To: Professor Kelm
From: STUDENT
Subject: Investigative Report on Writing in the Engineering Field
Date: September 15, 2015

The purpose of this memo is to document and present the variety of technical communication in the engineering field.

Introduction and Objectives
The focus of this professional development project is technical writing in the engineering field. The research gathered for this investigative report serves to disclose the different types of writing I will encounter in my profession. Through analyzing different documents and resources, I hope to aid myself in understanding the standards for writing as an engineer.

Research Methods
For primary research, I looked through databases and educational websites to find articles that focused on writing as an engineer. I found two separate documents that tackle different issues with engineering writing. The first resource, an excerpt from Beer and McMurrey's "A Guide to Writing As an Engineer," provided detailed instructions as to writing a formal investigative report. The second article, "Avoid These Technical Writing Mistakes" by Robert W. Bly discussed the most common errors made by engineers in writing and how to steer clear from these mistakes.

After looking up some articles on how to write efficiently as an engineer, I interviewed Professor Brian Thomas, an electrical and computer engineering professor at Baylor University. He ended up being one of the most valuable sources for my research. After working in industry for ten years, Professor Thomas found his true calling teaching college students and working with non-profit groups to implement sustainable technologies in developing countries. During the interview, he walked me through the main types of documents he wrote and presentations he had given throughout his career. I was also given valuable advice as to writing in the engineering field and what students should expect when they become professional engineers.

I was also able to obtain two sample documents written by Professor Thomas and some of his associates. The first report was a basic tutorial overview of cross-coupling in coaxial cavity filters. The second report was a paper that outlined a four-year process of implementing self-sustaining technology in Honduras. Both of these articles document the process that an engineer would take when researching a certain topic. Using the guidelines for analyzing genres, I critiqued both documents for content, rhetorical appeals, structure and organization, word choice, and purpose. Gathering this information allowed me to reveal values and beliefs, valued content, attitude, significance, and setting.

Findings

The excerpt from "A Guide to Writing as an Engineer" helped me narrow down the requirements for writing an investigational report in the engineering profession. I learned the basic outline and what specific sections were needed depending on what information needed to be included. The excerpt also did a very good job of describing each subsection that was required in an engineering report. The author mentioned that even though certain aspects of a report seem commonplace, it is always good to check the requirements for ones intended professional field. The second article that covered common technical writing mistakes gave me better insight on frequent errors to avoid in any engineering documents I will write in the future. The article covered problems with prose and format and gave a solution to common mistakes that occur. Reading both of these articles also helped me with analyzing the documents I received from Professor Thomas. I was able to compare the two as investigative reports while also contrasting them in terms of their specific content.

From the interview with Professor Thomas, I learned that there are many different forms of technical communication that engineers come in contact with in their day-to-day work. Emails are one of the most frequent forms of communication, and the format of these emails varies based on the recipient. More formal emails are sent to managers and others that are in higher positions, while casual emails are usually sent between co-workers. Professor Thomas mentioned a rule of thumb that he followed when sending any type of communication: you always want to overshoot on formality. Once you have received a reply, you can change the formality of the document based on how the person replies to you. Since Professor Thomas also does humanitarian work, he talked about how he writes proposals to different people asking for money. They are usually addressed to people who run foundations or granting agencies. Often times, after he has been given the money, the companies will ask him for a follow-up report asking him how the money was spent and how it benefitted the people it was intended for. Articles are another topic that we discussed in the interview. Those are usually indirectly addressed to professionals in the field. Many times they teach things of a certain topic and require a fair amount of research. These documents must be clear and concise as well as accurate, so that anyone else can replicate the instructions given and achieve the same results.

The amount of time Professor Thomas spends on writing technical documents usually parallels the importance of the document. Often times, it takes him a minimum of 40 hours to write an article that he knows will be published. Emails are usually much shorter, but if there are a lot of them, it can take a fair amount of time to get through them all. I also asked him about the types of presentations he has given and the purpose and audience for presentations. He told me that while he hasn't been to any major conferences, he has presented at smaller conferences with an audience of around thirty people. He presented his humanitarian research related to his mission trip in Honduras and discussed how to involve college students in overseas projects. He never presented his article on cross-coupling filters, but it was placed in a special tutorial IEEE issue,

which is considered very prestigious, and was cited 110 times. Although he did not formally present the paper and its findings, it still represents his work as an engineer.

I also gained some valuable lessons in writing as a young professional engineer as a result of this interview. One piece of advice was to write as much as possible, because the more you write the better you get. A common misconception is that engineers don't need to learn how to write well because we aren't exposed to writing as much as math and science. However, communication is a very integral part of the job. Many students underappreciate good writing skills this will be a deterrent for those looking for a job in the future. Good writers will be promoted faster because there is a perception that they are smarter. No matter how good an engineer is technically, it is still important for all engineers to be good at communication. Another thing Professor Thomas made sure to point out was that iterative writing is a must. Other people reading and giving feedback allows for more than one perspective, which can help with writing very formal emails and investigative reports. When another person looks at your work, they will be more likely to point out mistakes that you may have overlooked or not considered. In this way, you can also gauge your audience and write at their level.

For the genre analysis portion of the assignment, I compiled a list of similarities between both sample documents. These types of technical documents fall under the genre of investigative reports, in which the author collects and synthesizes information and takes research material from a variety of sources. Both documents are structured in block format, making the paper easy to read. Specialized jargon is used throughout, with index terms given right after the abstract, to give the reader an idea of the main concepts that will be discussed throughout. Papers like these are typically very straightforward and include research methods and results and exclude any extraneous information that does not pertain to the topic at hand. The readers who peruse through these investigative reports are usually professionals in the field who will benefit from the research and methods used by the writer and it allows for engineers to share ideas with each other. Many of the rhetorical appeals are logical and reasonable and address facts over emotion.

While both documents are targeted towards higher-level engineering professionals, the specific target audience varies for each paper. The first document examines filters and caters more towards professional engineers who specialize in industry, with a focus in radio-frequency technology. The second document, while still technical, directs its attention towards humanitarian engineering and gives not only a technical explanation, but includes financial information as well as other economic details of the project in Honduras. In this way, the second document adds in pathos to its rhetorical appeal by describing the lives of those living in rural areas of developing countries. Hydropower technology contributes to improving their lives, so there is a very personal feature to this side of engineering. Often times, members of non-profit organizations research different engineers in order to decide whom to sponsor for humanitarian efforts in other countries. By reading a document such as this, which includes an emotional aspect

to the research, these individuals may find themselves more willing to help certain engineers over others. This genre analysis allowed me to view engineering in multiple dimensions rather than just the common logical viewpoint.

Conclusions

After completing the research for this project, I can safely say that I am much more prepared for technical communication in my field. I used to think that writing was just a secondary skill that I would only need for certain aspects of my job. Now, I realize that it encompasses almost everything in engineering and that it is vital for me to master now rather than later. To be a good engineer, I need to hone in on my writing skills now so that I will be prepared for my future career. Learning all of this information has also motivated me to read more articles that are related to my field and gather more knowledge as to which investigative reports are appropriate for each occasion. By allowing myself to be more flexible and educated in technical communication in engineering, I will be setting myself up for success in my future career as an engineer.

References

Bly, Robert W. "Avoid These Technical Writing Mistakes." *Chemical Engineering Progress* (1998). n. pag. American Institute of Chemical Engineers. Web. 15 Sept 2015.

McMurrey, David. "Chapter 6: Writing an Engineering Report." *A Guide to Writing as an Engineer*. By David Beer. N.p.: Wiley and Sons, 1997. 126-53. Print.

Thomas, Brian. "Cross-Coupling in Coaxial Cavity Filters – A Tutorial Overview." *IEEE Transactions on Microwave Theory and Techniques* 51.4 (April 2003): 1368-76. Print.

Thomas, Brian, Ryan McGhee, and Brent Benner. "Pico-Hydropower Franchising in Rural Honduras." *International Journal for Service Learning in Engineering* 6.1 (2011): 46-64. Print.