and allowed opportunistic stromatolites to fill the ecological niche. I will use this to explain how ecological opportunists and organisms that are able to adapt and take advantages of niches will be able to do well in extinctions.

The annotated bibliography

- Students submit a brief overview of their paper and summarize their key sources
- Requires students to work in stages (due 2-3 weeks prior to paper?)
- Allows you to vet the project and sources ahead of time and head off potential problems

How to lengthen the time horizon: "Scaffolding" a longer writing assignment

- Getting students to take sufficient time on a writing assignment is challenging
- Lack of opportunity for revision based on comments
- Consider scaffolding longer assignments into manageable chunks (outline, introduction, results, etc. or however else you want to partition)
- Provide timely feedback on each section, focus on key issues
- Have students highlight for you the changes that they made for their revisions

Think, Pair, Share on a writing assignment you are considering

- On your own, brainstorm two or three content areas from your course that you could use for a student writing assignment
- Come up with the type of writing assignment that you would use for each topic
- Work with a partner to plan a writing assignment that you could give to your students with as much detail as possible
  - How long with they have to work on it?
  - What feedback, if any, would be provided along the way?
  - How will you assess this assignment?
  - How much is it worth (relative to their final grade)?
- Share your assignments with the group

Resources

- SERC Resource "Organizing Scientific writing"
- SERC Resource "A Simple Approach to Improve Student Writing"
- SERC Resource "Example of Writing Assignment on Plate Tectonics"
- Gopen, G.D. and Swan, J.A., 1990. The science of scientific writing. American Scientist, 78: 550-558. (On the importance of writing for the reader)
- Transparency in Learning and Teaching (TILT) Framework: https://www.unlv.edu/provost/teachingandlearning
  - Example of a writing assignment applying the TILT framework: https://serc.carleton.edu/teachearth/activities/209265.html