Effective Vocabulary Instruction in Science, Math, and Social Studies Classrooms
CABE 2019
Long Beach, CA
Lauren Greenberg, CORE

Objectives

1. Discuss how to choose which words to teach
2. Become familiar with three tiers of words and the Academic Word List
3. Delve into effective supports for English learners
4. Learn four basic strategies for vocabulary instruction
5. Experience a variety of techniques for active engagement

Instruction vs. Activity

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher planned and directed</td>
<td>Students on their own</td>
</tr>
<tr>
<td>Rich explanations</td>
<td>Definitions, not explanations</td>
</tr>
<tr>
<td>Guided student interactions</td>
<td>Little guidance</td>
</tr>
<tr>
<td>“I do it, you do it, we do it”</td>
<td>Minimal feedback</td>
</tr>
<tr>
<td>Precedes written application activities</td>
<td>No oral or expressive use of new words; written practice only</td>
</tr>
</tbody>
</table>

Source: Kate Kinsella, Teaching Vocabulary in the Middle Grades, CA Dept. of Education

Crucial for English Learners

“Vocabulary knowledge is the single best predictor of second language learners’ academic achievement across subject matter domains.”


Teaching Two Types of Academic Vocabulary, CCSS

General Academic Vocabulary (Tier 2)
- analysis, procedure, attribute, vary, structure, emphasize

Domain-specific Academic Vocabulary (Tier 3)
- circumference, electron, legislate, parallelogram, republic, photosynthesis

Kate Kinsella’s Top 10 unreliable vocabulary teaching practices
1. Copying the same word several times
2. Having students “look it up” in a typical dictionary
3. Copying from dictionary or glossary
4. Having students use the word in a sentence after items 1, 2, or 3
5. Role memorization without context
6. Telling students to “use context clues” as a first or only strategy
7. Asking students to guess the meaning of the word
8. Assigning independent activities (without prior explicit instruction) with no guidance or feedback
9. Activities such as word searches, fill-in-the-blank, and crossword puzzles
10. Asking, “Does anybody know what ______ means?”
Effective Instruction for English Learners
To guide instruction for ELs, teachers should consider these factors:

<table>
<thead>
<tr>
<th>Concrete vs. Abstract</th>
<th>Cognate Status</th>
<th>Depth of Meaning</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can students be shown a picture or image of the word? Can it be demonstrated? Is it abstract?</td>
<td>Does the English word have a cognate?</td>
<td>Does the word have multiple meanings?</td>
<td>Is the meaning of the word critical to understanding a text?</td>
</tr>
<tr>
<td>veiled vs. reliable</td>
<td>reputation/reputation</td>
<td>party solution/composed determined</td>
<td></td>
</tr>
</tbody>
</table>

Teaching Unfamiliar Words

- Pronounce words clearly
- Break down the word into syllables and have students repeat each syllable.
- When it will help students understand the word’s meaning, break down the word into its constituent morphemes.

Coxhead Academic Word List (AWL)

<table>
<thead>
<tr>
<th>word</th>
<th>meaning</th>
<th>example</th>
<th>frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>derive</td>
<td>derive</td>
<td>derived</td>
<td>functional</td>
</tr>
<tr>
<td>derivation</td>
<td>derivation</td>
<td>derivations</td>
<td>functionally</td>
</tr>
<tr>
<td>derivations</td>
<td>derivations</td>
<td>derivation</td>
<td>functioning</td>
</tr>
<tr>
<td>deriv</td>
<td>deriv</td>
<td>derived</td>
<td>function</td>
</tr>
<tr>
<td>derive</td>
<td>derive</td>
<td>derived</td>
<td>identify</td>
</tr>
<tr>
<td>deriving</td>
<td>deriving</td>
<td>derived</td>
<td>identified</td>
</tr>
<tr>
<td>distribute</td>
<td>distribute</td>
<td>distribution</td>
<td>identifiable</td>
</tr>
<tr>
<td>distributing</td>
<td>distributing</td>
<td>distributions</td>
<td>identification</td>
</tr>
<tr>
<td>distributive</td>
<td>distributive</td>
<td>distributions</td>
<td>identifiab</td>
</tr>
</tbody>
</table>
Specific Word Instruction for ALL students
Research indicates that teachers should:
1. Be highly selective about which words to teach
2. Provide rich, in-depth knowledge of word meanings—not just definitions
3. Provide clear, accessible explanations and examples of word meanings and opportunities for active involvement of students
4. Provide multiple encounters with targeted words
5. Engage students in active, deep processing by having them use the words in new contexts and create associations among the words

ELs Require Additional Instructional Supports (Goldenberg, 2013)
Building on student experiences and familiar content
Providing students with necessary background knowledge
Making instruction and learning tasks extremely clear

Big Picture Recommendations for Vocabulary Instruction
Teach a corpus of relevant Tier 2 Academic words (e.g., data, phase, structure, diverse, dominate)
Teach Tier 3 content-specific terms for each unit of study
For all of these, reach grade-level and subject-area consensus on which words to teach within your school or district

4 Strategies for Every Teacher’s Repertoire
<table>
<thead>
<tr>
<th>Strategy</th>
<th>How Best to Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show images</td>
<td>Recommended for low-incidence words that are nonetheless central to understanding the text. Recommended for words that are far more advanced than the students’ grade level. Recommended for high utility and cross content areas. Usually abstract words and concepts, but should be at the appropriate developmental level (i.e. not the most difficult words in the text. This option is time-consuming and should be reserved for words that are high utility and cross content areas. Usually abstract words and concepts, but should be at the appropriate developmental level (i.e. not the most difficult words in the text.)</td>
</tr>
<tr>
<td>Demonstrate</td>
<td>This works best for action verbs. Should be very quick. Recommended for low-incidence words that are nonetheless central to understanding the text. Also useful for words that are far more advanced than the students’ grade level. Recommended for Tier 3 content-specific terms for each unit of study. This option is time-consuming and should be reserved for words that are high utility and cross content areas. Usually abstract words and concepts, but should be at the appropriate developmental level (i.e. not the most difficult words in the text.)</td>
</tr>
<tr>
<td>Define quickly at point of use</td>
<td>This works best for concrete words; most often nouns but sometimes adjectives or verbs. Can be easily displayed on white board and quickly reviewed over the course of the week. This option is time-consuming and should be reserved for words that are high utility and cross content areas. Usually abstract words and concepts, but should be at the appropriate developmental level (i.e. not the most difficult words in the text.)</td>
</tr>
<tr>
<td>Teach fully and explicitly</td>
<td>This works best for concrete words; most often nouns but sometimes adjectives or verbs. Can be easily displayed on white board and quickly reviewed over the course of the week. This option is time-consuming and should be reserved for words that are high utility and cross content areas. Usually abstract words and concepts, but should be at the appropriate developmental level (i.e. not the most difficult words in the text.)</td>
</tr>
</tbody>
</table>

Teach a corpus of Greek and Latin roots relevant to your content area (e.g. bio, logy, graph, unimonio, biduo, anthro)

Teach Tier 3 content-specific terms for each unit of study

Using sentence frames and models to help students talk about academic content

Providing hands-on, interactive learning activities

Providing support utilizing the students’ first language including cognates

Providing redundant information (gestures, visual cues)

Using graphic organizers to organize information and clarify concepts

Using pictures, demonstrations, and real-life objects

Teach a corpus of relevant Tier 2 Academic words (e.g., data, phase, structure, diverse, dominate)

Teach Tier 3 content-specific terms for each unit of study

For all of these, reach grade-level and subject-area consensus on which words to teach within your school or district
Displaying Images

- This works best for concrete words; most often nouns but sometimes adjectives or verbs.
- Can be easily displayed on white board and quickly reviewed over the course of the week.
- Use Google Images or similar search engine for quick results.
- Never do this on the spot in front of students.

Explicit Instruction

<table>
<thead>
<tr>
<th>Term</th>
<th>AWL Sublist</th>
</tr>
</thead>
<tbody>
<tr>
<td>bond</td>
<td>6</td>
</tr>
<tr>
<td>compound</td>
<td>5</td>
</tr>
<tr>
<td>condensation</td>
<td>N/A</td>
</tr>
<tr>
<td>element</td>
<td>2</td>
</tr>
<tr>
<td>homogeneous</td>
<td>N/A</td>
</tr>
<tr>
<td>heterogeneous</td>
<td>N/A</td>
</tr>
<tr>
<td>phase</td>
<td>4</td>
</tr>
<tr>
<td>properties</td>
<td>N/A</td>
</tr>
<tr>
<td>substance</td>
<td>N/A</td>
</tr>
<tr>
<td>volume</td>
<td>3</td>
</tr>
</tbody>
</table>

This option is time-consuming and should be reserved for words that are high utility and cross content areas, i.e. Tier 2 words.

- Usually abstract words and concepts, but should be at the appropriate developmental level (i.e. not always the most difficult words in the text.)
- Which of these words from a high school Chemistry textbook are the best candidates for deep instruction?

Demonstrations

- Quick demonstrations are very effective for many verbs as well as some abstract nouns and emotions.
- With a partner, discuss and show each other how you might demonstrate several of the following words which might pose a challenge to English learners:

<table>
<thead>
<tr>
<th>Term</th>
<th>AWL Sublist</th>
</tr>
</thead>
<tbody>
<tr>
<td>slope</td>
<td>clattered</td>
</tr>
<tr>
<td>expression</td>
<td>perimeter</td>
</tr>
<tr>
<td>rotation</td>
<td>circumference</td>
</tr>
<tr>
<td>symmetry</td>
<td>taxation</td>
</tr>
</tbody>
</table>

Using Textbooks

Math, science, and social studies textbooks usually have target vocabulary words marked in bold. Teachers need to examine the words chosen and make various decisions. Options include the following:

- Accept the choice of the textbook because the words are high utility and important for comprehension.
- Reject the choice of the textbook publisher because the words are not high utility or important.
- Modify or boost the publisher's choice by editing the definition, sample sentences, or activities.
- Enhance the publisher’s choice by choosing high-utility words from the text that are not bolded.

Quick Definitions at Point of Use

- Recommended for advanced, low-incidence words that are nonetheless central to understanding the text
- May be in addition to a demonstration or image
- The key to doing this quickly is to use a learner’s dictionary such as the Longman Dictionary of Contemporary English
- www.ldoceonline.com to obtain student-friendly definitions that do not use other rare words. It can be hard to do this on the spot.

Think about how you would define:
- cosmic
- relieve
- pace

Enhancing instruction

- For ALL words, lead the students in reading the word accurately and pronouncing it correctly.
- Identify words that students will need to use in their writing but are difficult to spell or decode, such as “Pharaoh,” “Pompeii” or “species.” Use a simple spell-out method to help students decode and spell them accurately.
- Prepare images for words that can be taught quickly in that way. Either bookmark them on your computer or copy and paste to a slide.


Word Tier 2 or Tier 3?

<table>
<thead>
<tr>
<th>Word</th>
<th>Tier 2 or Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>artisan</td>
<td>2</td>
</tr>
<tr>
<td>authority</td>
<td>2</td>
</tr>
<tr>
<td>challenge</td>
<td>2</td>
</tr>
<tr>
<td>establish</td>
<td>2</td>
</tr>
<tr>
<td>Hatshepsut</td>
<td>3</td>
</tr>
<tr>
<td>Pharaoh</td>
<td>3</td>
</tr>
<tr>
<td>Ramses II</td>
<td>3</td>
</tr>
<tr>
<td>ritual</td>
<td>3</td>
</tr>
</tbody>
</table>

A variety of options to teach words

- There are 9 words highlighted in the textbook section.
- 3 are Tier 2 words that can be used in a wide variety of contexts across various subject areas: authority, challenge, and establish. Teach these explicitly.
- 4 can be taught using visual images: artisan, Hatshepsut, Pharaoh, and Ramses II.
- None of these can be quickly demonstrated.
- That leaves 1 word that should be quickly defined at point of use: "ritual" is an abstract word but it is of lower incidence.

Hatshepsut

- Hatshepsut was one of the few women rulers of ancient Egypt.
- She was the daughter of one pharaoh and the wife of another. When her husband, the pharaoh, died, her son was very young and so she became the pharaoh.
- Hatshepsut built Egypt’s wealth and power through trade.

Pharaoh: a king or ruler of ancient Egypt

Artisan: someone who does skilled work, making things with their hands

Elements of Explicit Vocabulary Instruction

- Pronounce and break down into syllables
- Student-friendly definition or explanation; may include explanation of word parts
- Translation or Spanish cognate, if applicable
- Optional related word forms or antonyms (depends on the word)
- Multiple examples using the word in varying contexts
- Accompanying image
- Engaging activity in which students process word meaning
- Prompts with written and oral response using sentence frame
- Follow-up questions
OBJECTIVES
Understand the relationship between religion, government, and society in ancient Egypt.
Deepen understanding of vocabulary terms through partner activities and completion of sentence frames.
Engage in close reading of text through partner reading.
Demonstrate understanding of the text by writing a brief summary which uses the target vocabulary terms.

AUTHORITY
Authority means the power someone has because of his or her official position.
We often talk about people in positions of authority, which means that they have certain powers over other people or events.
The authorities are the people or organizations that are in charge of a particular country or area: There was an agreement between the British and Irish authorities.
An authority may also refer to an expert, someone who knows a lot about a certain subject.
MORE EXAMPLES
César was the authority on training dogs; everyone came to him for advice. The hotel manager was the only person with the authority to open the hotel safe. If you want to get your money back after you buy something that turns out to be damaged, you need to speak with someone who has the authority to make returns.

YOUR TURN: COMPLETE THE SENTENCE FRAME
In my home, ___________ has/have more authority than ___________ , because ________________ .

My example:
In my home, my oldest daughter has more authority than her sister and brother, because she can always persuade them to do what she wants.

ACTIVITY
Are the following people in positions of authority? Show thumbs up, thumbs down, or sideways if you are not sure.
- a police officer
- a waitress
- a school principal
- your mother
- an older sister
- a younger brother
- your best friend
- a restaurant manager
- a priest or minister (or other religious leader)
- a dentist

Science Vocabulary
Monroe Middle School
structure – function – contribution – affect
Today’s Language Objectives

- To learn new vocabulary that we will encounter in our reading
- To dig deeply into several of those new words
- To practice using new words in oral language and writing

New Vocabulary

- structure
- function
- contribution
- affect

Meaning & Spanish Cognate

- The arrangement of the parts of a whole
- The way in which the parts of something connect with each other to form a whole
- The thing that the parts make up (e.g., the chemical structure of the molecule)
- Something that has been built (a huge wooden structure)

Examples

- Buildings, bridges, and dams are all examples of structures.
- Most students in middle school learn the structure of a five-paragraph essay.
- A good speech has a strong structure.
- In science, we can talk about:
  - The structure of a cell
  - The structure of an atom
  - The structure of a molecule
  - Plant structure
Structure of a tree

- The **structure** of a tree includes roots, a trunk, bark, limbs, branches, and leaves.
- When digging, be careful not to damage the root **structure** of a tree.

What kind of structure has these parts?

1. protons, neutrons, and electrons
2. three equal sides and three internal angles of 60° each
3. sclera, cornea, retina, iris, pupil, lens, optic nerve
4. topic sentence, details, conclusion
5. hook, rod, handle, reel, guide
6. cephalothorax, abdomen, eight walking legs, spinnerets, jaws with piercing fangs, eyes

A wide variety of active engagement techniques

- Questions with oral responses—usually the target word is one of the possible responses and often the opposite term is the other choice
- Questions with yes/no or thumbs up/thumbs down responses
- Questions with True/False responses using True/False cards
- Prompts followed by partner brainstorm and/or partner discussion, and then written responses using sentence frames
- Prompts with other physical responses

Compare two structures

- How is the structure of an automobile similar to the structure of an airplane?
- How are they different?

<table>
<thead>
<tr>
<th>similarities</th>
<th>differences</th>
</tr>
</thead>
</table>

Your Turn: turn to your partner and complete each sentence

- I can't function well when . . .
- A car cannot function well when . . .
- A cell phone will not function well if . . .
- A family will function well if . . .
- A class functions best when . . .

Write it down

- The structure of a __________ is similar to the structure of a __________ because they both ________________.

- My example:
  - The structure of a beehive is similar to the structure of an office building because they both have lots of layers and many smaller rooms where people or bees work.
12 steps to plan instruction

1. Choose words for instruction
2. Look up words in learner’s dictionary or at recommended online site
3. Create a student-friendly definition/explanation
4. Provide several varying examples of word usage
5. Choose an accompanying image
6. Explain related word forms, word parts (roots, affixes), or antonyms if appropriate
7. Find Spanish cognate or translation, or translate into other languages
8. Plan active engagement that helps students process the word’s meaning and usage, such as:
   - questions with oral or physical responses
   - questions with thumbs up/down or thumbs down
   - prompts followed by partner translation, discussion, or collaboration
9. Decide how students will record their learning: on a word map, on index cards, in a vocabulary notebook, etc.
10. Plan a written prompt with a sentence frame as a follow-up to one of the active engagement prompts.
11. Plan additional follow-up questions.
12. Plan a final question in which you restate the meaning and students respond with the target word: What word means ___________?

Thank You!

Lauren Greenberg
lgreenberg@corelearn.com

Effective Supports for English Learners

- Guide students in correct pronunciation and spelling of new words
- When helpful, break down words into parts
- Provide primary language support and cognates
- Use word maps or other graphic organizers to help cement learning
- Use student-friendly meanings and provide access to learner’s dictionaries
- Use images, demonstrations, and point-of-use meanings for many words
- Teach Tier 2 words explicitly using multiple examples, active engagement, and sentence frames