A Peer Review Writing Workshop in the Advanced Lab

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Goal:

To enhance students' scientific writing experience through critiquing peers manuscript-style reports.

For a peer review workshop to be successful, students need to be taught how to provide effective feedback.[1] The first advanced lab peer review workshop at Denison University took place in Spring 2015.

Timeline of Selected Writing Assignments

Week	Assignment
2	"Science of Scientific Writing"
4	Report 1 Drafts/ 1-on-1 Instructor Meeting
5	Report 1 Due
8	Peer Review of Writing Prep
9	Report 2 Drafts/ PEER REVIEW WORKSHOP
10	Report 2 Due

"The Science of Scientific Writing"

Assignment Prompt:

As you read the article "The Science of Scientific Writing[2]," make two separate lists: (1) The things you think are important in the article and (2) the things you find interesting about the article. These should be typed, printed, and brought to class. They will be collected and graded as +/-.

Class Exercise:

- "Pair and Share" activity - groups of 2-3 compile "Top 4 Most Important" lists, share with class
- Summarize and discuss manuscript style lab reports and expectations for Phys 312

main ideas

- **Reading = Interpreting; Effective writing minimizes incorrect interpretation**
- Link information throughout paper; Avoid logical gaps
- Keep audience in mind; avoid pointless jargon, acronyms
- Writing can improve author's own "quality of thought"

Peer Review Workshop

- Each student reviews one peer's Report 2 draft (pairings chosen by instructor)
  - Read and comment prior to workshop
  - Provide 1-2 paragraph summary of comments
- **WORKSHOP**: Students spend ~20 min per paper
  1. Reviewer begins with a few positive aspects
  2. **Reviewer DESCRIBES/ SUMMARIZES the experiment and findings**
  3. Discuss positive aspects and suggestions for improvement or rethinking
  4. Questions reviewer has for author & vice versa
- **Instructor's Role**
  - Thoughtful student pairings
  - Remind students of guidelines/ keep them on track
  - Mitigate disagreements

Preparation Led to an Effective Peer Review Workshop

Samples of Peer Feedback

Positive Comments:

"The error analysis is inclusive as it covers a variety of uncertainties, both systematic and random, which demonstrates your particular attention to details and careful evaluation of experimental methods."

"Even though the fuel cell gave you bad data, I appreciate that you discussed it and explained what it should have been and such. Sometimes bad data and failed experiments can still teach us something."

"Beginning with statistics of how dangerous gas and coal emissions can be is an excellent motivator for the reader. I found myself more interested in learning the history and theory of fuel cells later in the paper because of this."

Constructive Criticism:

"A circuit diagram would be helpful in understanding how the load circuit is set up."

"The motivation and goal are important parts to the experiment, thus they need to be clarified at the beginning."

"...give a better explanation of where the Lyapunov exponents come from. You give the equation, but show what factors in your experimental setup correspond to which variables in the equation."

"The biggest improvement would be (besides actually calculating uncertainties) to reorganize and expand on the description of chaos and nonlinear motion."

Outcomes

- ✓ Students provided overall constructive and thoughtful peer feedback
- ✓ Several students commented that they learned more about themselves as writers by reading and peer reviewing their classmates' papers.
- ✓ The peer reviewed reports were on average the strongest reports of the three that were written.
- ✓ Peer review workshop saved the instructor many hours of time reading and providing feedback on individual drafts

Improvements

- Workshop groups of 3 instead of 2
  - ➢ Provide built-in mechanism for reviewer to describe/summarize experiment (#2 in Workshop process)
- Stronger (grade?) incentive for students to provide complete drafts for review
  - ➢ More feedback on data/ uncertainty analysis

Peer Review of Writing Prep

Assignment Prompt:

As you read the article "Introducing Students to the Peer Review of Writing[3]," make two separate lists: (1) The things you think are important in the article and (2) the things you find interesting about the article. These should be typed, printed, and brought to class. They will be collected and graded as +/-.

Class Exercise:

- "Pair and Share" activity - groups of 2-3 compile "Top 4 Most Important" lists, share with class
- Summarize and discuss peer review process for Phys 312, format of Peer Review Workshop

main ideas

- Effective Peer Review ≠ Proofreading
- Provide specific feedback: both positive and negative
- **Asking reviewer to summarize the paper can help identify misinterpretation**

Reviewer should consider:

- Is it appropriate for the audience?
- Are motivation and hypothesis/ goals clearly stated?
- Are there logical gaps?
- Does reviewer agree with data/ uncertainty analysis methods?
- Are the conclusions valid?

References

1. J. C. Bean, *Engaging Ideas*, 2nd ed (Jossey-Bass, San Francisico, 2011), pp. 295-302.
2. G. Gopen and J. Swan, *Am. Sci.* **78**, 550-558 (1990).
3. R. M. Chisholm, *Writing Across the Curriculum* **3**, 4-19 (1991).

Acknowledgements

N. Daniel Gibson, Professor of Physics & Astronomy, Denison University
Denison University Writing Committee