A Review of Morphological Analysis Strategies on Vocabulary Outcomes with ELLs

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In this article, the literature on instruction in morphological analysis strategies with English Language Learners (ELLs) is reviewed to identify vocabulary outcomes for these students. The nature of instruction and quality of outcomes are examined for ELLs in general, and also for those with or at risk of reading disabilities. A total of nine studies met inclusion criteria for this review. While preliminary, results suggest that morphological analysis strategies are a promising approach to improving the vocabulary knowledge of ELLs, including those with or at risk of reading disabilities. Future research in this area is worth exploring, and several directions are provided.

Although much is known about the importance of vocabulary knowledge from over 100 years of research (Graves & Silverman, 2011), in practice, vocabulary instruction has historically not been prioritized (Roser & Juel, 1982; Scott, Jamieson-Noel, & Asselin, 2003; Watts, 1995). The relation between vocabulary knowledge and reading comprehension can be regarded as reciprocal, such that as students learn more words their comprehension is better facilitated; hence, successful comprehension may lead to wider reading and increased opportunities for learning new words (Lesaux, Kieffer, Faller, & Kelley, 2010; Stanovich, 1986).

For readers with underdeveloped vocabulary knowledge, incidental vocabulary learning during reading is an inherently unreliable source of new word knowledge (Kuhn & Stahl, 1998). Differences in vocabulary knowledge and reading proficiency between native English speakers and English language learners (ELLs) have been shown to increase over time (Kieffer, 2008) suggesting that strategic vocabulary support may be necessary for ELLs to read proficiently in English. Morphological analysis broadly refers to the understanding of word structure as involving combinations of meaningful units known as morphemes (Kieffer & Lesaux, 2008). To this end, instruction in morphological analysis is one way that ELLs can learn new words by analyzing their component parts to infer overall word meaning, and comparing that inference to a word's context. If successful, morphological analysis strategies could facilitate independent word

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learning for these students. The primary goal of this review is to identify whether morphological analysis strategies, which can be used independently during reading, can increase the English vocabulary knowledge of ELLs.

English Language Learners in the United States

English language learners (ELLs) are the fastest growing student subgroup in U.S. schools (Cheung & Slavin, 2012). By definition, these school-aged students have home languages other than English and range in both exposure to and proficiency in English. For example, some ELLs require support with the basic, introductory elements of English communication, whereas other ELLs speak English fluently but need to develop academic English skills in reading and writing. ELLs are thus an inherently diverse group of students with respect to not only English proficiency, but also various combinations of native languages, prior educational experiences, and the typical host of individual differences common to all students in general (Helman, 2009).

In the 2013-14 school year, ELLs comprised approximately 9% of all U.S. students and this percentage is expected to grow to 25% by the year 2030 (Cheung & Slavin, 2012). While the ELL population continues to increase, schools consistently struggle to meet their unique language and literacy needs. In general, ELL students do not perform at the same level of reading performance as their non-ELL peers despite successful early intervention and improvements in oral English over time (August & Shanahan, 2006; Quiroga, Lemos-Britton, Mostafapour, Abbott, & Berninger, 2002; Snow & Biancarosa, 2003). Results from the National Assessment of Educational Progress (NAEP) indicate that 68% of fourth-grade ELLs and 71% of eighth grade ELLs read below a basic level compared to 27% and 21% of fourth and eighth grade native English speakers (NAEP; 2016). Unlike their native English-speaking peers, many ELLs must learn to read in English while still learning the language. Without appropriate language and literacy instruction for these students, ELLs may experience unnecessary reading difficulties or be inappropriately identified as having disabilities (Sullivan, 2011).

ELLs and Vocabulary Knowledge

While English reading may require varied and enhanced instructional approaches with ELLs, one common academic area in need of development with these students includes English vocabulary knowledge. As can be expected, English word knowledge among many ELLs is significantly underdeveloped compared to that of native English speakers, and this has been confirmed across elementary, middle school, and secondary levels of education (Manis, Lindsey, & Bailey, 2004; Proctor, Carlo, August, & Snow, 2005; Swanson, Saez, & Gerber, 2006). As ELLs learn the structure of oral English and how it is read, an ongoing and significant component of their English literacy development relies on establishing sufficient vocabulary knowledge over time.

Vocabulary knowledge has been shown to develop similarly across students with low, average, or high total vocabularies (Biemiller & Slonim, 2001). Researchers have estimated that students must acquire between 1,000-2,000 root word meanings annually to make average gains (Biemiller, 2005; Nagy & Scott, 2001). Researchers have also observed that elementary students with varying vocabulary sizes typically learn new root words in the same sequence, such that the degree to which root words are known across grades occurs in an ordered fashion (Biemiller, 2005, 2011). For ELLs, the same developmental sequence has been observed although the average percentage of known words is typically lower. For example, in one study, fifth grade ELLs demonstrated the same sized vocabularies as normative third grade students (Biemiller, 2005).

Vocabulary Knowledge and Reading Comprehension

Vocabulary knowledge is strongly associated with reading proficiency and can be considered a necessary albeit insufficient component of reading comprehension. For many students who demonstrate sufficient decoding skills, low vocabulary knowledge has been observed to be a primary source of comprehension interference (Chall, Jacobs, & Baldwin, 1990). Children's vocabulary knowledge in kindergarten and first grade has predicted reading comprehension in grades three and four (Scarborough, 2001) and older elementary students have been observed to decode more words than they can understand (Biemiller, 2005). While problems with reading comprehension can involve multiple processes including working memory, sentence and discourse-level processes, and reading exposure (Cain & Oakhill, 2009), all reading begins at the word level and is supported by language comprehension. For these reasons, ELLs may demonstrate an uneven foundation from which to develop the types of inferencing skills necessary for English reading comprehension.

Vocabulary and Text Complexity

As ELLs and native English speakers develop their English vocabularies, school texts also become increasingly complex. In lower grades, high frequency words comprise the majority of early elementary texts but are subsequently replaced with increasingly esoteric, multi-syllabic, and morphologically complex words in higher grades (Anglin, 1993; Cummins, 2007; Nagy & Anderson, 1984). In general, students are expected to "learn to read" until grade three, and thereafter "read to learn." This progression relies on sufficient vocabulary knowledge to access grade-level texts, and as evidenced by what is commonly known as the "fourth grade slump" (Chall et al., 1990), many students with typical word reading skills begin to struggle to comprehend texts during and after this time. Chall and Conrad (1991) found that many students at the end of elementary school did not have sufficient vocabularies to comprehend typical junior high and high school material.

Vocabulary Instruction and Strategies

Given the vocabulary demands inherent in learning a new language and comprehending increasingly complex texts, the provision of vocabulary instruction for ELLs is an important educational consideration. To this end, much of the vocabulary instruction in early grades relies on word exposure and direct instruction during oral story telling because students do not yet read independently (Biemiller & Boote, 2006). Thereafter, vocabulary instruction commonly shifts from an oral activity to direct text-based word instruction as students' reading skills improve. Biemiller (2011) recommended that this instruction include direct teaching of word meanings that are (1) critical for comprehension of the text, and (2) high priority general vocabulary words. Beginning in upper elementary grades, direct vocabulary instruction is still necessary for some of these words, but the instructional focus can shift to emphasize students' own abilities to determine novel word meanings.

ELLs likely will encounter unknown words in grade-level texts, and to assist them in keeping pace with increased textual demands, the extent to which strategies for deciphering unknown words are effective merits attention. Strategies are broadly defined as procedures for completing academic tasks that enable students to learn or solve problems independently; in essence, strategy instruction involves teaching students *how* to learn or perform a task as opposed to teaching specific content (Pressley & Harris, 1990; Schumaker & Deshler, 1984). These procedures are explicitly taught to students, including how and when they should be applied; thereafter, control in implementing the strategy is transferred to the student (Deshler, Alley, Warner, & Schumaker, 1981). In the case of word learning, vocabulary strategies are a potentially powerful approach to broadening the contexts in which ELLs learn new words, provided that students can read somewhat independently and identify unknown words.

Vocabulary Knowledge and Morphological Awareness

Vocabulary strategies that focus on morphological awareness are compelling approaches to fostering this type of strategic and generative word learning (Graves, 2006; Stahl & Nagy, 2006). Both morphological knowledge and morphological awareness rely on knowledge of morphemes, which are the smallest units of meaning in a language and can be either freestanding words (e.g., *tough*) or linguistic units attached to these words (e.g., *-er* in *tougher*; Carlisle, 2010). Morphological knowledge includes explicit understanding of a root word's meaning (Pacheco & Goodwin, 2013) whereas morphological awareness includes a more sophisticated recognition, analysis, and manipulation of morphemic elements in words (Carlisle, 2010). Morphological awareness skills allow students to detect differences in meaning across words that share a common root but different affixes (e.g., *help, helpful, helpless, unhelpful*).

Many studies suggest the importance of morphological awareness in vocabulary acquisition, instruction, and overall reading proficiency (Carlisle, 2010; Graves, 2006; Katz & Carlisle, 2009; McBride-Chang, Wagner, Muse, Chow, & Shu, 2005; Stahl & Nagy, 2006). Wagner, Muse, and Tannenbaum (2007) found that fourth graders' morphological awareness was highly correlated with both vocabulary knowledge (r = 0.91) and reading comprehension (r = 0.86). Particularly important for ELLs, students have been found to use morphological awareness strategies to decipher an average of three additional words for each new word meaning learned (Nagy & Anderson, 1984). Given the focus on linguistic awareness to infer word meanings, morphological awareness can extend to both academic *and* content vocabulary, which is particularly critical for ELLs given their typically underdeveloped English vocabulary knowledge and increasingly difficult grade-level texts (Pacheco & Goodwin, 2013). Even without explicit instruction, researchers have observed that students naturally problem solve unknown words by relying on morphological awareness strategies (e.g., Anglin, 1993).

Morphological Analysis Strategies to Promote Vocabulary Knowledge

For these reasons, strategy instruction in morphological awareness (referred to hereafter as morphological analysis) with ELLs appears an important and intuitive approach to improving the vocabulary knowledge and general agency of ELLs to independently learn new words. As mentioned, instruction in morphological awareness is in the beginning stages of research; however, several syntheses on morphological analysis exist with native English speakers for initial guidance (Bowers & Kirby, 2010; Carlisle 2010; Goodwin & Ahn, 2010; Reed 2008). To our knowledge, no such reviews exist with ELLs and, in general, very few individual studies address morphological analysis instruction with ELLs.

Therefore, the purpose of this review is to identify the state of knowledge regarding the use and effectiveness of morphological analysis strategies to improve the English vocabulary knowledge of ELLs. Given that many ELLs also experience difficulty in English reading, particular attention will be paid to ELLs with or at risk of reading disabilities.

Method

To locate articles for this review, several electronic databases were searched including ERIC, Academic Search Premier, Psych Info, Digital Dissertations, and Google Scholar. Participant descriptors (*English language learners, ELL, English as a second language, ESL, limited English proficiency, LEP, English learners, EL, linguistically diverse*) were used in combination with the following key words: *morph** and *awareness, instruction, strategies,* and *analysis.* Ancestral searches were also conducted based on relevant citations from studies.

Peer-reviewed studies that implemented morphological awareness strategy instruction with ELLs were included. Due to the relatively small research base in this area with ELLs, dissertations were also included as were two studies without ELLs that formed the basis for two later studies with ELLs. If studies included morphological awareness instruction with ELLs but did not explicitly focus on morphological awareness as an instructional strategy, they were still included for further insight. To meet inclusion criteria, studies needed to include (a) morphological awareness instruction and a measure of vocabulary knowledge, (b) an experimental design, quasi-experimental design with a control group, or single subject design with at least one effect replication, and (c) participants in grades K-12. All studies needed to be written and conducted in English. One study (Diaz, 2009) was excluded due to unclear description of the independent variable such that it was impossible to discern whether a morphological awareness strategy was examined.

Literature Review

A total of nine studies were located for this review. In the following section, studies are grouped based on the nature of the morphological awareness instruction examined. In this manner, studies were grouped in one of three ways: (1) morphological awareness instruction only, (2) morphological plus context analysis instruction, and (3) multi-component vocabulary instruction that included a morphological awareness component. Within each group, descriptions of the study, outcomes, and the type of instruction examined are provided.

Group One: Morphological Awareness Instruction Only

Group One studies contain three studies that examined the effects of morphological awareness instruction in isolation on word knowledge, or combined with instruction but compared to instruction without a morphological awareness component. These studies explored whether morphological awareness instruction alone improved word knowledge compared to other types of vocabulary instruction (Filippini, Gerber, & Leafstedt; 2012), in combination with comprehension instruction (Goodwin, 2016) or whether morphological analysis strategy instruction alone could be used to learn new words (Davidson, 2014). All studies included ELL participants.

The study by Filippini et al. (2012) used a repeated measures pre-post design to explore the effects of two vocabulary conditions that included either morphological analysis or instruction on semantic features to a treatment control condition of phonological awareness. Researchers examined each condition using measures of target vocabulary and phonological decoding. Participants included 71 ELLs in first grade with many at risk of reading difficulty as noted by the researchers. Participants completed 15-min sessions four times weekly for eight weeks. Vocabulary dependent measures included target word assessments

at pre and posttest that required participants to identify statements as true or false based on knowledge of target vocabulary. Analysis of variance (ANOVA) indicated no statistically significant between-group differences on main effects of instruction across dependent variables. Within-group effect sizes on target vocabulary, though not statistically significant, were largest for the morphological awareness-only condition.

Morphological awareness instruction in this study involved explicit instruction in identifying root words and identification of inflectional and derivational suffixes. Participants practiced combining roots and suffixes into real words using games where teachers highlighted morphological components such as how the same suffix changed the meaning of different root words. Morphological awareness was neither taught nor practiced as an instructional strategy, however. Instruction in semantic features focused on grouping words according to meaning, such as through picture sorts, and on comparing and contrasting concepts and minimally contrastive word elements. Instruction in the treatment-control condition included explicit teaching on the identification, production, and manipulation of sounds in word- and sentence-level decoding.

In the study by Goodwin (2016), a matched pairs design was used to compare a comprehension strategy with and without morphological awareness instruction to see if the combined condition was more effective in general, and differentially effective for participants with different levels of English literacy skills. Participants included 203 fifth and sixth grade students, of whom 28 were ELL and 46 spoke a language other than English at home. Participants completed four sessions of either the treatment or control condition. Vocabulary measures included two researcher-created assessments of multiple choice receptive vocabulary and self-perceived vocabulary knowledge. Comprehension assessments included cloze and sentence verification tasks plus a morphological assessment.

Results of multilevel analyses indicate that, across all participants, the addition of morphological awareness instruction made moderate improvements to vocabulary knowledge across both measures (g = 0.41 multiple choice, g = 0.47 self-perceived) and the production of morphologically-related words. Results were not differentially effective for different types of students, except on measures of self-perceived vocabulary knowledge and production of morphologically-related words. For students with varying pretest levels on these outcomes, the intervention was differentially supportive, as it was for students from different language backgrounds on their production of morphologically-related words.

Instruction in morphological awareness was embedded in comprehension strategy instruction and compared to a comprehension-only control. Instruction in morphological analysis included a strategy for solving unfamiliar

words by identifying, defining, summing morphemes within words and then comparing to a story's context for confirmation. This strategy was modeled and practiced in the treatment condition, combined with comprehension instruction that included several components such as word instruction within text, shared and independent reading, visuals, and the guided-release model.

The study by Davidson (2014) used a multiple baseline design to examine morphological analysis strategy instruction to learn the meaning of unknown words. Participants included nine ELLs in 4th and 5th grades with English language development levels of three, four, or five according to their state assessment; all participants demonstrated reading difficulty according to the Dynamic Indicators of Basic Early Literacy Skills oral reading fluency assessments (DIBELS; Good et al., 2011). In groups of three, participants completed ten 15-min daily sessions of explicit strategy instruction in morphological analysis until a functional relation was established. Vocabulary dependent measures included a researcher-created receptive vocabulary measure on taught and transfer words that required participants to complete multiple-choice questions about correct definitions for morphologically complex words. Results according to visual analysis indicate an immediate positive intervention effect across participants with improved vocabulary scores during treatment phases that showed increasing trends and low variability across participants. Intervention effect sizes were large and ranged from 1.83 to 1.96. Results generally maintained one and two weeks after the intervention.

Morphological analysis strategy instruction in this study included explicit instruction in morphemes, a rationale for their use, and explicit instruction and practice with four derivational suffixes. The researcher modeled how to use suffix knowledge to derive word meaning according to explicit strategy steps; definitions of base words were also addressed. Strategy steps and suffixes were reviewed in sessions while participants practiced the strategy independently. Low frequency, morphologically complex words were used so that participants could apply morphological analysis to new, unknown words.

Summary of Group One Studies. Results from Group One studies provide preliminary evidence that instruction in morphological awareness alone improves word knowledge when taught and implemented as an instructional strategy (Davidson, 2014) and in combination with comprehension strategy instruction (Goodwin, 2016) but not without strategy instruction (Filippini et al., 2012). This inference is tentative, however, due to the exploratory nature of the study by Filippini et al. (2012) that had a small sample size, significant variability within the sample, and attrition that may have produced threats to internal validity that preclude instructional inferences. All studies, however, demonstrated positive gains for ELLs identified as at risk for reading difficulty (Filippini et al., 2012; Goodwin, 2016) or who demonstrate reading difficulty

(Davidson, 2014). To this end, Group One studies provide preliminary insight that suggests morphological awareness strategy instruction in isolation may be effective in improving word learning outcomes for ELLs with reading difficulty.

Group Two: Combined Morphological and Context Analysis Instruction

Group Two contains four studies that examined morphological analysis instruction in combination with context analysis. The purpose of this approach was to provide students with strategies to learn the meanings of unknown words encountered in text (Baumann, Edwards, Boland, Olejnik, & Kame'enui, 2003; Baumann, Edwards, Font, Tereshinski, Kame'enui, & Olejnik, 2002; Deng 2016) and to improve science vocabulary acquisition (Helman, Calhoon, & Kern, 2015). Two studies (Baumann et al., 2002, 2003) did not have ELL participants but were included for their comprehensive instructional approaches and methodological quality. Studies by Deng (2016) and Helman et al. (2015) employed intentionally similar instruction to studies by Baumann and colleagues (2002, 2003) but with ELL participants.

In Baumann et al. (2002), a quasi-experimental pre-post design with three treatment groups that included morphological analysis only, context analysis only, and combined morphological and context analysis were compared to a control condition of typical classroom instruction. Participants included 88 fifth graders across four classrooms that completed twelve 50-min sessions in treatment conditions. Vocabulary dependent measures included tests of recognition and production of instructional words from each condition, plus transfer words. Delayed recognition tests of instructional and transfer words were also included, as were transfer comprehension passages.

Results indicated that participants learned the instructional strategies and words taught within their respective treatment groups. One important finding is that participants in the morphological analysis conditions with or without context analysis outperformed context-only and control conditions on immediate production and recognition of transfer words not included in instruction. There were no significant effects on measures of comprehension or delayed transfer, however.

Morphological analysis instruction had two variations in this study. In the morphological analysis only group, instruction focused on teaching one of eight common prefixes per session (e.g., *-un*, *-im*, and *–in*). Instruction was structured using an introduction, explicit teaching component, practice, and cumulative review. The context analysis only group used the same format to teach five different types of context clues, such as synonyms or appositives. The combined condition used identical instruction but participants completed fewer examples across sessions.

In the second study by Baumann et al. (2003), a quasi-experimental design with matched classrooms was used to randomly assign classrooms to one

of two treatments: textbook vocabulary instruction or a morphological plus context analysis condition. Participants included 157 fifth graders across four classrooms per condition who completed thirty-three 15-min sessions of instruction embedded in social studies content. Vocabulary dependent measures included immediate and delayed vocabulary assessments on the use of treatment strategies in context, and textbook and word part production.

Results indicate that treatment groups did not differ on the immediate context vocabulary test; however, participants in the morphological plus context analysis condition scored statistically significantly higher on the delayed context vocabulary test of morphologically distinguishable transfer words. Groups did not differ on comprehension measures of chapter tests or passage comprehension.

Morphological analysis instruction in this study the same combined morphological and context analysis approach as in Baumann et al. (2002). In the comparison condition, vocabulary instruction included compare and contrast, prediction and confirmation, semantic maps, and examples and non-examples of words. Words used in both conditions were drawn from passages in participants' social studies textbooks.

In the study by Deng (2016), a multiple baseline design across participants was used to examine a self-regulated word learning strategy of morphological plus context analysis. Participants included nine ELL students across grades 3-5, with English language proficiency levels ranging 3-5 according to state assessments. Participants completed baseline, intervention, and maintenance sessions in three participant groupings. Vocabulary dependent measures included session assessments of 10 instructional and transfer words. Session vocabulary knowledge results according to visual analysis indicate that all participants increased word knowledge during intervention phases and the percentage of non-overlapping data was high for most participants (range = 57% to 100%).

The combined instruction in morphological plus context analysis in this study was modeled after the combined conditions in Baumann et al. (2002, 2003) but extended with additional self-regulated strategies related to goal setting, self-monitoring, and review with feedback. Vocabulary words included common academic words from large semantic families for the purpose of morphological analysis instruction.

Helman et al. (2015) used another multiple baseline design across participants to examine combined morphological and context analysis instruction referred to as Clue Word Strategy (CWS). Participants included three ELLs with reading disabilities in 9th and 10th grades and state English proficiency levels at 3 or 4 who completed 45-min sessions three times weekly until reaching mastery. Vocabulary dependent measures included CWS probes that required participants to write and define science morphemes within an unknown word

and provide a definition. The Word Knowledge Test (WKT; Harris et al., 2011) similarly required participants to write definitions of science words.

CWS results according to visual analysis indicated immediate upward changes in level upon introduction of the intervention across participants. Performance in all intervention sessions was higher than in baseline; maintenance data also indicated that treatment gains generally maintained for two students and generalized to unknown tested words two months post intervention.

The context analysis component of the combined instruction was based on the framework used in Baumann (2002, 2003). Morphological analysis was also similar, but instead of reviewing common prefixes and suffixes during instructional sessions, these were reviewed together with root and morpheme instruction in six training sessions prior to instructional sessions. Similar to Deng (2016), the participants' application of the combined instructional strategy included cognitive strategy steps that were taught, practiced, and prompted throughout instructional sessions.

Summary of Group Two Studies. Important to the focus of this review, all Group Two studies provide evidence that morphological analysis in the form of word-learning strategies combined with context analysis improved participant word knowledge on tests of instructional and transfer words, with some improvement also indicated on delayed tests (Baumann et al., 2003; Deng, 2016; Helman et al., 2015). This improvement occurred with commonly encountered academic words (Baumann et al., 2002; Deng, 2016) or content-specific words (Baumann et al., 2003; Helman et al., 2015). By examining highly similar combined morphological and context analysis treatments, Group Two studies indicate that ELLs may benefit from instruction in morphological analysis strategies in similar ways to non-ELLs (Deng, 2016; Helman et al., 2015) and that older ELLs with reading disabilities can also improve vocabulary knowledge with this combined instruction (Helman et al., 2015). Researchers noted across studies that lower-performing students seemed to receive the most educational benefit although this was not quantified. All studies included measures of implementation fidelity and fidelity was observed to be sufficiently high.

Group Three Studies: Multi-Component Vocabulary Instruction that Includes Morphological Analysis

Group Three contains two studies that examined the effects of morphological analysis instruction embedded within comprehensive vocabulary interventions on participants' acquisition of academic vocabulary and comprehension. Vocabulary interventions included additional components such as the use of context clues, cognates, glossaries, and multiple word meanings to add depth to the vocabulary instruction. Both studies included ELL and non-ELL participants and offered comparisons between participants' responsiveness to the same instruction.

In the study by Carlo et al. (2004) a quasi-experimental design was used to compare a multi-component vocabulary intervention to typical instruction on acquisition of academic vocabulary. Participants included 254 ELL and non-ELL fifth graders in nine classrooms across four schools in California, Virginia, and Massachusetts. Participants completed 15 weeks of 30-45 min sessions that occurred five times weekly. Vocabulary dependent measures included the Peabody Picture Vocabulary Test Revised (PPVT-R; Dunn & Dunn, 2007), an assessment of polysemy production, a word mastery test of instructional vocabulary, and a word association task. Comprehension was assessed using multiple-choice cloze passages and a base morphology assessment.

Results of the study indicated that, in general, both ELL and non-ELL participants in the treatment condition performed better on measures of instructional vocabulary, the reading comprehension measure, but not the morphology assessment. The performance of ELL and non-ELL participants in the treatment group improved to equal degrees, although ELLs scored lower than non-ELLs on all measures.

The morphological analysis component of the vocabulary instruction occurred one out of every five instructional days. This instruction included either analysis of root words and derivational affixes, cognate instruction, or promotion of word polysemy awareness. No additional information about the morphological analysis instruction was provided, so it is unknown whether it was taught as a strategy. Within the multi-component vocabulary intervention, other instructional days addressed the use of audiotapes to support reading, context clues, cloze tasks, synonym/antonym tasks and semantic features analysis. Instructional words included general-purpose academic vocabulary encountered across content areas that would permit morphological and cognate analysis.

In the study by Lesaux, Kieffer, Faller, and Kelley (2010), a quasi-experimental design was used to examine the effectiveness of a text-based academic vocabulary intervention to promote reading comprehension. Participants included 476 sixth graders, the majority of whom were described as language minority learners. Treatment Participants completed 18 weeks of 45-min daily sessions. Vocabulary dependent measures included the Reading Vocabulary Subtest from the Stanford Achievement Test-10th Edition (Harcourt Educational Measurement, 1996), four researcher-created measures assessing target word mastery, word association, morphological awareness, and word meanings in context. Results indicate that statistically significant gains in favor of the treatment condition occurred for meanings of taught words, morphological awareness, and word meanings in context. Results for reading comprehension also favored the treatment condition on the reading comprehension subtest of the Gates-MacGinitie Reading Test (MacGinitie, MacGinitie, Maria, & Dreyer, 2000). The performance of language minority and native English speaking participants in

the treatment group improved to equal degrees, although language minority participants scored lower than native English participants on all measures.

The morphological analysis strategy component of the vocabulary intervention included explicit instruction in specific suffixes, word completion with suffixes, and practice opportunities to make and recognize word forms in writing. The practice opportunities were designed to guide participants in how to figure out unknown words using word parts, similar to strategy instruction. Additional instruction included context clues, definition creation, deep processing of words, drawing pictures of words, and answering questions. Eight or nine high-utility academic words were addressed every eight days.

Summary of Group Three Studies. Results from Group Three studies cannot indicate a direct effect of instruction in morphological awareness on word knowledge given that it was one of several components combined within vocabulary interventions (Carlo et al., 2004; Lesaux et al., 2010). However, results suggest that ELLs can improve to the same extent as non-ELLs in response to multi-faceted, extended vocabulary interventions in terms of their vocabulary knowledge and comprehension. Of note, modest comprehension gains were demonstrated in Group Three studies; however, in the study by Carlo and colleagues (2004) these gains might be attributable to the use of instructional words in the multiple-choice comprehension cloze measure, thus assessing words learned instead of reading comprehension. Specific inferences about the effectiveness of morphological strategy instruction with ELLs with or at risk of reading disabilities cannot be inferred; however, Carlo and colleagues (2004) noted that the mean comprehension pretest score was at the 35th percentile, suggesting that many participants experienced reading difficulty within the sample.

Discussion

The purpose of this review was to identify the state of knowledge regarding the use and effectiveness of morphological analysis strategies to improve the English vocabulary knowledge of ELLs, with particular attention to ELLs with or at risk of reading disabilities. Group One studies examined morphological analysis instruction in isolation with ELLs (Davidson, 2014; Filippini et al., 2012; Goodwin, 2016). Group Two studies examined similarly combined morphological and context analysis strategies in two studies with native English speakers (Baumann et al., 2002, 2003) and two studies with ELLs (Deng 2016; Helman et al., 2015). Group Three studies examined multi-component vocabulary interventions that included morphological analysis strategy outcomes for both ELLs and native English speakers (Carlo et al., 2004; Lesaux et al., 2010). In this section, the outcomes and characteristics of morphological analysis strategies and ELL participants are synthesized. Limitations of the review and future directions for research are provided.

Vocabulary Outcomes of Morphological Analysis Strategies

While this review is limited by the small number of studies identified that examined strategy instruction in morphological analysis with ELLs, results from eight of nine studies indicated vocabulary gains in response to morphological analysis instruction with ELLs. These converging results provide preliminary support for the notion that instruction in morphological analysis is a promising vocabulary word-learning strategy for ELLs.

In considering vocabulary outcomes, it is important to note the measures used to assess word learning. Within this review, all studies used vocabulary measures of instructional words that were created by researchers; several studies also included morphologically similar transfer word assessments (Baumann et al., 2002, 2003; Davidson, 2014; Deng, 2016; Helman et al., 2015). While these types of measures are necessary to detect growth in response to specific instruction in morphological analysis, the non-transfer assessments are proximal in nature; furthermore, researcher-created measures tend to produce larger effect sizes (Edmonds et al., 2009). For these reasons, it is important to interpret vocabulary results cautiously; however, there is reason for optimism given the consistency of word learning outcomes across treatment conditions.

Over half of the studies included a standardized measure of vocabulary knowledge (Carlo et al., 2004; Davidson, 2014; Deng, 2016; Lesaux et al., 2010; Filippinni et al., 2012). No significant vocabulary gains were observed on these measures. This may be because studies were not of long or intense enough duration for changes to occur on standardized measures, or, it might also suggest that outcomes of morphological analysis strategies do not robustly impact overall vocabulary knowledge as captured by these measures.

Seven studies also included a comprehension assessment (Baumann et al., 2002, 2003; Carlo et al., 2004; Davidson, 2014; Deng, 2016; Goodwin, 2016; Lesaux et al., 2010). Similar to outcomes on standardized vocabulary assessments, only slight comprehension gains were observed for two studies (Carlo et al., 2004; Lesaux et al., 2010). Both of these studies emphasized multi-faceted vocabulary instruction of longer duration and with more participants compared to other studies in this review. Results may indicate that vocabulary knowledge as a result of specific morphological analysis strategies does not directly influence reading comprehension on its own, or at least as assessed in this review, or that not enough time had passed for these effects to be observed.

Characteristics of Reviewed Morphological Analysis Strategies

Across studies, the most common type of instruction was a combined form of morphological and context analysis strategies (Baumann 2002, 2003; Deng, 2016; Helman et al., 2015). This type of instruction is likely advantageous in that it provides readers two options to improve word knowledge, both of which bring increased attention to a text. While context analysis alone has

produced mixed results, particularly for struggling readers (no such studies were included in this review), in combination with morphological analysis it provides a more comprehensive and possibly more reliable way to infer word meanings.

Whether combined with other strategies or implemented in isolation, the most common characteristics of morphological analysis instruction in this review included explicit instruction on common suffixes and root words. This feature was observed across all studies except one (Goodwin, 2016), and seven studies (Baumann et al., 2002, 2003; Davidson, 2014; Deng, 2016; Goodwin, 2016; Helman et al., 2015; Lesaux et al., 2010) also provided guided instruction within a strategy framework on how to apply this knowledge to new words. Given the converging positive outcomes for word knowledge from studies that used this approach, the potential of morphological analysis to serve as a generative word-learning strategy over time appears promising with ELLs.

Within reviewed studies, the most common types of words addressed were everyday academic words that occurred across content areas. These words were also amenable to morphological analysis in order to infer word meanings. This characteristic is important to facilitating the practice and application of morphological awareness strategies, although it should be noted that no studies addressed how to distinguish and problem-solve words that are not amenable to this approach. This is likely due to the early stage of research in morphological analysis instruction; however, for research purposes, it should also be confirmed whether assessment words are truly unknown by participants.

Review of Implications for ELLs with or at Risk of Reading Disabilities

Several studies within this review included ELLs who either experienced reading difficulty (Carlo et al., 2004; Davidson, 2014; Filippinni et al., 2012; Goodwin, 2016) or who were identified with disabilities (Helman et al., 2015). Important to the focus of this review, results of morphological analysis strategies with these students appeared similarly promising, with some researchers noting anecdotally that this type of instruction seemed even more beneficial for lower-performing students. Group Three studies did not include ELLs with identified disabilities; however, results from this group suggest that ELLs respond similarly to intensive vocabulary instruction that includes a morphological analysis component. While not included in this review, several studies indicate that native English speakers with reading disabilities can improve their word knowledge in response to instruction in morphological analysis (Goodwin & Ahn, 2010; Harris, Schumaker, & Deshler, 2011). By extension, it appears reasonable that this outcome may also occur for ELLs with reading disabilities. The inherent variability of ELLs and students with reading disabilities warrants caution in making this assumption; however, results of this review suggest that it may be a fruitful approach worth examining in future studies with these students.

Review Limitations

Although the focus of this review was specific to vocabulary knowledge outcomes of morphological analysis strategies, it should be noted that this type of instruction also likely affects orthographic and phonological skills. These outcomes were not examined with ELLs in this review although they may contribute to both improved word knowledge and reading comprehension (Carlisle, McBride-Chang, Nagy, & Nunes, 2010). Therefore, it is a limitation that these outcomes were not assessed for their potential contribution to the dependent variable of interest within this review.

Studies that were not conducted in English but met all other inclusion criteria were still excluded from this review. These studies might have provided additional insight regarding vocabulary outcomes of instruction in morphological analysis; however, whether and to what extent generalizations can be made across languages likely depends on the type of language in comparison to English. Because insight could be gained from such comparisons, exclusion of non-English studies is a limitation of this review.

Future Research in Morphological Analysis Strategy Instruction with ELLs

Several specific suggestions for future research emerged from this review. Given the relatively nascent research base, future studies should comprehensively examine outcomes using immediate and delayed assessments of both instructional and transfer words similar to studies by Baumann and colleagues (2002, 2003). The inclusion of transfer words would help detect possible variability in outcomes across different types of morphological strategy instruction, and further indicate whether students learn new words resulting from transfer.

As previously noted, in addition to researcher-created assessments of instructional and transfer vocabulary words, future studies should also include standardized measures of vocabulary to further monitor whether these results change over longer periods of time, with more participants, or in response to different types of morphological analysis instruction. Future studies should also bolster morphological analysis instruction by embedding its practice and application within explicit strategy frameworks to promote successful transfer to new words.

While knowledge of affixes is helpful to developing skills in morphological analysis, it is likely only helpful in so far as root and base words are known to students. To this end, future research should examine whether teaching more root and base words than observed in this review is additionally helpful in facilitating morphological analysis. Further insight could also be gained by comparing outcomes of morphological awareness measures to outcomes of word knowledge measures to better ascertain the nature of this relationship within specific intervention contexts.

Last, future studies should examine whether outcomes of morphological analysis strategies differ across ELLs of varying English proficiency levels. Future research is also needed to pinpoint when instruction in morphological analysis should occur in relation to participant English proficiency levels, ages, or English reading ability. As previously mentioned, it is also important to include ELLs with disabilities as participants in future studies.

Conclusion

Given the relatively small research base in this area, results of this review are primarily intended to provide guidance for future research; however, outcomes of this review suggest that morphological strategy instruction may be a promising approach to improving the vocabulary knowledge of ELLs, including ELLs with or at risk for reading disabilities. Future research in this area is encouraged and may be one approach to providing better instruction for students who are academically diverse learners.

References

Anglin, J. M. (1993). *Vocabulary development: A morphological analysis.* Monographs of the Society for Research in Child Development, 58(10), Serial # 238.

August, D., & Shanahan, L. (2006). *Developing literacy in second-language learners: Report of the National Literacy Panel on language, minority children and youth.* Washington, DC: Lawrence Erlbaum Associates.

Baumann, J. F., Edwards, E. C., Boland, E. M., Olejnik, S., & Kame'enui, E. J. (2003). Vocabulary tricks: Effects of instruction in morphology and context on fifth-grade students' ability to derive and infer word meanings. *American Educational Research Journal, 40*(2), 447-494.

Baumann, J. F., Edwards, E. C., Font, G., Tereshinski, C. A., Kame'enui, E. J., & Olejnik, S. (2002). Teaching morphemic and contextual analysis to fifth-grade students. *Reading Research Quarterly*, *37*(2), 150-176.

Biemiller, A., & Boote, C. (2006). An effective method for building meaning vocabulary in primary grades. *Journal of Educational Psychology, 98*(1), 44-62.

Biemiller, A., & Slonim, N. (2001). Estimating root word vocabulary growth in normative and advantaged populations: Evidence for a common sequence of vocabulary acquisition. *Journal of Educational Psychology, 93*(3), 498-520.

Biemiller, A., (2005). Addressing developmental patterns in vocabulary: Implications for choosing words for primary grade vocabulary instruction. In E.H. Hiebert & M. Kamil (Eds), *Bringing scientific research to practice: Vocabulary* (pp. 223-242). Mahwah, NJ: Erlbaum.

Biemiller, A., (2011). Vocabulary development and implications for reading problems. In A. McGill Franzen, R. Allington (Eds.), *Handbook of reading disability research* (pp. 208-218). New York, NY: Routledge.

Bowers, P. N., & Kirby, J. R. (2010). Effects of morphological instruction on vocabulary acquisition. *Reading and Writing: An Interdisciplinary Journal, 23*(5), 515-537.

Cain, K., & Oakhill, J. (2009). Reading comprehension development from 8 to 14 years: The contribution of component skills and processes. In R.K. Wagner, C. Schatschneider, & C. Phythian-Sence (Eds.), *Beyond decoding: The behavioral and biological foundations of reading comprehension* (pp. 143-175). New York, NY: Guilford.

Carlisle, J. F. (2010). Review of research: Effects of instruction in morphological awareness on literacy achievement--an integrative review. *Reading Research Quarterly, 45*(4), 464-487.

Carlisle, J. F., Mcbride-Chang, C., Nagy, W., & Nunes, T. (2010). Effects of instruction in morphological awareness on literacy achievement: An integrative review. *Reading Research Quarterly, 45*(4), 464–487.

Carlo, M. S., August, D., McLaughlin, B., Snow, C. E., Dressler, C., Lippman, D. N., . . . White, C. E. (2004). Closing the gap: Addressing the vocabulary needs of English-language learners in bilingual and mainstream classrooms. *Reading Research Quarterly, 39*(2), 188-215.

Chall, J. S. (1990). *The reading crisis: Why poor children fall behind*. Cambridge, MA: Harvard University Press.

Chall, J. S. & Conrad, S. S. (1991). *Should textbooks challenge students?* New York, NY: Teachers College Press.

Cheung, A. C. K., & Slavin, R. E. (2012). Effective reading programs for Spanish-dominant English language learners (ELLs) in the elementary grades: A synthesis of research. *Review of Educational Research, 82*(4), 351-395.

Cummins, J. (2007). Pedagogies for the poor? Realigning reading instruction for low-income students with scientifically based reading research. *Educational Researcher, 36*(9), 564-572.

Davidson, S. J. (2014). *Morphological analysis training for English language learners with reading difficulties* (Ph.D.). Available from ProQuest Dissertations & Theses A&I. (1528597546).

Deng, Q. (2016). *The effect of a self-regulated vocabulary intervention on word knowledge, reading comprehension, and self-regulated learning for elementary English language learners* (Ph.D.). Available from Dissertations & Theses @ CIC Institutions, ProQuest Dissertations & Theses A&I. (1786671927).

Deshler, D. D. (1981). Instructional practices for promoting skill acquisition and generalization in severely learning disabled adolescents. *Learning Disability Quarterly, 4*(4), 415-21.

Diaz, I. (2010). *The effect of morphological instruction in improving the spelling, vocabulary, and reading comprehension of high school English language learners (ELLs)* (Ph.D.). Available from ProQuest Dissertations & Theses A&I. (250906858).

Dunn, L. M., & Dunn, D. M. (2007). *Peabody picture vocabulary test* (4th ed.). Circle Pines, MN: American Guidance Service.

Edmonds, M. S., Vaughn, S., Wexler, J., Reutebuch, C., Cable, A., Tackett, K. K., & Schnakenberg, J. W. (2009). A synthesis of reading interventions and effects on reading comprehension outcomes for older struggling readers. *Review of Educational Research, 79*, 262-300.

Filippini, A. L., Gerber, M. M., & Leafstedt, J. M. (2012). A vocabulary-added reading intervention for English learners at-risk of reading difficulties. *International Journal of Special Education, 27*(3), 14-26.

Good, R. H., Kaminski, R. A., Cummings, K., Dufour-Martel, C., Petersen, K., & Powell-Smith, K. (2011). *DIBELS next assessment manual*. Eugene, OR: Dynamic Measurement Group.

Goodwin, A. (2016). Effectiveness of word solving: Integrating morphological problem-solving within comprehension instruction for middle school students. *Reading and Writing, 29*(1), 91–116. doi:10.1007/s11145-015-9581-0

Goodwin, A. P., & Ahn, S. (2013). A meta-analysis of morphological interventions in English: Effects on literacy outcomes for school-age children. *Scientific Studies of Reading, 17*(4), 257-285. doi:10.1080/10888438.2012.689791

Graves, M. (2006). *The vocabulary book: Learning and instruction*. New York: Teachers College Press; Newark, DE: International Reading Association; Urbana, IL: National Council of Teachers of English.

Graves, M.F., & Silverman, R. (2011). Interventions to enhance vocabulary development. In A. McGill Franzen, R. Allington (Eds.), *Handbook of reading disability research* (pp. 315-328). New York, NY: Routledge.

Harcourt Educational Measurement (1996). *Stanford Achievement Test Series* (10th ed.). San Antonio, TX: Harcourt Educational Measurement.

Harris, M. L., Schumaker, J. B., & Deshler, D. D. (2011). The effects of strategic morphological analysis instruction on the vocabulary performance of secondary students with and without disabilities. *Learning Disability Quarterly, 34*(1), 17-33.

Helman, A. L., Calhoon, M. B., & Kern, L. (2015). Improving science vocabulary of high school English language learners with reading disabilities. *Learning Disability Quarterly, 38*(1), 40-52. doi:10.1177/0731948714539769

Helman, L. (2009). Factors influencing second-language literacy development. In L. Helman (Ed.), *Literacy development with English learners* (pp. 1-14). New York, NY: Guilford Press.

Katz, L. A., & Carlisle, J. F. (2009). Teaching students with reading difficulties to be close readers: A feasibility study. *Language, Speech, and Hearing Services in Schools, 40*(3), 325-340. Retrieved from http://login.ezproxy.lib.umn.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=eric&AN=EJ846606&site=ehost-live

Kieffer, M. J. (2008). Catching up or falling behind? Initial English proficiency, concentrated poverty, and the reading growth of language minority learners in the United States. *Journal of Educational Psychology, 100*(4), 851-868. doi:10.1037/0022-0663.100.4.851

Kieffer, M. J., & Lesaux, N. (2008). The role of derivational morphology in the reading comprehension of Spanish-speaking English language learners. *Reading and Writing, 21*(8), 783-804.

Kuhn, M. R., & Stahl, S. A. (1998). Teaching children to learn word meanings from context: A synthesis and some questions. *Journal of Literacy Research, 30*(1), 119-38.

Lesaux, N. K., Kieffer, M. J., Faller, S. E., & Kelley, J. G. (2010). The effectiveness and ease of implementation of an academic vocabulary intervention for linguistically diverse students in urban middle schools. *Reading Research Quarterly, 45*(2), 196-228.

MacGinitie, W.H., MacGinitie, R.K., Maria, K., & Dreyer, L.G. (2000). *Gates-MacGinitie reading tests forms S & T* (4th ed.). Itasca, IL: Riverside.

Manis, F. R., Lindsey, K. A., & Bailey, C. E. (2004). Development of reading in grades K-2 in Spanish-speaking English-language learners. *Learning Disabilities Research & Practice, 19*(4), 214-224. Retrieved from http://login.ezproxy.lib.umn.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=eric&AN=EJ687015&site=ehost-live

McBride-Chang, C., Liu, P. D., Wong, T., Wong, A., & Shu, H. (2012). Specific reading difficulties in Chinese, English, or both: Longitudinal markers of phonological awareness, morphological awareness, and RAN in Hong Kong Chinese children. *Journal of Learning Disabilities, 45*(6), 503-514.

Nagy, W. E., & Anderson, R. C. (1984). How many words are there in printed school English? *Reading Research Quarterly, 19*(3), 304-330. doi:10.2307/747823

Nagy, W. E., & Scott, J. A. (2001). Vocabulary processes. In M. L. Kamil P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 269-284). Mahwah, NJ: Erlbaum.

Pacheco, M. B., & Goodwin, A. P. (2013). Putting two and two together: Middle school students' morphological problem-solving strategies for unknown words. *Journal of Adolescent & Adult Literacy, 56*(7), 541-553. Retrieved from http://login.ezproxy.lib.umn.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=eric&AN=EJ1013110&site=ehost-live

Pressley, M., & Harris, K. R. (1990). What we really know about strategy instruction. *Educational Leadership, 48*(1), 31-34. Retrieved from http://login.ezproxy.lib.umn.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=eric&AN=EJ413160&site=ehost-live

Proctor, C. P., Carlo, M., August, D., & Snow, C. (2005). Native Spanish-speaking children reading in English: Toward a model of comprehension. *Journal of Educational Psychology, 97*(2), 246-256.

Quiroga, T., Lemos-Britton, Z., Mostafapour, E., Abbott, R. D., & Berninger, V. W. (2002). Phonological awareness and beginning reading in Spanish-speaking ESL first graders: Research into practice. *Journal of School Psychology, 40*(1), 85-111.

Reed, D. K. (2008). A synthesis of morphology interventions and effects on reading outcomes for students in grades K-12. *Learning Disabilities Research & Practice, 23*(1), 36-49. Retrieved from http://login.ezproxy.lib.umn.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=eric&AN=EJ787367&site=ehost-live

Roser, N., & Juel, C. (1982). Effects of vocabulary instruction on reading comprehension. In J. A. Niles & L. A. Harris (Eds.), *New inquiries in reading research and instruction* (31st yearbook of the National Reading Conference, pp. 110-118). Rochester, NY: National Reading Conference.

Scarborough, H. (2001). Connecting early language and literacy to later (dis)abilities: Evidence, theory, and practice. In S. B. Newman & D. Dickinson (Eds). *Handbook of early literacy research* (pp. 97-110). New York, NY: Guildford.

Schumaker, J. B., & Deshler, D. D. (1984). Setting demand variables: A major factor in program planning for the LD adolescent. *Topics in Language Disorders, 4*(2), 22-40.

Scott, J. A., Jamieson-Noel, D., & Asselin, M. (2003). Vocabulary instruction throughout the day in twenty-three Canadian upper-elementary classrooms. *The Elementary School Journal, 103*(3), 269-283. doi:10.1086/499726

Snow, C.E., & Biancarosa, G. (2003). *Adolescent literacy and the achievement gap: What do we know and where do we go from here?* Retrieved from Carnegie Corporation of New York, Adolescent Funders Meeting Report: http://olms1.cte.jhu.edu/olms/data/resource/2029/class9_snow_biancarosa.pdf

Stahl, S. A., & Nagy, W. E. (2006). *Teaching word meanings.* Mawhah, NJ: Lawrence Erlbaum Associates.

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 21*(4), 360-407.

Sullivan, A. L. (2011). Disproportionality in special education identification and placement of English language learners. *Exceptional Children, 77*(3), 317-334.

Swanson, H. L., Sáez, L., & Gerber, M. (2006). Growth in literacy and cognition in bilingual children at risk or not at risk for reading disabilities. *Journal of Educational Psychology, 98*(2), 247-264. doi:10.1037/0022-0663.98.2.247

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2013 Reading Assessment.

Wagner, R. K., Muse, A. E., & Tannenbaum, K. R. (2006). *Vocabulary acquisition: Implications for reading comprehension.* New York, NY: Guilford Press.

Watts, S. (1995). Vocabulary instruction during reading lessons in six classrooms. *Journal of Reading Behavior, 27*(3), 399-424.