What Works Clearinghouse

ies INSTITUTE OF EDUCATION SCIENCES

Peer-Assisted Learning Strategies

Program Description[2]

Peer-Assisted Learning Strategies is a peer-tutoring program for use in elementary school classrooms to improve student proficiency in reading. Its purpose is to supplement students' existing reading curriculum. *Peer-Assisted Learning Strategies* was developed for use with students with diverse academic needs and has been used with English language learners.

The program uses peer-mediated instruction, a process whereby students work in pairs or small groups to provide tutoring in three reading strategies: retelling (i.e., sequencing information), paragraph shrinking (i.e., generating main idea statements), and prediction relay (i.e., generating and evaluating predictions). In addition to being trained in each of the reading strategies, students are taught to correct their partner's reading errors, award points for correct responses, and provide consistent encouragement and feedback. Developers recommend that tutoring sessions last approximately 35 minutes and be conducted three to four times a week.

Research[3]

One study of *Peer-Assisted Learning Strategies* that falls within the scope of the English Language Learners review protocol meets What Works Clearinghouse (WWC) evidence standards, and no studies meet WWC evidence standards with reservations. The study that meets evidence standards includes 99 English language learners from 3rd to 6th grade in Texas.[4] Of the full sample, 49 English language learners were in classrooms that used *Peer-Assisted Learning Strategies* for reading instruction, and 50 were in classrooms that used "business-as-usual" reading instruction. Of the 49 *Peer-Assisted Learning Strategies*

1. This report has been updated to include reviews of three studies that have been released since 2007. Of these additional studies, one is not within the scope of the English Language Learners review protocol (Calhoon, Al Otaiba, Greenberg, King, & Avalos, 2006) and two are within the scope of the protocol but do not meet evidence standards (Calhoon, Al Otaiba, Greenberg, King, & Avalos, 2007; McMaster, Kung, Han, & Cao, 2008). One study that meets evidence standards in the earlier review (Saenz, Fuchs, & Fuchs, 2005) was rereviewed and still meets evidence standards. However, this report now excludes the group of students with learning disabilities, since those results will be reported in another WWC topic area. A complete list and disposition of all studies reviewed are provided in the references.
2. The descriptive information for this program was published as part of the previous report of the effects of Peer-Assisted Learning Strategies on English language learners, released May 2007. The WWC requests developers to review the program description sections for accuracy from their perspective. Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review. The literature search reflects documents publicly available by February 2009.
3. The studies in this report were reviewed using WWC Evidence Standards, Version 2.0 (see the WWC Procedures and Standards Handbook, Chapter III), as described in protocol version 2.0.
4. The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.

Research *(continued)* English language learners, 15 were in the low-achieving subgroup, 17 in the average-achieving subgroup, and 17 in the high-achieving subgroup. Of the 50 business-as-usual English language learners, 18 were in the low-achieving subgroup, 18 in the average-achieving subgroup, and 14 in the high-achieving subgroup.

Based on this study, the WWC considers the extent of evidence for *Peer-Assisted Learning Strategies* on English language learners to be small for reading achievement. The one study that meets WWC evidence standards did not examine the effectiveness of *Peer-Assisted Learning Strategies* in the mathematics achievement or English language development domains for English language learners.

Effectiveness *Peer-Assisted Learning Strategies* was found to have potentially positive effects on reading achievement for English language learners.

	Reading achievement	*Mathematics achievement*	*English language development*
Rating of effectiveness	Potentially positive effects	na	na
Improvement index[5]	Average: +12 percentile points	na	na
	Range: +5 to +25 percentile points	na	na

na = not applicable

Additional program information

Developer and contact
Developed by Lynn and Doug Fuchs, *Peer-Assisted Learning Strategies* is distributed by the Vanderbilt Kennedy Center for Research on Human Development. Address: Vanderbilt University, Attn: Flora Murray/PALS Orders, Peabody Box 228, Nashville, TN 37203-5701. Email: flora.murray@vanderbilt.edu. Web: http://kc.vanderbilt.edu/pals. Telephone: (615) 343-4782.[6]

Scope of use
Peer-Assisted Learning Strategies, developed in the 1990s, was designed to be used with all students in kindergarten through 5th grade. It has been implemented in Iowa, Minnesota, Oregon, Tennessee, Texas, and other states. The program has been used with English-proficient students with learning disabilities; the developers also have expanded its scope of use to include English language learners with and without learning disabilities and high school students.

Teaching
Peer-Assisted Learning Strategies is a peer-tutoring program that incorporates three reading strategies: partner reading and retelling, paragraph shrinking, and prediction relay. During *Peer-Assisted Learning Strategies* sessions, students are put in pairs and take turns being the tutor (coach) and the tutee. To form pairs, the teacher ranks students from highest to lowest reading achievement. To decrease the disparity of the reading ability of the pairs,

5. These numbers show the average and range of student-level improvement indices for all findings in the study.
6. The results discussed in this report pertain to *Peer-Assisted Learning Strategies*; however, it should be noted that materials for early grades, kindergarten and first grade, were developed by Patricia G. Mathes and others. Those materials are packaged under the *Peer Assisted Literacy Strategies* name and are distributed by Sopris West. Address: 4185 Salazar Way, Frederick, CO 80504. Email: customerservice@sopriswest.com. Web: http://www.sopriswest.com/default.aspx. Telephone: (800) 547-6747.

the list is split in half. The first student listed on the first half of the list is paired with the first student on the second half of the list.

During partner reading and retelling, the stronger reader reads for five minutes, while the weaker reader serves as the coach by identifying errors, initiating correction procedures, and awarding points for each sentence read correctly. After the first student reads, the coach asks what he or she has learned. Students switch roles for the second five minutes and follow the same procedure; that is, the weaker reader reads the same material while the stronger reader serves as the coach.

During paragraph shrinking, students generate main idea statements. The stronger reader reads one paragraph at a time. After reading each paragraph, the reader determines the main idea by responding to the following: "Name the most important who or what in the paragraph. Tell the most important informa-tion about the who or what. Say the main idea in 10 words or less." The reader receives one point for each correct response. The tutor uses a correction procedure to help the reader amend inaccurate main idea statements. The first reader reads and shrinks paragraphs for five minutes before students switch roles. The second reader does not read the same material.

Prediction relay increases comprehension and piques stu-dents' interest in the selection they are reading. Before reading half a page, the stronger reader has two minutes to predict what he or she might learn or what might happen. After reading for five minutes, the stronger reader has two minutes to evaluate the prediction. The students switch roles and follow the same procedure with new reading material.

Cost

Peer-Assisted Learning Strategies materials range from $15 to $35. Large-print lessons ($15) are recommended for using *Peer-Assisted Learning Strategies* in reading instruction for kindergarten classrooms. Materials for 1st grade consist of scripted lessons to teach students the *Peer-Assisted Learning Strategies* procedures, teacher-directed decodable worksheets, and decoding lesson worksheets that student pairs use during tutoring. Classroom reading materials (e.g., anthology from a core reading program, children's books) are used for the partner-reading portion of 1st-grade *Peer-Assisted Learning Strategies.* Materials for 2nd grade and above consist of a teacher's manual with scripted lessons to instruct students in the *Peer-Assisted Learning Strategies* program. Students use classroom reading material to implement the program. Additional information can be found on the *Peer-Assisted Learning Strategies* website (http://kc.vanderbilt.edu/pals).

Research

Four studies reviewed by the WWC investigated the effects of *Peer-Assisted Learning Strategies* on English language learners. One study (Saenz, Fuchs, & Fuchs, 2005) is a randomized con-trolled trial that meets WWC evidence standards. The remaining three studies do not meet either WWC evidence standards or eligibility screens.

Meets evidence standards

Saenz, Fuchs, and Fuchs (2005) examined the effectiveness of *Peer-Assisted Learning Strategies* on English language learners. The study included 99 English language learners (49 *Peer-Assisted Learning Strategies* and 50 comparison) from 12 classrooms in grades 3–6. Classrooms were randomly assigned to either the *Peer-Assisted Learning Strategies* condition or the comparison condition within grade and school. Teachers in the comparison condition were asked to conduct reading instruction in their normal fashion. The study team compared lesson plans and found that *Peer-Assisted Learning Strategies* teachers were more likely than comparison teachers to use one-on-one activities and peer-mediated instruction and less likely to use teacher-led instruction. The study took place in one school district in Texas. Saenz, Fuchs, and Fuchs (2005) present results for three subgroups: 1) low achievers, 33 English language learners (15 *Peer-Assisted Learning Strategies* and 18 comparison); 2) average achievers, 35 English language learners (17 *Peer-Assisted Learning Strategies* and

Research *(continued)*

18 comparison); and 3) high achievers, 31 English language learners (17 *Peer-Assisted Learning Strategies* and 14 comparison). The results for the average-achieving subgroup are presented in Appendix A4. The other two subgroups are not presented because they do not meet WWC evidence standards.[7]

Extent of evidence

The WWC categorizes the extent of evidence in each domain as small or medium to large (see the WWC Procedures and Standards Handbook, Appendix G). The extent of evidence takes into account the number of studies and the total sample size across the studies that meet WWC evidence standards with or without reservations.[8]

The WWC considers the extent of evidence for *Peer-Assisted Learning Strategies* to be small for reading achievement for English language learners. The one study that meets WWC evidence standards did not examine the effectiveness of *Peer-Assisted Learning Strategies* in the mathematics achievement or English language development domains for English language learners.

Effectiveness

Findings

The WWC review of interventions for English language learners addresses student outcomes in three domains: reading achievement, mathematics achievement, and English language development. The study included in this report covers one domain: reading achievement. The findings below present the authors' estimates and WWC-calculated estimates of the size and the statistical significance of the effects of *Peer-Assisted Learning Strategies* on English language learners.[9]

Reading achievement. Saenz, Fuchs, and Fuchs (2005) analyzed three reading achievement outcomes, which are three subtests of the Comprehensive Reading Assessment Battery (Word Correct, Maze Choices Correct, and Comprehension Questions Correct) for 3rd- through 6th-grade students. In the maze task, students read a selection in which the first sentence is intact.

This is followed by sentences in which every seventh word is replaced with a three-item multiple-choice format. One of the choices is a semantically correct substitution for the missing word. There were no statistically significant effects on the three reading achievement measures once clustering corrections were made. However, the WWC found that the combined effect for reading achievement across all measures was positive and large enough to be considered substantively important (ES = 0.31).

Rating of effectiveness

The WWC rates the effects of an intervention in a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative. The rating of effectiveness takes into account four factors: the quality of the research design, the statistical significance of the findings, the size of

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7. The low-achieving subgroup results do not meet standards because the combination of overall and differential attrition rates exceeds WWC standards for this area, and the estimates of effects did not account for the existing differences in pre-intervention characteristics. The high-achieving subgroup did not meet standards because the combination of overall and differential attrition rates exceeds WWC standards for this area, and the subsequent analytic intervention and comparison groups are not shown to be equivalent at baseline.

8. The extent of evidence categorization was developed to tell readers how much evidence was used to determine the intervention rating, focusing on the number and size of studies. Additional factors associated with a related concept (external validity, such as the students' demographics and the types of settings in which studies took place) are not taken into account for the categorization. Information about how the extent of evidence rating was determined for *Peer-Assisted Learning Strategies* is in Appendix A6.

9. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Saenz, Fuchs, and Fuchs (2005), a correction for clustering was needed, so the significance levels may differ from those reported in the original study.

the difference between participants in the intervention and the comparison conditions, and the consistency in findings across studies (see the WWC Procedures and Standards Handbook, Appendix E).

The WWC found *Peer-Assisted Learning Strategies* to have potentially positive effects for reading achievement for English language learners

Improvement index

The WWC computes an improvement index for each individual finding. In addition, within each outcome domain, the WWC computes an average improvement index for each study and an average improvement index across studies (see WWC Procedures and Standards Handbook, Appendix F). The improvement index represents the difference between the percentile rank of the average student in the intervention condition and the percentile rank of the average student in the comparison condition. Unlike the rating of effectiveness, the improvement index is entirely based on the size of the effect, regardless of the statistical significance of the effect, the study design, or the analysis. The improvement index can take on values between –50 and +50, with positive numbers denoting favorable results for the intervention group.

The average improvement index for reading achievement is +12 percentile points across one study, with a range of +5 to +25 percentile points across findings.

Summary

The WWC reviewed four studies on *Peer-Assisted Learning Strategies* for English language learner students. One of these studies meets WWC evidence standards; three studies do not meet either WWC evidence standards or eligibility screens. Based on the one study, the WWC found potentially positive effects on reading achievement for English language learners. The conclusions presented in this report may change as new research emerges.

References

Meets WWC evidence standards

Saenz, L. M., Fuchs, L. S., & Fuchs, D. (2005). Peer-assisted learning strategies for English language learners with learning disabilities. *Exceptional Children, 71*(3), 231–247.
  Additional source:
  Saenz, L. M. (2002). Peer-assisted learning strategies for limited English proficient students with learning disabilities. (Doctoral dissertation, Vanderbilt University, 2002). *Dissertation Abstracts International, 63*(07A), 163–2505.

Studies that fall outside the English Language Learners review protocol or do not meet WWC evidence standards

Calhoon, M. B., Al Otaiba, S. A., Cihak, D., King, A., & Avalos, A. (2007). Effects of a peer-mediated program on reading skill acquisition for two-way bilingual first-grade classrooms. *Learning Disability Quarterly, 30*(3), 169–184. The study does not meet WWC evidence standards because it is a randomized controlled trial in which the combination of overall and differential attrition rates exceeds WWC standards for this area, and the subsequent analytic and comparison groups are not shown to be equivalent.

Calhoon, M. B., Al Otaiba, S., Greenberg, D., King, A., & Avalos, A. (2006). Improving reading skills in predominantly Hispanic Title 1 first-grade classrooms: The promise of peer-assisted learning strategies. *Learning Disabilities Research & Practice, 21*(4), 261–272. The study is ineligible for review because it does not use a sample aligned with the protocol; the sample is less than 60% English language learners.

McMaster, K. L., Kung, S.-H., Han, I., & Cao, M. (2008). Peer-assisted learning strategies: A "Tier 1" approach to promoting English learners' response to intervention. *Exceptional Children, 74*(2), 194–214. The study does not meet WWC evidence standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.

Appendix

Appendix A1   Study characteristics: Saenz, Fuchs, and Fuchs, 2005

Characteristic	Description
Study citation	Saenz, L. M., Fuchs, L. S., & Fuchs, D. (2005). Peer-assisted learning strategies for English language learners with learning disabilities. *Exceptional Children, 71*(3), 231–247.
Participants	Twelve classrooms from grades 3–6 in one Texas school district were stratified based on grade level and school. Classrooms were then randomly assigned to either the *Peer-Assisted Learning Strategies* condition or the comparison condition. For a classroom to be eligible for the study, all students had to be English language learners, and at least two students had to have a learning disability (LD). Outcome data were collected on 11 students in each class: two students with LD, three low-achieving (LA) students, three average-achieving (AA) students, and three high-achieving (HA) students. The learning disability group is not included in this review since another WWC topic area will review those results. The students were categorized into LA, AA, and HA based on teachers' ranking according to classroom observations, previous scores on minimum state standards competency exams, and district-required informal reading inventories. LA students were in the lowest quartile of the class rank, AA in the middle half, and HA in the top quartile. The baseline sample included in this review consisted of 12 classrooms (six *Peer-Assisted Learning Strategies* and six comparison) and a total of 108 native Spanish-speaking students (54 *Peer-Assisted Learning Strategies* and 54 comparison) in grades 3–6. Of the 54 students in each condition, 18 were low achievers, 18 were average achievers, and 18 were high achievers. The analysis sample included in this review consisted of 12 classrooms (six *Peer-Assisted Learning Strategies* and six comparison) and 99 students (49 *Peer-Assisted Learning Strategies* and 50 comparison). Of the 49 *Peer-Assisted Learning Strategies* students in the analysis sample, 15 were low achievers, 17 were average achievers, and 18 were high achievers. Of the 50 comparison students in the analysis sample, 18 were low achievers, 18 were average achievers, and 14 were high achievers.
Setting	The study was conducted in one school district in Texas. All students were enrolled in bilingual education classrooms in grades 3–6.
Intervention	*Peer-Assisted Learning Strategies* sessions were conducted three times a week for 15 weeks. Each *Peer-Assisted Learning Strategies* session lasted for 25–35 minutes and occurred during regular reading instruction periods. Teachers ranked students by their reading achievement (high versus low) and paired a higher-achieving student with a lower-achieving student. Students were assigned a new partner about once a month. During *Peer-Assisted Learning Strategies*, pairs of students engaged in three reading activities: partner reading and retelling, paragraph shrinking, and prediction relay. In all three activities, students took 5-minute turns of being tutor and tutee. During partner reading and retelling, the better reader read aloud for five minutes while the weaker reader served as the tutor, who identified errors and corrected them. The weaker reader reread the same material for the next five minutes and retold what was read. During paragraph shrinking, each student read aloud for five minutes, stopping after each paragraph to summarize what was read. During prediction relay, the reader made a prediction before reading, read half a page, checked the prediction, and summarized using paragraph shrinking. Pairs earned points for correct or accurate responses during activities.[1]
Comparison	Teachers in the comparison group provided the district's regular curriculum for reading instruction. Lesson plans for both the intervention and comparison classrooms were reviewed twice during the study to assess the type of instruction provided. The study found that *Peer-Assisted Learning Strategies* teachers were more likely than comparison teachers to use one-on-one instruction, and no statistical differences were found in small-group instruction, whole-class instruction, and independent seatwork. The study found that *Peer-Assisted Learning Strategies* teachers were more likely than comparison teachers to use peer-mediated instruction and less likely to use teacher-led instruction.
Primary outcomes and measurement	The study measures in the reading achievement domain were three subtests of the Comprehensive Reading Assessment Battery. The subscales used were Word Correct, Maze Choices Correct, and Comprehension Questions Correct. For a more detailed description of these outcome measures, see Appendix A2.

1. Typically, the points are used as a motivation technique. Teachers can use them in several forms, for grades (participation points), prizes, class parties, and so on. In Saenz, Fuchs, and Fuchs (2005), the authors do not specify how these points were used by the teachers.

(continued)

Characteristic	Description
Staff/teacher training	Teachers assigned to the *Peer-Assisted Learning Strategies* condition were trained by research assistants during a full-day workshop. Teachers were given an overview of *Peer-Assisted Learning Strategies* as well as opportunities to practice *Peer-Assisted Learning Strategies* procedures. Training emphasized how teachers could train their students to implement *Peer-Assisted Learning Strategies*. Upon conclusion of the workshop, teachers received a comprehensive *Peer-Assisted Learning Strategies* manual. The manual included scripted lessons that could be used when training students on *Peer-Assisted Learning Strategies* procedures. As part of this study, research assistants provided daily technical assistance to *Peer-Assisted Learning Strategies* teachers during the five weeks during which teachers trained students on *Peer-Assisted Learning Strategies* procedures. At the completion of student training, research assistants provided weekly technical assistance for the duration of *Peer-Assisted Learning Strategies* implementation.

Appendix A2   Outcome measures for the reading achievement domain[1]

Outcome measure	Description
Comprehensive Reading Assessment Battery (CRAB)[2]	The CRAB includes four 400-word folktales with a 2nd- to 3rd-grade readability level. Students have three minutes to read the first folktale aloud and then answer 10 comprehension questions. For a second folktale, students have two minutes to complete a cloze or maze task, three minutes to read the story aloud, and then answer 10 comprehension questions (as cited by Saenz, Fuchs, & Fuchs, 2005). CRAB has three subscales described below.
CRAB Words Correct subscale	This subscale assesses reading fluency and accuracy. Scores on this measure are based on the number of words read correctly in three minutes (as cited by Saenz, Fuchs, & Fuchs, 2005).
CRAB Maze Choices Correct subscale	The Maze Choices Correct subscale assesses silent reading accuracy and fluency. The maze task requires students to read a passage that consists of the first sentence intact, followed by every seventh word replaced with a three-item multiple-choice format. One answer is a semantically correct choice for the missing word. Scores on this measure are based on the number of correct maze choices made in two minutes (as cited by Saenz, Fuchs, & Fuchs, 2005).
CRAB Comprehension Questions Correct subscale	The Comprehension Questions Correct subscale assesses reading comprehension. Scores are based on the number of correct answers to comprehension questions (as cited by Saenz, Fuchs, & Fuchs, 2005).

1. This appendix reports outcome measures considered for the effectiveness rating and the average improvement indices for the reading achievement domain.
2. Fuchs, L. S., Fuchs, D., & Hamlett, C. L. (1989). Monitoring reading growth using student recalls: Effects of two teacher feedback systems. *Journal of Educational Research, 83*, 103–111.

Appendix A3   Summary of study findings included in the rating for the reading achievement domain[1]

Outcome measure	Study sample	Sample size (clusters/ students)	Authors' findings from the study — Mean outcome[2] (standard deviation)[3] — Peer-Assisted Learning Strategies group[4]	Comparison group	WWC calculations — Mean difference[5] (Peer-Assisted Learning Strategies – comparison)	Effect size[6]	Statistical significance[7] (at $\alpha = 0.05$)	Improvement index[8]
Saenz, Fuchs, and Fuchs, 2005[9]								
CRAB Words Correct subscale	Grades 3–6	12 classes/ 99 students	341.08 (82.49)	329.41 (88.37)	11.67	0.14	ns	+5
CRAB Comprehension Questions Correct subscale	Grades 3–6	12 classes/ 99 students	5.09 (2.39)	3.71 (1.61)	1.38	0.67	ns	+25
CRAB Maze Choices Correct subscale	Grades 3–6	12 classes/ 99 students	11.23 (4.21)	10.74 (3.81)	0.49	0.12	ns	+5
Average for reading achievement (Saenz, Fuchs, and Fuchs, 2005)[10]						**0.31**	**na**	**+12**

ns = not statistically significant

na = not applicable/not studied

CRAB = Comprehensive Reading Assessment Battery

1. This appendix reports findings considered for the effectiveness rating and the average improvement indices for the reading achievement domain.
2. The means and standard deviations presented in this table for Saenz, Fuchs, and Fuchs (2005) were calculated by the WWC. Saenz, Fuchs, and Fuchs (2005) present separate results for low-achieving (LA), average-achieving (AA), and high-achieving (HA) subgroups at the class level. The results presented here are WWC aggregated results based on student-level findings presented in Saenz (2002) for the LA, AA, and HA subgroups.
3. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
4. The *Peer-Assisted Learning Strategies* group mean outcome values for Saenz, Fuchs, and Fuchs (2005) were calculated by the WWC using a difference-in-differences approach (see WWC Handbook, Appendix B); calculating the program means by adding the impact of the program (i.e., difference in mean gains between the intervention and control groups) to the unadjusted control group posttest means.
5. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group. The mean difference for each of the reading achievement outcomes reported by Saenz, Fuchs, and Fuchs (2005) reflects the mean difference between treatment and control groups calculated by the WWC using the difference-in-differences approach.
6. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
7. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
8. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between −50 and +50, with positive numbers denoting favorable results for the intervention group.
9. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Saenz, Fuchs, and Fuchs (2005), corrections for clustering and multiple comparisons were needed, so the significance levels may differ from those reported in the original study.
10. The WWC-computed average effect sizes for each study and for the domain across studies are simple averages rounded to two decimal places. The average improvement indices are calculated from the average effect sizes.

Appendix A4   Summary of subgroup findings for the reading achievement domain[1]

| Outcome measure | Study sample | Sample size (clusters/ students) | Authors' findings from the study — Mean outcome (standard deviation)[2] | | WWC calculations | | | |
			Peer-Assisted Learning Strategies group[3]	Comparison group	Mean difference[4] (Peer-Assisted Learning Strategies – comparison)	Effect size[5]	Statistical significance[6] (at $\alpha = 0.05$)	Improvement index[7]
Saenz, Fuchs, and Fuchs, 2005[8]								
CRAB Words Correct subscale	Average achievers	12 classes/ 35 students	322.92 (66.98)	318.39 (75.32)	4.53	0.06	ns	+2
CRAB Comprehension Questions Correct subscale	Average achievers	12 classes/ 35 students	5.02 (1.76)	3.86 (1.37)	1.16	0.72	ns	+26
CRAB Maze Choices Correct subscale	Average achievers	12 classes/ 35 students	10.66 (3.66)	10.72 (3.18)	−0.06	−0.02	ns	−1

ns = not statistically significant

CRAB = Comprehensive Reading Assessment Battery

1. This appendix presents subgroup findings for measures that fall in the reading achievement domain. Total group scores are presented in Appendix A3. Saenz, Fuchs, and Fuchs (2005) present separate results for low-achieving (LA), average-achieving (AA), and high-achieving (HA) subgroups at the class level. The results presented here are based on student-level findings presented in Saenz (2002) for the AA subgroup. This report presents only results for the AA group since the LA and HA subgroup results failed to meet WWC evidence standards. The low-achieving subgroup results do not meet standards because the combination of overall and differential attrition rates exceeds WWC standards for this area, and the estimates of effects did not account for the existing differences in pre-intervention characteristics. The high-achieving subgroup did not meet standards because the combination of overall and differential attrition rates exceeds WWC standards for this area, and the subsequent analytic intervention and comparison groups are not equivalent at baseline.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. The Peer-Assisted Learning Strategies group mean outcome values for Saenz, Fuchs, and Fuchs (2005) were calculated by the WWC using a difference-in-differences approach (see WWC Handbook, Appendix B); calculating the program means by adding the impact of the program (i.e., difference in mean gains between the intervention and control groups) to the unadjusted control group posttest means.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group. The mean difference for each of the reading achievement outcomes reported by Saenz, Fuchs, and Fuchs (2005) reflects the mean difference between treatment and control groups calculated by the WWC using the difference-in-differences approach.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between −50 and +50, with positive numbers denoting favorable results for the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Saenz, Fuchs, and Fuchs (2005), corrections for clustering and multiple comparisons were needed, so the significance levels may differ from those reported in the original study.

Appendix A5   *Peer-Assisted Learning Strategies* rating for the reading achievement domain

The WWC rates an intervention's effects for a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative.[1]

    For the outcome domain of reading achievement, the WWC rated *Peer-Assisted Learning Strategies* for English language learners as having potentially positive effects. The remaining ratings (mixed effects, no discernible effects, potentially negative effects, and negative effects) were not considered, as *Peer-Assisted Learning Strategies* was assigned the highest applicable rating.

Rating received

Potentially positive effects: Evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect.

  > Met. *Peer-Assisted Learning Strategies* has one study that shows a substantively important positive effect on reading achievement.

AND

- Criterion 2: No studies showing a statistically significant or substantively important *negative* effect and fewer or the same number of studies showing *indeterminate* effects than showing statistically significant or substantively important *positive* effects.

  > Met. *Peer-Assisted Learning Strategies* does not have any studies showing a statistically significant or substantively important negative effect or any studies showing indeterminate effects on reading achievement.

Other ratings considered

Positive effects: Strong evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: Two or more studies showing statistically significant *positive* effects, at least one of which met WWC evidence standards for a *strong* design.

  > Not met. *Peer-Assisted Learning Strategies* has no studies showing statistically significant positive effects on reading achievement.

AND

- Criterion 2: No studies showing statistically significant or substantively important *negative* effects.

  > Met. *Peer-Assisted Learning Strategies* has no studies showing statistically significant or substantively important negative effects on reading achievement.

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1. For rating purposes, the WWC considers the statistical significance of individual outcomes and the domain-level effect. The WWC also considers the size of the domain-level effect for ratings of potentially positive or potentially negative effects. For a complete description, see the WWC Procedures and Standards Handbook, Appendix E.

Appendix A6   Extent of evidence by domain

| Outcome domain | Number of studies | Sample size | | Extent of evidence[1] |
		Schools	Students	
Reading achievement	1	not available	99	Small
English language development	0	na	na	na
Mathematics achievement	0	na	na	na

na = not applicable/not studied

1. A rating of "medium to large" requires at least two studies and two schools across studies in one domain and a total sample size across studies of at least 350 students or 14 classrooms. Other-
    wise, the rating is "small." For more details on the extent of evidence categorization, see the WWC Procedures and Standards Handbook, Appendix G.