

Writing a Project Report for CE 489

Prepared by the
NDSU Center for Writers
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Agenda

- Need for Effective Communication
- Goal
- Writing Process
- Rhetorical Considerations
- Elements of Report for CE 489
 - Design
 - Language
 - Revision



The Need

- Clear information necessary for efficient and effective communication (failure can cause legal liability issues)
- Amount of recorded scientific and technical information doubles every 5 ½ years



The Need

- Volume: all documents related to the B-1B bomber project weighed as much as bomber itself
- Time spent on writing:
 - » 5% in engineering curriculum
 - » 20–40% in profession



The Need

**“Engineers who can’t write well
are definitely held back
from career advancement.”**

--Richard C. Levine

Manager of hardware planning

Bell Northern Research



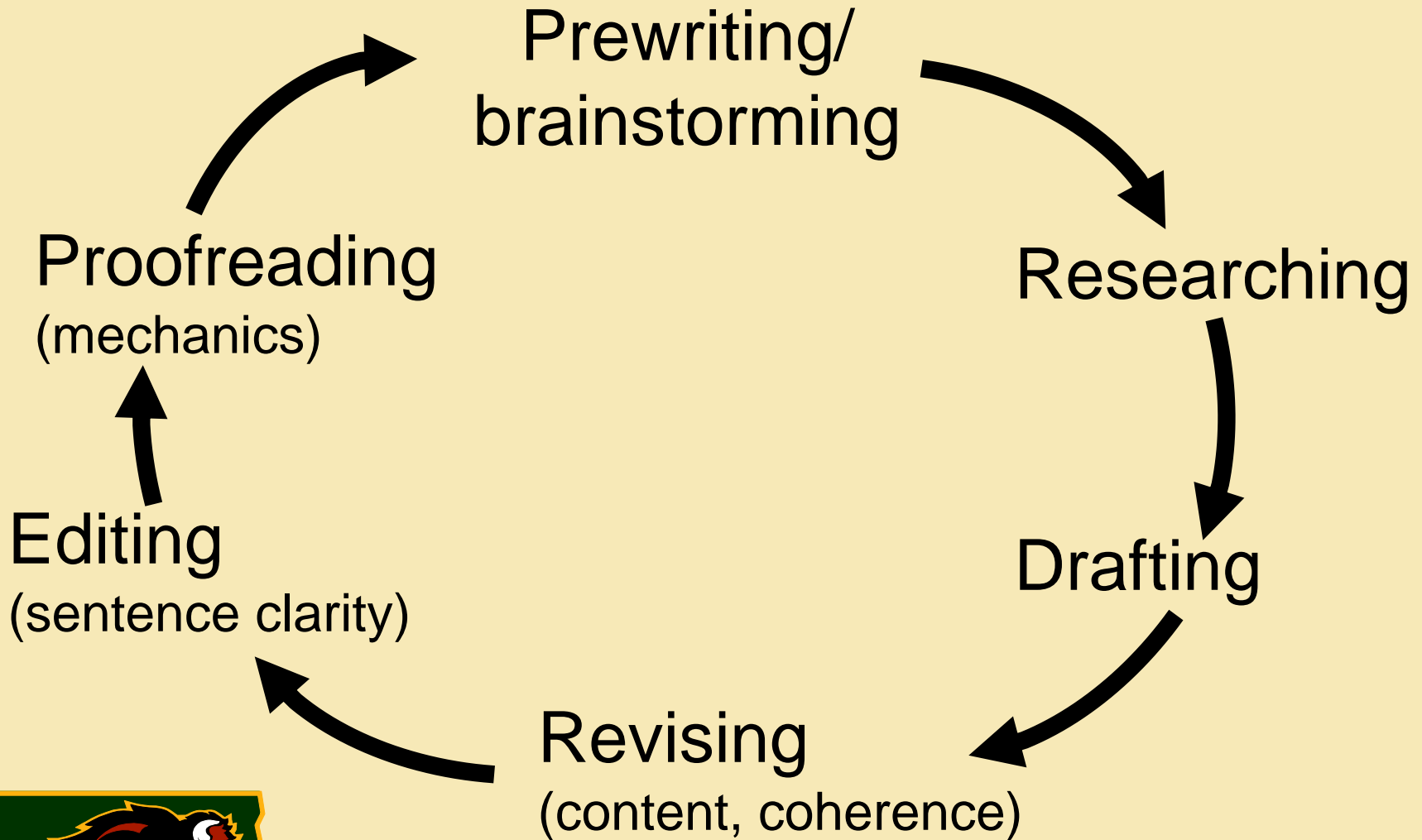
The Goal

Effective communication must be:

- Physically accessible (easily read, heard, viewed, “skim-friendly”)
- Comprehensible (easily understood)
- Usable (applied easily)



The Writing Process



**Visit
the Center for Writers
at any stage
of the writing process!**



Rhetorical Considerations

1. Purpose: Why am I writing?
2. Audience: Who will read my report?
3. Genre: Which type of document best addresses my purpose?
4. Content: What information do I include? Omit? Describe/define in detail?
5. Organization: What order best fits my purpose?
6. Style: What are the norms in my field? What language and tone are valued in my field?



Purpose for Writing

- **Inform** – convey information
- **Request** – obtain permission, information, funding
- **Instruct** – provide directions, procedures
- **Propose** – present plan of action
- **Recommend** – suggest alternatives
- **Persuade** – convince, change behaviors/attitudes
- **Record** – document research, progress



Audience

Who will read my document?

Identify all readers who have identifiable needs:

- Primary Audience
- Secondary Audience



Primary Audience

- People for whom the document is intended
- People who will use the information
 - Decision-makers
 - Supervisors
 - Clients
 - Customers
 - Researchers
 - Technicians



Secondary Audience

- People affected by the information or decisions
 - Technicians
 - Lawyers
 - Managers
 - Public
 - Customers & customer staff



Analyze Each Audience

- Interest in matter
- Expertise in area
- Position in organization
- Time available
- Attitudes, motivations, expectations
- Education, reading levels
- Experiences



Address Audience Differences

- Provide different content
- Use different language & presentation (visuals, lists, calculations, charts)
- Define technical terms
- Use different sections for different audiences (e.g., executive summary, appendices)
- Make document easy to scan visually



Pre-Writing

For this CE 489 class project:

1. Who is the primary audience?
2. Who is the secondary audience?
3. What is your purpose?



Genre Variations

No “cut-and-dried” format exists for all fields.

NASA study of “technical reports” found tremendous variation in format and organization

- use of nearly one hundred [different] components
- lack of consistency in the terms used for components
- lack of consistency in the location of components



Proposal Example

- Introduction
- Background
- Proposal/project statement
- Description of work product
- Benefits and feasibility of project
- Method or approach
- Qualifications and references
- Schedule
- Costs
- Conclusion



Progress Report Example

- Introduction
- Project description
- Progress summary
- Problems encountered
- Changes in requirements
- Overall assessment of project



Recommendation Report

- Introduction
- Background on the situation
- Requirements
- Technical background
- Description
- Point-by-point comparisons
- Conclusions (summary)



General Report Structure

Generally, complex formal reports include three parts:

- Front Matter
- Body
- End Matter



Front Matter: CE 489

- Letter of Transmittal (cover letter)
- Executive Summary
- Title Page
(Company name, members' names, date)
- Table of Contents
- List of Tables (can be separate page)
- List of Figures (can be separate page)
- ??List of Appendices (also include “title page” for each section’s appendices)



Letter of Transmittal

- Uses Business letter/block format on company letterhead
- Directly addresses the client
- Reminds readers of the overall purpose of the project
- Identifies and explains the project documents
- Conveys cordial tone



Letter of Transmittal

Your Company

Your 3-line (or more) address

Date

Client's mailing address (3+ lines)

Re: Subject line

Dear Ms. Smith:

I am pleased to . . .

Sincerely,



Executive Summary

- ?? 1-page or less (often ~200 words)
- Compose AFTER the report is written
- Provide concise summary of the report without the details
- Include important facts, conclusions, recommendations from the body of the report
- Written for executives, not technicians
- Can include subheadings, bulleted lists (ask instructor for models)



Table of Contents

- Visit Technology Learning & Media Center (TLMC) in IACC for computer formatting advice



Report Body: CE 489

- Project statement
- Introduction/Background
- Project Text/Narrative



Project Statement

- Brief description of the problem and the project
- Explains how the proposal addresses the problem, questions, activities
- Provides a clear focus to control the content and the organization of the document
- Ask instructor for sample projects to judge the length and level of detail



Introduction/Background

- Provides a enough information to “set the stage” for the project
- Explains foundational knowledge
“What do my reader’s need to know to understand my project?”
- Incorporates research
- Builds your credibility



Project Text/Narrative

- Provides step-by-step explanation of project activities—very detailed
- Create section w/subtitle for each task
- Include materials, costs, etc.
- Include summary tables, figures, etc.,
- Number titles sequentially by type (Table 1, Table 2; Figure 1, Figure 2)
- Place titles above tables, but below figures



Project Text/Narrative

- Follow each section with appendices
- Include “title page” for each appendix
- Discuss all appendices in the narrative
- Place large tables and figures in appendices
- Reference/cite all outside source material, including appendices, tables, and figures



Organization

- Chronological order for CE 489??
- Deductive order states a position and then establishes its validity (for neutral or receptive audience)
 - Overview/problem statement
 - Summary of recommendation/solution
 - Evidence/support in descending order (most important first)



Think of Audience (cont.)

- Inductive order states convincing information first and builds to recommendations (negative or oppositional audience)
 - Problem/Introduction/Background
 - Methods/Project Description
 - Results/Data
 - Analysis
 - Discussion
 - Recommendations



Design Elements

- Remember:
 - Accessibility
(easily read, viewed, “skim-friendly”)
 - Comprehensibility
(logically organized, easily understood)
 - Usability (applied easily)



Graphic Design Principles

The Non-Designer's Design Book by Robin Williams:
<http://www.hu.mtu.edu/~njcarpen/hu3120/pdfs/Basic%20Visual%20Design%20Principles.pdf>

C.R.A.P. or C.A.R.P.

- Contrast
- Repetition
- Alignment
- Proximity



Design: Headings

- **Headings/subheadings guide readers' attention**
 - Can be used to keep track of various parts of project. E.g.: “Making Components,” “Assembling Components,” and “Testing Assembly”
- **Headings/subheadings should be:**
 - Specific and helpful
 - Used to break up text and “chunk” information
 - Used to guide readers' attention



Design: Headings

- **Example of vague heading:**
 - “The use of some computing technologies in certain engineering classrooms”
- **Example of specific heading:**
 - “Using Matlab in the Freshman engineering classroom”



Design: Visuals

- A report's visual design can make or break its communication success
- Visual Design includes:
 - Use of font features (size, italics, bold)
 - Use of white space
 - Use of subtitles
 - Use of graphics



Integrating Graphics

- Refer to graphics in the text
 - “Table 5 shows...”
 - “... as shown in Figure 1.”
 - “... (Table 2).”
- Incorporate graphics correctly
 - Place graphics close to text reference
 - Place titles and captions
 - above tables
 - below figures



Design: Graphics

Graphics should

- be used to illustrate specific points
- be incorporated in a way that is natural to report's content/context
- be explained fully in text using references such as “Fig. 1 shows...”
- be cited if taken from a source



Design: Graphics

REMEMBER:

Graphics do not speak for themselves!



Integrating Graphics

- Number and title (caption) each graphic
 - Table 1. XXXXXXXX...
 - Figure 3. XXXXXXXX...
- Identify graphics correctly
 - Tables are “tables”
 - Everything else (graph, illustration, photo, etc.) is a “figure”



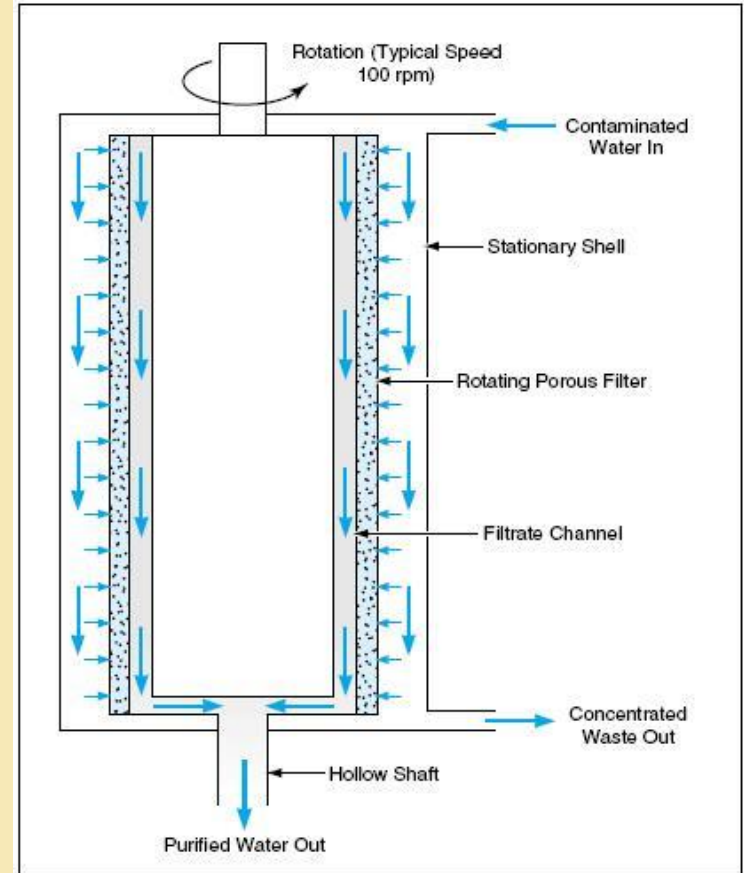
Tips for Graphics

- Design graphics for black-and-white printers and photocopies
- Figure and table captions can be long and informative
- Remember audience
 - What do they need to know?
 - What type of representation is most easily understood?



Diagrams and Drawings

- Function
 - Show parts and relationships
 - Focus audience on what is essential
- Design
 - Use color/shading to show relationships & draw eye (make compatible for bl/wh printer).
 - Avoid changes in proportion and scale

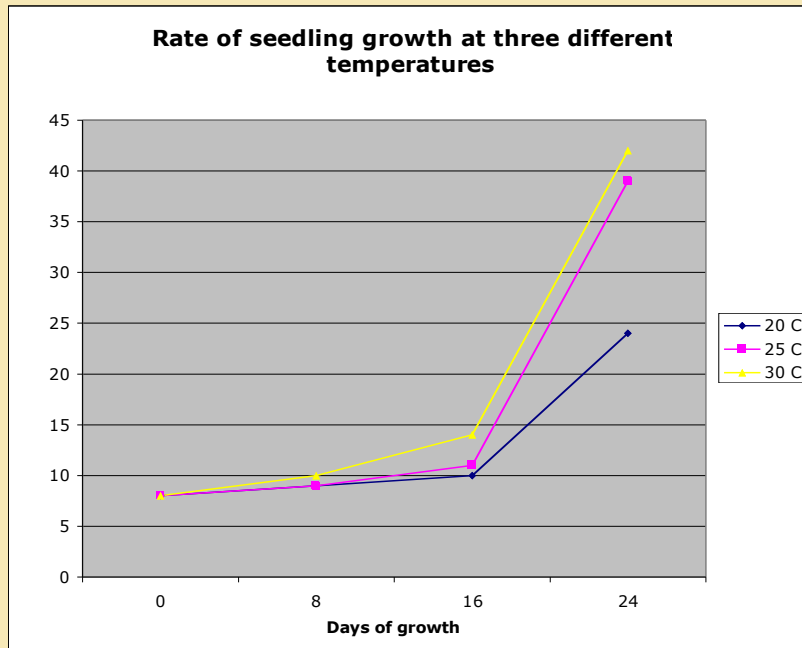


Leuptow, R.M. (June 2004) *NASA Tech Briefs*.

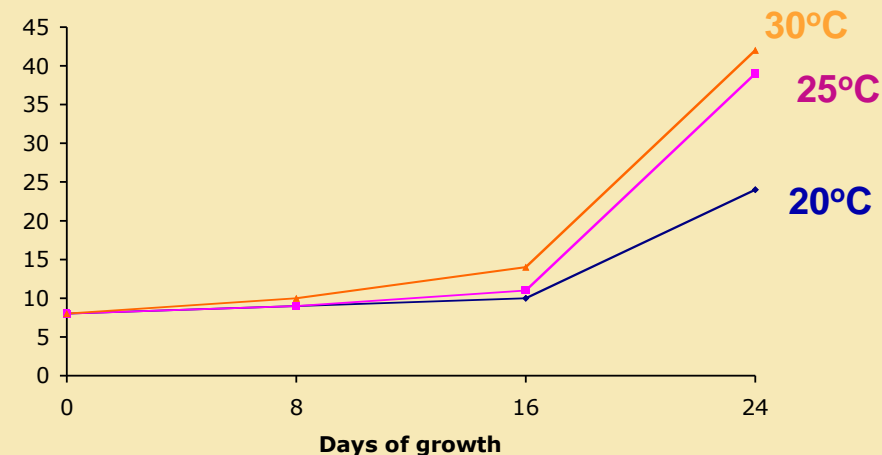


Beware Using Graphics

Graphical simplicity: keep “data-ink” to “non-data-ink” ratio high



Too much non-data ink



Emphasis on data
(better to use dotted lines)



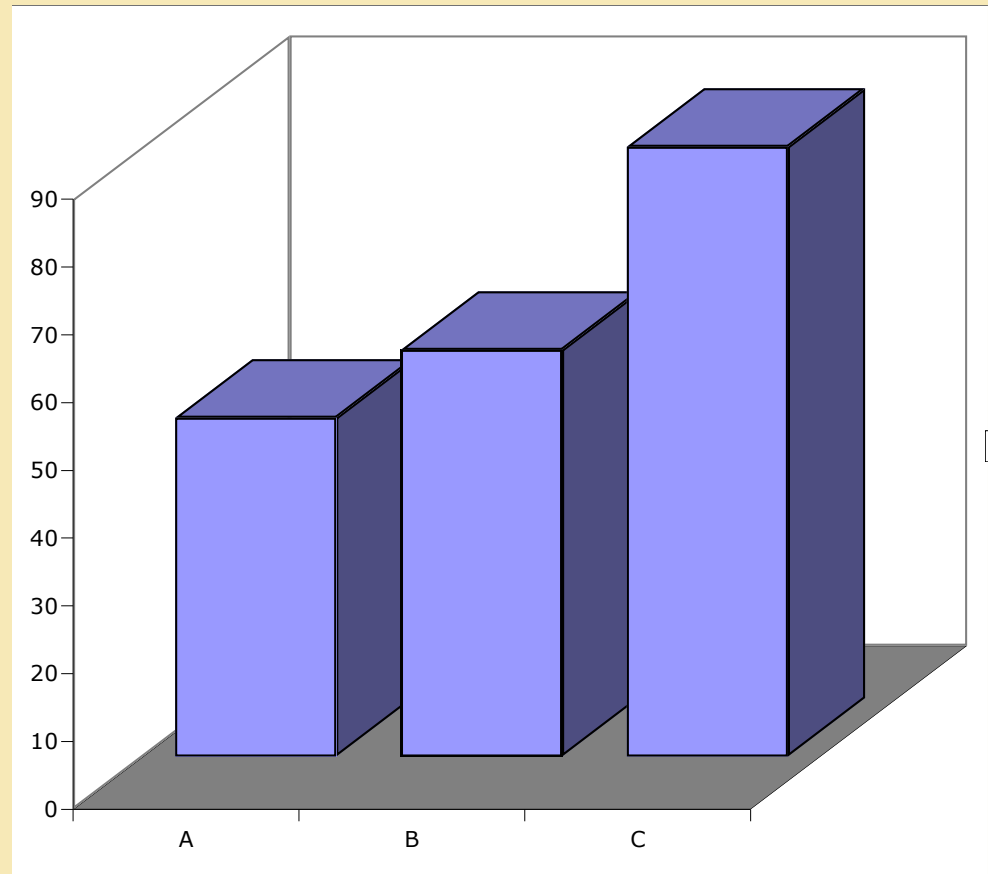
Beware Using Graphics

- Gridlines
 - Rarely necessary
 - Better when thin, gray
- Fill patterns
 - Avoid moiré/wavy effects
 - Gray shading is preferable to patterns



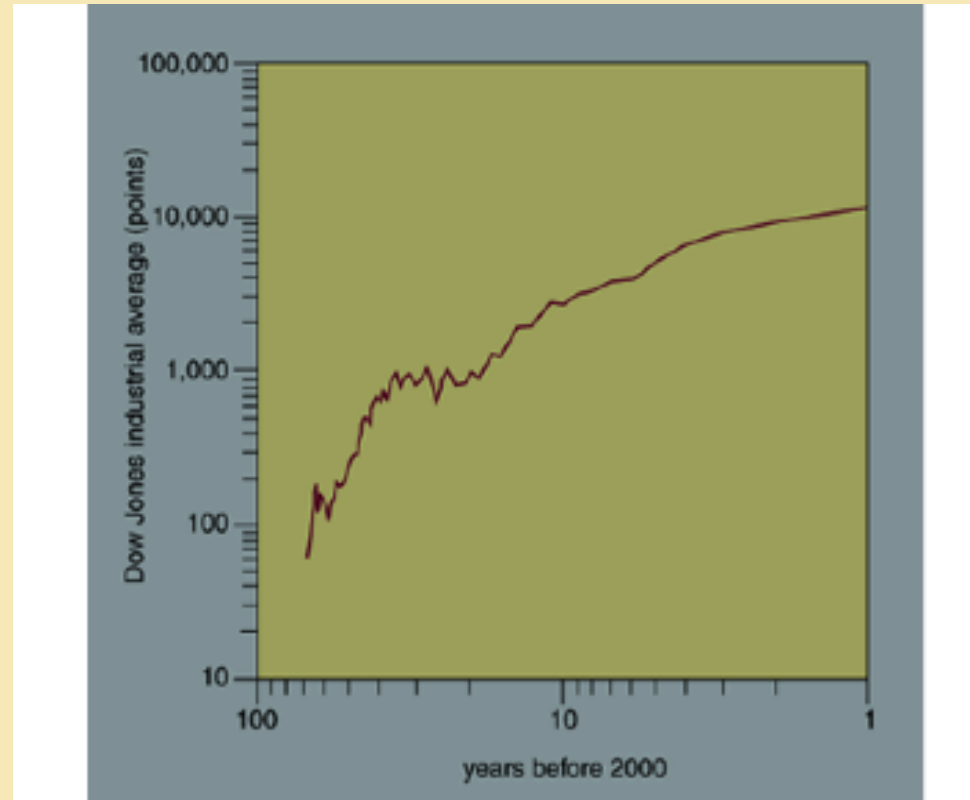
Beware Using Graphics

3-dimensional
graphs may fool
the eye



Beware Using Graphics

Look out for
consistency of
scales



End Matter: CE 489

- Some fields place appendices at the end
- Some fields include other information, such as an index and list of terms
- For CE 489, place reference page ?? (before appendices in each section?)



Style

- Formal tone
 - 3rd person
 - adult vocabulary (not stuffy)
 - simple terms, but no slang or contractions
- Straightforward, clear, concise wording
- Avoid confusing jargon and technical terms (unless you define them)



Style

- Be specific and not general
(concrete numbers and specific nouns/verbs)
- Keep sentences short and simple
(20 words max)
- Transitions to guide readers



Language & Vocabulary

- **Be clear**
 - The microprocessor interfaced directly with the 7055 RAM chip. It runs at 5 MHz.
 - The microprocessor interfaced directly with the 7055 RAM chip. The 7055 runs at 5 MHz.
 - Our records now include all development reports for B-44 engines.
 - Our records now include all B-44 engine development reports.



Language & Vocabulary

- **Be specific**
 - The robotics group is several weeks behind schedule.
 - The robotics group is six weeks behind schedule.
 - The CF553 runs faster that the BG562 but is much more expensive.
 - The CF553 runs 84% faster that the BG562 but costs \$4,320 - \$2,840 more than the BG562.



Language & Vocabulary

- **Be direct**
 - After a long and difficult development cycle due to factory renovation, the infrared controller will be ready for production in the very near future.
 - The infrared controller will be ready for production by March 4. Its development cycle was slowed by the factory renovation.



Language & Vocabulary

- **Be concise**
 - A large number of → Many
 - At this point in time → Now
 - In the majority of instances → Usually
 - Subsequent to → After
 - The reason why is that → Because
 - In the real possibility → Possible



Beware Language!

Taken from actual reports:

- “The other wildly used configuration of the dc commutator machine is the series field motor.”
- “...the power rating was doubled by about a factor of 2.5...”
- “From the result section we see that the transformer was rated at approximately 20 kHz from 10 kHz to 2 MHz and the results were consistent.”



Beware Language!

Taken from actual reports:

- “A sketch of the setup for both tests depicting relative positions and connections is featured in showing the relative posit featuring the relative setup of the tests is featured in the following section.”



Editing for Clarity

- Sentence level
 - Grammar
 - Misplaced modifiers
(Barking loudly, I walked the dog.)
 - S/V agreement
 - Pronoun agreement (he, their)
 - Pronoun referents
(This is... vs. This situation is...)



Editing for Clarity

- Sentence level, cont.
 - Precise word choice (thing = aspect)
 - Conciseness (avoid there is and it is)
 - Parallelism in lists (to read...to listen)



Proofreading

- Spelling
- Punctuation
 - Comma splices
 - Semi-colons
 - Run-on sentences
- Homophones—sound the same
 - there, they're, their



Proofreading Strategies

- Check for one aspect at a time
- Read backwards for spelling & sentence-level issues
- Keep list of common mistakes
- Read document out loud
- Ask someone else to read it aloud
- Beware spell checkers



Owed to the Spell Checker

Eye halve a spelling checker,
It came with my pea sea,
It plainly Mark's four my revue
Miss steaks eye kin knot sea.
Eye strike a key and type a word,
And weight four it two say,
Weather eye am wrong oar write,
It shows me strait a weigh.



**As soon as a mist ache is maid,
It nose bee fore two long,
And eye can put the error rite,
Its rare lea ever wrong.
Eye have run this poem threw it,
I am shore your pleased two no,
Its letter perfect awl the weigh,
My checker tolled me sew.**

Anonymous



Questions?



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- Purdue University Online Writing Lab.
<http://owl.english.purdue.edu/>
- Basic visual design principles from *The Non-Designer's Design Book* by Robin Williams:
<http://www.hu.mtu.edu/~njcarpen/hu3120/pdfs/Basic%20Visual%20Design%20Principles.pdf>

