



**Research and evidence base for:**



**Unlock the magic and meaning of words!**



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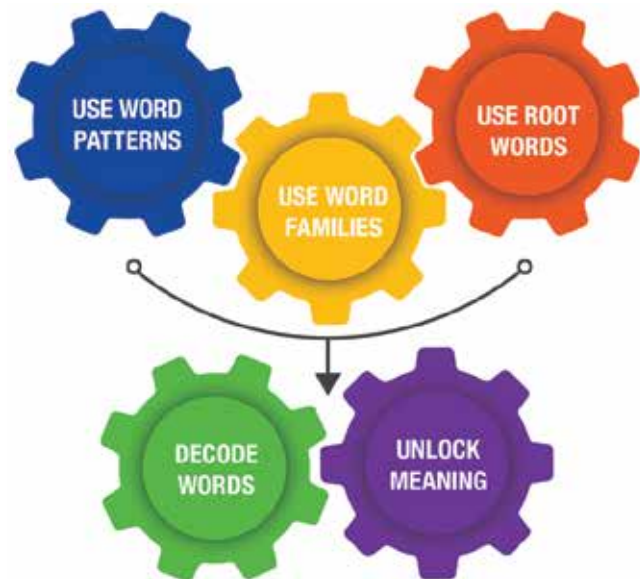
# Program Architecture

## ***Building Vocabulary: Foundations, 2nd Edition*** (K–2)

The overall goal of *Building Vocabulary: Foundations, 2nd Edition* (K–2) is to help students see that words often contain similar letter patterns (also called word families or rimes) and know that this can help them decode new words these phonics skills are introduced systematically throughout *Building Vocabulary: Foundations*. The human brain is a pattern detector, so taking advantage of linguistic patterns sets the stage for the morphological patterns that students learn later in the program.

## ***Building Vocabulary from Word Roots, 2nd Edition*** (grades 3 and up)

There is a systematic approach to word awareness and vocabulary building for students in grades three and up. Based on the dual premises that over 90 percent of English words of two or more syllables are of Greek or Latin origin and that most academic vocabulary is derived from Latin and Greek origins, this program teaches essential word strategies that enable students to unlock the meaning of vocabulary words they encounter inside and outside of school. *Building Vocabulary from Word Roots, 2nd Edition* teaches Greek and Latin prefixes, bases, and suffixes—the semantic units from which the vast majority of English words are derived.



## ***Building Vocabulary, 2nd Edition Lessons***

Designed according to a “gradual release of responsibility” instructional model, the *Building Vocabulary, 2nd Edition* lessons allow teachers to scaffold student learning as needed. This flexible model involves demonstration, guided and independent practice, and application. Each word family, group of compound words, or root is introduced with a poem or a short text. Embedding the study of word parts in whole texts reminds students that the ultimate goal of word analysis is meaning. Brief comprehension activities based on the poems and texts also underscore the message about meaning. Moreover, reading and rereading these short texts promotes fluency development. Additional activities focus on building familiarity with the word parts—both their meaning and how they can be used to decode unfamiliar words.

At the beginning of each unit, a few “challenge words” from the poems and texts are identified that may deserve some instructional attention. Including some words in the poems and texts that students do not readily know is a way of raising their curiosity about words and expanding their listening vocabulary. Beck, McKeown, and Kucan (2002) advise some instructional emphasis on words like these—Tier 2 words—which are unlikely to be in students’ speaking vocabularies. Many students, and most English learners, may benefit from brief discussions of these interesting words.

The activities developed for this program offer students varied and engaging opportunities to learn the word parts through the multiple exposures necessary for deep learning. Students unscramble target words, answer (and write) riddles about words, and play word games, such as Go Fish and Memory. One of the most important activities is called “divide and conquer,” which helps students learn to locate parts within words. These word parts are initially word families, and students use them to decode. Eventually, however, students find familiar word roots that they can use to determine the meaning of unfamiliar words. The Digital Games mirror the strategies learned in the lessons and provide an interactive space for students to practice combining and dividing the words learned in each unit.

Name \_\_\_\_\_ Date \_\_\_\_\_

**Divide and Conquer**

**Directions:** Draw a slash after the prefix in each word. Write the meaning of the prefix in the first blank. In the second blank, rewrite the base word. Then, pick the best definition from the Definition Bank. Write the letter in the box.

Word	Prefix means	Base word is
1. <u>in</u> credible	_____	_____
2. <u>in</u> formal	_____	_____
3. <u>in</u> edible	_____	_____
4. <u>in</u> expensive	_____	_____
5. <u>in</u> visible	_____	_____

**Make It Yours!**

- Choose one word. Draw a picture of it.
- Choose two words and use them in the same sentence.
- How is the meaning of *visible* different from the meaning of *invisible*?
- How is the meaning of *edible* different from the meaning of *inedible*?

**Definition Bank**

A. casual  
 B. amazing; hard to believe  
 C. cheap; not costly  
 D. out of sight; unseen  
 E. not fit to eat

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## Teaching Vocabulary

Early reading instruction focuses on the phonological aspect of word learning. Children learn to manipulate phonemes and recognize letter patterns and to use this information strategically to decode unfamiliar words. It’s easy to forget that many children do not automatically understand what the words mean once they have decoded them. Learning to read new words also often means learning new concepts or new labels for familiar concepts.

A solid bank of conceptual knowledge is especially important for beginning readers. Wide conceptual knowledge supports decoding. Hiebert and Kamil (2005) view vocabulary as a bridge that connects the word-level process of phonics and the broader cognitive process of comprehension. This is a useful way to visualize the importance of vocabulary for young readers.

Beginning readers encounter many one-syllable “daily life” words. Words such as *cat*, *look*, *hill*, and *sleep* came to the English language through Germanic and Scandinavian invasions of England. Because many of these words share spelling patterns (*took*, *cook*, *shook*) that generate predictable and consistent sounds, they can easily be taught together as “word families.” In fact, a respected body of research has shown that students learning to read often naturally use the sound patterns of familiar print words to make analogies that help them pronounce unfamiliar print words (Adams 1994; Cunningham 2012; Moustafa 2002).

Word families make word processing easy and efficient. When seeing the word *bright*, readers don’t see six letters, they see two chunks: *br-* and *-ight*. Also, word families are consistent; for example, *-ack* always has the same sound. And they are ubiquitous—knowledge of just 38 word families can help students sound out/decode over 650 one-syllable words (Fry 1998) and several thousand words with more than one syllable. When students can identify a word family, they can read many words in the same family by simply changing the initial consonant(s). In addition, much of the vocabulary used in this program also appears in high-frequency word lists, particularly those developed for the primary grades by Fry (2004) and Dolch (1948).

A wide vocabulary is also important for success in school beyond early reading. As students move from grade to grade, literacy tasks become more complex. Most researchers believe that children naturally add between 2,000 to 3,000 new words each year, yet by fifth grade they will meet 10,000 new words in their reading alone (Nagy and Anderson 1984). Many of these words will represent challenging and unfamiliar content-area concepts. An extensive vocabulary helps students read fluently, comprehend, discuss what they have read, and learn. Sadly, students who begin school with smaller vocabularies are at an academic disadvantage that most never overcome (Hart and Risley 1995, 2003).

A solid foundation of vocabulary of understanding allows students to share their thoughts and feelings with others more effectively. It is also central to reading comprehension. The larger a reader’s vocabulary, the easier it is for him or her to understand the meaning of a text (National Reading Panel 2000). Young readers who lack adequate vocabulary knowledge cannot apply word recognition strategies efficiently. Baffled and frustrated, they are quickly left behind by readers who do have adequate word knowledge. The result is an escalating cycle of reading failure for too many students. Decades of research have consistently found a deep connection between vocabulary knowledge, reading comprehension, and academic success (Baumann, Kame’enui, and Ash 2003).

Until very recently, most formal vocabulary instruction has been limited to the introduction of key words before reading a new text. Yet the National Reading Panel (2000) found that vocabulary is learned both indirectly and directly, and that dependence on only one instructional method does not result in optimal vocabulary growth. The concept of vocabulary and important evidence-based research findings clarify its critical role in reading comprehension instruction.

### The Vocabulary of Vocabulary

The vocabulary of vocabulary can be confusing. Unfortunately, different resources use different terms. This is even true of curriculum documents. The list that follows shows how these various terms interrelate and which terms are used in *Building Vocabulary, 2nd Edition*.

affix	any word part that attaches to the beginning or end of a word; an umbrella term for <i>prefix</i> and <i>suffix</i>
base	a root that carries the basic meaning of a word; a base may be a word part (the base <i>duct</i> in <i>ductile</i> , <i>conduct</i> , <i>conduction</i> ) or a stand-alone word (e.g., <i>duct</i> ).
base word	a stand-alone word (i.e., a dictionary entry) to which affixes may be attached (e.g., <b>view</b> : <i>review</i> , <i>preview</i> , <i>interview</i> , <i>viewer</i> )
prefix	a root attached to the beginning of a word; generally, a prefix gives a word direction, negates a word with the meaning “not,” or intensifies a word’s meaning by adding the notion of “very”
root	any word part that carries meaning; an umbrella term for <i>prefix</i> , <i>base</i> , and <i>suffix</i> .
suffix	a root attached to the end of a word; generally, a suffix changes a word’s meaning and/or part of speech (e.g., <i>conductor</i> , <i>conduction</i> )

Simply put, vocabulary is knowledge of word meanings. Oral vocabulary is used to listen and speak, and print vocabulary is used to read and write. Each person also has a unique word schema consisting of active and passive vocabulary. Active vocabulary includes words that can be quickly generated when speaking or writing because they are well known. Passive vocabulary includes those words that are recognizable but aren't regularly used. Most people only know them well enough to figure them out when they encounter them.

Words themselves are constructed from tiny units of sound (phonemes) that form units of meaning (morphemes). We use letters and letter patterns (graphemes) to spell or represent those meanings in print. But very often there is no simple one-to-one connection between the sound (or spelling) of a word and its meaning. This fusion of sound/meaning/spelling makes learning English words both interesting and complex.

Words can have the same sounds and spellings but multiple meanings.  
Define the word *running* in each of these sentences:

I am *running* in a marathon.

My neighbor is *running* for city council.

My refrigerator is *running* in the kitchen.

Words can also have the same sounds but different spellings and meanings.  
Define the words *bear* and *bare* in each of these sentences:

Hiking through the forest, John and Mary grew afraid of seeing a *bear*. They could not *bear* the cold and blowing snow, so they looked for shelter to protect their *bare* hands and faces.

Finding a *bare* room, Mary asked John to *bear* with her as she built a fire.

## How Should Vocabulary Be Taught?

New words are learned directly and indirectly (National Reading Panel 2000). Direct teaching of key words can be worthwhile, but research tells us that children can only learn 8 to 10 new words each lesson through direct instruction because learning requires repetition and multiple exposures (Stahl and Fairbanks 1986). Students will require frequent opportunities to use new words in oral and print contexts in order to learn them on a deep level (Blachowicz and Fisher 2014).

Students should also study the structural and semantic nature of words. They should use the surrounding context and/or word parts (prefixes, suffixes, bases) to unlock meaning. Learning key word parts will enable students to master new words that are semantically connected. In other words, looking up words in a dictionary and learning definitions is not enough to ensure word learning. However, dictionaries and other reference works can add interest to a vocabulary program.

Most students learn word-analysis strategies (phonics, context) in the primary grades. They also begin to learn about reference tools. For example, they may know how to use a print dictionary, and they may also know how to use the enormous variety of electronic and print dictionaries available. They may know the concepts of *synonym* and *antonym*, but they may not know how to use a thesaurus. Explicit practice with all these strategies for unlocking word meanings will help students learn to use them automatically. So a vocabulary program should focus on reinforcing and expanding the strategies students have already learned. Moreover, teachers will be encouraging students to become word sleuths, a habit that they may well carry with them throughout (and beyond) their school years.

Most vocabulary is learned spontaneously through discussion, reading, or listening. So another important principle of vocabulary instruction is to read aloud to students. Teachers should choose books with wonderful words and powerful language. Teachers can share their own favorites, encouraging students to do so as well. If students will be tackling a new or difficult concept in the content areas, it's helpful for the teacher to begin by reading picture books that address the topic. In addition to their many other benefits, read-alouds help increase children's oral vocabulary, which is an important stepping-stone to reading comprehension.

Related to this principle is another: encourage wide reading. The more that students read, the better. Teachers must establish different purposes for reading—including pure pleasure—and urge students to choose texts at various levels of difficulty. Research tells us that students learn more new words incidentally—when they appear while reading or listening—than they do through direct instruction (Lehr, Osborn, and Hiebert 2004). Teachers can share their own love of words and invite students to share theirs. Everyone has a favorite text that moves them to laughter or tears. As these are read aloud to students, teachers can talk about the power of words. Invite students to do so as well. A good practice is to whet their appetites by sharing interesting word histories and then showing them how to explore the origins of a lot of words themselves.

<b>Building Vocabulary: Foundations</b>	<b>Building Vocabulary from Word Roots</b>
<p>Students learn to “divide and conquer” words by separating initial consonants from the most common word families. Take the word family <i>-in</i> for example. Students learn to decode unfamiliar <i>-in</i> by focusing on sound-spelling patterns.</p> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <span style="background-color: #f4a460; padding: 2px 5px;">b</span> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">-in</span> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <span style="background-color: #f4a460; padding: 2px 5px;">cous</span> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">-in</span> </div> <div style="display: flex; align-items: center;"> <span style="background-color: #f4a460; padding: 2px 5px;">pumpk</span> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">-in</span> </div> </div>	<p>As students progress, the skill of “divide and conquer” remains. The familiar <i>-in</i> has a predictable sound and can be readily identified, but the focus shifts to learning words through their roots. Now, students learn <i>in-</i> as a directional prefix meaning “in, on, into” and use this knowledge to analyze and decode multisyllabic content-area words.</p> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">in-</span> <span style="background-color: #f4a460; padding: 2px 5px;">augerate</span> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">in-</span> <span style="background-color: #f4a460; padding: 2px 5px;">vent</span> </div> <div style="display: flex; align-items: center;"> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">in-</span> <span style="background-color: #f4a460; padding: 2px 5px;">scribe</span> </div> </div>



Meaning does not automatically follow successful decoding. If a word is not in a student’s oral vocabulary, the student cannot apply word recognition strategies effectively, and reading comprehension is hindered (National Reading Panel 2000). *Building Vocabulary, 2nd Edition* frontloads vocabulary instruction in every lesson so that students have experiences with learning the words they need to know before they encounter them in text.

Students with wide vocabularies find it easier to comprehend more of what they are reading than do students with limited vocabularies. The type of reading students encounter in school can be highly specialized, and the words they need to learn can be challenging. This type of academic vocabulary is often not encountered in everyday life or in everyday reading. Therefore, all students need an explicit introduction to and explanation of these vocabulary words.

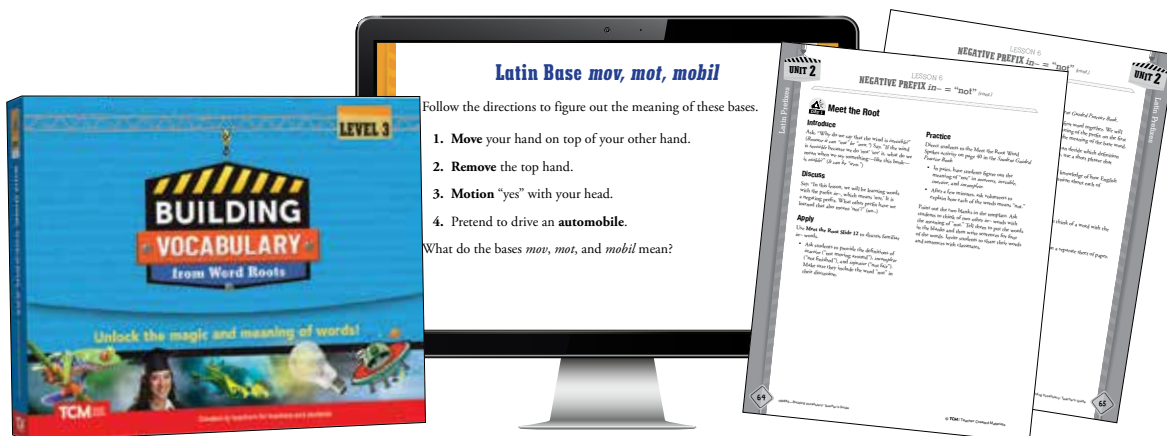
Some Latin prefixes occasionally change spelling. If a prefix ending in a consonant (such as *con-* and *in-*) attaches to a base beginning with a consonant, the final letter of the prefix may change to make the word easier to pronounce. This is called *assimilation*. For example:

<i>in</i> (not) + <i>legal</i>	=	<i>illegal</i> (not <i>inlegal</i> )
<i>con</i> (with, together) + <i>pose</i> (put)	=	<i>compose</i> (not <i>conpose</i> )

Assimilation is a simple concept, but it can seem technical and confusing. Students may benefit from knowing that prefixes sometimes change spelling to make resulting words easier to pronounce.

Marzano, Pickering, and Pollock (2001) have identified “high-yield” strategies for improving instruction and student achievement. The *Building Vocabulary, 2nd Edition* lessons focus on the skills of identifying similarities and differences between roots and word meanings, with multiple opportunities for practice and reinforcement. Opportunities to provide feedback are evident in each lesson, as well as through the assessments. Finally, cooperative learning is included in the lessons, activities, and games.

*Building Vocabulary, 2nd Edition* combines the six levels of Marzano and Kendall’s New Taxonomy, an update to the classic Bloom’s Taxonomy. The prompts and questions included in each lesson move from the lowest level of thinking—basic retrieval of information—through comprehension, analysis, and knowledge utilization (application) (Marzano and Kendall 2007). Finally, the assessments and lessons also help students develop their metacognitive skills by expressing and refining their thoughts as they monitor progress. Marzano and Kendall’s highest level of thinking—self-system—includes examining importance, developing efficacy, and examining motivation. The discussions that activate and build background knowledge through the lesson plans and slides, as well as the small-group work activities, help students develop their self-system thinking.



## Using Technology to Improve Vocabulary

Within the last decade, there has been a shift in the ways students are expected to think and process information. Students in today's classrooms have been deemed *digital-age learners*. They were born into a digital world and challenge us to transform the classroom experience to better meet their needs (Furman 2015). A pedagogical shift has been recognized as necessary due to the increase in digital technologies and its impact on society. In twenty-first century learning, technology should be used widely and responsibly in the classroom—with the goal of enriching students' learning. Extensive research has been conducted over the years to determine the effectiveness of technology in improving student performance.

The following positive effects have been observed when technology has been used to enhance curriculum:

➤ <b>increased achievement</b>
➤ <b>improved higher-order thinking skills and problem-solving abilities</b>
➤ <b>enhanced motivation and engagement</b>
➤ <b>improved ability to work collaboratively</b>

### Using Digital Games to Motivate Struggling Learners

Digital games are a proven source of motivation. They are a fun way for students to develop, maintain, and reinforce mastery of essential concepts and processes. The article "Gamification in Education: What, How, Why Bother?" by Lee and Hammer (2011) discusses the benefits and learning potential of using games in the classroom. The authors identify various advantages, including motivation and engagement. Games have the ability to encourage a love of learning and provide meaningful opportunities of extended practice.



Games are fun and collaborative, which means that more students have opportunities for success. Attitudes are also an important part of success. Students who feel good about a subject and their abilities to do well in it will be motivated to learn. It is important to provide a positive learning environment where students are under minimal stress; meaning and understand (rather than rote memorization) are emphasized, and real-world concepts are related.

The *Building Vocabulary, 2nd Edition* games, *Divide and Conquer* and *Combine and Create*, provide:

➤ <b>multiple opportunities for practice and reinforcement of the skills used for identifying similarities and differences between roots and word meanings</b>
➤ <b>engaging and age-appropriate art and themes</b>
➤ <b>immediate feedback</b>



# Differentiating Instruction

Students have differing learning styles, come from different cultures, experience a variety of emotions, and have varied interests. For each subject, they differ in academic readiness. Teaching must be differentiated to better meet their needs (Blachowicz and Fisher 2014).

Differentiation encompasses what is taught, how it is taught, and the products students create to show what they have learned. These categories are often referred to as *content*, *process*, and *product*. Teachers can differentiate content, process, and product according to students' characteristics. These characteristics include students' readiness, learning styles, and interests. If a learning experience matches closely with their skills and understanding of a topic (readiness), they will learn better (Heibert and Kamil 2005).

Creating opportunities that allow students to complete work according to their preferences (learning styles) will help learning experiences become more meaningful. If a topic sparks excitement in the learner (interests), then students will become involved in learning and better remember what was taught.

## English Learners (EL) Vocabulary

Students who learn English at school have unique advantages and challenges. They bring rich background experiences that can be tapped to enhance everyone's learning. They know how to move between two languages, integrating sounds and meanings into new words and grammatical structures. As they learn English, their natural manipulation of two languages promotes higher-level thinking. Yet English learners sometimes feel lost in the unfamiliar linguistic and academic world in which they find themselves.

Fortunately, everything about how to teach vocabulary applies to both first- and second-language learners: Students need to focus on meaning, using research-based strategies to learn new words. They need frequent opportunities to try out new words in varied learning contexts. The major difference is that EL students generally require more distinctive and frequent support.

Word study in *Building Vocabulary, 2nd Edition* helps English learners actively seek elements of words. It helps them develop strategies for breaking words into smaller and more understandable components, rather than feeling overwhelmed by strings of letters that form incomprehensible words.

At a minimum, the first day of each *Building Vocabulary, 2nd Edition* lesson features teacher-led discussion, and many activities throughout the lessons either direct students to work with partners or can be adapted for small-group work. These discussion opportunities will benefit EL students by supporting their growth in conversational English as well as promoting learning of the featured word parts.

Use students' native languages wherever possible. Many English words have cognates in other languages.

LESSON 8

**LATIN BASE *pon, pos, posit* = "put, place" (cont.)**

**UNIT 2**  
Latin Bases

**Differentiation Strategies**

Use **Definitions at a Glance** to practice specific words, or invite students to choose their own *pon, pos, posit* words from the classroom word wall or *Student Guided Practice Book* activities. See Bonus Pages on the Digital Resources for additional student activities for the unit. These exclusively digital options can be used to pre-teach or reteach a lesson or give students another chance to play with the unit's newly learned roots.

**Above-Level Support**

Create a list of appropriate content-area words with the Latin base from this lesson. In pairs, have the students work to sort the words by content area. Discuss the results as a class.

**English Language Support**

Provide students with a word bank to use with the **Combine and Create** activity.

See **Cognate Connections** for Spanish words built on this base, and point out the similarities with English.

**Below-Level Support**

Review the difference between a base word and a prefix/suffix. Discuss that *pon, pos, posit* means "put, place," miming the motion *during* the lesson by pretending to *put* or *place* something as you speak the vocabulary word.

**Cognate Connections**

Spanish-English cognates with the base *pon, pos, posit* to share with students:

*componere* (compose); *componer* (compose); *compositio* (composition); *decomponere* (decompose); *disponere* (dispose); *disponer* (dispose); *exponere* (expose); *exponitio* (exposition); *impone* (imposition); *imponitio* (imposition); *ponere* (ponch); *positio* (position); *positio* (position); *ponal* (postal); *preponitio* (preposition); *propone* (proposal); *propone* (propose); *supponere* (support); *supponitio* (supposition); *transponere* (transpose)

**Spelling Matters**

Two prefixes that attach to the *pon, pos, posit* base assimilate, resulting in a doubled *p* near the beginning of the word:

- The prefix *ob-* ("up against") assimilates into *op-*, as in: *opponere*, *oppositio*.
- The prefix *sub-* ("under, below") assimilates into *sup-*, as in: *supponere*, *suppositio*.

The base *pon, posit* is always spelled with a single *n*: *opponere*, *oppositio*; *imponere*, *impositio*; *componere*, *compositio*. The base *pon* is always spelled with a single *n*: *componere*, *propone*, *opponere*.

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Because they share Latin derivatives, Spanish-speaking students can easily relate many new English words to Spanish. In teaching *aqueduct*, for example, students may already have the concept of *water* from the Spanish word *agua*. Encourage students to draw such connections between their first and second languages. In *Building Vocabulary from Word Roots, 2nd Edition*, the Latin roots are identified for students, which should simplify this process.

## Program Outcome

### ***Building Vocabulary: Foundations***

By the end of each unit of *Building Vocabulary: Foundations*, students will learn to decode and fluently read some of the most common word families in the English language.

### ***Building Vocabulary from Word Roots***

By the end of each unit of *Building Vocabulary From Word Roots*, students will learn the meaning of some of the most common Greek and Latin roots in the English language. This knowledge provides students with the understanding of how to apply these skills to new words and develop the skills to adequately divide and conquer unfamiliar words and deepen their overall word awareness. Above all, Building Vocabulary builds independent word sleuths and lifelong word lovers and readers.

# Data Study

## Overview

TCM and Euclid City Schools partnered to conduct a research study of *Building Vocabulary* in six classrooms during the 2007–2008 school year. The teachers in the experimental group were directed to use the program a minimum of four days a week, 15 minutes a day. The primary purpose of the study was to measure the effectiveness of *Building Vocabulary* in improving the vocabulary of targeted, Euclid City Schools' students.

Through the implementation of *Building Vocabulary*, TCM and Euclid City Schools investigated the research question, "How will the *Building Vocabulary* program affect the vocabulary development of students in Euclid City Schools?" Both parties hypothesized that the targeted students in the experimental group would demonstrate a greater increase than the control group on the *Building Vocabulary* Pre-test and Post-test, after participating in the Building Vocabulary curriculum.

## Study Design

Euclid City Schools selected three schools with similar student populations to participate in the study: School A had three experimental classrooms; School B had two experimental classrooms; and School C had two control classrooms.

## Participants and Setting

Euclid, Ohio is a suburb located directly east of Cleveland. As reflected on the Euclid City School District, 2007–2008 School Year Report Card ([www.reportcard.ohio.gov](http://www.reportcard.ohio.gov)), the average daily student enrollment was 6,042. There are seven elementary schools with a total enrollment of 2,052 students. 58.8% of those students are considered economically disadvantaged.

The percentages of students for specific populations are listed below:

- 74.9% Black, non-Hispanic
- 58.8% Economically Disadvantaged
- .3% Asian or Pacific Islander;
- .3% Limited English Proficient
- 6% Hispanic
- 18.3% Students with Disabilities
- 4.7% Multi-racial

## Program and Implementation

A quasi-experimental design was used to carry out the research for this study. Both quantitative and qualitative evaluation tools were used to measure the efficacy of *Building Vocabulary*. To measure students' vocabulary development and their use of word roots to determine meanings of words, the *Building Vocabulary* Pre-test and *Building Vocabulary* Post-test were administered. The Pre-test was administered in November of 2007 and Post-test was administered in May of 2008. The students were not given a time limit in which to complete the assessment.

An outside team evaluated the assessments and compiled the data for the *Building Vocabulary* assessments. The evaluators used the answer keys provided for both assessments and followed standard protocols for scoring the assessments, giving the number of correct items out of the number possible.

Three qualitative tools were also used to gather anecdotal information from teachers and students. Teachers were asked to record each usage of *Building Vocabulary* in a lesson log. The purpose of the lessons logs were to measure frequency of usage and to gather anecdotal feedback regarding specific lessons. At the end of the study, teachers completed a survey that provided them an opportunity to share information about their experiences with the program. Teachers responded to questions for the following topics:

- ease of use of the program
- professional growth as a result of participating in the study
- student use of the program
- appropriateness of the content
- students' vocabulary growth

Students in each class were assigned alphanumeric designations. Data was entered into spreadsheets, organized by class, and students' alphanumeric designation. Classes were identified as part of the experimental or control groups. To measure vocabulary development, students' Pre-test and Post-test scores were compared, and an overall increase or decrease was determined. The mean scores on the Pre-test and Post-test for *Building Vocabulary* were then calculated for each class, followed by an analysis of the data for the experimental and control groups, separately. Mean increases or decreases between the Pre-test and Post-test for *Building Vocabulary* were also calculated for each class, as well as the experimental and control groups.

Finally an item analysis for the *Building Vocabulary* assessments was conducted by class. The sum and percentage of students who had each the item correct on both the Pre-test and Post-test was tabulated. This data was utilized to determine students' overall level of mastery on specific word roots.

Analysis of the teachers' lesson logs and surveys provided a picture of each teacher's usage of the program. Each experimental teacher was categorized into high, medium, and low usage groups based on the information shared on their lesson logs and surveys. For each class, the mean *Building Vocabulary* Pre-test and Post-test scores were aligned with each teacher's high, medium, or low usage of the program. The overall student growth in each class was compared to the category of usage by the classroom teacher to determine if a correlation exists between teacher usage of *Building Vocabulary* and students' overall growth on the *Building Vocabulary* assessments. The teacher and student questionnaires were tallied and reviewed. Relevant anecdotal data from these questionnaires has been selected for inclusion in this report and will be used to support TCM in future product development.

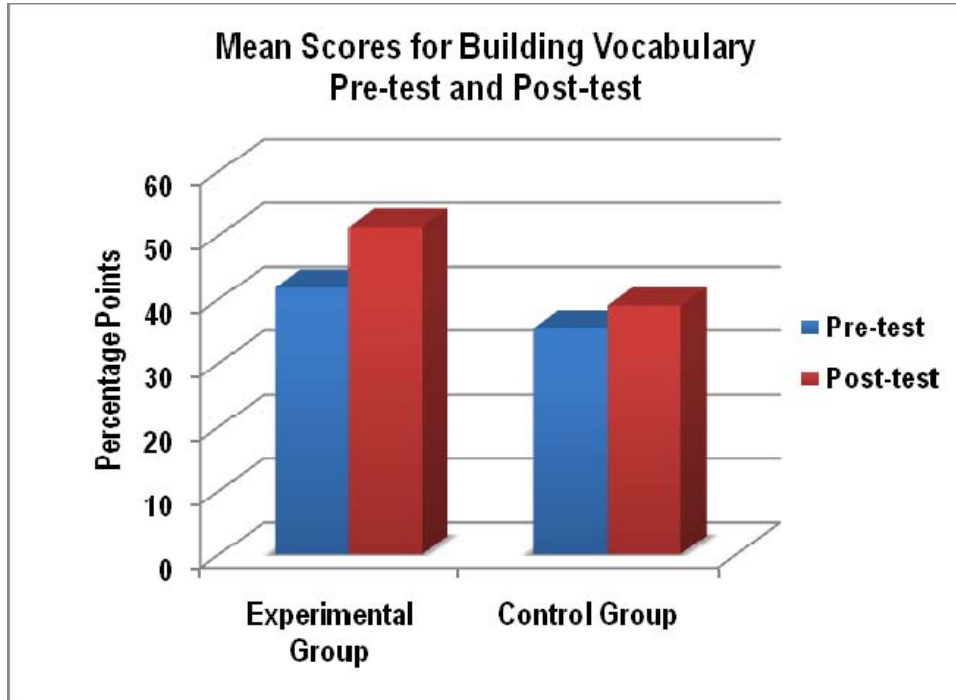
## Results

### ***Building Vocabulary* Pre-test and Post-test**

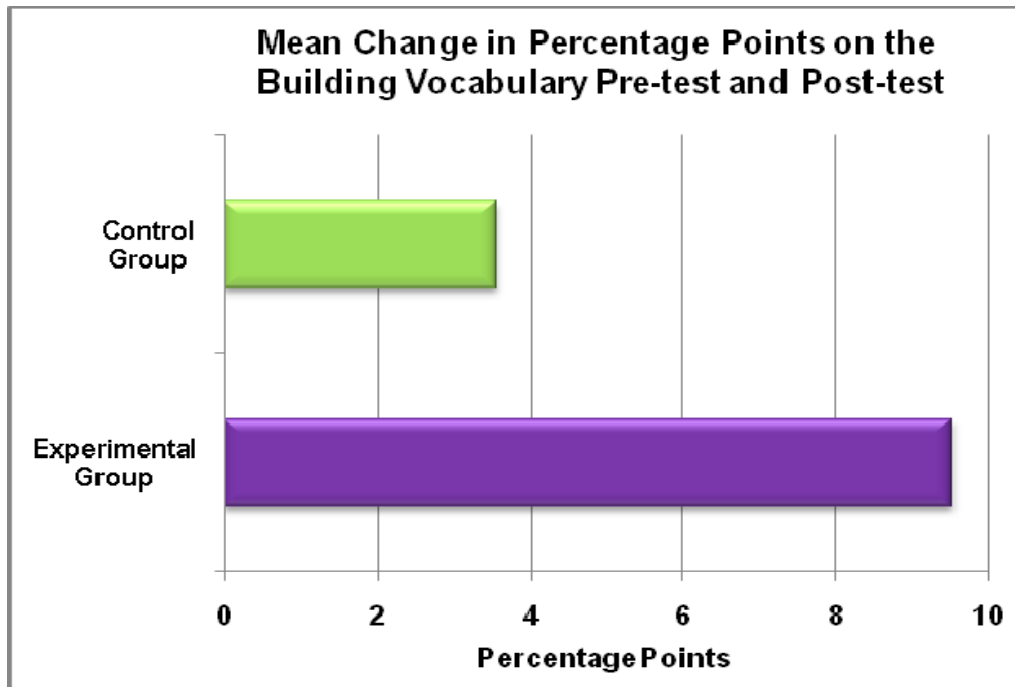
The data from the *Building Vocabulary* Pre-test and Post-test provide evidence that during the course of the study, experimental group (Classes 1E–5E) students' vocabulary increased more than students' vocabulary in the control group (Classes 1C–2C). The experimental group's scores from the Pre-test to the

Post-test increased on average by 9.52 percentage points, where the control group's scores increased on average of 3.57 percentage points. The experimental group increased 5.95 percentage points more than the control group. *Figure A* shows the mean Pre-test and Post-test scores for the experimental and control groups. *Figure B* shows the mean change in percentage points for the experimental and control groups on the Pre-test and Post-test. The effect size for this data study was 0.376.

*Figure A*



*Figure B*



**Table 3** below shows the mean number of points students scored out of 20 possible points (1 point per item) on the *Building Vocabulary* Pre-test and Post-test for each teacher in the experimental and control groups. The first column is the assigned reference code for each class. The second column indicates each teacher’s usage of the program. Teacher usage was categorized into high, medium, and low groups. Teachers who used the program three times per week or more are considered to be in the high usage category. Teachers who used the program one to two times per week are considered in the medium usage category. Teachers who used the program once or twice a month were in the low usage category. The third and fourth columns indicate the mean Pre-test and Post-test scores for each class. The last column shows the mean difference between the Pre-test and Post-test scores.

**Table 3**

**Mean Points Scored on the Building Vocabulary Pre-test and Post-test**

<b>Experimental Group</b>				
<b>Classes</b>	<b>Usage Category</b>	<b>Mean Pretest Scores*</b>	<b>Mean Post-Test Scores*</b>	<b>Mean Difference in Points Scored</b>
Class 1E	High	7.95	8.74	0.79
Class 2E	High	8.64	11.64	3.00
Class 3E	High	8.88	9.60	0.72
Class 4E	High	8.22	10.00	1.78
Class 5E	High	8.64	11.57	2.93
Mean Scores*	High	8.47	10.31	1.8
<b>Control Group</b>				
Class 1C		6.80	6.73	-0.07
Class 2C		7.35	8.84	2.11
Mean Scores*		7.08	7.79	0.71

\*Mean number of points out of 20. One point was assigned for each question.

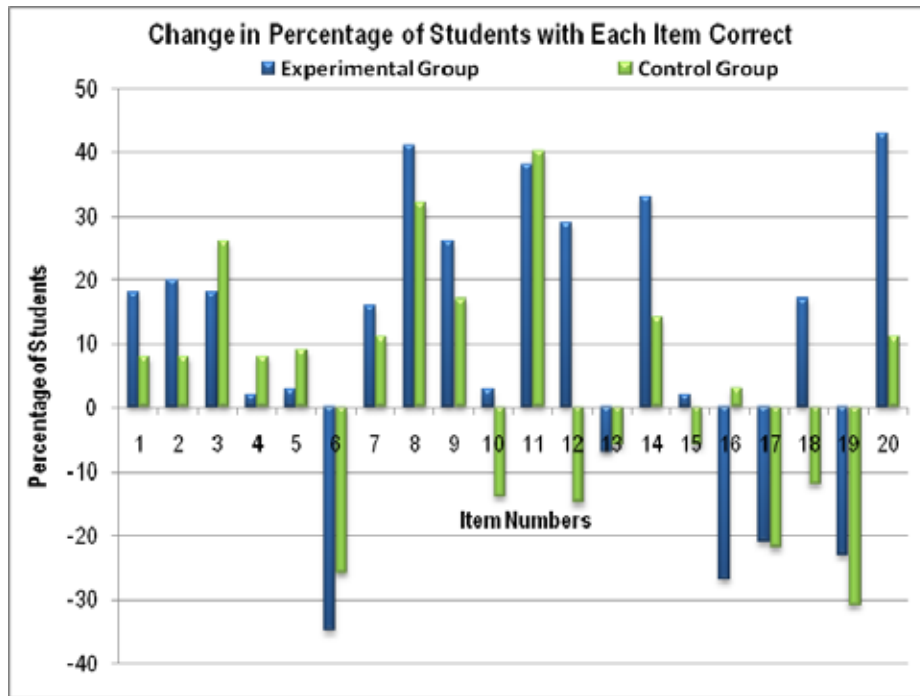
The experimental group also showed greater growth overall on the individual items on from the *Building Vocabulary* Pre-test to the Post-test . **Table 4** reflects students’ performance on these items. The data is categorized by experimental and control groups. The percentage of students that correctly answered each item was calculated for the Pre-test and Post-test. The difference in the percentage of students was then calculated for both the control and experimental groups, reflecting an overall increase or decrease in students’ growth from the Pre-test to the Post-test for each item. **Figure C** compares the experimental group’s and control group’s increases and decreases in the percentage of students that answered each item correctly. Overall, the experimental group showed a greater increase than the control group in the percentage of students who correctly answered each item.



Table 4

Experimental Group: Percentage of Students with Each Item Correct on the Pre-test and Post-test																				
Item Numbers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Pre-test Percentages	42	6	40	56	51	78	10	26	46	69	51	38	21	17	40	65	56	21	72	26
Post-test Percentages	60	26	58	58	54	43	26	67	72	72	89	67	14	50	42	38	35	38	49	69
Differences	18	20	18	2	3	-35	16	41	26	3	38	29	-7	33	2	-27	-21	17	-23	43
Control Group: Percentage of Students with Each Post-test Item Correct																				
Pre-test Percentages	26	23	23	49	31	63	20	34	29	43	40	49	26	17	40	40	51	23	57	29
Post-test Percentages	34	31	49	57	40	37	31	66	46	29	80	34	20	31	34	43	29	11	26	40
Differences	8	8	26	8	9	-26	11	32	17	-14	40	-15	-6	14	-6	3	-22	-12	-31	11

Figure C



The complexity and difficulty between parallel items on the Pre-test and Post-test may vary, which could account for some of the differences in the percentage of students that answered the items correctly between the Pre-test and Post-test. There are other variables that could have played a role in the data collected from the *Building Vocabulary* Pre-test and Post-test. The control group may have inadvertently received instruction for specific vocabulary words in their language arts program or in other content-area curricula that were also included on the *Building Vocabulary* Pre-test and Post-test. Some of vocabulary terms may have been prior knowledge or linked to students' experiences. Students in the control and experimental groups may have been taught common roots before participating in this study. Even when considering these variables, one can conclude that the data from the *Building Vocabulary* assessments reflects the positive outcomes the program had on students' vocabulary development.

## Teacher Surveys

Teacher surveys were administered to the teachers in the experimental group at the conclusion of the research study. Teachers responded to questions for the following topics:

- ease of use of the program
- professional growth as a result of participating in the study
- student use of the program
- appropriateness of the content
- students' vocabulary growth

The overall responses from the teachers in each of the above areas were positive. Over 60% of the teachers' responses to the survey items, which were based on a Likert scale, were strongly agree or agree. One teacher commented, "I liked that the students were introduced to the concepts on a weekly basis. Also, I enjoyed the resources provided."

With the transition from memorizing word meanings to utilizing word parts, the teachers expressed that the students enjoyed many of the engaging activities that the program had to offer. "My students became excited immediately with all the fun and engaging activities provided. Most seemed to look forward to vocabulary work daily, not even realizing they were working on vocabulary skills." All the teachers, who participated in the study, agreed that the "Extend and Explore" and "Read and Reason" activities were most engaging for their students. Many of the teachers also utilized additional research-based practices that were recommended by the authors during professional development. They conducted the activities with hands-on materials, created classroom word walls, modeled Guided Practice book pages on the overhead, started with words that were recognizable to students, provided additional practice, and selected or utilized a word of the day.

Most importantly, the teachers shared how they witnessed students' vocabulary grow as a result of using the program, which is also evident in the Pre-test and Post-test data. All the teachers agreed that as a result of using the program, students' knowledge of word roots increased and the majority of them felt that students' vocabulary increased. It was concluded that as a result of using the program, "Students did develop a basic understanding of prefixes and suffixes."

## Conclusions

The evidence resulting from this research study illustrates the power the program has to increase students' knowledge of word roots, their ability to construct meaning from word roots, and their overall vocabulary growth. The program was motivating and empowering for students. Teachers and students alike expressed how the program changed the way in which they taught and learned vocabulary.

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