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VOCABULARY INTERVENTION FOR ELEMENTARY AND
SECONDARY SCHOOL STUDENTS WHO ARE ENGLISH
LANGUAGE LEARNERS: A REVIEW OF RESEARCH

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Vocabulary Intervention for Elementary and Secondary School Students Who are English Language Learners: A Review of Research

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Clinical Scenario

Debbie, a monolingual elementary school speech-language pathologist (SLP), frequently assists other teachers with creating and implementing intervention plans for students. She recently was approached by a fifth-grade teacher who was concerned about one of her students, named Pedro. Pedro is a Spanish-English bilingual student who has been learning English in school since first grade. Though his conversational speech appears adequate, Pedro struggles in English class where the language is more advanced and literary based. He has particular difficulty answering questions about class readings. Pedro's parents only speak Spanish at home, so his exposure to English is limited to the classroom. Reading has never been a strong skill for Pedro, but this year his grades have dramatically declined, likely because of the increased difficulty and the increased need to derive meaning from the text. Pedro's teacher is concerned that he is falling behind his classmates. She thinks that Pedro's limited vocabulary knowledge could be influencing his reading comprehension, but is unsure of how to address these needs in the classroom. She wants to assist Pedro in any way that she can, but is inexperienced with teaching English language-learning students; the majority of her classroom is composed of monolingual English speakers. The teacher is interested in any suggestions Debbie has and how she can implement them in the classroom to help Pedro catch up to his peers.

Background and Rationale

Reading comprehension is an essential skill that predicts future success. Not only is reading comprehension important for classroom achievement (Anderson & Nagy, 1991; Baker, Simmons, & Kame'enui, 1998; Becker, 1977; Cunningham & Stanovich, 1998; Snow, 2002), but studies also have shown that high school dropout rates, delinquency, teenage pregnancy, unemployment,

and criminal behavior are higher among students with reading difficulties (Chall & Curtis, 2003). Studies such as these suggest the importance of reading comprehension intervention not only improves students' academic achievement, but also improves their quality of life.

Most researchers agree that vocabulary is a key component of reading comprehension because word knowledge is imperative in understanding language (Baumann & Kame'enui, 1991; Catts & Kamhi, 2005; Stanovich, 1986). If a student does not know what words mean, his or her ability to understand is impaired. Therefore, the greater a student's vocabulary knowledge is, the greater the aptitude for comprehending a message (Flood, Lapp, & Fisher, 2003). English monolingual students who are typically developing learn new vocabulary incidentally, through exposures to print or conversational discourse. English Language Learners (ELLs) may lag behind in vocabulary levels due to reduced English input, which leads to deficits in reading comprehension. According to the Nation's Report Card™, 70% of fourth-grade ELL public school students and 71% of eighth-grade ELL public school students scored below basic on reading assessments conducted by the National Assessment of Educational Progress (NAEP; Lee, Grigg, & Donahue, 2007).

The term ELL refers to a heterogeneous group of students who speak one or more languages other than English and are in the process of developing English proficiency. Because the first language (L1) of these students may vary, ELL students tend to have differing language needs and experiences. Ways to address these needs are largely unknown and there is a great demand for research on how to assist the various learning needs of these populations. As the ELL population grows, more and more SLPs will encounter situations similar to the one described in the clinical scenario. In fact, the ELL population has grown approximately 105% versus only a 12% growth of the general school population since the 1990–1991 school year (National Center for Educational Statistics, 2002).

In 2005, ELL students made up approximately 20% of all elementary and secondary students. About one-quarter of the students who spoke a language other than English at home had difficulty speaking English. Students who spoke another language at home and spoke English with difficulty accounted for 5% of all students. Among students in kindergarten through grade 12, Hispanic students made up the highest percentages of students who spoke English with difficulty (KewalRamani, Gilbertson, Fox, & Provasnik, 2007). These students make up approximately 79% of the ELL population (Orosco, de Schonewise, de Onis, Klingner, & Hoover, 2008).

This difficulty with the English language has a direct impact on vocabulary acquisition. Because ELL students have inadequate depth and breadth of word knowledge for frequently occurring English words, they typically have low reading comprehension (August, Carlo, Dressler, & Snow, 2005; Carlo et al. 2004; Qian, 1999). Students with low vocabulary knowledge have higher error rates in reading and difficulties linking text to their background knowledge, which increases frustration and decreases motivation (Graham & Bellert, 2004).

Clinical Question

How do teachers and SLPs provide appropriate interventions for ELL students who have small English vocabularies and struggle with reading comprehension? SLPs who are familiar with evidence-based practice understand the need for consulting the research when making clinical and educational recommendations. The goal of this brief is to locate relevant research, evaluate the research, compare outcomes of the studies, and suggest effective strategies for vocabulary intervention for these students.

Method

Study Selection Criteria

The following six criteria were adopted for their minimal restrictions and their focus on research with the highest quality of evidence:

1. The study must include one of the following research designs: randomized controlled trials (RCTs), quasi-experimental controlled studies (QEDs), and regression discontinuity designs (RDs). Case studies, single subject design studies, and studies with a pretest–posttest comparison design were excluded.
2. The sample must include participants identified as English second language (ESL), English language learners (ELL), limited English proficient (LEP), potentially English proficient (PEP), readers and writers of English as an additional language (REAL), English as a new language (ENL), or English speakers of other languages (ESOL). According to Hudelson, Poynor, and Wolfe (2003), these terms were common labels for children who do not speak English as their first language.
3. The participants must have been from elementary, middle, or high schools. Studies that included preschool or post-secondary participants were excluded.
4. Intervention must have included vocabulary instruction. For example, studies that focused on teaching word knowledge and meaning were included, whereas studies that solely focused on sight word reading or fluency were excluded.
5. The dependent measures of vocabulary learning were reported with data that were amenable to the calculation of an effect size.
6. The studies must have been published in a peer-reviewed journal or in a book between the years of 1990 and the present. Doctoral dissertations, presentations, and masters theses were excluded.

Literature Search Procedures

Multiple searches were conducted via computer and print sources using the criteria listed to locate as many articles as possible. The following 11 databases were searched for appropriate studies: Academic Search Complete, CINAHL Plus, Communication and Mass Media Complete, Educational Resource Information Center (ERIC), MasterFILE Premier, MEDLINE, Primary Search, PsychARTICLES, PsychEXTRA, Psychology and Behavioral Sciences, and PsychINFO.

Descriptor terms that would yield the greatest number of relevant articles and included terms to address the desired population, intervention, and outcome

measures were used. Descriptors for the database search included:

- a. Population Terms (ESL, ELL, LEP, PEP, REAL, ENL, or ESOL)
- b. Intervention Terms (intervention, strategies, or instruction)
- c. Outcome Terms (vocabulary and reading comprehension)

Computer searches of specific journals also were conducted. The term “English language learners” was used to search *Learning Disabilities Research & Practice* between 1999 and 2008, using InterScience and EBSCO as search agents. *Reading Research Quarterly* was searched with the terms “vocabulary instruction” and “English language” and “reading comprehension” between 1990 and 2004, using JSTOR. EBSCO also was used to search *Language Learning* between the years of 1994 and 2008, using the terms “vocabulary” and “English language.” These searches yielded a total of five articles that met the inclusion criteria described.

Evaluating the Evidence

Description of Studies

Table 1 provides a summary of each study, including sample composition, experimental design, instructional approaches, intervention duration, outcome measures, and results. A total of 673 ELL students and 329 monolingual English-speaking students participated in the studies reviewed. All children were enrolled in public schools in the United States.

A variety of grades and language backgrounds were represented in the research. All five investigations reported specific grade levels of subjects, ranging from grades 3 through 8. Four of the studies represented elementary school students (Avila & Sadoski, 1996; Calderón et al., 2005; Carlo et al., 2004; Carlo, August, & Snow, 2005), while the other study included middle school students (Denton, Wexler, Vaughn, & Bryan, 2008). Spanish was reported as the first language (L1) for all of the participants.

In each study, control and experimental groups received different types and amounts of vocabulary intervention. Avila and Sadoski (1996) taught low achieving, disadvantaged Spanish-speaking students to use a keyword

approach when learning new vocabulary. This method involved using keyword descriptors and imagery links to assist students in encoding and recalling novel terms. Keywords were related to the target vocabulary word phonetically and the imagery link provided a visual relationship that connected the keyword to the target word. Participants were assigned randomly into four groups: immediate keyword group, delayed keyword group, immediate control group, and delayed control group. In the keyword condition, the teachers explained the logic of the keyword method, provided interactive pictures for the practice items, and emphasized the importance of remembering the interactive pictures. Interactive pictures consisted of the keyword and target word interacting in a visual. For example, if the target word was “hairpin” and the keyword was “horquilla,” meaning harp, then the picture would have a harp with a hairpin used to stroke the strings. The control groups received no explicit vocabulary instruction. The immediate groups were assessed directly after treatment, and the delayed groups were assessed one week after treatment (see Table 1).

Cognitive strategy instruction provides students with a deep understanding of word meanings and teaches them strategies about how to learn novel words independently. Two investigations (Carlo et al., 2004; Carlo et al., 2005) discuss the Vocabulary Improvement Project (VIP), which utilizes first language knowledge to assist students in learning second language vocabulary. Though the two studies by Carlo et al. are similar, one is a pilot study and the other is a follow-up study, the subtle differences in structure and implementation of treatments results in different outcomes. Both studies examined intact classrooms that consisted of both bilingual Spanish/English and monolingual English students. Classrooms in the VIP experimental group received concentrated instruction designed to give students a multifaceted understanding of new vocabulary by using literature and teaching terms in multiple contexts. Students in the comparison condition received typical classroom instruction without special vocabulary-centered training.

Calderón et al. (2005) used direct instruction to teach vocabulary. This method assumes a strong link between vocabulary knowledge and reading comprehension and suggests that when vocabulary is directly taught before a reading activity, the comprehension of that reading material will increase. Direct instruction can encompass

many different approaches to vocabulary intervention. This study involved teaching definitions, providing example sentences, and utilizing classroom discussion. These lessons were centered on age appropriate literature and were taught to intact elementary classrooms containing Spanish dominant students with limited English proficiency.

The study conducted by Denton et al. (2008) used what we have labeled “combination instruction.” These interventions target multiple kinds of instruction rather than just focusing on vocabulary. For example, an intervention that teaches phonological awareness, fluency, and vocabulary would be considered a combination approach because multiple skills related to reading are being taught, although not all of these are directly related to vocabulary growth. Denton et al. (2008) provided phonics, vocabulary, fluency, and comprehension strategy instruction to middle school students with severe reading difficulties. These skills were taught in decoding and encoding formats to assist students with both interpreting and recalling new information.

Assessing the Effect of Intervention

Using a 3-point rating scale (Thomason, Gorman, & Summers, 2007), each study was appraised to determine the quality of evidence. The following 11 attributes were considered:

- randomization
- recognizable participants
- baseline equivalence
- blinding
- reliable outcome measures
- statistical significance
- practical significance
- confidence intervals for effect sizes
- attrition
- teacher-intervention confound
- treatment fidelity

These attributes represent important qualities of a methodologically sound research study. Qualities such as randomization, recognizable participants, and baseline equivalence demonstrate a well-constructed study design

and, if well described, these details enable replication of the study. The use of blinding, reliable outcome measures, avoiding teacher-intervention confounds, and treatment fidelity demonstrates how the steps of the experimental procedure were performed systematically to prevent confounds or bias from affecting the outcomes. Providing adequate and usable data in the forms of statistical significance, practical significance, and confidence intervals quantifies the textual claims made by the author. These data enable a complete analysis in assessing the true amount of gains or losses. Table 2 provides the ratings for each study. Overall inter-rater reliability was .93. All differences were within one point and were resolved through discussion.

Calculating and Interpreting the Intervention Effect

Effect sizes (Cohen’s d) were calculated to determine how effective the interventions were at improving vocabulary knowledge. In this calculation, effect size is equal to the difference between the mean posttest score of the experimental group and of the control group, divided by the pooled standard deviation of the two groups. Cohen’s d was interpreted using the following scale: an effect size of .2 is considered small, .5 is medium, and .8 is large (Cohen, 1988). The effect size calculator (Lyons, 2004) that was used also factored in sample size, accounting for differences in group sizes. Effect sizes for each dependent measure were then pooled and averaged for each study. This calculation involved adding all of the effects for each study and dividing by the number of effects. These effects are presented in Table 3. Only one study (Carlo et al., 2004) could not have effect sizes calculated because adequate mean and standard deviation data were not provided; however, the What Works Clearing House (2006) provided data on the effectiveness of the VIP treatment used in both Carlo et al. studies. Those data are reported in Tables 1–3.

An analysis of the five studies indicated that no single study exhibited both high study quality and large effect size results. Of these studies, Denton et al. (2008) received the highest quality appraisal score (17) because of its thorough experimental procedures. However, the effects achieved were found to be small and statistically non-significant ($d = .19$, 95% CI = $-.08$ to $.46$). These small effects may have been a result of the participants’ severe

reading impairment coupled with second language-learning difficulties. The reported outcomes were measured via standardized tests. Although standardized tests are considered stringent measures of learning outcomes, they may not have captured all of the gains made by students during the short intervention period.

The two studies of *cognitive strategy instruction* also resulted in small intervention effects. Carlo et al. (2004) reported $d = .44$ and 95% CI = .13 to .75; Carlo et al. (2005) reported $d = .07$ and 95% CI = $-.04$ to .19. The small effect size indicates that though the outcomes were statistically significant, the effect of those gains was very small. The appraisal scores for these studies were variable. Carlo et al. (2004) received a score of 11, and Carlo et al. (2005) received a score of 8. It is important to note that the Carlo et al. (2005) study focused on the effects of *sustained* cognitive strategy instruction. Specifically, they compared a group of students who participated in the intervention for 1 year (5th grade only) and a different group of students who participated in the intervention for 2 years (4th and 5th grade) to see if students who had received the intervention for a longer time made greater gains. Their data suggest that although vocabulary outcomes were greater for the students who participated in the intervention for 2 years for certain measures, the overall difference was not clinically significant.

The study utilizing the *direct instruction approach* (Calderón et al., 2005) also produced small effects ($d = .13$, 95% CI = .06 to .19), but received a relatively high study quality appraisal score of 14. This study used rigorous research procedures and was the only one that discussed baseline equivalence and blinding procedures thoroughly. These authors also used standardized tests to measure vocabulary and comprehension gains, which could have made it more difficult to detect participants' improvements.

Despite the common assumption of a strong relationship between vocabulary intervention and reading comprehension (Anderson & Nagy, 1991; Baker, Simmons, & Kame'enui, 1998; Becker, 1977; Cunningham & Stanovich, 1998; Flood et al., 2003), results from the studies examined here indicated either small statistically significant positive effects or nonexistent gains on measures of reading comprehension.

Of all of the studies, Avila and Sadoski (1996) was perhaps the best balanced in quality and effect size. These

authors used the *keyword approach* and obtained large effects ($d = 1.08$, 95% CI = .63 to 1.52), demonstrating the success of their intervention. They also conducted one of the few randomized experimental studies and reported both statistical and practical significance data. These qualities helped achieve an appraisal score of 12, the third highest of all the studies reviewed. Although these authors were the only ones that specifically discussed the use of L1 during vocabulary instruction, they did not explicitly state the length, duration, or location of the intervention, making replication studies and reliability calculations difficult. They also were the only authors that did not directly discuss reading comprehension, so it is difficult to determine if the vocabulary gains that participants made would affect reading comprehension skills.

To summarize, all interventions proved to have some positive effect on participants' vocabulary acquisition. The link between vocabulary intervention and reading comprehension for ELL students is less clear and needs to be investigated more thoroughly. These data demonstrate that of the vocabulary interventions examined, the keyword instruction appears to be the most effective.

The Evidence-Based Decision

At the beginning of this brief, a clinical scenario was presented in which Pedro's teacher asked Debbie, the school SLP, for suggestions about how to improve his vocabulary and reading comprehension. To answer this question, this review analyzed the evidence regarding vocabulary intervention and reading comprehension for ELL students. This review and analysis of the five studies indicated that there is a potential impact of intervention designed to improve the vocabulary and reading comprehension for ELL students. However, the strength of that evidence is limited, with only one study (Avila & Sadoski, 1996) demonstrating a substantial impact.

How does Debbie evaluate this small body of evidence and make recommendations to Pedro's teacher? Does this lack of evidence mean that Pedro's teacher should not encourage the growth of his English vocabulary? In this case, it appears that there are multiple ways to conduct vocabulary intervention that may lead to positive gains for ELL students. While a strong relationship between these vocabulary interventions and reading comprehension has not been uncovered, it does not mean that vocabulary intervention would not be a worthwhile

instruction to pursue for ELL students. The study by Avila and Sadoski (1996) provides the strongest, although preliminary, support for vocabulary intervention for ELL students. This is consistent with The Center on Instruction (COI; Francis, Rivera, Lesaux, Kieffer, & Rivera, 2006) recommendations that teachers increase opportunities for ELL students to develop sophisticated vocabulary knowledge. The COI have found that in most cases, classroom vocabulary instruction is too superficial and does not allow for students' complete conceptual knowledge of the word. By teaching Pedro vocabulary explicitly, using the keyword method examined in this review, he is likely to benefit in the classroom.

Because we cannot unequivocally say that vocabulary intervention will improve Pedro's reading comprehension, an examination of the research on reading comprehension interventions for ELL students may be helpful to determine what strategies would assist Pedro. The COI recommends that teachers promote active reading and engagement with text by teaching students to make predictions consciously before reading, showing students how to monitor their understanding and ask questions during reading, and instructing students to summarize what they have read after completing their reading (Francis et al., 2006). Investigating the research on reading comprehension intervention for ELL students may uncover some specific strategies that are particularly effective.

After considering the research, Debbie has seen that there are a few vocabulary intervention programs that may result in vocabulary gains for students. In particular, one study emerged with a large effect (Avila & Sadoski, 1996), suggesting a substantial impact on vocabulary acquisition. However, Debbie also found that this study lacked some of the qualities in the study design that would offer an unequivocal recommendation for implementation. Specifically, the intervention program itself was not sufficiently described to enable Debbie to replicate it with Pedro. Nevertheless, Debbie has seen improvement with other children in her caseload using an approach similar to the keyword strategy approach used in Avila & Sadoski (1996). Therefore, Debbie suggested to Pedro's teacher the keyword strategy as an effective method to use with students like Pedro. Debbie also explained that the research in this area is still young and further research is needed to determine if specific vocabulary interventions can promote reading comprehension for ELL students such as Pedro.

Author Note

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Table 1. Summary of Interventions

Citation	Sample Description	Experimental Design	Intervention Description; Duration	Dependent Measures	Results
Avila & Sadoski (1996)	63 low-achieving, disadvantaged LEP students in Texas; M age = 11.2; Grade: 5 th	RCT—students randomly assigned into classes, classes randomly assigned to interventions, and teachers randomly assigned to classes	Keyword method condition (immediate or delayed) vs. control condition (immediate or delayed) Instruction consisted of 3 sessions focused on vocabulary teaching and practice. Immediate conditions were tested on the third day & delayed conditions were tested 1 week later.	Cued recall of Spanish words with no word bank; sentence completion in English with word bank; informal interviews	Posttest: Cued Recall—immediate keyword group > immediate control keyword group ($d = .71$); delayed keyword group > delayed control group ($d = 1.71$). Sentence Completion—immediate keyword group > immediate control group ($d = 1.09$); delayed keyword group > delayed control group ($d = .79$). Interviews—students in the control group used a variety of strategies to recall vocabulary, while students in the keyword group only used the keyword method
Calderón, August, Slavin, Duran, Madden, & Cheung (2005)	293 Spanish dominant students with limited English proficiency from 8 elementary schools in Texas; Reading: 2.0 grade level in Spanish; Grade: 3	Matched control design	Control (8 intact classrooms receiving regular classroom instruction) vs. Experimental (8 intact classrooms participating in an adaptation of the Success For All (SFA) Reading program). Took place for 22–25 weeks for 90-minute session.	Four Subtests (picture vocabulary, letter-word identification, word attack, passage comprehension) of the <i>Woodcock Language Proficiency Battery—Revised</i> (WLPB-R) in both Spanish and English.	Posttest: English—Experimental group > Control on English word attack ($p = .013$; $d = .25$), passage comp. ($p = .05$; $d = .16$), and picture vocab. ($p = .08$; $d = .12$). NS difference between groups on letter-word identification ($d = 0$). Spanish—Experimental group > Control on Spanish letter-word identification ($p = .028$; $d = .25$), and picture vocab. ($p = .091$; $d = .17$). NS difference between groups on passage comp. ($d = .05$) and word attack ($d = 0$).

continued

Table 1. Summary of Interventions, continued

Citation	Sample Description	Experimental Design	Intervention Description; Duration	Dependent Measures	Results
Carlo, August, & Snow (2005) Study 1	156 monolingual English speaking students (EO) and 103 native Spanish speaking students (ELL) from four schools in California, Virginia, and Massachusetts; Grade: 4	Quasi-experimental design of intact classrooms	Vocabulary Improvement Project (VIP) vs. comparison condition (each condition contained EO & ELL students) Ten lessons, consisting of 8 components. Lessons occurred for 30–45 min daily, 4 days/week for 2 weeks.	<i>Peabody Picture Vocabulary Test Revised</i> (PPVT-R), polysemy production task, 3 multiple choice cloze passages, 36-item multiple choice word defining task (mastery task), word association task, morphological task	Posttest: EO > ELL on all measures. Site of intervention also produced differing outcomes of intervention. No clear treatment effects for depth of word knowledge or reading comprehension. Intervention did affect mastery test scores according to a condition by time interaction. No data was given to describe outcomes.
Carlo, August, & Snow (2005) Study 2	45 EO and 50 ELL students who participated in both Study 1 and 2 (total number of participants in Study 2 described below in Carlo et al.); Grade: 5	Same as Study 1	Same as Study 1 Fifteen lessons that consisted of 5 components occurred for 30–45 min daily on 4 days of each of 2 weeks	Same as study 1	Posttest: Students who participated in 4 th grade intervention performed better than students who had received only one intervention especially on morphology ($d = .18$) and mastery ($d = .21$). All other assessments (polysemy ($d = .06$), cloze ($d = -.01$), word association ($d = .02$)) had small or negligible effects.

continued

Table 1. Summary of Interventions, continued

Citation	Sample Description	Experimental Design	Intervention Description; Duration	Dependent Measures	Results
Carlo et al. (2004)	112 monolingual (EO) & 142 bilingual (ELL) children from 4 schools in CA, VA, & MA; Grade: 5	Random quasi-experimental design of intact classrooms	Intervention (VIP) vs. comparison condition (each condition contained EO & ELL students). Instruction delivered for 30–45 min, 4 days a week over 15-week period.	<i>Peabody Picture Vocabulary Test Revised</i> (PPVT-R), polysemy production, reading comprehension (cloze passages), word mastery, word association task, morphological task.	Posttest: On PPVT-R, NS gains for ELL group. Reading comprehension, target word mastery, polysemy, and word knowledge scores all improved for ELLs*. *The following data is reported from What Works Clearing House (2006): VIP group performed better than comparison group on measures of word mastery ($d = 1.03$), polysemy ($d = .59$), word associations ($d = .44$), & morphology ($d = .18$), & reading comprehension ($d = .50$). NS gains on PPVT-R ($d = -.11$).
Denton, Wexler, Vaughn, & Bryan (2008)	38 students identified as "at risk" for reading (22 LEP); Reading: 10–79 words correctly per minute; Grades: 6–8	RCT into two groups	Treatment (multi-component reading intervention consisting of word encoding and decoding strategy teaching) vs. typical practice. 47–55, 40-minute sessions over the course of 13 weeks.	The passage comprehension, letter-word identification, & word attack subtests of the <i>Woodcock-Johnson Tests of Achievement III</i> (WJ III); sight word efficiency from the <i>Test of Word Reading Efficiency</i> (TOWRE); timed reading of 5 th grade level connected text from DIBELS; teacher form of the Social Skills Rating System	Posttest: NS outcomes or differences were achieved between or within groups on any measures, however negligible to moderate effects were achieved on WJ-III: basic reading ($d = .48$), passage comprehension ($d = -.2$), spelling ($d = -.08$); TOWRE: sight words ($d = .33$); and oral reading fluency ($d = .41$).

NA = Not assessed; NS= Not significant; * = effect size information and data to calculate effect size was not provided
 d = Cohen's d = difference in means/pooled standard deviation, Scale for interpretation: small effect = .2, medium effect = .5, large effect = .8
 ES= Effect Size; * = not enough information provided to calculate effect size, presented effect size data reported by WWC

Table 2. Appraisal of Study Quality using Thomason et al. (2007)
(0 = inadequate, 1 = unclear, 2 = adequate)

Criteria	Studies				
	Avila & Sadoski (1996)	Calderón et al. (2005)	Carlo, August, & Snow (2005)	Carlo et al. (2004)	Denton et al. (2008)
Randomization	2	0	1	1	2
Recognizable Participants	1	1	1	1	2
Baseline Equivalence	1	2	1	1	1
Blinding	0	2	0	0	1
Reliable Outcome Measures	1	2	1	1	2
Statistical Significance	2	2	1	2	2
Practical Significance/ Effect Sizes	2	2	0	0	1
Confidence Interval for Effect Sizes	0	0	0	0	0
Attrition	1	1	1	1	2
Teacher-intervention Confound	2	2	2	2	2
Treatment Fidelity	0	0	0	2	2
TOTALS	12	14	8	11	17
Percent Agreement	100%	82%	91%	100%	91%

Table 3. Summary of Intervention Type and Effect Size

Citation	Intervention Type	Mean Effect Size	95% Confidence Interval
Avila & Sadoski (1996)	Keyword	1.08*	.63 to 1.52
Calderón et al. (2005)	Direct Instruction	.13*	.06 to .19
Carlo, August, & Snow (2005)	Cognitive	.07	-.04 to .19
Carlo et al. (2004)	Cognitive	.44*	.13 to .75
Denton et al. (2008)	Combination	.19	-.08 to .46

*Statistically significant difference in favor of the treated group.

