



English for Specialized **SCIENCE** and **TECHNOLOGY**

JoAnne Juett Ph.D. + **Word Book** **Second Edition**



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Preface

This is a textbook designed for students studying in science and technology related fields, as well as for general readers interested in scientific and technical subjects. Contained in this book are 46 chapters in 16 units of information about some of the most recent and exciting topics in the scientific and technical area. The chapters in each unit relate to its general topic; for instance, the unit on Nanotechnology contains three chapters addressing the most recent nanotechnology information, including trends such as disruptive nanotechnologies and nanomanufacturing. Additionally, current global concerns, such as climate change and emerging technologies, are explored in different ways among various units in the book, including subjects such as semiconductor environmental safety issues and conservation farming.

The aim of this book is to help students develop basic skills in reading science and technology related publications, including essays, magazines, reports, etc. Each article models a scientific or technical essay and is followed by several sets of exercises designed to help the reader identify vocabulary specific to scientific and technology writing. Using context clues and word analysis, the reader will engage in discovering meaning and use of 17-30 **subject-related words** in each article. By working through each chapter of this book, the student will enhance his or her vocabulary skills and analytical reading skills.

Besides vocabulary and reading skill development, this textbook also provides excellent resources for research on current scientific and technical topics. I would like to recommend some general sources of information that will inform the research process of science and technology students. Sources such as Wikipedia and Webopedia contain vast amounts of resources to begin research from. These are not secondary resources whose credibility lends itself to inclusion in a Works Cited, but they contain excellent bibliographies of information more expert in nature. Additionally, students have available to them sources such as HowStuff Works and About.com, each of which offers in-depth and up-to-date explanations and illustrations on myriad scientific and technical subjects. Again, these resources will help the student begin serious research into a chosen topic.

Finally, I would like to acknowledge my debt to the people and institutions that have helped me complete this book. I wish to thank the University of Wisconsin-Eau Claire Office of Research and Sponsored Programs, who provided a generous grant that afforded me course release time to finish this book. I would also like to thank my English department for their support of my project. I especially appreciate the patient efforts of my editor, Jenny Hung, and all of her hours shaping the text of this book. Perhaps the most patient of all have been my family, Jacqueline, Jarred, and Sam, who have shared in my efforts toward and enthusiasm for this project—thank you.

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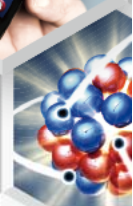
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Strategies for Better Reading Comprehension of English in Science and Technology Fields

All readers encounter words they don't know while reading. The first response of the reader may be to look up the word in a dictionary. However, it is not always possible or the best strategy to look up new words in the dictionary when you read. Many sentences and paragraphs include enough information for a reader to use **context clues** and **word analysis** to figure out the meaning of new words.



Strategy 1

CONTEXT CLUES

Readers use the words surrounding the unknown word to help determine the unknown word's meaning. There are many different types of context clues; the clues may appear within the same sentence as the word, or they may be in a preceding or subsequent sentence.

1. Definition

Sometimes a word is clearly defined in a sentence or paragraph.

- 1 The unknown word can be defined immediately following its use by using a brief definition, separated from the unknown word by punctuation—commas, parentheses or dashes.
 - 2 The use of a "to be" verb indicates that the two ideas are the same.
- **Archaeologists**, anthropologists who study prehistoric people and their culture, search ancient sites for artifacts.

- A **chemical bond** is a strong force that holds two or more atoms together.

2. Example or summary

Writers may include examples familiar to the reader to help explain a new and unfamiliar concept or term. A major section or the entire passage may be used. Clue words for examples include

- *such as, for example, for instance*
 - *to illustrate*
 - *specifically*
- Hurricane **hazards**, such as strong winds and high water levels, can cause extensive damage to people and property along coastlines.

3. Description

Sometimes several phrases or sentences help draw a mental picture about a word.

- Lula was at her grandmother's farm when a yellow fever **epidemic** broke out in West Tennessee and Mississippi, only a few miles from the farm. An infectious disease of warm regions, yellow fever is carried by mosquitoes. The humid summer air provided the perfect climate for breeding the many mosquitoes that quickly spread the infection to thousands of residents.
→ *The above paragraph demonstrates the meaning of epidemic by chronicling its spread, from its inception to its rapid rate of infection among the residents.*

4. Explanation

An explanation is close to a definition. In the same paragraph, the difficult word is explained, usually in simpler words, to make the meaning clearer. The explanation is generally longer than a definition.

- People with macular degeneration may soon be able to be fitted with a **bionic** eye. This artificial eye will contain a battery-powered video processing unit that sends signals to an electronic unit behind the eye. The unit then sends signals to the brain, and the brain will interpret the signals as images.

5. Synonym

Sometimes a difficult word is used with another word or phrase with the same or a similar meaning. Synonym clue words include—

- *in other words*
 - *also known as*
 - *that is*
 - *sometimes called*
 - *or*
- Patients with fibromyalgia sometimes suffer a sudden onset of **acute pain**, that is, severe pain that lasts a short time.

6. Restatement

Close to a synonym, a restatement differs in that a difficult word is usually restated in a simpler form—usually set off by commas.

- After the long drought, the village was **depopulated**, most of the residents dead or moved, but the livestock remained untouched.

7. Contrast

Sometimes phrases or words in the sentence indicate the opposite of the target word. Contrast clue words are—

- *but*
 - *in contrast*
 - *however*
 - *instead of*
 - *unlike*
 - *yet*
- **Cultivated** plants are purposefully grown for their products, unlike uncultivated plants that thrive in the wild without standard agricultural methods.

8. Cause and effect

The cause of an action may be stated using an unfamiliar word. The effect, though, is usually stated in familiar words so that the reader can infer its meaning. Cause and effect context clues include—

- *as a result of*
 - *accordingly*
 - *because*
 - *consequently*
 - *for this reason*
 - *hence*
 - *if . . . then*
- The weeds in the garden are so **profuse**, that the neighbors can no longer see the flowers.

9. Inference from general context

Some writers help you figure out unfamiliar words by having you use reasoning and prior knowledge. This context clue is often a little harder to spot.

- Sonny refused to accept that his wife's **dementia**, until she didn't recognize the grandchildren when they came to visit.
- *The second clause of this sentence describes the effects of dementia in order to illuminate the meaning of the word.*

10. Experience or general knowledge

The meaning is derived from the experience and background knowledge of the reader—"common sense" and logic. The context contains information familiar to the reader.

- You can usually **cure** a cold by drinking lots of orange juice and getting lots of sleep. If you do that, you should feel better.



Strategy 2

WORD ANALYSIS

Readers analyze elements of written patterns of speech to figure out unfamiliar words.

Words are composed of elements—affixes, which are prefixes, suffixes, combining forms; and root words. The very words *prefix* and *suffix* are examples of word elements. *Pre* means *before* and *fix* means *to fasten or attach*, so a prefix is something attached to something else. *Suf* is a variant of *sub*, *below or under*, so a suffix is something fastened underneath, or in the case of words, behind something else.

prefix	A prefix is a letter or group of letters placed at the beginning of a word to alter the original word in some way, thus creating a word of opposite meaning.	<ul style="list-style-type: none">• <i>un (not) + science</i> → <i>unscientific</i>
suffix	A suffix is a letter or letters added to the end of a word to create another form of a word, thus creating a verb from a noun.	<ul style="list-style-type: none">• <i>-ion (result of) + infect</i> → <i>infection</i>
combining form	A combining form is part of a word that occurs only as part of a compound word.	<ul style="list-style-type: none">• <i>electro (from electric) + magnetic</i> → <i>electromagnetic</i>
root word	A root word is the form of a word after all affixes are removed.	<ul style="list-style-type: none">• <i>act</i>• <i>complete</i>

a group of words	Many root words have a word family, that is, a group of words that share the same root. Each word when combined with affixes becomes a related but different word.	<ul style="list-style-type: none">• <i>action, acting, acted, react, inaction</i>• <i>completion, completing, completely, incomplete</i>
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Developing vocabulary, especially for comprehension of difficult scientific and technical texts, is a simple process of memorization. Furthermore, meaningful understanding of vocabulary words involves more than looking up words in the dictionary. In order to fully understand the subject matter, readers must understand the vocabulary words that represent the concepts they are learning.

Engaging multiple vocabulary strategies will help readers to connect unknown words to familiar words and concepts, to understand and apply examples for the meaning of difficult words, and to differentiate between similar words and concepts. Vocabulary strategies enable readers to think about words and ideas in multiple and different ways, and to engage the full range of their cognitive and imaginative skills in the process of reading comprehension.



EXERCISES

A

CONTEXT CLUES

Circle the correct meaning of the bold word based on the surrounding clues.

- () 1 The nurse enjoyed working in **pediatrics**. The children often responded more quickly to treatments than older patients, and they always seemed to have such positive attitudes.
- branch of medicine that deals with women
 - branch of medicine that deals with children and adolescents
 - branch of medicine that deals with elderly patients
- () 2 A cancerous growth may be diagnosed as a **malignant** tumor.
- relating to cancer cells that are invasive and tend to metastasize
 - relating to cuts and abrasions of the skin
 - relating to broken bones
- () 3 Inhaling bleach can scar the lungs and inhibit the **respiratory** system.
- pertaining to the process of blood circulation
 - pertaining to the process of digestion
 - pertaining to the process of breathing
- () 4 Obesity contributes to heart disease and other physical problems that can shorten one's lifespan, or increase the chances of **premature** death.
- happening or done before the normal or expected time
 - happening according to a normal cycle
 - happening later than expected
- () 5 Perimenopausal women should take calcium to prevent the onset of **osteoporosis**. Otherwise, as they age, women may experience thin and frail bones and be prone to bone fractures.
- a form of dementia
 - brittleness of the bones
 - iron deficiency

B WORD ANALYSIS

Write the prefixes, suffixes, and root words in the blanks.
Finally, match each word to its correct definition.

	Prefix or suffix	Root word
a	biochemistry	
b	aquatic	
c	malnutrition	
d	dehydration	
e	inflammation	
f	malpractice	
g	photosynthesis	
h	hemisphere	
i	discharge	
j	imbalance	

- () 1 combining of compounds with the aid of radiant energy (especially in plants)
- () 2 a state of disequilibrium or instability
- () 3 physical weakness resulting from insufficient food or an unbalanced diet
- () 4 consisting of, relating to, or being in water
- () 5 pain, swelling, and redness of body tissues in response to illness or injury
- () 6 the study of the chemical substances and vital processes occurring in living organisms
- () 7 to release, as from confinement, care, or duty
- () 8 dryness resulting from the removal of water
- () 9 half of the terrestrial globe
- () 10 professional wrongdoing that results in injury or damage