WORD DETECTIVES

Using Units of Meaning to Support Literacy

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This article examines overall trends in morphological instruction and offers a view into what effective morphological instruction looks like in K–8 classrooms.

Ellie, a 7th grader, stares at the word *clinician*, trying to figure out the meaning.

Researcher: Have you seen or heard this word before?

Ellie: No.

Researcher: Can you figure out what the word might mean?

Ellie: Probably someone who works in a clinic...because it has the word *clinic* in it and *-ian* usually means someone who does something.

This episode stems from an interview completed by Amanda, the first author, and shows how morphological knowledge can support student literacy achievement. Ellie (all names are pseudonyms) did not know the low-frequency word, *clinician*, but was able to use her knowledge of morphemes, which are the smallest units of meaning within words, to figure out its meaning. She then applied that meaning to support her understanding of the text she was reading.

Ellie's knowledge of morphemes is strong, probably because part of her reading instruction involves 15 minutes per day of instruction in Greek morphemes (Harris, 2009). Yet instruction in Greek morphemes is only one type of morphological intervention. Reviews of studies involving morphological instruction shows variability among learning goals and instructional strategies (Bowers, Kirby, & Deacon, 2010; Carlisle, 2010; Goodwin & Ahn, 2010). The current study examines overall trends regarding morphological instruction with the goals of determining whether morphological instruction supports literacy achievement and presenting a clear picture regarding what effective morphological instruction looks like in K–8 classrooms.

Evidence of Support

For generations, students and teachers have complained about the difficulties of learning to read and write in English. It is a language for which there is an exception to almost every rule. Because English is a morphophonemic writing system (Chomsky & Halle, 1968; Venezky, 1999), many of

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these exceptions are morphological in nature. For example, the *t* and *h* are pronounced separately in *hothouse* because of the morphological structure of the compound word. Similarly, the spelling of *health* communicates the relationship to its root, *heal*, even though pronunciation changes exist. Consistent spelling of the past tense morpheme, *ed*, whether it sounds like */t/* in *kissed*, */d/* in *killed*, and */ed/* in *waited*, also supports communication of meaning.

In terms of word meanings, morphology plays a pivotal role, as Pinker (1994) wrote, "The engineering trick behind human language—its being a discrete combinatorial system—is... [that] words themselves are built out of smaller bits by another set of rules, the rules of 'morphology'" (p. 120). In fact, morphemes play semantic roles, communicating lexical meaning (*dis* + *like*) through roots (*friend*, *ped*) or affixes (*un*, *tion*), and also syntactic roles, conveying changes in tense (*run*, *running*), grammatical categories (*help-* > *helpful*), number (*dogs*), or degree (*fastest*).

Because morphology guides how we communicate in written and oral language, it is no surprise that research shows the role of morphological knowledge, sometimes termed *awareness*, in contributing to spelling, vocabulary, decoding, and reading comprehension measures (Carlisle, 2000, 2003; Goodwin, 2011; Kieffer & Lesaux, 2008; Kuo & Anderson, 2006; Siegel, 2008). Morphological knowledge even explains unique variance beyond phonological skills (Carlisle, 1995; Nagy, Berninger, & Abbott, 2006; Roman, Kirby, Parrila, Wade-Woolley, & Deacon, 2009) and decoding (Kieffer & Lesaux, 2008) to reading outcomes, with similar findings being reported for English learners (ELs) (Goodwin, 2011; Kieffer & Lesaux, 2008) and for children with reading disabilities (Casalis, Cole, & Sopo, 2004; Elbro & Arnbak, 1996).

What does this support look like? With familiar words, morphological processing occurs unconsciously, whereas with unknown words, a reader must consciously identify morphemic units and search their lexicon for the pronunciation and meaning of these units (Schreuder & Baayen, 1995; Taft, 2004). If a student breaks complex words into the component morphemes, decoding and accessing meaning becomes easier. With less attention needed for word identification and meaning detection, more resources are available to use in comprehending the text as a whole (Perfetti, 1988; Stanovich, 1990).

Better knowledge of the word's meaning improves comprehension because the student can construct a more accurate model of the text by knowing the meanings of words used (Perfetti, 1988). For example, within the larger word *characteristic* are the base word *character* and the component morpheme *istic*. Readers can decode the base word *character*, using its meaning and pronunciation to decode and understand the meaning of *characteristic*.

There are small differences in how groups of students are supported by morphological knowledge. For typically achieving students, this awareness augments their existing skills by adding a component of meaning to their literacy endeavors. For students with reading disabilities, morphological awareness can provide a compensatory mechanism that relies on meaning knowledge, thereby overcoming areas of deficit such as phonological processing (Arnbak & Elbro, 2000). For ELs, morphological awareness can provide a bridge from native language to second language by highlighting similar units of meaning within both languages, which can support reading in content areas in which texts are often culturally decontextualized.

Pause and Ponder

- What do my students know about units of meaning (i.e., parts of words such as prefixes, suffixes, and root words)?
- How can I improve my students' awareness of the relationships between related words?
- How can I get my students to be "word detectives" so that they can use morphological knowledge to estimate the meaning, spelling, and pronunciation of unknown words?
- What cognates are present in the texts that we are reading that my English learners may know from their native languages?
- How can I adapt these strategies to meet the needs of my students in a culturally responsive manner?

Age also factors into how morphology supports literacy achievement for students. Demands on students regarding morphology increase as students grow older. In kindergarten and early elementary school, emphasis is on inflectional morphology, which requires students to apply inflectional rules when making words plural, changing tenses, and creating superlatives (*big, bigger, biggest*). These young children are exposed mostly to relatively simple morphological constructions as their derivational awareness, which involves changes in the part of speech mostly, develops across elementary school.

For example, first graders have only a primitive understanding of derived words (Anglin, 1993), with development of more explicit awareness of derivational morphology beginning in third and fourth grade (Anglin, 1993; Carlisle, 2000; Tyler & Nagy, 1989). This tends to be when complexity increases, with 60%–80% of words encountered in texts from third grade or later being morphologically complex derived words the meanings of which can often be determined from analysis of component morphemes and context (Nagy & Anderson, 1984).

Content area reading is particularly dense in words of Latin or Greek origins. These words involve multiple affixes with roots that cannot stand alone, as in the examples of *eruption*, *credible*, and *taxonomy*. Refinement of derivational awareness continues into high school as students encounter rarer words (Mahony, 1994).

Evidence From Morphological Instruction

Recent reviews have begun to show the potential of morphological interventions to support literacy outcomes for school-age students across multiple languages (Bowers, Kirby, & Deacon, 2010; Carlisle, 2010; Goodwin & Ahn, 2010; Reed, 2008). For example, Reed (2008) showed positive yet mixed results on word identification, spelling, and vocabulary based on trends from seven studies. Carlisle (2010) suggested that morphological instruction holds promise in supporting literacy achievement, especially in phonology, orthography, and word meaning areas based on 16 studies in different languages.

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Bowers et al. (2010) examined 22 studies in different languages, similarly finding positive effects of morphological instruction on literacy at the sublexical, lexical, and supralexical level. Larger effect sizes were reported for younger versus older readers, less able versus undifferentiated readers, and integrated versus isolated morphological instruction. More recently, Goodwin and Ahn (2010) used meta-analytic techniques to identify trends from 17 studies showing that morphological instruction supported students with literacy difficulties, especially in the areas of phonological and morphological awareness, vocabulary, reading comprehension, and spelling.

The Present Study

The current review uses meta-analytic technique to identify effective morphological instructional strategies for elementary and middle school classrooms. Full details regarding the meta-analysis are included in Goodwin and Ahn (2011), and a summary of the meta-analytic method and findings appear in the online-only research supplement. Based on that review, five morphological strategies are identified and discussed in detail.

It is important to note that evidence from the meta-analysis suggests that these strategies could improve students' phonological and morphological awareness, decoding, spelling, and vocabulary, but no significant overall effects were found for reading comprehension and fluency. Further analysis, described in Goodwin and Ahn (2011), suggests that, in fact, certain types of morphological instruction improve reading comprehension. This type of morphological instruction tends to be more intensive, involving 20 hours or more of instruction, and to involve work with smaller groups of students.

In addition, Goodwin and Ahn (2011) showed that morphological instruction is more effective in supporting reading comprehension compared with alternative treatments such as phonological or orthographic awareness training. Such findings suggest that although morphological instruction supports many components of literacy development, which may in turn improve fluency and reading comprehension, morphological instruction does not, in itself, necessarily improve reading comprehension unless it is implemented in a rigorous manner. The following strategies detail ways in which to integrate morphological instruction within classroom instruction.

Strategy 1: Segment and Build With Morphemes

Studies suggest that morphological instruction starts with teaching students to identify morphemes that make up a word whether orally or in written form. When identifying morphemes, the focus must remain on the meaning of the unit. Working with fifth- through seventh-grade students with reading disabilities, Berninger et al. (2003) suggested having students break words apart into morphemes as in the example *wash/able*. Examples of words include *completely, brownish, dislike, scientist, leadership, mouthful, different, amazing, northern, reporter, sickness, important, harmless, impolite, invisible, unclear, magical, magician,* and *projector,* although easier words could be used with primary-grade students. Students identify the word, determine its meaning, and explain how the word's meaning relates to the meaning of the root and affixes. Next, students generate additional words using either the same affix or root.

Such work could be integrated into content areas such as science, in which students would be given the root *plant* and asked to think of morphologically related words such as *plant, planter, planting, plants, planted, implant, implanted, replant,* and so forth. Direct instruction or learning centers similar to Making Words (Cunningham & Cunningham, 1992) but using morphemes rather than letters can be used to provide practice opportunities during which cards for high-frequency prefixes, roots, and suffixes are used to generate words from morphemes.

Oral discussion can also support students' identification of morphemes and building of words from morphemes. For example, when discussing characteristics of the protagonist of a story, the word *unfriendly* provides an opportunity for a derivational morphological teaching moment. To break apart *unfriendly,* the teacher asks students for the word's meaning, summarizes responses such as *not nice* or *not friendly,* and asks what part of *unfriendly* means *not*.

After determining that the prefix *un* means *not*, the teacher next focuses on the remaining word, *friendly,* asking for a definition and ultimately helping students conclude that it refers to how someone acts. Next, the teacher asks students to find the smaller word within *friendly* (*friend*) and discusses how the *ly* adverb ending changes the root word from a noun into an adverb. Finally, students could identify the number of morphemes (three) in *unfriendly* and describe how the meanings of each morpheme relate to the meaning of the word as whole.

Analysis of word families also supports identification of morphemes. Teachers can explain that words, like people, have families, often with related meanings. In a unit on bullying, students can be asked to identify the base word from a list of related words such as *respected, respecting, respectful, respectfully, disrespectful,* and *disrespect*. Teachers can also highlight the difference between graphically similar units and units of meaning.

To teach this, the teacher says pairs of words, asking students to circle *yes* if one word comes from the other or *no* if the words are unrelated. Examples of word pairs are *reporter/report; respectfully/respect; mayor/may; transportation/transport; tenor/ten; orange/or; injection/inject; specifically/specific; onion/on; pillow/pill, corner/corn,* and so on. These word pairs were used in an intervention with children with reading disabilities in which students improved decoding and morphological awareness skills (Berninger et al., 2003). An adaptation for individual or group work is to provide students with these word pairs on cards and have them sort the cards into related and nonrelated categories.

Strategy 2: Teach Affix and Root Meanings

Another strategy used by the majority of studies in the meta-analysis was

affix and root instruction, which teaches students to become "word detectives" who use clues within words to identify the meaning of whole words. Some activities would include having students underline as many roots and circle as many affixes as possible in a given time using a list of morphologically complex words, perhaps related to current study topics (Berninger et al., 2003). For example, Baumann, Edwards, Boland, Olejnik, and Kame'enui (2003) used words such as *enlist*, *boost*, *siege*, *hardships*, *unconditional*, and *overjoyed* in a social studies unit titled "Grant Leads the Union."

With classroom time constraints, instruction must focus on affixes used most frequently. Baumann et al. (2002) created a list of eight frequently occurring affix families based on 14 published lists, teaching these families in twelve 50-minute lessons. These families include prefixes with similar meanings but different spellings. See Table 1 re-created from Baumann et al. with example words and frequency indexes added.

A similar suffix table, Table 2, has been created by combining frequency indexes (Carroll et al., 1971; Zeno et al., 1995) and suffixes used in intervention studies (Arnbak & Elbro, 2000; Berninger et al., 2003; Lovett et al., 2000; Lyster, 2002).

Providing students with a system for affix use is also important. Baumann et al. (2003) suggested a word-part strategy that involves identifying the meaning of the root, prefix, and suffix and then putting the meanings together to get the whole word's meaning. We have created a mnemonic, PQRST, with a reference poster and bookmark to help students remember this system. See Figure 1 for an example. In this mnemonic,

Table 1 Eight Frequently Occurring Prefix Families Based on Baumann et al. (2002)

Family	Prefixes	Example words	Frequency*
Not family	dis (not, opposite, reversal) un (not) in (not) im (not) a (not)	disloyalty, dissimilar unappetizing, unfortunate inactive, inadvertent improper, impure amoral, apathy	High
Number family	mono (one) bi (two) semi (half, partly)	monorail, monotone bilingual, biannual semicircle, semiformal	Medium
Below or part family	sub (below, part of) under (below, not enough)	subset, submerge underweight, underdone	Medium
Again and remove family	re (again) de (remove, reverse)	retell, reconsider, redo decode, deductive	High
Before and after family	pre (before) post (after)	preshrunk, preview postgraduate, postwar	Medium
Against family	anti (against, stopping) counter (against, opposite)	antifreeze, antisocial counterattack, countermeasures	Medium
Excess family	over (too many or much) super (more, better, highest) out (better, more than)	overpopulation, overflow superhighway, superheated outrun, outlandish	Medium
Bad family	mis (bad, wrongly) mal (bad)	mistrust, mistreatment malnutrition, maladaptive	Medium

* Frequency of the prefix group based on Carroll et al. (1971) and Zeno et al. (1995).

- P = Prefix; find the prefix and identify its meaning
- QR = Queen Root; find the root (which is queen of the word) and identify its meaning
- S = Suffix; find the suffix and identify its meaning
- T = Total; put the meanings of the units together to gain the total word's meaning

PQRST is similar to "peeling off," which was used by Lovett et al. (2000) as a decoding strategy for children with severe reading disabilities. As part of a 70-hour intervention, Lovett et al. introduced up to 75 affixes by teaching one or two new affixes per day. These researchers used the analogy of a tree to help students understand affixes as leaves that can be peeled off the tree and its roots. A figure of a tree was created with prefixes as green leaves and suffixes as orange leaves. Students also developed the skill of identifying affixes by circling the affixes in words such as *fishing*, *taken*, *dropped*, *cooked*, *eaten*, *booking*, *timely*, *given*, *resell*, *consultant*,

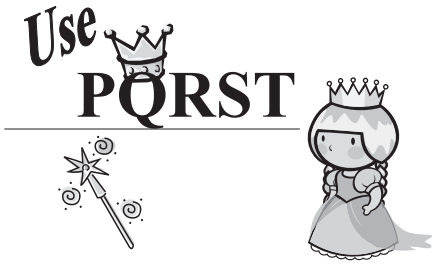
"Students explain how the word's meaning relates to the meaning of the root and affixes and also generate words with the same affix or root."

Table 2 Five Frequently Occurring Suffix Families

Family	Suffixes	Example words	Frequency*
Inflectional: Plural and tenses	s, es (plural) s (singular verb) ed (past tense) ing (present participle)	dogs, foxes runs, dances jumped, danced jumping, dancing, amazing	High
Inflectional: Comparative	er est	bigger, smarter biggest, smartest	Low
Derivational: Adverbs and agents	ly (adverb) er (agentive) or (agentive) ist (agentive)	friendly, completely washer, reporter creator, projector scientist, pianist	Medium
Derivational: Nouns	ion tion ition ness ment ity ic	education, creation addition, subtraction partition, apparition happiness, sickness judgment, announcement uppity, creativity chronic, toxic	Medium
Derivational: Adjectives	ible able al, ial ship ent ant ous y en ful less ish	edible, credible believable, reachable magical, judicial leadership, friendship different, absorbent important, hesitant nervous, ambitious juicy, healthy, salty golden, brighten hopeful, mouthful hopeless, harmless brownish, foolish	Medium

* Frequency of the suffix group based on Carroll et al. (1971) and Zeno et al. (1995).

Figure 1 Poster and Bookmark for Mnemonic PQRST



Prefix	Queen Root	Suffix	Total
un	friend	ly	unfriendly
in	cred	ible	incredible
re	tell	ing	retelling

pretended, *magnetic*, *completely*, *assistant*, *important*, and *pleasant*.

Strategy 3: Use Morphemes to Improve Spelling

Another popular morphological instructional strategy in the meta-analysis was teaching students to use morphemes to support spelling. Studies by Nunes and Bryant and colleagues (Bryant et al., 2006; Nunes et al., 2006) highlight how to link spelling instruction to morphemes. Working with fourth and fifth graders, Bryant and colleagues suggested that students sort words such as *education*, *institution*, *magician*, *technician*, *election*, and *electrician* into columns based on endings, discovering that *ion* is used for abstract nouns and *ian* is used for nouns that refer to animals or people.

Students should also sort words by ending sound to show the importance of meaning over sound in the spelling of the past tense morpheme, *ed*, which sounds like */t/* in *missed*, */d/* in *killed*, and */ed/* in *waited*. Students can also relate morphemes to spelling by segmenting words into morphemes such as *locks* (two morphemes: *lock* + *s*) versus *fox* (one morpheme) or *trees* (two morphemes *tree* + *s*) versus *freeze* (one morpheme). In this case, even though these words sound the same, their spelling differences relate to the plural morpheme *s*. Additional morphological spelling strategies include identifying the root of the word, which often has more accurate phoneme/grapheme correspondence, such as *electric* and *electricity*, or using the derived word to help spell the base in cases such as *muscle* and *muscular*, for which the closer phoneme/grapheme correspondence in the derived word makes spelling easier.

Strategy 4: Segment and Put Together Compound Words

Another strategy suggested by this group, although used in fewer studies, is instruction in segmenting and building compound words. Lovett et al. (2000) used this strategy to support word reading for second- through seventh-grade students with reading disabilities. The researchers taught students to identify words within compound words using "I-Spy." For example, to decode a word such as *raincoat*, dialogue similar to the following would occur: "Here is a long word. I Spy *rain*. I'll put a box around *rain*. Now I spy *coat*. So the whole word is *raincoat*. I used I Spy to figure out this word and it worked" (Lovett et al., 2000, p. 469).

These researchers also created worksheets on which students identified smaller words within compound words, putting a box around the smaller word. Examples of compound words included those with boy (*boyfriend*, *cowboy*, *bellboy*), those with red (*redcoat*, *redhead*, *redskin*, *redwood*), and random assortments such as *birthplace*, *daytime*, *blueberry*, *marketplace*, *birthday*, *clockwise*, *daydream*, *fireplace*, *daylight*, and *weekday*.

This strategy can be adapted for older, more advanced students by presenting more difficult words possibly related to a unit of study. Instead of identifying component words within compounds, students can analyze the relationship between the two words, produce their own examples of compound words, change the order of the component words, and also identify pseudomorphemic compound words (Arnbak & Elbro, 2000).

For example, in the word *basketball*, the student would identify *basket* and *ball* first, think about how a *basket* relates to a *ball*, and produce similar compound words such as *baseball* and *volleyball*. Students would then change the order of the word parts, such as *ballbasket*, and then discuss how this change in word order affects the meaning of the new compound word. Students could also discuss whether *football* is a true compound word or a pseudomorphemic example (e.g., a football is most often thrown, not kicked).

Strategy 5: Identifying Cognates for ELs

In looking at adaptations for ELs, we expanded our criteria beyond the studies in this sample because one of the requirements of the studies was that instruction and assessment occur in English. Cognate instruction emerged as an important support for ELs, so we include this strategy here. Cognate instruction provides a scaffold for students whose first language is not English by showing the relationship between root words in one's first language and unfamiliar words in English when these languages share historical roots.

By using cognates to decode the root of an unfamiliar English word, ELs can improve their grasp of English vocabulary as well as their reading comprehension. For example, Carlo and colleagues (2004) showed that teaching students to use cognates and morphological clues to infer word meaning resulted in improved vocabulary and reading comprehension scores for ELs compared with students in a control group.

Cognate instruction can occur orally—for example, through read-alouds—or through writing, during which students identify cognates in the texts they are reading and pair words that are similar in their native language and in English, identifying aspects of spelling and sound that change depending on the language (Carlo et al., 2010). In read-alouds, teachers can pause at an appropriate place such as the end of a paragraph or page and ask children to identify a word in the story that sounds or looks like a word in their own language. For example, teachers might highlight the following: "Look at *bicycle* in this sentence. That sounds kind of like *bicicleta* in Spanish. Do you think they might mean the same thing?"

As students improve cognate identification with teacher support, students then take more of a primary role in identifying cognates by circling those that they find in an English text (Nagy, Garcia, Durgunoglu, & Hancin-Bhatt, 1993). Teachers can develop this independence through cognate hunts, during which students hunt through a given passage, attempting to find a certain number of cognates. Students are also encouraged to find false cognates such as *pie*, which in Spanish means *foot*

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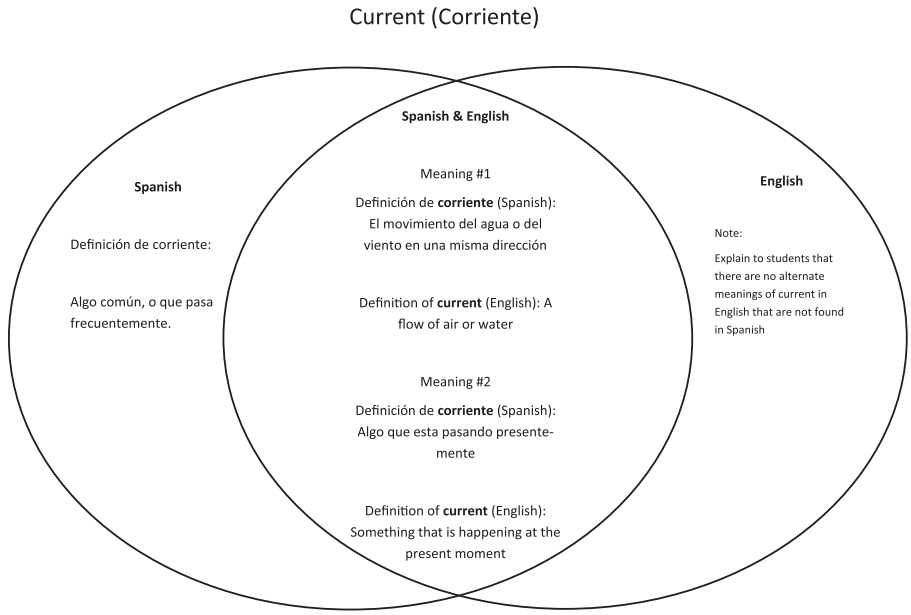
and in English means a baked dessert (Carlo et al., 2010). An important scaffold for beginning students completing this activity is to provide students with a hint of how many cognates and false cognates are in the passage.

To further develop the idea of multiple meanings and overlap, the use of Venn diagrams is suggested. In this activity, students are provided with a Venn diagram with one oval labeled *English* and the other oval labeled *Spanish*. The intersection is where students write meanings that are common to the word in both languages. For example, the word *mass* shares the scientific meaning in both English and Spanish and would therefore be written in the overlap area of the Venn diagram. Also, in English, *mass* has a religious meaning, which would be written in the English oval, whereas in Spanish, *mass* can mean a type of dough, which would be written in the Spanish oval. This is shown in greater detail with the word *current/corriente* in Figure 2.

Another useful strategy is for teachers to provide students with a list of common cognates or have the student find such words in a cognate dictionary such as *NTC's Dictionary of Spanish Cognates* (Nash, 1997). Similar cognate dictionaries or books that list English cognates of other languages exist for French, German, Russian, and so on and can be provided for

"The idea is to flexibly insert these important strategies into everyday instruction."

Figure 2 Venn Diagram for English and Spanish Words With Common Meanings



ELs, especially if the teacher does not speak the student's first language. For emergent and early readers still learning dictionary skills, a list of cognates is preferable to providing the entire cognate dictionary.

Discussion

On the basis of meta-analytic techniques, the current study synthesizes the results of 30 studies involving morphological instruction, calculating an overall moderate effect, which suggests the value of morphological instruction in improving literacy outcomes for school-age children. Given these results and the coding of instructional strategies across these 30 studies, five morphological instructional strategies are suggested and detailed. Teachers are encouraged to teach students to do the following:

1. Segment and build with morphemes.
2. Use affix and root meanings.
3. Use morphemes to improve spelling.
4. Segment and put together compound words.
5. Identify cognates to support ELs.

These strategies are not meant to be isolated or intensive, worksheet-focused interventions, but rather should be embedded in both language arts and content area instruction at various points throughout the year. Although these strategies stem from research-based interventions that are more concentrated, the idea is to flexibly insert these important, and often overlooked, strategies into everyday instruction to promote higher levels of morphological awareness that will feed into improved reading, vocabulary, and spelling outcomes.

This article has demonstrated why morphological knowledge is

important, determined the overall effect of morphological instruction, and identified key morphological instructional strategies for teachers to use within their classrooms. Results from this study show that students can be taught to apply morphological strategies to improve phonological and morphological awareness, decoding, spelling, and vocabulary skills. If instruction is implemented in a rigorous manner, students can also be taught to use morphological strategies to improve reading comprehension.

Analysis of instructional trends suggests five ways in which to increase morphological knowledge. In summary, this article provides classroom teachers with the instructional tools to improve morphological awareness, leading to enhanced overall literacy outcomes. As Nunes and colleagues (2006) suggested, "Some of the most important correspondences between spoken and written language are at the level of the morpheme.... The system of morphemes, therefore, is a powerful resource for those learning literacy"(p. 157).

Note

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TAKE ACTION!

1. Start highlighting relationships between words with similar roots or affixes.

2. Create cards with affixed words. Have students cut the cards into units of meaning and determine the meaning of the word. Next have students use the affixes and roots to create their own words.

3. Learn a root or an affix each day. Relate the root or affix to other words with the same root or affix.

4. Choose a root word that relates to a topic of study in your class. Have students find as many words as they can with that root and share the meaning with the class, both words with affixes and compound words.

5. Encourage students to be "word detectives" when reading and break unknown words into units of meaning to detect their meanings.

6. Highlight and discuss cognates that your ELs may know from their native language.

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MORE TO EXPLORE

ReadWriteThink.org Lesson Plans

- "Flip-a-Chip: Examining Affixes and Roots to Build Vocabulary" by Lee Mountain
- "Improve Comprehension: A Word Game Using Root Words and Affixes" by Loraine Woodard

IRA Journal Articles

- "Breaking Down Words to Build Meaning: Morphology, Vocabulary, and Reading Comprehension in the Urban Classroom" by Michael J. Kieffer and Nonie K. Lesaux, *The Reading Teacher*, October 2007
- "Interactive Frames for Vocabulary Growth and Word Consciousness" by Rod Winters, *The Reading Teacher*, May 2009

Supporting Information

Additional supporting information may be found in the online version of this article:

Research Supplement: Study Details.