

Writing Tips for Capstone Project Proposals and Final Reports

People read a technical document to learn how to carry out a task, to keep abreast of developments, or to gather information. In other words, they read it to get a job done. To help them, make your sentence clear, concise, and easy to understand.

Language

- Write in complete sentences (except when bulleting lists, such as requirements and design specifications). Each sentence should have a noun (subject) doing something, a verb! Some verbs require an object.
- Focus on the real subject. Examples:
 - Weak: The **use** of method would eliminate the problem of motor damage.
 - Strong: The **method** would eliminate the problem of motor damage.
 - Weak: The **presence** of a fault was detected.
 - Strong: A **fault** was detected.
- Reduce the grammatical expletives, such as *it is ... that*, *there is*, and *there are*. Focus directly on the subject and object. Examples:
 - Weak: *There is* no alternative *for us* except withdraw the product.
 - Strong: *We* have no alternative except withdraw the product.
 - Weak: *It is* hoped that simulation of the design will help us make the right decision.
 - Strong: We hope that simulation of the design will help us make the right decision.
- Focus on the real verb. A common problem in technical documents is the inappropriate use of a nominalized verb – a verb that has been changed into a noun, and then the nominalized verb coupled with a weak verb. Examples:
 - Weak: Each **preparation** of the solution **is done** twice.
 - Strong: Each solution is **prepared** twice.
 - Weak: **Consideration** should be given to an **acquisition** of the device.
 - Strong: We should **consider acquiring** the device.
- Use parallel structure: A sentence is parallel if its coordinate elements follow the same grammatical form/pattern. For example, all the clauses are either passive or active; all the verbs are either infinitive or participles; and so on:
 - Nonparallel: Our present system **is costing** us profits and **reduces** our productivity.
 - Parallel: Our present system is **costing** us profits and **reducing** our productivity.
 - Nonparallel: The compositor **should follow** the printed directions; **do not change** the originator's work.
 - Parallel: The compositor **should follow** the printed directions and **should not change** the originator's work.
- When using parallel structure, make sure that parallel items in a sentence do not overlap, causing confusion, or event changing the meaning of the sentence:
 - Confusing: We need to buy a faster processor, more sensors, and **find** a better programmer.

- Clear: We need to buy a faster processor and more sensors, and **we need to find** a better programmer.
- Use the active and passive voice appropriately. In a sentence using the active voice, the subject performs the action expressed by the verb. In a sentence using the passive voice, the subject receives the action.
 - Active: John commands the robot to traverse the maze.
 - Passive: the robot is commanded by John to traverse the maze.

In most cases, the active voice is better than the passive voice because it is shorter, clearer, and natural, and it emphasizes the agent. However, in certain cases, passive voice is better or is necessary:

- When the agent is clear from the context: *CSE students **are required** to take two consecutive capstone courses.*
- When the agent is known: *The comet was first referred in an ancient Egyptian text.*
- When the agent is less important than the action: *The robot components we ordered last week were delivered this morning.*
- When a reference to the agent is embarrassing, dangerous, in inappropriate, or unnecessary: *A mistake was made in the design process.*
- Avoid using long sentences. Break the sentence into a few sentences, or use the bullet lists.
- Avoid mixing tenses (past, present, future)
- Avoid using **this** by itself. If using **this**, place the noun to which **this** refers immediately after **this**: *Because of **this design defect**, we believe the container will be inferior.*
- Avoid using **that** by itself. Same reason as above
- Know the difference between **certain** and **some**.
- Know the difference between **incorrect** and **wrong**.
- Avoid casual language. Example of too casual:
 - a) *Our team is pretty sure that this design will be the cream of the crop,*
 - b) *We used a lot of packing peanuts,*
 - c) *The parachute will allow the container to sort of float.*
- Avoid using **very**.
- Avoid sequencing ideas using First or Firstly, Second (or Secondly), Third (or Thirdly), etc. This technique causes the document to read like a diary. Use bulleting lists instead.
- Avoid unnecessary information that the customer will assume of professionals. The customer will assume that professionals will
 - a) *brainstorm to collect possible ideas;*
 - b) *evaluate designs,*
 - c) *choose the best design,*
 - d) *design items that meet specification,*
 It is not necessary to say (a) through (d) in any documents that you provide to him/her.
- Use professional power words. For example,
 - Use **believe**, instead of feel, use **develop**, instead of came up with, and use **considered**, instead of thought.
 - More power words: *Confident, Successful, Superior, Coordinated, Directed, Developed, Facilitated, Accomplished, Managed, Objective, Goal, Organized, Evaluated, Reinforced, and Utilized.*

- State your ideas using as few words as necessary but maintain clarity. Be concise.
 - Bad example: *We researched two structure designs. The first design was a Warren truss. The second design was similar to that of a suspension bridge.*
 - Good example: *We researched two different structure designs: the Warren truss and the suspension bridge.*
- Know the difference between
 - its, it's,
 - their, there, they're,
 - accept, except,
 - loose, lose, loss,
 - to, two, too,
 - than, then,
 - who, which, that
- In technical documents, do not use
 - contractions. Example: Do not use *don't* or *we'll*.
 - second person words in a technical report. Example: **you** or **your**.
 - first person words in a technical report. Example: **we**, **our**, **I**, or **my**.

Consistency

- Even if several people contribute to a document, it should be edited such that it appears the document was written by one person. Style, spacing, terminology and language should be the same throughout – Use a template!
- If using multiple figures, they should appear to have been made by the same person: use same font, colors, and style.
- Be consistent with terminology: If a design is referred to as *Design Alternative #1*, it should be called *Design Alternative #1* throughout the report (*not Alternative Design #1*).
- Paragraph headings features (bold, italic, indent, spacing, etc) and indents should be consistent throughout the document – Use the pre-defined "Styles" in your word processor, or define your style.
- Avoid redundancy: The document should be well organized and redundant description in different sections should be avoided. Redundant description can easily create inconsistency.

Figures and Tables

- ALL figures and tables should
 - a) be numbered sequentially in the document;
 - b) have a descriptive caption;
 - c) be placed below the figure and diagram. For tables, caption (title) can be placed above the table;
 - d) be centered on the page;
- The figure and table must be cited in the document. The citation should appear before the figure and table. If they are not in the immediate next to the citation, the reader should be told where to find it, for example, at the end of the document or in the appendix.

- If a figure or table is too detailed or too big to place in the body of the document, it should be placed at the end of the report in a section titled, Appendix.

Using Numbers

- Sentences starting with numbers should have the number's word equivalent followed by the number itself in parentheses: ***Eight (8) pieces of string will be used.***
- Dimensions should use the number itself, along with the appropriate units or abbreviations: ***7" x 7"*** or ***7 inches x 7 inches***
- Numbers should be used in titles and sentences as a delineation of sequence: ***“Project #1 requires that we create a security robot to patrol a building”.*** Do not use the word form: ***“Project number one”***
- Numbers that come before a compound modifier, which includes a figure, should be written in words: ***Each student will five 2-page progress reports.***

Other

- Avoid bringing any inexperience or lack of confidence to the customer's attention.
Example: *Our team is not certain that this design will be successful because none of us has ever done a project of such difficult before.*
- Avoid writing a diary of details that the customer will assume the team will do or has done. For example, it is not necessary to explain that ***the team has met several times*** or ***has considered many designs*** or ***has worked long and hard on this project.***
- Keep a table (a figure) and its caption on same page. That is, avoid having a table broken up and appearing on two (2) adjacent pages.
- If you choose to use the phrase ***these factors*** in your writing, you should have clearly delineated EXACTLY what the 'factors' are in the previous sentence.
Example: *We believe that our craft stick structure failed on test day because: (1) the glue was still slightly wet and (2) we did not properly anchor the ends to the table. Due to ***these factors***, our structure could not hold the 8.8 lb. load.*
- Add an extra space between major sections in the body of the report.
- Add an extra space between paragraphs if using block format.
- Be consistent with variable names.
- Keep all font sizes and styles the same in figures and tables.