

MSFEA Guidelines for Writing in Engineering

Prepared by: Niveen AbiGhannam

(To be) Reviewed by:

The MSFEA Writing Task Force

The Communication Skills Program (ENGL 206 instructors)

The Writing in the Disciplines Program

This document presents the MSFEA guidelines for writing technical documents. These guidelines were developed to address the weaknesses in student writing as identified by MSFEA faculty surveys and interviews. Specifically, the guidelines address means to enhance the technical writing **process, content style and structure**, and **form**. MSFEA students are encouraged to follow these guidelines in order to improve their writing throughout their coursework and professional experiences at MSFEA and beyond.

2. The Technical Writing Content

Developing your evidence-based content

The **content** of technical documents refers to the information that writers synthesize and communicate to their readers. Knowing and understanding the messages that you need to communicate about should be established in the early stages of writing (see Box 1). Additionally, such messages should follow a clear and evidence-based logic. In other words, the basis on which you develop your messages and assertions should be made explicit throughout your document (see Box 2).

Box 2: Evidence-based content enhances the credibility of your text.

Consider the following statement: “We observed that the slope is unstable.”

In this example, the writers do not clarify the rationale for their assertion, which may lead readers to question the message (what did you actually observe, how does that observation relate to slope instability, etc.).

Now consider the following revised sentence: “We observed arc-shaped pavement cracks, which is typical of embankment slope instability.”

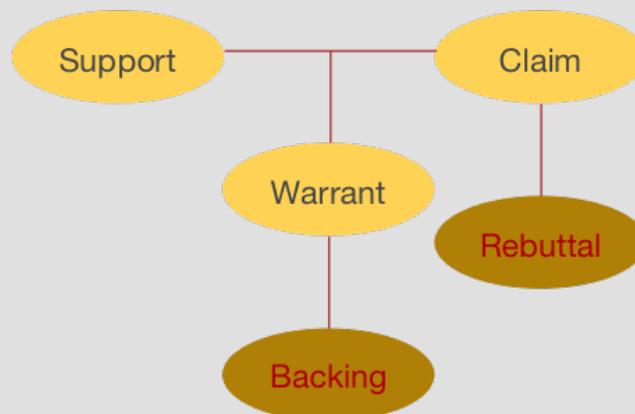
This latter sentence is an example of an evidence-based assertion where the writer offers a clear message along with the evidence leading to it.

Developing your content as such is extremely important for your readers to perceive your writing as well-supported and credible. This is especially important because it reflects positively on your credibility and professionalism as an engineer.

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This approach of writing evidence-based messages can be further examined through the Toulmin Model of Argumentation (Box 3). This model provides the general structure of well-supported arguments and is widely applied in various disciplines. Based on this model, you need to start your arguments with a *claim*, which is an assertion/ statement/ message that you articulate and that you want to prove. Then, you begin to accumulate the evidence needed to *support* your claim. Such evidence may come from various sources (as long as you cite specialized information that you do not produce). After collecting the necessary evidence, you then need to provide a *warrant* that links the claim to its supporting evidence. In other words, the way that the evidence may prove (or support) a claim should be made explicit to the readers. In more complex arguments that involve counterarguments, the model necessitates including *rebuttal* statements that disprove the counterarguments. Furthermore, in some cases, warrants themselves may need to be supported with *backing* statements. Box 3 includes an example to illustrate the elements of this model.

Box 3: Use the Toulmin Model of Argumentation to build strong arguments that appeal to your audience (readers).



Example Claim: Driving hybrid cars is an effective strategy to fight pollution.

Support 1: Driving a private car is a typical citizen's most air polluting activity.

Warrant 1: Because cars are the largest source of private, as opposed to industry produced, air pollution (backing), switching to hybrid cars should have an impact on fighting pollution.

Support 2: Each vehicle produced is going to stay on the road for roughly 12 to 15 years.

Warrant 2: Cars generally have a long lifespan (backing), meaning that a decision to switch to a hybrid car will make a long-term impact on pollution.

Counterclaim: Some might argue that instead of focusing on cars, which still encourages a culture of driving even if it cuts down on pollution, the nation should focus on building and encouraging use of mass transit systems.

Rebuttal: While mass transit is an environmentally sound idea that should be encouraged, it is not feasible in many rural and suburban areas, or for people who must commute to work. Thus, hybrid cars are a better solution for much of the nation's population.

Applying the evidence-based approach throughout your document

As discussed above, this evidence-based writing approach is extremely important for your credibility, not only as a writer, but also as an engineer. The way that you approach problems as engineers stems from researching situations and making sure that you are making accurate conclusions and calculated decisions. The same approach should be reflected in your writing. Such approach can help you build strong arguments and messages throughout your text. In this section, you will learn how this approach can be applied in writing about research information.

As engineers, you will conduct two types of research efforts: primary research and secondary research. **Primary research** refers to the original research efforts that you conduct as engineers (e.g. field observations and experiments, lab experiments, modeling and simulations, etc.). On the other hand, **secondary research** refers to seeking research information from existing credible sources (databases, scholarly papers, public and governmental records, etc.). Whether your technical writing assignment involves primary research, secondary research, or both, use this evidence-based writing approach to organize and synthesize research information.

For instance, when reporting original results:

1. Articulate each main finding in the form of an assertion using full sentences.
2. Support your assertions (main findings) with data (e.g. highlight trends, emphasize specific data points etc.).
3. Link your main findings to the evidence provided and discuss the implications/ limitations/ interpretations, especially in relation to your overall purpose, and your readers' interests, questions, goals, or concerns.

Similarly, when reporting information obtained from secondary sources (e.g. in the introduction/ literature review sections of your reports):

1. Articulate claims that summarize the main themes found in secondary sources about your topic of interest
2. Support those assertions (main themes) through summarizing and citing results from specific studies.
4. Link the general themes and gaps in secondary research findings to your overall purpose, and your readers' interests, questions, goals, or concerns.
3. Finally, cite the sources used according to a uniform style that is accepted in your discipline (e.g. ASCE, ACS, IEEE, APA, etc.).

Remember that your job as an engineer is to not only produce data, but to also break down, simplify, synthesize, and analyze results for your audience (instructors, collaborators, clients, etc.). This evidence-based approach will help you achieve this goal throughout your curriculum at MSFEA and in your future career as engineers.

Box 4: Writing ethics and academic integrity

Academic integrity is a serious topic in technical writing. Your accountability and credibility as engineers should be reflected in the technical and writing aspects of your projects. Your writing should thus only present your own analysis, design, and thinking. **Any kind of plagiarism, whether intentional or unintentional, will reflect badly on you as an MSFEA student and as a future engineer.** Your accountability and integrity in writing reports is not separate from your accountability and integrity in any other effort that you are asked to produce as a student or engineer. It is therefore extremely important that you review and abide by the **AUB Code of Conduct** and learn how to paraphrase, synthesize, and cite information from secondary sources.

After developing your content, read your text critically and revise messages that are not well-supported. Your goal at this stage should be to have a strong draft content-wise. In other words, make sure that the content produced at this point has a clear (1) direction, in terms of the scope, research question(s), and purpose statement(s), (2) message, in terms of problem/gap statements, general findings, and evaluations of findings, and (3) support for the messages included, which is in turn linked to your overall purpose and to your readers' concerns and questions.

Once you feel confident about the technical content in your draft, start focusing on the way that you are communicating and presenting your content to your readers (see Box 1). This is where you should start focusing on how to enhance your writing **Style** and **Form** in a way that improves the readability and understandability of your text. You will thus need to rewrite your draft through multiple rounds of revising, editing, and proofreading. The sections below include some important techniques to strategically communicate and present your messages to your readers through focusing on style and form.