



THE UNIVERSITY OF THE WEST INDIES

ST. AUGUSTINE, TRINIDAD AND TOBAGO, WEST INDIES

**FACULTY OF ENGINEERING &
ENGINEERING STUDENTS' SOCIETY**



Technical Report Writing Workshop

**Facilitated by: Halcyon Lawrence
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Topic 1: The Communication Model

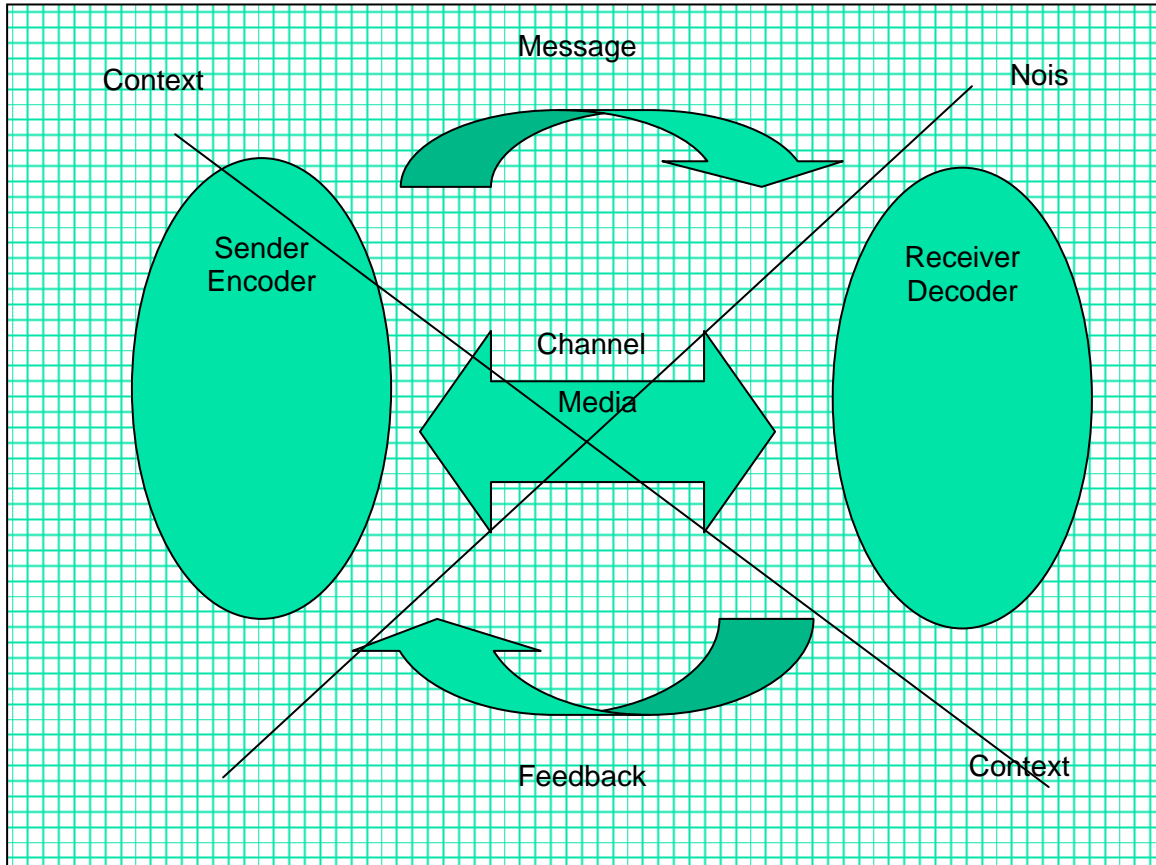


Figure 1: The Transmission Model of Communication

Role of Sender

- Encode the Message
- Analyse the audience
- Choose appropriate channels and media for transmission of message
- Encourage feedback

Role of Receiver

- Decode the message
- Provide feedback

Channels

- Verbal – use of words
- Non-verbal – non-use of words

Media within the Verbal Channel

- Written – letters, proposals, reports
- Oral – presentations, seminars

Media within the Non-verbal Channel:

- Models, Symbols
- **Kenesics**: the science of body language. Nonverbal gestures, postures and facial expressions by which a person manifests various physical, mental or emotional states, and communicates nonverbally with others.
- **Paralinguistics**: non-language – ums, ahs, etc.
- **Haptics** is the science of touching. Some psychologists have studied the effects of touching during conversations. For example, they tested how people would react when they were told a certain statement.
- **Proxemics** is the science of personal space. The distance between individuals during, for example, a conversation, a meeting or a shared activity.

Types of Noise

- Physical: Unexplained variation in a communication channel or random error in the transmission of information.
- Semantic Noise: may be related to people's knowledge level, their communication skills, their experience, their prejudices etc.

Examples of Physical Noise

- a loud motorbike roaring down the road while you're trying to hold a conversation
- your little brother standing in front of the TV set
- mist on the inside of the car windscreen
- smudges on a printed page
- 'snow' on a TV set

Examples of Semantic Noise

- Distraction
- Differences in the use of the code
- Emphasising the wrong part of the message
- Attitude towards the sender
- Attitude towards the message

Context

Merriam-Webster Online Dictionary defines context as:

1 : the parts of a discourse that surround a word or passage and can throw light on its meaning

2 : the interrelated conditions in which something exists or occurs

Before the message is encoded, ask the questions:

- Who is the audience or receiver?
- What needs to be transmitted?
- Why does the message need to be transmitted?
- What is the expected outcome of the interaction?
- What is the most effective way to transmit the message?
- How can feedback be encouraged?
- What is the context in which the message is being transmitted?

NOTES:

Topic 2: Five Cs of Technical Communication

The 5 Cs of Technical Communication

- Clarity: To be clear so that understanding is easy.
- Conciseness: To be brief or to the point without losing the intent of your message.
- Concreteness: To be definite, not abstract, real, complete.
- Coherence: To be easily understood, consistent.
- Context: To consider your scope and your audience, and the effect of your message on your readers.

Clarity

Structural Clarity (document level)

- Abstracts
- Introductions (Scope & Objectives)
- Table of Contents
- Appropriate graphics
- Descriptive titles
- Subject headings

Stylistic Clarity

- Use simple, direct language
- Do not overload your sentences
- Use precise, specific word choices

Grammatical Clarity

- Consider syntax
- Be aware of punctuation
- Use active vs. passive verb forms

Contextual Clarity

- Use reporter questions – Who, What, Why, Where, How, When, Which
- Consider your audience/environment receiving the communication
- Avoid abbreviations, acronyms, and jargon

Conciseness

Document level Conciseness

- Narrow your focus/scope – clear intro & develop a detailed outline
- Use graphics – tables, graphs, photographs, diagrams, flowcharts, etc.
- Revise your writing

Paragraph/sentence level Conciseness

- Avoid Wordy expressions
- Camouflaged words
- Repetition

Concreteness

- Technical accuracy
- Precision
- Accurate word choices

Coherence

Document level Coherence

- Provide a road map that link your ideas - abstract, introduction, problem statements

Paragraph level Coherence

- Use a topic sentence and supporting sentences
- Repeat terms that link ideas logically
- Use transitional words to establish links between ideas
- Paragraph development patterns OR Informational Structures¹
 - Definition
 - Analysis
 - Exemplification
 - Comparison and Contrast
 - Description
 - Process Discussion
 - Causal Discussion
 - Classification

¹ Informational Structures are discussed in detail on page 28, Topic 4

The 5 Cs of Technical Communication

	Clarity	Conciseness	Concrete	Coherence	Context
Definition	To be clear so that understanding is easy.	To be brief or to the point without losing the intent of your message.	To be definite, not abstract, real, complete.	To hold together in a logical, orderly, and consistent manner.	To consider the circumstances in which an event occurs.
Elements	<ul style="list-style-type: none"> ♣ Avoid needless complexity in words, phrases, and sentences. ♣ Keep things simple by using familiar words, constructing effective sentences and paragraphs that are logical and ordered. ♣ Avoid ambiguity by using precise, concrete language and making appropriate choices in words, syntax, pronouns, and punctuation. <p><i>Syntax</i>: the order and structure of words & phrases</p> <p>A note about word choices: Avoid jargon, colloquialisms, and slang.</p>	<ul style="list-style-type: none"> ♣ Eliminate unnecessary prepositional phrases ♣ Avoid unnecessary repetition ♣ Avoid wordy expressions, filler words and padding. <p>A note about prepositional phrases: They list details but do not emphasise any one detail over another.</p>	<ul style="list-style-type: none"> ♣ Be precise – say what you mean. ♣ Be technically accurate and complete. ♣ Choose the right words and be careful when substituting one word for another (e.g. weight vs. mass; it’s vs. its) ♣ Use specific facts and figures – make no assumptions. ♣ Use active rather than passive verb forms. 	<ul style="list-style-type: none"> ♣ Keep ideas tied together by repeating key terms and phrases. ♣ Establish links between ideas by using appropriate transitional words (e.g., however, in addition). ♣ Develop ideas and details that fit together clearly and read smoothly. 	<ul style="list-style-type: none"> ♣ Define your purpose or goal. ♣ Identify your audience, their knowledge and needs. ♣ Consider the effect of or response to your writing – what do you hope or want to achieve? ♣ Consider ethical and legal implications.

1. **Rewrite** the following abstract based on your knowledge of the 5 Cs of good technical communication – clarity, conciseness, concreteness, context, and coherence. (20 marks)

ABSTRACT

ISO 10006:2003 Standard provides guidance on quality management in projects. The requirements of ISO 10006:2003 standard was used along with the AHP hierarchical structure to develop a model to assess project management performance. This study aims to investigate the issues of measurement and performance of project management. In terms of the methodology, a questionnaire survey sent to project managers and project engineers sought to elicit their experience and provide weightings to the model to improve its accuracy, also, four projects, two completed at the Montezuma Glasswork Corporation and two at a multinational company, in Trinidad, were identified. The framework and a variety of knowledge areas of the selected projects were evaluated with the application of the model developed. Based on this, the study concluded that more documented procedures were required for organizations to improve project management performance in line with the requirement of ISO 10006:2003 Standard. It was also found that Management was not sufficiently involved in key processes, including continual improvement, but rather focused on customer satisfaction as opposed to ensuring high quality products. The study provided a model that can assist organizations in measuring project management performance in a consistent and practicable manner. The accuracy and applicability of the model was tested, but, further application of the model on different projects is required in order to refine its suitability and improve on its effectiveness.

Practice Exercises in Exercises in Clarity & Conciseness

Re-write the following sentences to improve issues of clarity and conciseness. Look for these common pitfalls:

- Unneeded Prepositional Phrases
 - Filler Words
 - Repetitious Wording
 - Overly Precise Wording
1. In the future, most houses will contain smart devices that can communicate with each other across in-home communication via networks in order to enhance the comfort, efficiency, and security of the home.

2. A system controller is required to have the ability to accomplish system macros, time/date triggered lighting events, security events, or light scenes.
3. It is intended that the following pages act as examples for designers and installers; however, it is impractical at this point in time for this manual to attempt to show every possible combination.
4. At this point in time, EM Inc. is engaged in the study of munitions safety for the purpose of providing extensive training for its engineers.
5. A variety of types of digitizers are employed in both fixed and portable configurations and include models from Sony, Hewlett-Packard, and Packard Bell.
6. In the month of September, EM Inc. will sponsor a training course for the purpose of introducing their new product line to potential sales people.

NOTES:

A **phrase** is a group of related words that does not include a subject and verb.

Examples:

Prepositional phrases (start with a preposition): Within minutes...

Infinitive phrases (start with verb in infinitive form):To understand the programme, ...

Participial phrases (contains verb participle): Its slopes collapsing, ...

Sentence Structures

There are three common sentence structures: simple, compound and complex.

1	<p>Simple:</p> <ul style="list-style-type: none"> ▪ Contains 1 main clause. ▪ Expresses one main idea. 	<p>Lava from a nonexplosive eruption ordinarily contains only 0.2 percent water.</p>
2	<p>Compound:</p> <ul style="list-style-type: none"> ▪ Contains 2 or more main clauses. ▪ Expresses 2 or more ideas of equal importance. <p><i>Possible sentence patterns:</i></p> <ul style="list-style-type: none"> ▪ Main clauses (joined by coordinating conjunctions – and, but, for, or, nor, so, yet) ▪ Main clauses joined by a semi-colon. <p>Compound sentence possible sentence patterns:</p> <ul style="list-style-type: none"> ▪ Main clauses joined by a semi-colon and a transitional word – therefore, moreover, thus, consequently, however, also. 	<p>Precursor activity to the eruption began on March 20, 1980, and many times during the next two months the mountain shook for minutes.</p> <p>Precursor activity to the eruption began on March 20, 1980; many times during the next two months the mountain shook for minutes.</p> <p>The initial cost of the machine is high; however, maintenance is relatively inexpensive.</p>
3	<p>Complex</p> <ul style="list-style-type: none"> ▪ Contains a main clause joined with one or more subordinate clauses. ▪ Expresses a main idea supported by subsidiary information. <p><i>Possible sentence patterns:</i></p> <ul style="list-style-type: none"> ▪ Subordinate conjunction and subordinate clause. Followed by main clause. 	<p><u>Although the amount of devastation caused by the May 18 blast was a surprise</u>, the eruption itself had been expected for weeks.</p>

<ul style="list-style-type: none"> Main clause followed by subordinate conjunction and subordinate clause. <p>Examples of subordinate conjunctions/dependent markers are because, before, since, while, although, if, until, when, then, after, as, as if.</p>	<p>The eruption itself had been expected for weeks <u>although the amount of devastation caused by the May 18 blast was a surprise.</u></p> <p>Note: When the subordinate clause starts a sentence, a comma is used before the main clause (See example 2 above). However, if the main clause starts a sentence, no comma is necessary (See example 1 above).</p>
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Punctuation

Punctuation	Characteristics	Main Uses	Examples
Comma (,)	Denotes a slight pause	1. After an introductory clause or phrase. <i>Exception:</i> If the phrase is directly followed by a verb, and not the subject, the comma is omitted.	Before leaving home, I switched off the television. Out of the BMW stepped the woman we were looking for.
		2. Before co-ordinating conjunctions in a compound sentence (and, but, or, nor, so, yet). <i>Exceptions:</i> If clauses are very short and closely connected, the comma may be omitted. If two verbs share one subject – compound predicate – the comma is omitted, unless ambiguity may arise.	The farmer and his faithful workers harvested the July crops, and their children helped them. Fran played the piano and John sang. Promoters said the investment was for a limited time and could not be extended at all. She recognized the man who entered the room, and gasped. (Comma used to prevent ambiguity).
		3. After a transitional phrase that links sentences or parts of sentences.	The rain fell yesterday. As a result, we did not go to the beach.
		4. Between all items in a series (serial/series comma)	I dedicate this thesis to my parents, Mother Teresa, and the Pope. The meal consisted of soup, salad, and macaroni and cheese.

Punctuation	Characteristics	Main Uses	Examples
		5. Between adjectives if you can substitute the word "and" for the comma.	He wore a dirty, brown shirt.
		6. To set off useful but non-essential information.	Elise, my older sister, visited us last Christmas.
Commas (,)		7. After a dependent clause that precedes a main clause.	Although the laboratory was closed for the week, the students tried to gain access.
		8. After a main clause that precedes a dependent clause containing supplementary but non essential information. <i>Exception:</i> If the dependent clause is restrictive, i.e. contains information essential to the sentence's meaning, then the comma should be omitted. Note: The distinction is occasionally tenuous. If in doubt, use the comma to indicate a pause.	She ought to be promoted, if you want my opinion. Paul was astonished when he heard the news.
		9. Before and after a non restrictive relative clause, i.e., contains details which if omitted do not affect the meaning of the sentence. Note: Relative clauses usually begin with "who", "which", "that", "when", and "where" Restrictive relative clauses contain information essential to the sentence's meaning. No commas are used.	This book, which I finished yesterday, is due back tomorrow. She is the woman who arrived late. The report that the students submitted was well documented.
Semi colon (;)	Denotes a pause stronger than that of a comma but weaker than a full stop	1. To join two closely related independent clauses when there is no connecting word (e.g. subordinate conjunction or conjunctive adverb).	The idea is not to use the test to get people in trouble; it is to help them avoid decisions they will regret later.

Punctuation	Characteristics	Main Uses	Examples
		2. To join two independent clauses when there is a subordinate conjunction.	He was determined to complete his degree; consequently, he studied diligently.
Semi colon (;)		3. To separate items in a series when one or more of the items contains internal commas.	The students came from Mona, Jamaica; St. Augustine, Trinidad; and Cave Hill, Barbados.
Colon (:)	Introduces an element or series of elements illustrating or amplifying what has preceded the colon	1. After a complete thought that introduces a list of items. Words such as <i>these</i> , <i>the following</i> , and <i>as follows</i> may introduce the list.	The recruiters were looking for the following 3 qualities: initiative, versatility, and enthusiasm.
		2. To introduce long quotations.	The chief researcher said: "The generator uses a small version of a thermo-acoustic, sterling engine, developed at Los Alamos in 1999. That engine converts heat to acoustic energy using no moving parts."
		3. After business letter salutations:	Dear Ms. X:
Dash or em dash (—)	May perform a similar function as commas, parentheses, and colons. Note: No sentence should contain more than two em dashes. Use parentheses if more than two elements need to be set off.	1. To set off parenthetical elements containing internal commas.	The three top students – Andrew Smith, Brent Cowie, and Charlene Maxwell – won awards.
		2. To separate an introductory list from a summarizing statement.	Dell, IBM and Apple – these are three of the leading computer manufacturers.
		3. To emphasise a sentence interruption	Executives at IBM – despite many rumours in the stock market – remained quiet about dividend earnings.
Other items	Hyphen is used in compound words,		Dirty-brown

Punctuation	Characteristics	Main Uses	Examples
referred to as dashes - hyphen – en dash	names, and word divisions En dash connects numbers and less often words		Chase-Caffyn 1920—1940
Punctuation	Characteristics	Main Uses	Examples
Parenthesis ()		To set off information that is less closely related to the rest of the sentence than that enclosed in em dashes or commas.	He suspected that the inert gases (helium, etc.) could produce a similar effect.
Square Brackets []		To enclose material – usually added by someone other than the original writer – that does not belong to the surrounding text.	The witness said, “They [the police] brutalized the suspects in custody.”
Curly Brackets or Braces { }	Heavily used in programming language, mathematics, and other specialized writing.		
Angle Brackets < >	Encloses codes for the typesetter in electronic manuscript preparation.		

Source: Chicago Manual of Style. 2003. 15th Edition. Chicago: Chicago University Press. Chapter 6.

Punctuating Vertical Lists, Chicago Manual of Style Guidelines

1. Vertical lists are best introduced by a grammatically complete sentence (i.e., a sentence that is still a sentence all by itself, without the help of the list), like the one above, followed by a colon.
2. No periods are required at the end of entries unless at least one entry is a complete sentence, in which case a period is necessary at the end of each entry.
3. Items in a list should be syntactically similar. (parallelism)
4. If items are numbered, as they are in this example, a period follows each number, and each entry begins with a capital letter—whether or not the entry forms a complete sentence.
5. Bulleted lists are considered appropriate mainly for instructional or promotional material and are treated the same as numbered lists in terms of capitalization and punctuation.
6. A group of unnumbered items each of which consists of an incomplete sentence should begin lowercase and requires no terminal punctuation.
7. If a list completes the sentence that introduces it, items begin with lowercase letters, commas or semicolons are used to separate each item, and the last item ends with a period; **such lists are often better run into the text rather than presented vertically.**

Defining Grammar

Grammar can be defined according to the structure and usage of language.

- It is the systematic description of the way words work together to form a coherent language. (**Structure**)
- It is the set of 'rules' that governs how a language ought to be spoken and written. (**Usage**)

Source: Brusaw, Charles T, Gerald J. Alred, and Walter E. Oliu. 1998. Handbook of Technical Writing. 5th Ed. St. Martin's Press.

Common Grammatical Errors

1. Poor sentence construction
 - i. Sentence Fragments
 - ii. Run on/ fused sentences; Comma splices
 - iii. Word choices including word context, jargon, colloquialism, idioms and clichés, slang, and abbreviations.
2. Subject-verb agreement
3. Verb inconsistency
4. Unparallel structure
5. Ambiguous modifiers
 - i. Dangling modifiers
 - ii. Misplaced modifiers
 - iii. Squinting modifiers
6. Poor punctuation
7. Poor spelling and commonly confused words

	Common Errors	Definition	Affects...	Examples
1.	Poor sentence construction	A sentence is a group of words which makes sense in itself. It must contain at least one complete verb, and one main item of information to	Clarity Coherence Conciseness	Lava contains only 0.2 percent water.

	Common Errors	Definition	Affects...	Examples
		<p>which various subsidiary ideas may be added. A sentence that is too long makes it difficult for the reader to understand the ideas expressed.</p> <p>Sentences are composed of clauses and sometimes phrases. There are two types of clauses: Main/Independent and Subordinate/Dependent .</p>		<p>Fragment: The volcano’s eruption had been expected for weeks. Although the amount of devastation caused was a surprise. Correction: The volcano’s eruption had been expected for weeks although the amount of devastation caused was a surprise.</p>
i.	Sentence Fragments	A fragment is an incomplete sentence.	Clarity	<p>Run on/Comma splice: Mechanical engineers work in many industries, their work varies by industry and function. Correction: Mechanical engineers work in many industries, and their work varies by industry and function.</p>
ii	Run on/fused sentences Comma Splices	<p>“Run-on” and fused sentences describe two or more main clauses joined together with no connecting word or punctuation.</p> <p>A comma splice, a type of “run-on” sentence, is the use of a comma between two main clauses.</p>		
iii	Word choices including word context, colloquialism jargon, , idioms and clichés, slang, and abbreviations.	<p>Word context – knowing the meaning of words used, paying attention to position of words, and repetition of “favourite” words or phrases. Colloquialism – language used in familiar/ informal conversation. Idioms/idiomatic expressions – expressions whose meaning do not follow from the meaning of the individual words which make up the expression. Clichés – overused or</p>	Concrete Context Conciseness Clarity	<p>Word meanings: E.g. Weight vs. mass Word position: Modifiers such as “only” Word repetition: Incidentally, in fact, apparently</p> <p>Colloquialism Contractions: I’ll (I will); don’t (do not) Filler words: conversational words used to enhance the</p>

	Common Errors	Definition	Affects...	Examples
		<p>unoriginal words or expressions.</p> <p>Jargon – words or expressions used by a particular profession or group that are difficult for others to understand.</p> <p>Slang – informal language that is more common in speech than in writing.</p> <p>Abbreviation – shortened word, phrase or text.</p> <p>Circumlocution – the use of too many words where fewer would be better.</p>		<p>flow of spoken language – I mean, right, Ok.</p> <p>Idioms Take on board – note Break new ground – start something new</p>
2.	Subject-verb agreement	A verb must agree with its subject. A singular subject has a singular verb, and a plural subject has a plural verb.	Clarity	<p>Disagreement: The accuracy and applicability of the model <u>was</u> tested.</p> <p>Agreement: The accuracy and applicability of the model <u>were</u> tested.</p>
3.	Verb inconsistency	One tense must be maintained for the main discourse. Do not move from one tense to another if the time frame for each action or state is the same.	Clarity	<p>The main tense is the present.</p> <p>A dragonfly rests on a branch overhanging a small stream this July morning. It is newly emerged from brown nymphal skin. As a nymph, it crept over the rocks of the stream bottom, feeding first on protozoa and mites, then, as it grew larger, on the young other aquatic insects. Now as an adult, it will feed on flying insects. Its head, thorax, and abdomen glitter; its wings are iridescent in the sunlight.</p>

	Common Errors	Definition	Affects...	Examples
4.	Unparallel structure	Parallel structure means using the same syntactical structure to show that two or more ideas have the same level of importance.	Coherence	Unparallel: The report was written quickly, accurately, and in a detailed manner. Parallel: The report was written in a quick, accurate, and detailed manner.
5.	Ambiguous modifiers	A modifier is a word, phrase, or clause that describes, clarifies, or gives additional information about other elements in a sentence. To avoid ambiguity, modifiers should be next to or close the word they are modifying.	Clarity	
i	Dangling	A dangling modifier is a word or phrase that modifies a noun or pronoun that is not clearly stated in the sentence.		Ambiguous: While eating dinner at home, the computer malfunctioned. Clearer: While I was eating dinner at home, the computer malfunctioned.
ii	Misplaced	A misplaced modifier occurs when the word modified is not clear or could be more than one word.	Clarity Context	Observe the different meanings of these 2 sentences: We almost lost all of our money. We lost almost all of our money.
iii	Squinting	A squinting modifier occurs when there is some ambiguity as to which sentence element the modifier should describe.	Clarity	Which sentence element is being modified? We agreed on the next day to make the changes.
6.	Poor punctuation	Incorrect use and no use of commas, semi colons, colons, dashes, parentheses, and brackets	Clarity Coherence	See the Chicago Manual of Style.

	Common Errors	Definition	Affects...	Examples
7.	Poor spelling Commonly confused words	Write or name the letters that form a word in an incorrect sequence. To use words inappropriately especially when they are similar sounding.	Clarity Concrete Coherence	The rule for –ie and –ei: receive, relief Words ending in –sede, –ceed, and –cede. It’s/its; advice/advise; cite, site, sight; principal/principle Check this URL for other examples http://www.io.com/~hcexres/tcm1603/achtml/twspell.html .

NOTES:

Exercises:

I. Modifiers and Parallel Structure

Revise the following sentences.

1. When travelling at the speed of sound, the moon is approximately 320 hours away.

2. Inventors unlocked more than a century ago the secrets of turning the sun's rays into mechanical power.

3. Pointing out the productivity and health problems plaguing US workers, aerobic fitness programmes may become much more common in American industry, according to the spokeswoman.

4. Project management combined with change management may yield these benefits:

- i. The ability to respond to customers' change requests rapidly
- ii. Decreasing the impact of changes on budget and schedule
- iii. Increased value-added efforts on behalf of customers

5. I like to run around the savannah, going to the gym, and it's also fun to make music videos.

6. Excerpt from a resume:

Position	Responsibilities	
Newspaper Editor	<ul style="list-style-type: none"> • Responsible for editing copy • Supervised layout • Three years experience as a news writer 	

II. Spelling/Commonly Confused Words and Punctuation

Cross out and correct the spelling errors. Insert appropriate or delete unnecessary punctuation marks.

Example: In a communication context, there is physical noise and ^{*semantic*} ~~symantie~~ noise.

1. Each of the employees attended the meeting accept the line supervisor who was out of town on job-related travel.
2. The advise he gave will help us all do a better job.
3. Management must affect a change in employees' attitudes toward absenteeism. Attendance is an important principal.
4. Siting this most recent case as an example its too early to tell if our efforts will create a better working environment.
5. There budget has got to large to ensure a successful profit margin.
6. Fluidization is the phenomena by which a pack bed behaves like a boiling liquid.

Circle the correct punctuation marks. If no punctuation is needed, draw a slash mark (/) through both options.

Example: In a communication context (, ;) there is physical noise and semantic noise.

7. John took an hour for lunch (, ;) but Joan ate at her desk so she could complete the project.
8. Sally wrote the specifications (, ;) Randy was responsible for adding any needed graphics.
9. The following employees attended the training session on stress management (, ;) Steve Janzen, purchasing agent (, ;) Jeremy Banks, personnel director (, ;) and Karen Rochford, staff supervisor.
10. Although the sales people were happy with their salary increases (, ;) the technicians felt slighted.
11. The employee (, ;) who achieves the highest rating this month (, ;) will earn 10 bonus points (, ;) therefore (, ;) competition should be intense.
12. First (, ;) let us remember that meeting schedules should be a priority (, ;) and not an afterthought.

Correct the following Dangling or Misplaced Modifiers

1. When only three, her mother taught her to read.
2. Running across the field, a car light appeared.
3. He watched the parade sitting by the window.
4. The woman was escorted by her husband wearing a black velvet gown.
5. The policeman shot the thief who was fleeing with his gun.

Re-Write the following sentences to reflect a parallel structure

1. Espinoza's style was remarkable for its dexterity, grace, and she could play any position.
2. Either you will begin to study now or risk failing the exam.
3. The college has space for a new computer lab but not a faculty lounge.

Using the CMOS 15th Edition Rules to Punctuating Vertical Lists, convert the following paragraph into a vertical list:

The system is called an isolated word recognition system and consists of three major components that process human speech which are the preprocessor which removes irregularities from the speech signal and then breaks it up into parts, the feature extractor which extracts 32 key features from the signal and classification phase which identifies the spoken word and includes the training mode and reference pattern memory

NOTES:

Topic 4: Information Structures²

An information infrastructure is a type of information content (such as descriptive writing), a way of organizing information (such as a comparison or classification), or both

What are the different types of Informational Infrastructures?

- Definitions
- Analysis
- Exemplification
- Comparison and Contrast
- Description
- Process Discussion
- Causal Discussion
- Classification

Definitions

When should a term be defined?

- When the term is new
- When the term is new to your audience
- When the term has two or more meanings
- When the context requires it

Writing Definitions

- A formal definition is based upon a concise, logical pattern that includes as much information as it can within a minimum amount of space. It consists of three parts.
 - The term (word or phrase) to be defined
 - The class of object or concept to which the term belongs.
 - The differentiating characteristics that distinguish it from all others of its class

Sample Definition

- "Water (term) is a liquid (class) made up of molecules of hydrogen and oxygen in the ratio of 2 to 1 (distinguishing characteristics)."

² Material taken from < <http://www.io.com/~hcxres/textbook/structov.html>>

Guidelines for Writing Definitions

- Avoid defining with "is when" and "is where." These adverb phrase introducers do not work well when defining a word. A noun should be defined with a noun, a verb with a verb, an adjective with an adjective.
- Do not define a word by mere repetition:
- A resistor is an electronic device that resists current flow. Find a synonym to replace resists.
- Define a word in simple and familiar terms.
- Keep your class small but adequate. It should be large enough to include all members of the term you are defining but no larger.
- State the differentiating characteristics precisely.

Descriptions

- The majority of technical reports include some type of descriptions, either of objects, processes or ideas. A description can be physical (what it looks like), functional (what it does or how it works) or both. When writing descriptions, the writer must:
 - Consider the technical level of the intended reader
 - Anticipate questions
 - Sequence the details of the descriptions to make the picture complete and understandable.

Physical Attributes of objects may include:

- | | |
|-------------------------|-------------------------|
| • Color | • methods of attachment |
| • Height | • amount |
| • Width, length & depth | • Pattern |
| • Shape | • design |
| • weight | • age |
| • Materials | • subparts |
| • Texture | • finish |
| • Width | • temperature |
| • location | |

Guidelines for Writing Descriptions

- Begin with the name of the object followed by its definition
- Describe the most obvious details first (general appearance, shape and size) and then go on to specific details (parts, arrangement)
- Avoid abstract words such as pretty, really or very. Such words water down the meaning.
- Use precise, concrete adjectives or terms such as parallel, perpendicular, cylinder or grainy
- Reread your description with the device in front of you and check for completeness, logical order; and word choice.
- people need to know how things happen, how things work, how to operate things, and how to perform certain actions.
- A process is an event or set of events that can be performed or that occurs regularly or repeatedly.

Non-Instructional Process Discussions

- These process discussions answer such questions as:
- How does this mechanism work?
- What are the typical steps in this natural, mechanical, social, biological, psychological phenomenon?
- How does this event (mechanical, natural, human, social) happen?
-

Process vs. Causal Discussions

- These are closely related to process discussions.
- In causal discussions, we're interested in why something happens, what causes it, what its results or consequences are.
- In process discussions, we are interested in how something happens, how it works, in a step-by-step fashion.
- Process discussions explain the workings of such mechanisms as automobile batteries, light bulbs, telephones, televisions, microwave ovens, stereo receivers.

Writing Process Discussions

- Identify steps and individual actions
- Description—Explain how things look before, during, or after the process, or any phase within the process.
- Definitions—Explain the meaning of any technical terms used in the discussion.
- Comparisons—Compare the process, any of its phases or outcomes, to something similar or something familiar to help readers understand.
- Examples—Provide examples of the process you are explaining. For example, in a discussion of tornadoes, examples of tornadoes in history can help.

Exercise:

Using the guidelines for a technical description, label and describe the object shown below:



Topic 5: Parts of the Report

Abstracts

There are two types of Technical Abstracts: Descriptive and Informative Abstracts

Informative Abstracts

1. Communicate contents of reports
2. Include purpose, methods, scope, results, conclusions, and recommendations
3. Highlight essential points
4. Are short--from a paragraph to a page or two, depending upon the length of the report (10% or less of the report)
5. Allow readers to decide whether they want to read the report

Descriptive Abstracts

1. Tell what the report contains
2. Include purpose, methods, scope, but NOT results, conclusions, and recommendations
3. Are always very short-- usually under 100 words
4. Introduce subject to readers, who must then read the report to learn study results

Qualities of A Good Abstract

1. Uses one or more well-developed paragraphs, which are unified, coherent, concise, and able to stand alone
2. Uses an introduction-body-conclusion structure in which the parts of the report are discussed in order: purpose, findings, conclusions, recommendations
3. Follows strictly the chronology of the report
4. Provides logical connections between material included
5. Adds no new information but simply summarizes the report
6. Is intelligible to a wide audience

Steps for Writing Effective Report Abstracts

1. Reread your report with the purpose of abstracting in mind. Look specifically for these main parts: purpose, methods, scope, results, conclusions, and recommendations.
2. After you have finished rereading your report, write a rough draft **WITHOUT LOOKING BACK AT YOUR REPORT.**

3. Consider the main parts of the abstract. Do not merely copy key sentences from your report. You will put in too much or too little information. Do not summarize information in a new way.
4. Revise your rough draft to:
 5. correct weaknesses in organization and coherence,
 6. drop superfluous information,
 7. add important information originally left out,
 8. eliminate wordiness, and
 9. correct errors in grammar and mechanics.
10. carefully proofread your final copy.

Sample: Descriptive Abstract

NSF Faculty Early Career Development Program (CAREER)

This project has both teaching and research components. The teaching component consists of developing plans for upgrading an undergraduate machines laboratory, and for updating the subject matter in several graduate and undergraduate power systems classes.

The research portion of the project is to continue our development of an optimal power flow (OPF) program to include the effects of static system security on system dispatch. The researchers attempt to include the effects of steady-state stability and voltage stability into the OPF as well. The results of the OPF will be used to obtain information on the values, costs, and prices of actions taken to increase system security. The topic of power system security, which is concerned with the ability of an interconnected power system to withstand various types of disturbances, is especially relevant today, as the electric power industry moves towards deregulation of generation and open transmission access. Many in the industry are concerned that increased competition in the industry will cause some to neglect security considerations, with possibly disastrous consequences. New methodologies, such as the one proposed in this project, are needed to better quantify the economics of power system security, so that competitors can maintain an appropriate level of system security without hurting their competitive position by overspending or inefficiently spending on security.

Sample: Informative Abstract

Palmquist, M., & Young, R. (1992). The Notion of Giftedness and Student Expectations About Writing. *Written Communication*, 9(1), 137-168.

Research reported by Daly, Miller, and their colleagues suggests that writing apprehension is related to a number of factors we do not yet fully understand. This study suggests that included among those factors should be the belief that writing ability is a gift. Giftedness, as it is referred to in the study, is roughly equivalent to the Romantic

notion of original genius. Results from a survey of 247 postsecondary students enrolled in introductory writing courses at two institutions indicate that higher levels of belief in giftedness are correlated with higher levels of writing apprehension, lower self-assessments of writing ability, lower levels of confidence in achieving proficiency in certain writing activities and genres, and lower self-assessments of prior experience with writing instructors. Significant differences in levels of belief in giftedness were also found among students who differed in their perceptions of the most important purpose for writing, with students who identified "to express your own feelings about something" as the most important purpose for writing having the highest mean level of belief in giftedness. Although the validity of the notion that writing ability is a special gift is not directly addressed, the results suggest that belief in giftedness may have deleterious effects on student writers.

Exercise: Using the Guidelines provided, create an INFORMATIVE abstract based on the article below:

Unsafe At Any Airspeed?

By Bill Strauss, M. Granger Morgan, Jay Apt, and Daniel D. Stancil

Modified from: <http://www.spectrum.ieee.org/mar06/3069>

Is it safe to use cellphones on airplanes? The U.S. Federal Communications Commission (FCC) thinks it may be. In December 2004, the agency began soliciting comments on proposed regulations that would allow airline passengers to use cellphones and other electronic devices.

In the meantime, more and more passengers are bringing cellphones, PDAs, laptops, DVD players, and game machines on board. All of these items emit radiation and have the potential to interfere with aircraft instrumentation. More and more passengers, however, do not believe that using portable electronic devices presents a risk to their safety. We, on the other hand, have had our doubts that such use was safe.

Over the course of three months in late 2003, we investigated the possibility that portable electronic devices interfere with a plane's safety instruments by measuring the RF spectrum inside commercial aircraft cabins. What we found was disturbing. Passengers are using cellphones, on the average, at least once per flight, contrary to FCC and FAA regulations, and sometimes during the especially critical flight phases of takeoff and landing. Although that number seems low, keep in mind that it represents the furtive activity of a small number of rule breakers. Should the FCC and the airlines allow cellphone use, the number of calls could rise dramatically. In addition, regulations already permit a wide variety of other portable electronic devices—from game machines to laptops with Wi-Fi cards—to be used in the air today. Yet our research has found that these items can interrupt the normal operation of key cockpit instruments, especially Global Positioning System (GPS) receivers, which are increasingly vital to safe landings. Two different studies by NASA further support the idea that passengers' electronic

devices dangerously produce interference in a way that reduces the safety margins for critical avionics systems.

There it was—the clear spectral signature of that cellphone call

There is no smoking gun to this story: there is no definitive instance of an air accident known to have been caused by a passenger's use of an electronic device. Nonetheless, although it is impossible to say that such use has contributed to air accidents in the past, the data also make it impossible to rule it out completely. More important, the data support a conclusion that continued use of portable RF-emitting devices such as cellphones will, in all likelihood, someday cause an accident by interfering with critical cockpit instruments such as GPS receivers. This much is certain: there exists a greater potential for problems than was previously believed.

Yet despite the paucity of available data, regulators and the airlines seem poised to yield to public demands to allow the use of cellphones in flight and the use of other devices, such as PDAs, during critical phases of flight. We believe additional studies are needed to characterize potential risks, followed by regulations that ensure the safe use of radiating devices, and we conclude with a suggested five-point program for such studies. And we argue that in the meantime, the public needs to be more clearly informed about the risks of its current behavior.

Notes:

References using Chicago Manual of Style Citation Guide

Introduction

This guide is based on the *The Chicago Manual of Style 15th ed. rev.* (University of Chicago Press, 2003). Examples are shown for the **Author-Date** style of citation recommended for natural sciences and social sciences,

Reference List items are listed alphabetically at the end of the research paper. Items are referred to in the body of paper using the **In-Text** style.

Numbers in brackets [] refer to the section of the *Chicago Manual of Style* which describe the specific citation style. Consult these pages for more information.

Author-Date Style - (Sciences)

Book - (one author)

[17.27]

Bibliography:

Kourik, Robert. 1998. *The lavender garden: beautiful varieties to grow and gather*. San Francisco: Chronicle Books.

In-Text:

(Kourik 1998)

Author-Date Style - (Sciences)

Book - (two to three authors)

[17.27]

Bibliography:

Flinders, David J. and Geoffrey E. Mills, eds. 1993. *Theory and concepts in qualitative research: perspectives from the field*. New York: Teachers College Press.

In-Text:

(Flinders and Mills 1993)

Author-Date Style - (Sciences)

Book - (more than three authors)

[17.29]

Bibliography:

Kimble, John M., Rattan Lal, and Ronald F. Follett, eds.
2002. *Agricultural practices and policies for
carbon sequestration in soil*. Boca Raton,
Fla.: Lewis Publishers.

In-Text

(Kimble, et al. 2002)

Author-Date Style - (Sciences)

Book - (corporate or organization author)

[17.47]

Bibliography:

Ohio State University. Natural Resources Institute. 1959.
*A directory of Ohio facilities and services
for resource conservation*. Columbus: Natural
Resources Institute.

In-Text:

(Ohio State 1959)

Author-Date Style - (Sciences)

Journal Article - (one author)

[17.156] [17.168]

Bibliography:

Terborgh, J. 1974. Perservation of natural diversity:
The problem of extinction-prone species.
BioScience 24:715-22.

In-Text:

(Terborgh 1974, 720) or (Terborgh 1974)

Author-Date Style - (Sciences)

Journal Article - (two authors)

[17.168]

Bibliography:

Bolzan, J.F. and K.C. Jezek. 2000. Accumulation rate changes in central Greenland from passive microwave data. *Polar Geography* 27(4): 277-319.

In-Text:

(Bolzan and Jezek 2000, 280) or (Bolzan and Jezek 2000)

Author-Date Style - (Sciences)

Newspaper Article

[17.188]

Bibliography:

[Do not include in Bibliography. Citation is made in running text style as shown in the In Text examples below.]

In-Text:

"In an article on rampage killers (*New York Times*, April 10, 2000), Laurie Goodstein and William Glaberson describe..."

Author-Date Style - (Sciences)

Encyclopedia Article

[17.188]

Bibliography:

[Do not include in Bibliography. Citation is made in running text style as shown in the In Text examples below.]

In-Text:

"In his article on Nebo in the eleventh edition of the *Encyclopedia Britannica*, Morris Jastrow noted that..."

Author-Date Style - (Sciences)

Electronic Journal or Newspaper Article

[17.12] [17.359]

Bibliography:

Thomas, Trevor M. 1956. Wales: Land of Mines and Quarries. *Geographical Review* 46, no. 1: 59-81.
<http://www.jstor.org/> (accessed June 30, 2005).

In-Text:

(Thomas 1956)

Author-Date Style - (Sciences)

Electronic Book

[17.143]

Bibliography:

Rollin, Bernard E. 1998. *The Unheeded Cry: Animal Consciousness, Animal Pain, and Science*. Ames, Iowa. The Iowa State University Press.
<http://www.netlibrary.com> (accessed June 30, 2005).

In-Text:

(Rollin 1998)

Author-Date Style - (Sciences)

Web Site

[17.356]

Bibliography:

Roach, John. 2005. Journal Ranks Top 25 Unanswered Science Questions. <http://news.nationalgeographic.com> (accessed July 7, 2005).

In-Text:

(National Geographic 2005)

Author-Date Style - (Sciences)

Other Electronic or Internet Citations

<http://liblearn.osu.edu/tutor/les7/guide.html>

Exercise:

Identify and correct the errors in the Bibliography below, using CMOS as your guide.

BIBLIOGRAPHY

- Babb A. and Anius D. 2005. *Draft Barbados' National ICT Strategic Development Plan*. Barbados: ACB Knowledge Consultants Inc.
- Balwin R and Cave M. (1999) *Understanding Regulation*. New York: Oxford University Press
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- Cave Martin. 2002. "Review of Radio Spectrum Management". An Independent Review for the Department of Trade and Industry and HM Treasury.
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- FCC February (2005). Connected on the Go - Broadband goes Wireless. Overview of the Wireless Broadband Access Task Force Report. Retrieved from <http://www.fcc/wbaft/>
- Future Delivery of Broadband in Ireland, 2003. Office of the Director of Telecommunications Regulation. Retrieved from <http://www.odtr.ie/docs/odtr0279.pdf>
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- Government of Jamaica. Telecommunications Act 2000
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- International Telecommunications Union. Trends in Telecommunication Reform 2004/2005
- Kenny, Charles. 2002. "The Costs and Benefits of ICTs for Direct Poverty Alleviation". World Bank, Washington DC: World Bank.

Appendix A: Parts of the Report and Sample Formatted Report

Parts of the Report	Content	Format	Pagination
General Information	<p>Quotations of more than two lines are single spaced and indented .5” from the left Margin.</p> <p>Tables or Figures should appear closely following the text where they are discussed. No further than a page following. Tables and Figures must have descriptive titles.</p>	<p>1.5 to double line spacing</p> <p>Single line spacing used in Quotations, Appendices, References</p> <p>Margins- top and bottom 1”; Left 2” and Right 1”</p> <p>Typeface – 10-12 Pitch fonts Preferably Serif font (TNR) for body text and Sans Serif font (Arial) for Headings Equations and Formulae must be typed, not hand written</p>	<p>Roman Numerals Lowercase</p> <p>Page numbers on Top or Bottom Right of the page</p> <p>Tables and figures are numbered using Arabic numbering and separate sequences</p>
Title Page	<p>Student’s Name & ID Number Lecturer’s Name Title of Report Date of Report</p>	Centered Horizontally and Vertically on the Page and spaced evenly	No Page Numbering
Abstract	Should include the Purpose of the report, Methods used in conducting research, the results and the significance of findings	Single Line Spaced	Lower case Roman Numerals, Page starting from 2
Acknowledgements	Optional – single page		All front matter continues lower case Roman Numerals, numbered consecutively off the abstract
Table of Contents	Includes all significant parts of the report. Does NOT include the TOC		
Glossary			
List of Abbreviations			
List of Figures/Tables			
Text/Body of Thesis		Each section/chapter on a new page	New Sequence, Arabic numbering
References	Chicago Manual of Style 15 th Ed.	Generated in sequence	
Appendices	Each appendix must have a descriptive title	The list of appendices MUST appear in the TOC	Continue sequence of Arabic numbers

Institution

Department of XXXXXXXXXXXX
The University of the West Indies
St. Augustine

**Project
Name**

**Report on
LIGHT WATER NUCLEAR REACTORS**

**Student
Name and
ID
Number**

Submitted by

John M. Smith
ID: 000-00000

Date

April 27, 19XX

Lecturer

Lecturer : Dr. Joesph Bloggs
Department of XXXXXXX

ABSTRACT

Abstract: →
Single line spacing

**Scope of
Project**

**Delimiting
Statement**

A nuclear power reactor operates by having a central unit, called the core, in which nuclear fission reactions take place and produce heat. A liquid, called the coolant, flows through the system and absorbs the heat produced in the core. The liquid is then converted into steam that drives a turbogenerator to produce electricity. The purpose of this report is to present the basic design, operation, and safety measures of light water reactors to the city council. The city council is currently investigating the possibility of membership in a regional consortium as an alternative to increased coal-fired production of electricity (Bupp 1998). This report will explain how the two types of light water reactors, the design to be used by the consortium, operate and present the key safety and economic aspects of these reactors. Although the operations of nuclear power reactors do involve complex chemistry and physics, these aspects of the discussion have been avoided; only an introductory discussion of the mechanical operation of the reactor will be presented.

Chicago Manual of
Style, in text
Citation ←

TABLE OF CONTENTS

**Generated
Table of
Contents**

**Note: It
does not
contain the
heading
Table of
Contents**

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Pressurized Water Reactors	3
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Economic Aspects.....	5
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LIST OF FIGURES

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Level Heading 1

LIGHT WATER NUCLEAR REACTORS

Level Heading 2

Introduction

Vertical lists are **best introduced** by a grammatically complete sentence (i.e., a sentence that is still a sentence all by itself, without the help of the list) **If items are numbered, a period follows each number, and each entry begins with a capital letter**—whether or not the entry forms a complete sentence

There are approximately five hundred nuclear power plants in operation or under construction worldwide. These plants can produce as much as 370,000 megawatts of electricity. These nuclear power plants can be categorized into four types:

1. Light water reactors
2. Heavy water reactors
3. Gas-cooled reactors
4. Breeder reactor

If a list completes the sentence that introduces it, items begin with **lowercase letters, commas or semicolons** are used to separate each item, and the last item ends with a period; **such lists are often better run into the text rather than presented vertically**

The four parts of this report discuss:

1. the design and operation of pressurized water reactors;
2. the design and operation of boiling water reactors;
3. safety measures employed in these reactors; and
4. economic aspects of these reactors' operation.

The sections on the two types of light water reactors will describe the components and explain their operation. The section on safety measures will discuss the causes of meltdown, safety systems used in both types of reactors, and the role of the Nuclear Regulatory Commission plays to ensure the safety of these reactors. The final section will review the various costs involved in the construction and operation of a nuclear power plant.

Body of Report:
1.5 to double line
spacing

Light Water Reactors

Light water reactors are a category of nuclear power reactor in which water is used as both a coolant and a moderator. There are two types of light water reactors: the pressurized water reactor and the boiling water reactor. In a pressurized water reactor, steam is produced in a secondary system. The main components of a pressurized water reactor are the core, control rods, reactor vessel, steam generators, and pressurizer. The core contains fuel assemblies that contain fuel rods filled with fuel pellets. The coolant flows through the core where it is heated at high pressure. Then coolant then flows to a series of steam generators where the coolant flows through the heat exchangers and the steam drum. The pressure is lowered and steam is allowed to form which then flows to a turbogenerator where electricity is produced. The control rods control the amount of nuclear fission reactions in the core while the pressurizer maintains the operating pressure in the reactor coolant system. The reactor vessel contains the fuel elements, the control elements, and the core monitoring instruments.

In a boiling water reactor, steam is allowed to form directly in the core. The main components of a boiling water reactor are the core control rods, the core shroud and reactor vessel, the recirculation system, the steam separators, and the steam dryers. The core of a boiling water reactor is slightly larger than that of a pressurized water reactor but contains the same elements. The coolant is circulated through the system by the recirculation system that consists of two loops containing pumps external to the reactor vessel and jet pumps inside the vessel. After steam is formed in the reactor vessel, it flows to a series of steam separators where it is separated from the coolant. The steam then flows through steam dryers where additional drying is done, and then it proceeds to turn a turbogenerator. The control rods and reactor vessel function in the same way as in the pressurized water reactor.

Safety systems are designed to prevent meltdown in both types of light water reactors. The safety systems in a pressurized water reactor include the residual

heat removal system, the emergency core cooling systems, and the containment building. The residual heat removal system removes decay heat from the primary coolant system during plant shutdown. The emergency core cooling systems are designed to deal with loss-of-coolant accidents. The passive system consists of accumulators which inject coolant into the vessel when an accident occurs. The low pressure injection systems and the high pressure injection systems also provide make-up water. The safety systems of a boiling water reactor include the drywell and emergency core cooling systems. The reactor core isolation cooling system pumps water into the reactor during a loss-of-coolant accident while the low and high pressure core spray systems provide make-up water. The drywell encloses the reactor vessel, and the containment vessel encloses all the components of the reactor. The Nuclear Regulatory Commission inspects all nuclear power plants to ensure that these safety systems are adequate.

Pressurized Water Reactors

This section of the report describes the key components of the pressurized light water reactor and explains their operation in the production of electricity.

Description of the Major Parts

In a pressurized water reactor (see Figure 1), the reactor cooling water entering the core is highly pressurized so that it remains below the boiling point. The water leaves the reactor to pass through steam generators where a secondary coolant is allowed to boil and produce steam to drive the turbine.

Reference to Figures and tables in the body of the work

Tables or Figures should appear closely following the text where they are discussed. No further than a page following. Tables and Figures must have descriptive titles.



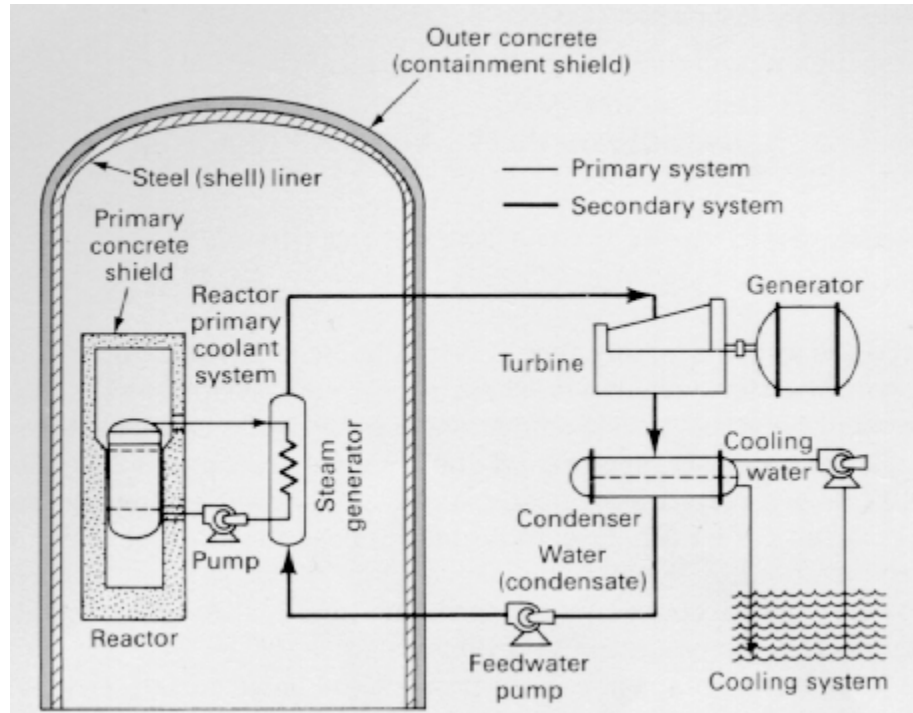


Figure 2: Schematic of a Pressurized Water Reactor

Source: Nero, Anthony V. A Guidebook to Nuclear Reactors, p. 78.

- Use of Captions.
- Diagram referenced by Source:
- Diagram has a descriptive title

The key components in this process are the core, the control rods, the reactor vessel, the steam generators, and the pressurizer.

Core. The core is the active portion of the reactor providing heat to the system. The core contains fuel assemblies that contain fuel rods filled with fuel pellets.

Fuel. The fuel in the pressurized water reactor consists of cylindrical pellets of slightly enriched uranium dioxide with a diameter of 0.325 in by 0.39 in. The pellets are dished at the ends to allow for thermal expansion [12:2004].

Fuel Rod. A fuel rod consists of a cylindrical tube made of Zircalloy, a steel-gray alloy that highly resistant to corrosion. This tube is 13 ft long with an outer diameter of 0.39 in and a 0.025-in thick wall. The tube is filled with fuel pellets and is sealed [10:122].

Fuel Assembly. A fuel assembly is formed when about 230 of the fuel rods are grouped in a bundle. The fuel assembly is about 8 in on a side and 177 in long

[10:122] . The reactor core is formed when about 240 of these assemblies are arranged in a cylindrical array. These assemblies are supported between upper and lower grid plates and are surrounded by a stainless steel shroud. The grid plates consist of an assembly of spring clips interlocked to form an egg-crate arrangement providing rigid support and spacing of the fuel rods [3:259].

Control Rods. Control rods provide a means of changing the amount of heat produced in the core . . . [text deleted]

Economic Aspects

This section presents some of the key costs that determine the economics of a nuclear power plant. These costs will be compared to those associated with other energy-producing systems, primarily those involving coal. Costs are determined by the busbar cost and the operating capacity costs.

Busbar Costs

The busbar cost is the total cost of electricity leaving the power station. The busbar cost consists of several factors:

1. Construction cost
2. Operation and maintenance costs
3. Cost of the fuel.

The per-kilowatt cost of electricity estimated by the Energy Research and Development Administration (Burn 2003) generated from 1000-megawatt nuclear, coal, and oil plants beginning operation in 1980 is as follows:

- Use of Captions.
- Table has a descriptive title
- Use of Table AutoFormat

Category	Nuclear	Coal	Oil
Capital costs	18.7	15.2	10.5
Fuel cost	5.8	13.7	25.7
Operation & maintenance costs	2.8	3.3	2.2
TOTAL	27.3	32.2	38.4
* A mill is 1/10 of a cent (\$0.001).			

Table 1: Busbar Costs Electricity costs

Construction Cost. The construction costs include the hardware, labor, original capital borrowed, interest generated on that capital, and inflation of capital costs. The construction costs for a nuclear power plant are 18.7 mills per kilowatt hour, while those of coal are 15.2 mills per kilowatt hour. However, there is evidence to show that complete or nearly complete nuclear power plants cost about twice as much in real dollars than they do at the time they are ordered. This inflation is the result of additional quality assurance, inspection, and documentation requirements. The rise in costs can also be attributed to increases in the cost of engineering manpower and of materials such as concrete, steel, and wire. However, the actual cost of nuclear steam supply system and the turbine generator together amount to only 15% of the total cost. Most of the cost of a nuclear plant can be attributed to interest on capital during construction. Industry experts hope that reducing the time between initial plans for and operation of nuclear power plants will cut these costs.

REFERENCES

- CMOS uses Hanging Indents
- List in Alphabetical order

Bupp, Irwin C., Jr., and Robert Trietel. 1998. *The Economics of Nuclear Power*. Boston: MIT. New York: New York University Press: 55.

Burn, Duncan. 2003. *Nuclear Power and the Energy Crisis*. New York: New York University Press: 93.

About the Reference List

The Reference List is located at the end of your paper, and it includes all of the bibliographic details your readers need in order to seek out your sources on their own (i.e., to replicate your research).

The reference list should begin on a **new** page following the last page of your paper. For instance, if your paper itself is six and a half pages long, using half of page seven, the reference list should begin on page eight. This page should also be numbered (page 8) just like the rest of your paper. However, most instructors, when assigning an eight-page paper, do not actually count the reference page as one of the required pages.

The title of the page, which can vary according to which type of list you are using, should be centered one inch from the top of the page. All entries should be single spaced. Entries themselves should be formatted in the following way: The first line of an entry is set flush with the left margin. The second line (if one exists) and all subsequent lines are indented five spaces from the left margin. The entries are listed in alphabetical order by author's last name, and are not typically numbered.

About the Reference List

When There Are Two or More Works by the Same Author

The only exception to using the author's name in the entry is when you cite a single author more than once. In this instance, it is acceptable to use the three-em dash (---.) in place of the author's name after the first entry. This three-em dash serves the same purpose as "ditto" marks.

Two or more works by the same author are ordered chronologically, and if they are published in the same year, they are ordered alphabetically by title, with the date of each entry assigned a different letter, for the purpose of distinguishing these sources in the text citations. (See below for an example of this.)

Example:

Nesbitt, P.B. 1998a. Zoning laws and neighborhood crises. (Knoxville, Tenn.: Wachese Press), 99

---. 1998b. The role of neighborhood associations in urban development battles. (Knoxville, Tenn.: Wachese Press), 98

For more on the Chicago Manual of Style see:
<http://www.press.uchicago.edu/Misc/Chicago/cmosfaq/tools.html>

APPENDICIES

Appendices

An appendix contains material which is too detailed, technical, or complex to include in the body of the report (for example, specifications, a questionnaire, or a long complex table of figures), but which is referred to in the report.

You should place information in an Appendix that is relevant to your subject but needs to be kept separate from the main body of the report to avoid interrupting the line of development of the report. Anything can be placed in an appendix as long as it is relevant (supporting) and as long as you made reference to it in the body of your report.

An appendix should include only one set of data, but additional appendices are acceptable if you need to include several sets of data that do not belong in the same appendix.

Label each appendix with a letter or number. Do not place the appendices in order of their importance to you, but rather in the order in which you referred to them in your report.

- Appendix listed in sequence, numbered or lettered.
- Uses a descriptive title
- Not to be used to introduce new material, without reference in the body of the report
- Page numbers continue in Arabic sequence
- Equations and Formulae must be typed, not hand written

Appendix A: Guidelines to using Mathematical Equations in Reports³

- 14.2 Notation should be consistent and clear. The same symbol should denote the same thing whenever it occurs and not be used for more than one thing.
- 14.6 Mathematical symbols should not begin a sentence.
- Poor S is countable.
Better The Set S is countable.
- 14.7 Mathematical symbols in adjacent mathematical expressions should be separated by words or punctuation. For example:
- Suppose that $2=bq+r$, where $0 \leq r \leq b$
- 14.17 Mathematical expressions should be displayed, that is, set on a separate line of clear text and CENTRED, if they are important to the exposition.
- 14.21 Mathematical expressions that are referenced later in the text should be numbered or otherwise labeled,
- Hence it is apparent that
- $$1^3 + 2^3 + \dots + n^3 = (1+2+\dots+n)^2. \quad (1.1)$$
- Recalling equation (1.1), we can conclude that...
- 14.22 Mathematical expressions are sentences or parts of sentences, and they should be punctuated accordingly. See example above.

END OF SAMPLE REPORT

³ The Chicago Manual of Style: The Essential Guide for Writers, Editors, and Publishers, 15th Edition. The University of Chicago Press. 2003.

References

Texts

Kirkman, John. Good Style: Writing for Science and Technology. E & FN Spon, London. 1992

Neufeld, Jacqueline K. A Handbook for Technical Communication. Prentice-Hall, Incl, New Jersey. 1986

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Turk, Christopher and John Kirkman. Effective Writing: Improving Scientific, Technical and Business Communication. E & FN Spon, London. 1982

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West Indian Journal of Engineering. Volume 22. Number 1. July 1999

Websites:

This reference guide has been edited for this technical writing programme. The original and unedited version of this manual is available online at:

http://134.117.206.17/www/resources/report_writing/pages/vidoli.htm

Other useful online references include:

http://134.117.206.17/www/resources/report_writing/pages/vidcover.htm

<http://www.mech.ed.ac.uk/students/repstyle.html>

<http://www.io.com/~hcexres/tcm1603/achtml/final.html>

<http://odtl.dcu.ie/wp/1999/odtl-1999-03.html>