

Reading in Science: Targeted Learning Skills

1. **Skimming Tasks:** Such activities include the rapid reading of a paragraph, graph or table to obtain information pertaining to a specific idea. Students are given a list of specific questions to be answered in a given amount of time. (Timed trials are key and the student should work towards building up speed.)
2. **Syntactic Clue Searching:** Students underline or tally morphemes of a certain category such as noun markers in a reading or listening passage. (Huh? This means to take the word apart for clues. Specifically, have the students take the science words apart and learn the meanings of the parts so that they can do this for words they have not seen before. This makes an excellent fast-paced game for vocabulary building.)

Definition: A morpheme is the smallest meaningful unit in the grammar of a language.

Examples:

- a. Unladylike -- The word unladylike consists of three morphemes.
 - * un- 'not'
 - * lady '(well behaved) female adult human'
 - * -like 'having the characteristics of'
 - * None of these morphemes can be broken up any more without losing all sense of meaning. Lady cannot be broken up into "la" and "dy," even though "la" and "dy" are separate syllables.
 - b. Technique -- The word technique consists of only one morpheme.
 - * Even though the word has two syllables, it is a single morpheme because it cannot be broken down into smaller meaningful parts.
 - c. Photosynthesis – How many morphemes does this word have? _____
3. **Semantic Clue Searching:** Students underline or tally lexical items of a given category such as descriptive adjectives, adverbs, specific vocabulary groups etc. (Ex. Identify all adjectives describing a cell, a volcano, an ionic bond, an electromagnetic wave.)
 4. **Information Search:** Students are asked to read or listen to a passage with certain pre-posed questions in mind. They may be asked to identify the foreign language equivalent of the target word or to find an answer to specific questions. A variation on this technique is to have the students write down target questions based solely on guessing context from examining the headings of the passage and then find the answers.
 5. **Who said? Contextual Technique:** Have students identify who would have made a particular statement about the text in question. The student must use the text to support their choice. (This technique is particularly good at helping students identify bias.) Ex. Have the students read an article on deforestation and then identify who said, “But if I don’t cut down the tress then how will I find fuel to heat my home?”

6. **Reverse Semantic Cloze**: Students are given a passage in which extraneous words have been inserted. Their task is to cross out the words that do not apply.
7. **Correct me**: Students either read or listen to a passage containing inappropriate words or incorrect content and must identify the *non-sequiturs*. Ex. In my living room I have a lamp, a sofa and two green armpits. (armchairs) Ex. Animal cells have both cell walls and cell membranes.
8. **Card Sorting**: Students write the target vocabulary words on cards and then are asked to sort them according to the category to which they belong. Ex. Cell organelles, rock types, acids vs. bases etc.
9. **Find Odd Word**: Students are given short lists of vocabulary words. All the words are related except one. The student must identify this word and explain why it is different.
10. **Analogies**: Students are given a pair of words that are related in some fashion. They are given a third word and are asked to find an appropriate match. Ex. Dr. Kitts is to Educational Goddess as Drs. Windelborn and Miller are to _____.
11. **Discrimination Tasks**: Students pick the correct (or incorrect) word from a list of words that are similar in form or meaning. Ex. To look outside, I went to the _____ a) window b) widow c) willow d) minnow Ex. Parts of the gas equation: a) pressure b) velocity c) moles d) gas constant e) temperature
12. **Segmenting**: Students listen to or read passages and identify their component parts. What is the paragraph about? Who or what is the agent of change? What is the object being acted upon? What is the action?
13. **Sentence Sense**: First, the student reads a complex passage. After which, the student is asked to judge whether a follow-up sentence is meaningful or not. If the sentence is not meaningful, the student changes it so that it makes sense. Ex. Proteins provide the blueprint by which DNA is made.
14. **Ranking**: Students are given a list of related vocabulary words and are asked to rank them according to their personal preferences. After which, they must express aloud or in writing how and why they ranked the words in that manner.
15. **Making up Questions**: After the passage is read, the students devise their own questions, trade lists and then answer their classmate's questions.
16. **Résumé -- Second Language**: Students are given a list of sentences in their native language and are asked which one summarizes the science reading passage the best. (Trick is to get hold of a Spanish version of the text or enlist the aid of the ESL teacher in the building.)

Reading in Science: Targeted Learning Skills Part 2

17. **Résumé: English:** (A.K.A. the abstract) The students read a passage and summarize it in 250 words or less.
18. **Redaction:** Students read a passage and must rewrite the passage reducing its size by 50%. They do this by identifying only the most important parts of the passage and eliminating anything extraneous. (Helps those who are bogged down by details.) This exercise can be repeated until the passage is reduced to one line, or the key idea.
19. **Create a Title:** Similar to redaction except the student must either write the “moral of the story” or the title directly after reading the selection.
20. **Jargonectomy:** Students replace with their own words all jargonistic expressions in a reading passage that the teacher underlines, highlights, puts in bold etc. in advance.
21. **Scrambled Composition:** Students reorder sentences into a meaningful and coherent paragraph. The paragraph can be based on material already read or a recombination of words and structure with which the students are familiar. As a variation, student compositions can also be used for this activity. (This helps improve their writing skills and aids them in developing a logical thought process when presenting arguments.)
22. **Semantic Matching:** In column A, students are given a set of sentences. They are asked to choose from Column B equivalent or nearly equivalent sentences. The goal is to put the vocabulary words in context inside sentences and not limit this activity to a variation on multiple-choice definitions. The skill being targeted is how students learn to decode meaning from context.
23. **Syntactic Matching:** Same as above but this one focuses on the grammatical transformations. (This helps ESL and poor writers.) Ex. The dog bit the cat. The cat was bitten by the dog. This helps students avoid the plague that is science writing... passive voice.
24. **Rose Technique I:** Students placed in pairs or groups take turns reading a passage. The non-reader must then draw on a blank piece of paper what the reader is describing.
25. **Rose Technique II:** Individual students read a passage and draw what the passage is describing. This includes intangibles.
26. **CLOZE Passage:** The key words are removed from a reading passage and the students themselves must provide the appropriate words derived from the context.
27. **Contextual Guessing:** Students are given a passage in which new vocabulary words have been underlined. They must try to guess the meaning of each new word from the context only.

28. **Identifying Visuals**: Students must identify one visual from a series based on a description from a written text. A variation is that they must order a series of pictures based on the passage they read or hear. This technique is quite helpful for students who need help on process or following instructions.
29. **Style Shifting**: Modifiers are removed from a passage and the students must identify who is speaking from contextual clues only. (This is also good at helping students to recognize bias.)
30. **Inferential Identification**: Students identify whom or which process might be associated with a particular statement. The actual statements must be different than those in the original text but are reflective of the individual or process. This help students learn to extrapolate and apply ideas more broadly.
31. **Logical Rejoinders**: Students are given sentences in pairs and must determine whether the second sentence follows logically from the first. Ex. John never goes out on weeknights. John went to the movies on Tuesday. Ex. Light falls off with the square of the distance. Therefore, the patch of light from the flashlight will be nine times as spread out at two meters as it would at one meter. A variation is to have them correct the ones that do not.
32. **Did you read?**: Students read a short narrative. They then read a series of sentences; some of which were in the text and some not. Their task it to identify which sentences they read and which they did not. This is especially helpful for those students with poor memories.
33. **Key Sentences**: Students select and write out the single most important sentence in each paragraph of a long reading passage. They use these sentences to develop an outline. Variation: have students find the key sentences in each other's writing. Students are surprised at what others think their key sentences are. Note that if there is no clear key sentence then this is usually represented by a zero (0). This indicates an extraneous or poorly written paragraph. This exercise helps students to learn to evaluate and to write more logically.
34. **Heuristic annotation**: Students select a quote from the text that summarizes the entire selection and defends their choice orally or in written form.
35. **Motivation annotation**: Students speculate about why the author wrote the selection in the first place. This can be done in a think-pair-share, group activity or in written form.

Reading Study Skills

1. **Purpose:** Always read the selection with a purpose. If the teacher does not give you a purpose, set one of your own. This will help you to better understand and retain the material.
2. **Author's Organization:** Try to discover the author's organization. This will help you to outline the material and enable you to pick out the main ideas.
3. **Visualization:** Try to picture what the author is attempting to describe in your mind. This will help you to remember the material longer.
4. **Read Actively:** This means to:
 - a. **Take notes** on important information in the material. (Writing it down helps you to fix the material into your memory.)
 - b. **Summarize** the material in your own words. (This demonstrates that you successfully extracted the main points in the text and understood them.)
 - c. **Write down any reactions or questions** you have while you read. (By writing down your reactions, you will be more likely to remember the material itself. By writing down your questions, you will be more likely to ask someone to help you answer them.)
5. **Discussion:** Discuss the material with a classmate or with a group. This will help you to understand the text, see different viewpoints and to remember what is important.
6. **Repetition and Retention:** If you wish to retain the material over a long period of time you should:
 - a. **Use spaced practice.** (This means a number of short study sessions as opposed to one long study session.)
 - b. **Recite the main point** to yourself or another classmate. (Working with a classmate is a good way to check for accuracy. You don't want to waste your time learning something that is incorrect.)
 - c. **Use mnemonic devices** whenever possible. (For example: My very energetic mother just served us nine pizzas. This is the list of the order of the planets from Mercury to Pluto.)
 - d. **Continue to review.** Reviewing something after you have mastered it fosters long-term retention.

EVOKER

Pauk, W. (1963) On Scholarship: Advice to High School Students. *The Reading Teacher*, 17, 73-78.

Explore: Read entire selection silently and write down the overall message in a sentence or two. (For the teacher, this is the Essential Question.)

Vocabulary: Look up highlighted or words in bold and write down their meaning if they are new words.

Oral Reading: Read the selection again but out loud learning to pronounce all new words.

Key Words: Locate and highlight key ideas. Asterix the most important sentence in each paragraph and notice the author's organization. Write a sentence or two about the organization.

Evaluation: Evaluate these ideas by numbering each key sentence in order of importance.

Recapitulation or Reformulation: Reread the selection or have the student rephrase/rewrite each key sentence in his or her own words.

SQ3R

Survey: Survey the reading quickly, taking no more than five minutes for an entire chapter. Note heading and subheadings to understand the chapter's organization. Look at all pictures and graphs reading only the captions if you can't make sense of the picture. Read the headings on all tables.

Question: What is the main point of this chapter from the survey? Answer this question and write it down. Convert all headings and subheadings into the answers to the questions of who, what, where, when, why and how.

Read: Read actively by highlighting the key sentence in each paragraph.

Recite: From memory, list these key sentences using only the headings for clues. Say these key points out loud or write them down in your own words.

Review: Review your key sentences for accuracy by rereading the text.

Diagnosing and Responding to Individual Learner Needs: Eight Common Complaints of the Frustrated Student

Based on a paper by Diane W. Birckbichler, The University of Illinois
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1. Poor Memory: The student cannot remember information long enough to integrate the different elements of a spoken or written message into a meaningful and coherent whole. In addition, the student may have difficulty recalling specific vocabulary words, verb endings, noun markers, etc.

2. Lacks Flexibility: The student hesitates, stumbles over words and is not able to find alternate means of expression. The performance of this student is often characterized by pauses in speech and by skimpy or brief compositions. The student may have a tendency to remain within the strict limitations of a task or to focus on the production of a single right answer.

3. Too Impulsive: This student is generally characterized by a tendency to jump into a task without considering its various components and is not attentive to detail. The impulsive student does not know how, or is not willing, to take the time to identify the distinctive or salient features of a learning task or segment of language. The student may lack organizational skills. This student is not overly concerned with the adequacy nor accuracy of a response and will often give the first answer that pops to mind.

4. Too Reflective: This student is too attentive to detail and discriminates so finely that the general thread of a listening or reading passage is lost. (The student cannot see the forest for the trees.) The student tends to second guess the adequacy and accuracy of his or her responses and may spend too much time thinking over alternatives before coming to a decision.

5. Field Dependent: The student lacks focusing skills, is too easily distracted by detail and cannot distinguish relevant from irrelevant information. This student is easily frustrated by extraneous information and therefore has a tendency to make a task more difficult than necessary.

6. Broad Categorizer: This student has difficulty in making pertinent distinctions between categories. This student has a tendency to overgeneralize, making rules about the second language that subsume many examples.

7. Narrow Categorizer: This student tends to create a rule for every example which distracts from his or her ability to make necessary and accurate generalizations. Consequently, the student is often lost in detail and has difficulty forming concepts.

8. Low Tolerance of Ambiguity: The student gives up quickly when the task presents difficulty, doubt or ambiguity. The student cannot hypothesize well and does not like to take risks. This student will resist answering questions in class.

SOURCE OF PROBLEM OR NEED	LEARNING TASK: READING
POOR MEMORY	Syntactic Clue Searching, Semantic Clue Searching, Information Search, Who Said?, Making up Questions, Résumé: Second Language, Résumé: English, Rose Technique I, Rose Technique II, Do You Recognize?
LACKS FLEXIBILITY	Skimming Tasks, Semantic Matching, Syntactic Matching, Cloze Passages, Contextual Guessing, Style Shifting
TOO IMPULSIVE	Syntactic Clue Searching, Semantic Clue Searching, Information Search, Who Said?, Reverse Semantic Cloze, Corrigez-moi, Discrimination Tasks, Sentence Sense, Ranking, Making up Questions, Résumé: Second Language, Résumé: English, Scrambled Composition, Identifying Visuals, Inferential Identification, Logical Continuation: Receptive
TOO REFLECTIVE	Skimming Tasks, Information Search, Create A Title, Semantic Matching, Syntactic Matching, Cloze Passages, Contextual Guessing
FIELD DEPENDENT	Skimming Tasks, Syntactic Clue Searching, Semantic Clue Searching, Information Search, Who Said?, Reverse Semantic Cloze, Corrigez-moi, Segmenting, Résumé: Second Language, Résumé: English, Create A Title, Cloze Passage, Contextual Guessing
BROAD CATEGORIZER	Syntactic Clue Searching, Semantic Clue Searching, Reverse Semantic Cloze, Card Sorting, Find Odd Word, Analogies, Discrimination Tasks, Sentence Sense
NARROW CATEGORIZER	Syntactic Clue Searching, Semantic Clue Searching, Card Sorting, Find Odd Word, Semantic Matching, Syntactic Matching
LOW TOLERANCE OF AMBIGUITY	Skimming Tasks, Information Search, Sentence Sense, Cloze Passages, Contextual Guessing