

The Right Assignment

David P. Devine, P.E., S.I.T.
Indiana University Purdue University Fort Wayne

Abstract

TAC ABET criteria state that communication skills are expected of college graduates. Moreover, employers often indicate that students need to communicate effectively through written expression to become quality employees. The author believes that writing skills are necessary in the engineering, technology, and construction fields based on work experience. This paper presents how the author, new to the teaching profession, is working to develop the “right” writing assignments for sophomore level civil engineering technology students.

Background

Although technology classes are typically associated with many calculations, writing assignments can enhance these courses and more fully prepare students for the work world. The author makes straightforward writing assignments in the sophomore level Civil Engineering Technology classes Structural Analysis I (statics), Structural Analysis II(strength of materials), and Hydraulics and Drainage. The principal purpose of each of these writing assignments is for students to effectively communicate through written expression. Each assignment is made specific to an aspect of the subject matter of the class. Students select their own topics based on their own interests within general guidelines of the assignment. Assignment guidelines include structures such as buildings or bridges, material specifications, material properties, and water, sewer, and storm water services. Students have several weeks to complete the assignments of less than 5 pages and they gather information for their topic primarily through readings and interviews. While the Internet is a valuable resource for information, it is not allowed as the sole source of information. A secondary purpose of the assignment is for students to read information from multiple sources. The grading rubric for the assignment stresses good writing by making correct spelling, punctuation, and grammar a component of the grade as well as documentation of the sources of information.

The development of these assignments is an ongoing process. The author recognizes that assignments made are not yet the “right” writing assignment. Nevertheless, the repeated use of writing assignments for classes in addition to a continual assessment and improvement of the assignments will lead toward that goal.

Need

Communication skills are requisites for college graduates. Moreover, TAC-ABET criteria identify communication skills as necessary components of accredited degree programs¹. The need for improved writing skills for engineering students is apparent in other articles as is ongoing efforts to improve them over several years^{2,3,4,6}. The same case is true of engineering technology students. Employers and graduates identify the value of writing skills. Furthermore, the author's experience of several years of engineering practice reinforces this need for effective writing skills.

General Strategy

The general strategy of the writing assignments is that students concentrate on writing technical information that they read or learn from personal communications. This is in the third year of an academic career for the author who has made writing assignments in most every course taught. The importance of the writing assignment is reinforced by an assignment sheet. Putting a document in the hands of the student reinforces to the student that the instructor has taken the time to prepare for the assignment rather than just dreaming the assignment up at the end of class. The assignment sheet aids the student in completing the assignment and formally establishes what is expected in the assignment⁷.

An epiphany of sorts occurred early in the first year of teaching as the author sought assistance from the campus writing center on how to grade writing assignments. During the meeting the writing center director explained how the writing assignment can be made to facilitate the grading. Writing center personnel explained that a more effective assignment sheet for a writing assignment takes the bullet-outline format rather than text. This seems contradictory when the writing assignment is for students to compose sentences and paragraphs. However, the student understands the assignment better when a "check-off" can be done using the bullet-outline format of the assignment sheet.

The intention is not to burden the student with the writing assignment. The assignment is intended to be a bit more effort but akin to a "low-stakes writing" assignment as suggested by McKeachie⁵. The assignments are intended to be no more than 5 pages long. Moreover, it is important to create student interest. Obviously an interested student is more involved in the assignment. Also, making the assignment interesting counteracts that some students have adverse reactions to "just another assignment" let alone a writing assignment in particular. Students need to e-mail their selected topics to the instructor in order to prompt students to do work on the assignment earlier rather than just before the due date. In the past year of making these assignments, an "extra credit" offer of an additional 5% has been made to students who make use of the campus writing center. The reward for this effort actually is much more than 5% because students who use the campus writing center resources often submit much better assignments.

The assignment identifies to students that writing is important and that this is the case in sophomore level engineering technology classes. The students in these classes work towards degrees in Civil Engineering Technology, Architectural Engineering Technology, and

Construction Engineering Technology. The simple nature of the assignment in introductory classes illustrates to students that writing is a part of becoming a technician or a technologist. Furthermore, it builds a foundation upon which students can work from when they complete written aspects of assignments not only in subsequent classes but also in the work world.

Assignment Details

The details of the writing assignments for the three classes all follow the same general strategy but are specific to the topic of the particular class. The statics class deals with topics of a structure of interest to the student. The mechanics of materials class deals with topics of construction materials. The hydraulics and drainage class deals with the topics of water resources where the student lives.

The assignment for the statics class is the most general assignment. Often, this class will be the first time that students have the author as an instructor. The general guideline for this assignment is to write about a structure that interests the student. Students are encouraged to select a structure of interest that may be a building, bridge, stadium, airport, ship, sculpture, monument, work of art, or other constructed work. The original version of this assignment was for students to write about a design or construction failure. However, after the September 11, 2001 attacks on the World Trade Center and Pentagon, those tragedies overwhelmed student topic selection. Past topics certainly include common constructed works such as the Brooklyn Bridge, Golden Gate Bridge, and Empire State Building. However, some students use the assignment as an opportunity to gather more information about some lesser known structures such as churches in town, a local sports arena, or county courthouses.

The guidelines for the assignment in the mechanics of materials class are to investigate and write about a material used in construction that is of interest to the student. The material topic is to be explicit such as according to an ASTM standard. The full ASTM standards are not available via the Internet. Thus students are persuaded to use the campus library and read from books in order to gather information about the complete ASTM standard.

The topics for this assignment often cause students a bit of difficulty in the beginning because they are not completely familiar with an explicit construction material standard. The class refers to ASTM A36 steel quite a bit so that material is not allowed as a topic. Past topics have generated quite some interest as some architectural technology students used the assignment as an opportunity to investigate and learn more about building materials of glass block and various types of wood and a non-traditional student who spent years in the U.S. Navy used the assignment to investigate the details of a specific type of titanium used in ship building.

The hydraulics and drainage class writing assignment allows students to investigate the water resources particular to where they live. The information gathering for this assignment is more dependent upon personal communication with utility personnel. Students are required to find some data during the information gathering. The numbers associated with this data must then be used in a hydraulics calculation. The calculation can be in hand-written format or on a spreadsheet but has to be referenced in the written text of the assignment as well as be included

at the end of the paper. Students often comment about how they have never considered much about the water resources around their homes.

Assignment Sheet Example

An example of an assignment sheet used in the class Structural Analysis II (mechanics of materials) follows. This assignment sheet incorporates the most recent version of how the general strategy of the assignment is worded and the details of the assignments in this class.

CET 283, Spring 2004
Writing Assignment

Synopsis:

- 1) Select a material used in construction as a topic.
- 2) Find information about the selected material topic from various sources.
- 3) Write a summary paper more than 2 pages and not more than 5 pages about the information.

Details:

- The purpose of this writing assignment is for students to gather information, primarily through reading, and communicate this information in written form. The purpose of the topic selection guidelines is for students to learn about material specifications.
- The audience for this assignment is other students in the class.
- The selected material topic must be explicit according to a specification such as ASTM A36 carbon steel. ASTM A36 carbon steel is not an acceptable topic. A good beginning reference is in the Helmke Library, the *Annual Book of ASTM Standards*, TA401 .A64. The year 2002 version of this multiple volume series is in the Science Reference Collection.
- Send an e-mail, devined@ipfw.edu, or letter by US Mail at your earliest convenience stating the material topic you select. Acceptable topics will be confirmed by a reply. Duplicate topics in class may not be allowed. Submit a copy of the reply sent to you with your completed paper.
- Find information from various sources in books, magazines, journals, web pages, or other printed material. Include at least 3 sources of information in your readings. Do not use the Internet as the only source of information. Phone calls and personal interviews are also acceptable methods to gather information. References are critical to the assignment.

- Completely reference the sources of information. The references should be included in the text of the writing by use of endnotes. The references should be included in a bibliography at the end of the paper. The purpose of the references is that anyone reading your paper will be able to know the source of the information. Well written papers will encourage the reader to find additional information by reviewing the sources of information you used. An example of reference format is available from the IPFW Writing Center. If personal communications are used as a means to gather information, then these communications should be included references for this assignment. This is not as the APA format on the IPFW Writing Center advises. Reference formats other than APA are allowable. The general guideline is that the reference format allows the reader to know how to find and confirm the information you are writing about.
- Write a summary paper in your own words about technical information you discovered. Include information such as fabrication methods, cost, allowable or ultimate stresses, strain, elastic or inelastic behavior, other properties of the material, common cross section shapes, and structures or components built with the material among many other topics. Write more than 2 complete pages but less than 5 complete pages.
- Write about why you selected the material as your topic.
- The assignment is due Wednesday xx MONTH 2004. Late assignments will not be accepted.
- The writing should be in an acceptable format suitable for a college level writing assignment. An example of such a format is presented on the IPFW Writing Center website: <http://www.ipfw.edu/casa/wc/default.htm>. Students are encouraged to make use of the resources at the IPFW Writing Center. An abstract is not needed. Students who use the IPFW Writing Center as a resource should request documentation from the center.
- Begin the assignment early.
- Ask questions about any aspect of the assignment that you are not certain of.

Basis of Grade:

- 30% grammar, spelling, punctuation, & format
- 30% references, listed at end of paper and referenced in the paper itself
- 40% content, writing style, & e-mailing topic
- 5% use of resources at the IPFW Writing Center, documentation required (i.e. this is “extra credit”)

Grading

Grading the writing assignments continues to challenge the author. This is much in part due to lack of confidence in the author's own writing skills. Concern for grading is cited as an impediment to making writing assignments³. The author experiences similar concerns. However, the author decided that this shortcoming should not keep writing assignments out of the classroom. The establishment of a grading rubric aids this grading effort greatly. The rubric is most effective when it is included on the assignment sheet³. Surprisingly few, less than 5 students out of nearly 150, students have critiqued the grading of any writing assignment over the past 5 semesters. The author's concern regarding grading initially prompted a meeting with the campus writing center. This meeting set in motion the thought that making the "right" writing assignment is a task to work toward.

Assessment by Student Feedback

The effectiveness of the writing assignments in the latest form is presented in the table below. Questionnaires were completed by students in the statics and hydraulics and drainage classes during the Fall 2003 term. An assessment that the writing assignment is "right" in the opinions of the students is established by the responses of the students. Students overwhelmingly use the assignment sheet and deem the sheet to be helpful. Approximately 70% of students report that they have not received assignment sheets for writing assignments in other technology classes. Many students commented that assignment sheets are common in English and Composition classes. Furthermore, the vast majority, over 80% of students report that the writing assignments interest them. Not all students responded to each question.

Question	Yes	No
Did you read the written assignment sheet when working on the assignment? (one student did not respond)	23	zero
Was the assignment sheet helpful? (one student did not respond)	22	1
Have you ever received an assignment sheet for a written assignment in another technology class?	7	17
Did the written assignment interest you?	19	4

Purdue University guidelines regarding Human Research Subjects governed collecting student feedback. A "Research Exemption Request" application was submitted for this data collection. The student feedback collected by questionnaire was required of all students in the class. The collection of this data was deemed "exempt" because the research activity was conducted in commonly accepted educational setting⁸.

Assessment by Instructor's Impressions

The author offers the following impressions as a means of assessment of the writing assignments made in CET classes at IPFW. Students in these classes become aware that writing is a skill needed in the work world. The assignment generates discussion in the classroom, visits to the

instructor's office, and e-mail inquiries. When the assignments are collected in class, students have taken the invitation to report to the class what they learned from the assignment. Other students have also reported to the class after a comment by the instructor such as "if you do not consider your writing interesting enough to report, then is it worthy of reading?" Students in junior level classes have commented that it was good to have writing assignments that were not too intensive in classes prior to upper level classes that require much more effort.

Conclusion

Writing assignments made in sophomore level civil engineering technology classes can create interest for the student, cause the student to read and gather information about a topic of interest, and enable the student to express this information in written communication. The assignment can be made in a manner to better facilitate this effectiveness much due to an assignment sheet. The development of an effective writing assignment is an ongoing and likely a never ending endeavor. Nevertheless, an effective writing assignment can indeed be the right assignment for technology classes.

Bibliography

1. "Criteria for Accrediting Engineering Technology Programs," ABET, Inc. November 2003, accessed online at <http://www.abet.org/images/Criteria/T001%2004-05%20TAC%20Criteria%2011-19-03.pdf>.
2. Nicklow, John W. (2000). "Technical Writing in an Undergraduate Design Course." Proceedings of the 2000 ASEE Conference.
3. Carvill, Caroline, Susan L. Smith, Anneliese Watt, and Julia Williams. "Integrating Writing into Technical Courses: Steps toward Incorporating Communication Into the Engineering Classroom." (2000) Proceedings of the 2002 American Society of Engineering Education Annual Conference & Exposition.
4. Harvey, Roberta, David Hutto, Kathryn Hollar, and Eric Constans. "Writing as a Design Practice: A Preliminary Assessment." (2002) Proceedings of the 2002 American Society for Engineering Education.
5. McKeachie, Wilbert J., *McKeachie's Teaching Tips 11th Edition: Strategies, Research, and Theory for College and University Teachers*. Houghton Mifflin Company, 2002.
6. Carvill, Caroline, Anneliese Watt, and Julia M. Williams, "Developing and Evaluating Writing Assignments for Technical Courses." 30th ASEE/IEEE Frontiers in Education Conference.
7. "Creating Writing Assignments," MIT Online Writing and Communication Center, 1999. Accessed online at <http://web.mit.edu/writing/Faculty/crateeffective.html> 6 December 2003.
8. Purdue University Committee on the Use of Human Research Subjects, "Research Exemption Request Guidelines," accessed online at <http://www.irb.purdue.edu/terguide.shtml>.

Biographical Information

DAVID P. DEVINE, P.E., S.I.T.

David P. Devine, P.E., S.I.T., assistant professor, is beginning an academic career after over 10 years in various engineering jobs including service with the United States Peace Corps. He has a B.S.C.E. from the University of Notre Dame and a M.S.C.E. from Purdue University.