4.5 Teaching, Assigning, and Grading Writing: Ugh!

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1. INTRODUCTION

Term paper. That dreaded phrase that high school and college students hear regularly across the world every semester. Why do we dread it so much? Why do we put off writing like we are fighting the plague? For many it is likely because you don't think that you are a good writer (the authors included!) and often stare at the blinking cursor of death when you begin a new writing project. Whatever the reason, many of our students feel the same way, yet as scientists we have not generally done a stellar job at teaching writing to them, except through continuing to assign the ever loved "semester project".

As the result of a university-wide initiative (http://www.valpo.edu/university-writing-program/) at Valparaiso University and through the authors desire to read more cogent and well-constructed writing assignments the meteorology program has begun to look systematically at how we teach and assign writing in our curriculum. The authors began by taking a university Writing Seminar conducted by the University Writing Director. This seminar was designed to have the faculty thinking about writing as a process, which is inextricably linked to critical thinking and therefore relevant to all disciplines.

The authors utilized the ideas from this seminar to develop a one-credit Scientific Writing in Meteorology course that was offered concurrently with junior-level Atmos. Dynamics II, which has a large Literature Review assignment as a part of the course. This was a first attempt to intentionally teach the scientific writing process to the students in order to strengthen their critical thinking, writing, and ultimate learning of advanced meteorological material through writing a scientific literature review paper.

This paper will briefly describe writing as a teachable, process oriented skill, how the authors applied it the junior-level literature review assignment and scientific writing course, and how to refocus grading writing assignments to give students better feedback and make grading a more enjoyable process.

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2. TEACHING WRITING

Language acquisition begins as soon as we are born and infants are readily adapted to learn because of specific language-dedicated systems that are inherent in all of us (Hespos 2007). Much of our early acquisition comes through a naturalistic (or implicit) learning through interaction with adult speakers of the language (Ellis 1990). As a result, the "rules" of our native language are not explicitly taught, but gathered implicitly through exposure to and repeated use of them. This, in general, works well and by the time young students reach elementary school (sometimes referred to as grammar school), students begin to receive formal training in languages.

Despite formal education in written language most students only have a basic level of writing competency by the time they graduate high school. According to the Nation's Report Card, 79% of the 12th graders from 2011 had at least a basic level of competency in writing, but only 27% were at a proficient level (NCES 2012). Students performing at the basic level "developed explanations using some details that do not enhance the clarity or progression of ideas, while organization was somewhat loose and sentence structure simple overall" (NCES 2012). Whereas students performing at the proficient level "develop[] explanations with well-chosen details in parts of the response and an overall control of the progression of ideas and sentence structure" (NCES 2012). It should then be no surprise that many of our students (maybe even most) struggle with communicating their ideas in a written form. This is especially true when they are faced with the task of writing a scientific argument, which they have not likely had much practice at before entering our classroom.

Not only have our students had minimal experience with a general scientific writing genre, but also meteorology has many of its own

discipline-specific genres that students have not been exposed to before reaching our curriculum. Some examples of meteorological writing genres include, research journal articles, literature review journal articles, technical notes, theoretical journal articles, forecast discussions, popular news articles, etc. This wide array of genres has different conventions and standards, which makes it difficult for our emerging scientists to become active members of the dialogue community.

Therefore, it is worth the time and effort to think systematically about how we teach writing throughout a meteorological curriculum. Many instructors think that this would take time away from learning critical concepts, derivations, and theoretical ideas, but it doesn't have to. According the Bean (2011), writing can be used as a means by which we teach our discipline specific content in a way that will "evoke a high level of critical thinking, help students wrestle productively with a course's big questions, and teach disciplinary ways of seeing, knowing, and doing" (Bean 2011)*. By helping students understand rhetorical thinking or the purpose, audience, and genre of a particular assignment. By doing so the instructor can help students develop transferable writing skills that will benefit them throughout their professional lives.

3. SCIENTIFIC WRITING COURSE

Since 1974 there has been a concerted effort to incorporate writing into curriculum at all levels through the efforts of the National Writing Project. This effort became a national authorized federal program in 1991 and has over 200 cooperation sites across the U.S., primarily hosted at colleges and universities. This organization promotes "sustained efforts to improve writing and learning for all learners" (NWP 2016). One key tenet of the National Writing Project is that "writing can and should be taught, not just assigned, at every grade level". For many years the authors have assigned writing in their courses, but there was not too much emphasis on teaching the elements of a process that would aid in the development of the student and their writing.

The assignments in our curriculum vary in genre, but most are journal article reviews where students are tasked with writing a short paper that summarizes the key questions studied, the methods used in studying the questions, the major findings, and any outstanding questions left by the authors of the paper. Students performance on these assignments vary greatly and much of the work put into those assignments does not appear to transfer well from course to course.

The junior-level Atmospheric Dynamics II literature review project is similar to a journal article review, but for a focused topic instead of a single paper. This project was outlined through the course syllabus, giving detail about what the paper should entail (a review of a topic in dynamic meteorology), the length of the assignment, along with a timeline of intermediate assignment due dates (short description of topic and list of articles). More or less a typical term paper related to content relevant to the course. Later in the semester a list of potential topics was given to students along with additionally verbal instructions/comments about the project from the faculty member.

After participating in the faculty seminar on writing the authors determined that they needed to be more intentional in the design and execution of the writing that is assigned throughout the curriculum. To begin the process of becoming intentional in assignment design and our teaching of the writing process the lead author developed a one credit course focused primarily on teaching meteorological scientific writing as it applied to the literature review genre (in conjunction with the Atmospheric Dynamics II project) during the Spring 2016 semester. The students enrolled in Dynamics were offered the opportunity to take the class, however, it was not mandatory and was offered as a once a week fifty-minute session.

What became apparent in the first week of the course were the different interpretations of the writing vocabulary used by the instructor. One of the primary difficulties was the interpretation of what was meant as a review. Too often students have put in their personal opinions about a journal article rather than summarizing or assessing the ideas contained therein. The authors speculate that this might be related to a rise in ease of offering personal views through any number of internet media platforms including In YouTube, iTunes, Yelp, etc. After a discussion with the students they more readily identified what the

* The authors highly recommend reading chapter 1 of Bean (2011) for a good overview of using writing as a means of effectively teaching students without sacrificing course content.

instructor wanted for the project would be better identified as a literature *synthesis*.

Proceeding from that initial discussion on writing vocabulary, the course outlines writing as a process and develops their scientific writing vocabulary. Weekly topics (Table 1) were used to focus our discussion and often included some combination of reading and writing that accompanied the topic. The ideas for topics were directly taken from Schultz (2009), which is an excellent resource for a new or experienced writer. The course used a couple of journal articles to attempt to illustrate different aspects of reading and writing scientific work. In order to illustrate argumentative writing the class read the "tornado wall" paper (Tao 2014) and the response to that paper by Dahl and Markowski (2014) and Coffer (2014). This allowed the students to read and interpret for themselves the original article, then subsequently read the responses published in the literature. This illustrated that that the scientific process is about the ideas in a paper and not an opinion or related to personal matters.

Table 1. Weekly topics for scientific writing course

Week	Topic Headings
1	What is scientific writing? Where to begin?
2	Argumentative Writing
3	Structure of Scientific Writing
4	Brainstorming, Outlining, and Drafting
5	Constructing Logical Arguments
6	Constructing Effective Paragraphs and Sentences
7	Evolving Ideas and Paper Organization
8	Editing/Revising
9	Peer Review Process
10	Peer Review Conferences
11	Figures, Tables, Citations, References
12	Abstracts and Titles
13	Journal Reading Club – Paper #1

In addition to reading and writing assignments outside of class, there were a number of in-class activities, often derived from Eloquent Science (Schultz 2009). One of the activities that captured the students' attention was in reconstructing a paragraph from a published paper. Each table received the sentences from the paragraph printed on separate pieces of paper. The task was for the group to put the sentences in a logical order to make it easy for the reader to understand the material being presented. This activity occurred during Week 6 of the course, aligned with a discussion of constructing effect, logical paragraphs.

A key element to the course was a highly structured peer review process. Many students had encountered a peer review process prior to this course, but from what the authors gathered that was a largely informal process that yielded feedback focused on editorial changes to their paper as opposed to substantive revision oriented feedback. As a result, a formal peer review process was developed to guide the students to avoid solely giving editorial (e.g., punctuation, spelling, comma use) feedback and instead focus on the arguments the paper is making. This formal process produced four distinct elements that the students had to respond to: organization, concision, precision, and coherency. These elements largely derive from Schultz (2009) and his chapter on the publication review process. Students greatly appreciated this focused feedback process as they both learned a great deal from reviewing two fellow students paper in addition to receiving thoughtful (and useful) feedback to revise their own paper. The peer review handout used in this course is available as a supplemental document at the end of this paper.

Feedback from the students suggest that the course was a success, not only in helping them with the particular writing project, but further developing their critical thinking and reasoning skills. One student on the course evaluation form wrote, "This class was great to have because it helped students learn about the process that goes into writing in the science world. [] As a result *I was able to learn more from writing the paper*." Another student wrote that the course "taught us things about scientific writing that I probably would have never known if I had not taken this course." Additionally, one student thinks this will impact their abilities outside of the discipline, "The skills acquired from this class will be very beneficial to me in my future, even if it is outside of the meteorology world."

A suggestion a student made via the course evaluations was to have the instructor more involved in the helping the student narrow their topical area. Many students usually have a good idea what broad topic they want to investigate, but then stumble when they begin to search for journal articles and attempt to focus on a coherent story they want to tell. For example, a student may want to study the dynamics of jet streaks, for which

there is a wealth of journal articles to choose from. However, they run into difficulty in narrowing that topic to a manageable task that will fulfill the requirements of the project. More guidance by an instructor in this phase will help to solidify the project bounds with the student and ultimately yield a better finished project at the end through a more focused writing process that results from a more cogent topic.

Despite the success of this course, it is not currently offered as an independent course. The goal is to incorporate the elements taught in this course throughout the curriculum as a way to continually develop our students writing and critical thinking ability. Early stages of the literature synthesis project have been incorporated into the first semester of the Atmospheric Dynamics course and we hope to continue to evolve other aspects of our curriculum over the next few years.

4. GRADING WRITING

For many instructors grading is the thing we least want to do. Of all the things we have to grade, many of us would put the grading of writing at the bottom of the list of things we want to do. No doubt, it is a difficult task to read and respond to 10, 20, or 30+ students written projects or papers. Often these are due at the end of a semester and it is rare a student will stop by the next semester to pick up their corrected paper. The best advice the authors can give is to refer to part four of Bean (2011). This section outlines ways to utilize rubrics to aid in grade assignment and feedback, how to handle the paper load, and writing purposeful comments on drafts or final papers.

A key element to keep in mind is try to not approach grading papers as correcting for language usage (e.g., punctuation, comma usage, spelling), but rather to focus on the argument(s) being made and how well they are communicated. This is a difficult task (even for the authors) after many years of giving and receiving that feedback on formal writing assignments.

In the end, each instructor will have a different method for commenting on and assigning the final grade on a paper. The goal should be for an instructor to be consistent across a particular assignment and make sure the process is clearly explained to students. Hopefully through more intentionally developed assignments and teaching of the writing process, grading will be made easier due to a greater number of students being on task in their paper.

5. CONCLUSION

Over the fall 2015 semester there were a number of students who asked if this writing course would be taught again. At least among this handful there seems to be a desire to receive more formal instruction on writing, especially as it pertains to discipline specific genres. The authors believe this is especially true for students who writing scientifically for the first time, as it is a very different genre than they have likely encountered before. Beyond thinking about writing for an individual assignment or course, incorporation of writing assignments and the teaching of writing would be best accomplished when it is intentionally incorporated throughout the curriculum. This may not be an easy task as there will be many instructors who believe that there is not a way to incorporate a writing element in their course. Encourage them to think of writing as a way to improve the critical thinking of their students, which will likely yield enhanced learning of course material as a result.

6. REFERENCES

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MET 490 – Scientific Writing in Meteorology
Dr. Kevin Goebbert

Peer Review of Formal Writing

Purpose

A peer review of a paper is much more than checking for grammar and spelling typos. A peer review is a constructive critique of the arguments being made by the author(s) and their delivery through the written prose. As you undertake this process, be thoughtful, but thorough in your reading and analysis of the papers you review. The more effort that you put into the review of colleagues papers, the more you will gain for your future writing endeavors.

Process

The following process is adapted from Schultz (2005) with specifics and modifications for this particular writing assignment (Dynamics II Literature Synthesis)

1. Read the paper to get a sense of what the author is attempting to argue in the paper. Take some notes if desired, but generally just get a feel for the paper and the topic.

2. Consider the following questions:

    a. General Structure
        i. How is the paper organized? Does the topics logically follow each other as the argument is built?
        ii. Does the content of the paragraphs match with the paper sections?
        iii. Are there appropriate transitions from paragraph to paragraph, leading the reading to easily follow the argument being made?
        iv. Generally how is the grammar throughout the paper?
        v. Does the title appropriately capture what the paper is actually about?

    b. Critical Reading Questions
    Introduction
        i. What is the stated purpose of the paper? What are the hypotheses?
        ii. Who is the audience?
        iii. What are the boundaries/limits of this paper?
        iv. Is the task well set up for the reader to follow the argument that is to come?

    Body Sections
        i. Is the purpose of the paper addressed?
        ii. Are all posed hypotheses addressed?
        iii. Does the selection of evidence support the hypotheses?
        iv. How well is the evidence integrated into the arguments being made?
        v. Is the evidence well sourced and in the writers own words?
        vi. Does the author take care and well represent the work of others?
        vii. Are the topics discussed well synthesized and easily understandable from reading the text and figures/tables?
        viii. Do the figures and tables presented help support the claims that made?

Conclusion

i. Are the conclusions from the work clearly presented?
ii. Do the conclusions accurately represent what this paper claimed it was going to discuss?
iii. Does the author appear to have a solid understanding of the topic discussed throughout the paper?
iv. What are any limitations and assumptions made in this paper? Have they been adequately addressed or were they unstated?
v. Does this paper accurately reflect the dynamical underpinnings of the topic being discussed?

References

i. Are the references appropriately done?
ii. Are there enough references to support the claims being made?
iii. Are any relevant articles missing?

3. Read the paper for a second time. Allow yourself to get even more into the science of the paper and assess it based on the critical reading questions from above.

4. As you are reading the paper for the second time, begin writing the review and marking comments and suggestions directly on the paper.

5. Read a third time to note anything you missed, make grammar/format edits/suggestions.

Writing the Formal Review

In addition to any markings and comments that you mark on the paper, you must prepare a formal written review that further explains your comments and suggestions. The review should follow the following structure.

Reviewer Name
Title of paper being reviewed
Author of paper being reviewed
Date

Summary

This should be a short paragraph that briefly summarizes the purpose of the paper and gives a few strengths, improvements, and insights of the paper being reviewed.

Organization

Comment any positives and negatives of the overall structure, organization, and synthesis of the arguments being made throughout the paper. Offer concrete way of improving the structure to make a better paper.

Concision

Comment on ways in which the paper could benefit from trimming text or paragraphs to make a more solid argument. If there is a good section, point that out as something to emulate. Draw attention to particularly wordy areas of text that seem convoluted and unclear to the reader.

Precision

Comment on the use of words and phrases to accurately convey the information to the reader. Offer specific suggestions on better words or phrases to use that would improve the readability and understanding of the content to the reader. Make particular note to identify misused words and phrases.

Coherency

Comment on the transitions between sentences, paragraphs, and sections of the paper and how well they succeed. Offer clear guidance on how the author could improve areas of the text for better overall flow and understanding throughout the paper.

Other Comments

If there are other comments that could be offered to improve the paper, comment on those here.

General Comments on Writing Reviews

- Try to sandwich criticism between more positive surrounding comments
- Explain why the change or suggestion is recommended
- Use positive examples from the authors writing to motivate revisions
- Offer suggestions of reworded phrases or sentences
- Always point back to readability of the audience of the paper
- Indicate why a change would benefit the paper

Assignment

Review the two assigned papers by 1 April 2016.

- Make two copies of the review, one for the author and one for me.
- The reviews should be single-spaced.
- Be sure to review your review before you hand it in.