What Works Clearinghouse™

ies INSTITUTE OF EDUCATION SCIENCES

Students with Learning Disabilities May 2014

Repeated Reading

Program Description[1]

Repeated reading is an academic practice that aims to increase oral reading fluency. *Repeated reading* can be used with students who have developed initial word reading skills but demonstrate inadequate reading fluency for their grade level. During *repeated reading*, a student sits in a quiet location with a teacher and reads a passage aloud at least three times.[2] Typically, the teacher selects a passage of about 50 to 200 words in length. If the student misreads a word or hesitates for longer than 5 seconds, the teacher reads the word aloud, and the student repeats the word correctly. If the student requests help with a word, the teacher reads the word aloud or provides the definition. The student rereads the passage until he or she achieves a satisfactory fluency level.

Research[3]

The What Works Clearinghouse (WWC) identified two group design studies of *repeated reading* within the scope of the Students with Learning Disabilities topic area that meet WWC group design standards. Both studies meet WWC group design standards without reservations. Together, these studies included 78 students with learning disabilities from grades 5–12 in two different locations.

The WWC considers the extent of evidence for *repeated reading* on students with learning disabilities to be small for four outcome domains—reading comprehension, alphabetics, reading fluency, and general reading achievement. There were no studies that meet standards in the five other domains covered by the WWC reading topic area, so this intervention report does not summarize the effectiveness of *repeated reading* for those domains. (See the Effectiveness Summary on p. 5 for further description of all domains.)

Effectiveness

Repeated reading was found to have potentially positive effects on reading comprehension and no discernible effects on alphabetics, reading fluency, and general reading achievement for students with learning disabilities.

Report Contents

Table 1. Summary of findings[4]

Outcome domain	Rating of effectiveness	Improvement index *(percentile points)*		Number of studies	Number of students	Extent of evidence
		Average	Range			
Reading comprehension	Potentially positive effects	+7	+2 to +11	2	78	Small
Alphabetics	No discernible effects	+4	na	1	62	Small
Reading fluency	No discernible effects	–1	–4 to +5	1	62	Small
General reading achievement	No discernible effects	–7	na	1	62	Small

na = not applicable

Program Information

Background

Repeated reading is an academic reading practice that does not have a single developer. It is based on the theory of automaticity, developed in the 1960s and 1970s. The theory is that fluent readers decode reading text automatically, enabling the reader to focus on comprehension.[5] *Repeated reading* aims to build automaticity, and thus, improve reading fluency and comprehension.

Program details

Repeated reading is an academic practice that aims to make word recognition skills automatic through practice. During *repeated reading*, a student sits in a quiet location with a teacher and reads a passage aloud at least three times. Teachers can vary:

- the criterion for progression to the next passage (minimum number of times read or minimum reading rate of 85–100 words per minute),
- the instructional settings (teacher-directed setting, with same-age or cross-age peers, in groups, independently),
- the purpose (identifying motivations of characters, finding out information),
- the materials (narrative texts, expository texts, poems, chants, songs, text written by the student or class),
- the modalities (read silently with a tape, read aloud with the model, read chorally, read to a peer, read to oneself),
- the length of the passage read, and
- feedback provided on reading errors.

Cost

Information is not available about the costs of teacher training and implementation of *repeated reading* practices.

Research Summary

The WWC identified 194 studies that investigated the effects of *repeated reading* on students with learning disabilities. Of those studies, 15 met WWC eligibility screens for review in this topic area (five group design and 10 single-case design). Citations for all 194 studies are in the References section, which begins on p. 7.

Table 2. Scope of reviewed research

Grade	5–12
Delivery method	Individual
Program type	Practice

Two of the eligible group design studies (Ellis & Graves, 1990; Wexler, Vaughn, Roberts, & Denton, 2010) are randomized controlled trials that meet WWC group design standards without reservations. These studies contribute to the ratings in this report. The other three eligible group design studies do not meet WWC group design standards.

The evidence from the single-case design studies on *repeated reading* does not reach the threshold to include single-case design evidence in the effectiveness ratings in this report (see p. 36). More details on the study that met pilot single-case design standards can be found in Appendix E.

Summary of studies meeting WWC group design standards without reservations

Ellis and Graves (1990) examined the effects of *repeated reading* on the reading comprehension of fifth-, sixth-, and seventh-grade students with learning disabilities from a small rural middle school in the southeastern United States. The authors randomly assigned 32 students to one of four groups: *repeated reading*, paraphrasing, *repeated reading* combined with paraphrasing, and comparison. There was no attrition of students from the final study sample. This review focuses on the subset of 16 students who were assigned equally to either the *repeated reading* group or the comparison group. (The comparison between the *repeated reading* combined with paraphrasing group and the comparison group is reported in Appendix D but does not contribute to the evidence rating.) Comparison group students read the story only once. The outcome assessed was students' ability to identify the main idea of a passage that was administered three times: after the first 4 days of the intervention (midtest), after the next 4 days of the intervention (posttest), and 14 days after completion of the intervention (follow-up). The immediate posttest affects the evidence rating, but the follow-up (reported in Appendix D) does not.

Wexler et al. (2010) conducted a study with a total of 106 high school students from 11 classrooms in a metropolitan area in the southwestern United States. All students in the study had significant reading difficulties and were enrolled in special education English and reading classes. Students within each class were paired based on median pretest oral reading fluency scores—higher scorers were paired with lower scorers in such a way that practice texts would be appropriate for both students in the pair. Each pair was then randomly assigned to one of three conditions: *repeated reading*, wide reading, or comparison. This review focuses on the subset of 62 students who were assigned to the *repeated reading* (33 students) and comparison (29 students) groups. Seventy-seven percent of the students in the combined *repeated reading* and comparison groups were learning disabled. Students in the comparison group received the reading instruction they would normally receive from their classroom teachers. All outcome measures were administered immediately before and after the 10-week intervention.

Summary of studies meeting WWC group design standards with reservations

No studies of *repeated reading* met WWC group design standards with reservations.

Effectiveness Summary

The WWC review of *repeated reading* for the Students with Learning Disabilities topic area includes student outcomes in nine domains: reading comprehension, alphabetics, reading fluency, general reading achievement, mathematics, writing, science, social studies, and progressing in school. The two group design studies of *repeated reading* that meet WWC group design standards reported findings in four of the nine domains: (a) reading comprehension, (b) alphabetics, (c) reading fluency, and (d) general reading achievement. The findings below present the authors' estimates and WWC-calculated estimates of the size and statistical significance of the effects of *repeated reading* on students with learning disabilities. For a more detailed description of the rating of effectiveness and extent of evidence criteria, see the WWC Rating Criteria on p. 35.

Summary of effectiveness for the reading comprehension domain

Two studies reported findings in the reading comprehension domain.

Ellis and Graves (1990) found no statistically significant effect of *repeated reading* on one measure of reading comprehension: the Main Idea Test. The WWC-calculated effect size was not large enough to be considered substantively important. The WWC characterizes these study findings as an indeterminate effect.

Wexler et al. (2010) found no statistically significant effect of *repeated reading* on one measure of reading comprehension: the Passage Comprehension subtest of the Woodcock-Johnson III (WJ III) Tests of Achievement. However, the WWC-calculated effect size (0.28) was large enough to be considered substantively important according to WWC criteria (i.e., an effect of at least 0.25). The WWC characterizes these study findings as a substantively important positive effect.

Thus, for the reading comprehension domain, no studies found statistically significant effects. However, one study had an effect size large enough to be considered substantively important. This results in a rating of potentially positive effects, with a small extent of evidence.

Table 3.1 Rating of effectiveness and extent of evidence for the reading comprehension domain

Rating of effectiveness	Criteria met
Potentially positive effects *Evidence of a positive effect with no overriding contrary evidence.*	In the two studies that reported findings, the estimated impact of the intervention on outcomes in the *reading comprehension* domain was not statistically significant, but in one study was large enough to be a substantively important positive effect.
Extent of evidence	**Criteria met**
Small	Two studies that included 78 students reported evidence of effectiveness in the *reading comprehension* domain.

Summary of effectiveness for the alphabetics domain

One study reported findings in the alphabetics domain.

Wexler et al. (2010) found no statistically significant effects of *repeated reading* on one measure of alphabetics: the Letter-Word Identification subtest of the WJ III Tests of Achievement. The WWC-calculated effect size for this measure was not large enough to be considered substantively important. The WWC characterizes these study findings as an indeterminate effect.

Thus, for the alphabetics domain, no studies found statistically significant or substantively important effects of *repeated reading*. This results in a rating of no discernible effects, with a small extent of evidence.

Table 3.2 Rating of effectiveness and extent of evidence for the alphabetics domain

Rating of effectiveness	Criteria met
No discernible effects *No affirmative evidence of effects.*	In the one study that reported findings, the estimated impact of the intervention on outcomes in the *alphabetics* domain was neither statistically significant nor large enough to be substantively important.
Extent of evidence	**Criteria met**
Small	One study that included 62 students in 11 classrooms reported evidence of effectiveness in the *alphabetics* domain.

Summary of effectiveness for the reading fluency domain

One study reported findings in the reading fluency domain.

Wexler et al. (2010) found no statistically significant effect of *repeated reading* on four measures of reading fluency: the Test of Silent Contextual Reading Fluency (TOSCRF) and three assessments of oral reading fluency (number of words read correctly per minute) using the AIMSweb reading system. The WWC-calculated average effect size across the four outcomes was not large enough to be considered substantively important. The WWC characterizes these study findings as an indeterminate effect.

Thus, for the reading fluency domain, the study found no statistically significant or substantively important effects of *repeated reading*. This results in a rating of no discernible effects, with a small extent of evidence.

Table 3.3 Rating of effectiveness and extent of evidence for the reading fluency domain

Rating of effectiveness	Criteria met
No discernible effects *No affirmative evidence of effects.*	In the one study that reported findings, the estimated impact of the intervention on outcomes in the *reading fluency* domain was neither statistically significant nor large enough to be substantively important.
Extent of evidence	**Criteria met**
Small	One study that included 62 students in 11 classrooms reported evidence of effectiveness in the *reading fluency* domain.

Summary of effectiveness for the general reading achievement domain

One study reported findings in the general reading achievement domain.

Wexler et al. (2010) found no statistically significant effect of *repeated reading* on one measure of general reading achievement: the Test of Silent Reading Efficiency (TOSRE). The WWC-calculated effect size for this measure was not large enough to be considered substantively important. The WWC characterizes these study findings as an indeterminate effect.

Thus, for the general reading achievement domain, no studies found statistically significant or substantively important effects of *repeated reading*. This results in a rating of no discernible effects, with a small extent of evidence.

Table 3.4 Rating of effectiveness and extent of evidence for the general reading achievement domain

Rating of effectiveness	Criteria met
No discernible effects *No affirmative evidence of effects.*	In the one study that reported findings, the estimated impact of the intervention on outcomes in the *general reading achievement* domain was neither statistically significant nor large enough to be substantively important.
Extent of evidence	**Criteria met**
Small	One study that included 62 students in 11 classrooms reported evidence of effectiveness in the *general reading achievement* domain.

References

Studies that meet WWC group design standards without reservations

Ellis, E. S., & Graves, A. W. (1990). Teaching rural students with learning disabilities: A paraphrasing strategy to increase comprehension of main ideas. *Rural Special Education Quarterly, 10*(2), 2–10.

Wexler, J., Vaughn, S., Roberts, G., & Denton, C. A. (2010). The efficacy of repeated reading and wide reading practice for high school students with severe reading disabilities. *Learning Disabilities Research & Practice, 25*(1), 2–10.

Additional source:

Wexler, J. A. P. (2008). The relative effects of repeated reading, wide reading, and a typical instruction comparison group on the comprehension, fluency, and word reading of adolescents with reading disabilities. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 68*(12–A), 5034.

Study that meets WWC pilot single-case design standards without reservations[6]

Steventon, C. E. (2004). Repeated reading within the context of a peer-mediated remedial reading program. *Dissertation Abstracts International, 65*(06A), 105–2162.

Studies that do not meet WWC group design standards

Mathes, P. G., & Fuchs, L. S. (1993). Peer-mediated reading instruction in special education resource rooms. *Learning Disabilities Research & Practice, 8*(4), 233–243. The study does not meet WWC group design standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.

Additional source:

Fuchs, L. S., & Mathes, P. G. (1991). *Peer-mediated reading instruction in special education resource room settings. Final report.* Washington, DC: U.S. Dept. of Education, Office of Educational Research and Improvement, Educational Resources Information Center.

Russell, J. M. (2012). *The impact of fluency intervention on the oral reading fluency and comprehension of middle school students with learning disabilities* (Unpublished doctoral dissertation). Florida Atlantic University, Boca Raton. This study does not meet WWC group design standards because the measures of effectiveness cannot be attributed solely to the intervention—there was only one unit assigned to one or both conditions.

Therrien, W. J., & Hughes, C. (2008). Comparison of repeated reading and question generation on students' reading fluency and comprehension. *Learning Disabilities: A Contemporary Journal, 6*(1), 1–16. The study does not meet WWC group design standards because it only includes outcomes that are overaligned with the intervention or measured in a way that is inconsistent with the protocol.

Studies that do not meet WWC pilot single-case design standards

Christner, B. A. R. (2009). *Videotaped oral reading fluency lab: An alternative approach to one-on-one interventions for intermediate elementary students with learning disabilities* (Unpublished doctoral dissertation). University of Central Florida, Orlando. This study does not meet WWC pilot single-case design standards because inter-assessor agreement did not meet the minimum thresholds.

Fascio-Vereen, S. T. (2004). *A comparison of reading interventions using social studies text to improve oral reading fluency of middle school students* (Unpublished doctoral dissertation). Mississippi State University, MS. This study does not meet WWC pilot single-case design standards because it only includes outcomes that are overaligned with the intervention or measured in a way that is inconsistent with the protocol.

Hawkins, R. O., Hale, A. D., Sheeley, W., & Ling, S. (2011). Repeated reading and vocabulary-previewing interventions to improve fluency and comprehension for struggling high-school readers. *Psychology in the Schools, 48*(1), 59–77. This study does not meet WWC pilot single-case design standards because it only includes outcomes that are overaligned with the intervention or measured in a way that is inconsistent with the protocol.

Morisoli, K. L. (2010). *Effects of repeated reading on reading fluency of diverse secondary-level learners* (Unpublished doctoral dissertation). University of Arizona, Tucson. This study does not meet WWC pilot single-case design standards because it only includes outcomes that are overaligned with the intervention or measured in a way that is inconsistent with the protocol.

Stout, T. W. (1997). *An investigation of the effects of a repeated reading intervention on the fluency and comprehension of students with language-learning disabilities* (Unpublished doctoral dissertation). Georgia State University, Atlanta. This study does not meet WWC pilot single-case design standards because it only includes outcomes that are overaligned with the intervention or measured in a way that is inconsistent with the protocol.

Vandenberg, A. C., Boon, R. T., Fore, C., & Bender, W. N. (2008). The effects of repeated readings on the reading fluency and comprehension for high school students with specific learning disabilities. *Learning Disabilities: A Multidisciplinary Journal, 15*(1), 11–20. This study does not meet WWC pilot single-case design standards because inter-assessor agreement did not meet the minimum thresholds.

Weinstein, G., & Cooke, N. L. (1992). The effects of two repeated reading interventions on generalization of fluency. *Learning Disability Quarterly, 15*(1), 21–28. This study does not meet WWC pilot single-case design standards because inter-assessor agreement was not measured at least once in each phase and on at least 20% of the data points in each condition.

Welsch, R. G. (2007). Using experimental analysis to determine interventions for reading fluency and recalls of students with learning disabilities. *Learning Disability Quarterly, 30*(2), 115–129. This study does not meet WWC pilot single-case design standards because inter-assessor agreement did not meet the minimum thresholds.

Wilson, L. D. (2009). *Improving fluency through instructional synergy in special day class students in an alternative school* (Unpublished doctoral dissertation). Walden University, Minneapolis, MN. This study does not meet WWC pilot single-case design standards because inter-assessor agreement was not measured at least once in each phase and on at least 20% of the data points in each condition.

Studies that are ineligible for review using the Students with Learning Disabilities Evidence Review Protocol

Allor, J. H., & Chard, D. J. (2011). A comprehensive approach to improving reading fluency for students with disabilities. *Focus on Exceptional Children, 43*(5), 1–12. This study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

Archer, A. L., Gleason, M. M., & Vachon, V. L. (2003). Decoding and fluency: Foundation skills for struggling older readers. *Learning Disability Quarterly, 26*(2), 89. This study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

Ardoin, S. P., Williams, J. C., Klubnik, C., & McCall, M. (2009). Three versus six rereadings of practice passages. *Journal of Applied Behavior Analysis, 42*(2), 375–380. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Ari, O. (2011). Fluency interventions for developmental readers: Repeated readings and wide reading. *Research & Teaching in Developmental Education, 28*(1), 5–15. This study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Armstrong, T. K. (2009). A computer assisted repeated reading intervention with children with high functioning autism. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 71*(2–A), 522. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Armstrong, T. K., & Hughes, M. T. (2012). Exploring computer and storybook interventions for children with high functioning autism. *International Journal of Special Education, 27*(3), 88–99. http://files.eric.ed.gov/fulltext/EJ1001062.pdf. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Begeny, J. C., Daly, E. J., III, & Valleley, R. J. (2006). Improving oral reading fluency through response opportunities: A comparison of phrase drill error correction with repeated readings. *Journal of Behavioral Education, 15*(4), 229–235. This study is ineligible for review because it does not examine an intervention implemented in a way that falls within the scope of the review.

Begeny, J. C., Krouse, H. E., Ross, S. G., & Mitchell, R. C. (2009). Increasing elementary-aged students' reading fluency with small-group interventions: A comparison of repeated reading, listening passage preview, and listening only strategies. *Journal of Behavioral Education, 18*(3), 211–228. This study is ineligible for review because the authors could not confirm that at least 50% of the sample were classified as students with learning disabilities.

Berkeley, S., Scruggs, T. E., & Mastropieri, M. A. (2010). Reading comprehension instruction for students with learning disabilities, 1995–2006: A meta-analysis. *Remedial and Special Education, 31*(6), 423–436. This study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

Blamey, K. L. (2008). *The effects of two repeated reading treatments on fluency and comprehension of second grade students* (Unpublished doctoral dissertation). University of Delaware, Newark. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Boisvert, P. C. (2006). *Video self-modeling and assisted repeated readings: A fluency intervention with adolescent English learners* (Unpublished doctoral dissertation). University of Hawaii at Manoa, Honolulu. This study is ineligible for review because it does not implement the intervention in a way that falls within the scope of the review—the intervention is bundled with other components.

Bolton, A. B. (1991). *Reading to read: Evaluating a variant of repeated reading* (Unpublished doctoral dissertation). University of Southern Mississippi, Hattiesburg. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Boyer, L. M. (1992). *Reading to read: Generalization and effects on comprehension* (Unpublished doctoral dissertation). University of Southern Mississippi, Hattiesburg. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Bradley, T. A. (1999). *Increasing integrity of classroom interventions: A comparison of performance feedback and social support* (Unpublished doctoral dissertation). Syracuse University, NY. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Bramuchi, L. H. (2009). Reading interventions to improve oral reading fluency and literal comprehension. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 70*(5–A), 1599. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Büttner, G., & Shamir, A. (2011). Learning disabilities: Causes, consequences, and responses. *International Journal of Disability, Development & Education, 58*(1), 1–4. This study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

Cahill, M. A., & Gregory, A. E. (2011). Putting the fun back into fluency instruction. *Reading Teacher, 65*(2), 127–131. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Carrick, L. U. (2001). *The effects of Reader's Theatre on fluency and comprehension on fifth grade students in regular classrooms* (Unpublished doctoral dissertation). Lehigh University, Bethlehem, PA. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Casey, L. B., & Williamson, R. (2011). Training parents as effective literacy tutors: Increasing the procedural integrity of tutoring. *Mentoring & Tutoring: Partnership in Learning, 19*(3), 257–276. This study is ineligible for review because it does not examine the intervention in a way that falls within the scope of the review.

Cates, G. L., Thomason, K., Havey, M., & McCormick, C. (2006). A preliminary investigation of the effects of reading fluency interventions on comprehension: Using brief experimental analysis to select reading interventions. *Journal of Applied School Psychology, 23*(1), 133–154. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Caudill-Hansen, K. J. (2009). Reader's Theater as a strategy to increase comprehension and fluency in sixth grade students. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 70*(12–A), 4624. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Chard, D. J., Ketterlin-Geller, L., Baker, S. K., Doabler, C., & Apichatabutra, C. (2009). Repeated reading interventions for students with learning disabilities: Status of the evidence. *Exceptional Children, 75*(3), 263–281. This study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

Chard, D. J., Vaughn, S., & Tyler, B. (2002). A synthesis of research on effective interventions for building reading fluency with elementary students with learning disabilities. *Journal of Learning Disabilities, 35*(5), 386. This study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

Chrisman, T. A. (2005). T*he effects of repeated reading and types of text on oral reading fluency* (Unpublished doctoral dissertation). University of Pittsburgh, PA. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Coleman, M. B., & Heller, K. W. (2010). The use of repeated reading with computer modeling to promote reading fluency with students who have physical disabilities. *Journal of Special Education Technology, 25*(1), 29–41. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Additional source:

Coleman, M. E. (2008). *The use of a repeated readings with computer modeling treatment package to promote reading fluency with students who have physical disabilities* (Unpublished doctoral dissertation). Georgia State University, Atlanta.

Conrad, N. J. (2008). From reading to spelling and spelling to reading: Transfer goes both ways. *Journal of Educational Psychology, 100*(4), 869–878. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Cook, C. R., Dart, E., Collins, T., Restori, A., Daikos, C., & Delport, J. (2012). Preliminary study of the confined, collateral, and combined effects of reading and behavioral interventions: Evidence for a transactional relationship. *Behavioral Disorders, 38*(1), 38–56. This study is ineligible for review because it does not implement the intervention in a way that falls within the scope of the review—the intervention is bundled with other components.

Czepull, T. K. (2007). *Analysis of a fluency method and a phonics method of reading instruction in third-grade students* (Unpublished doctoral dissertation). University of South Dakota, Vermillion. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Daly, E. J., III, & Kupzyk, S. (2012). An investigation of student-selected and parent-delivered reading interventions. *Journal of Behavioral Education, 21*(4), 295–314. This study is ineligible for review because it does not implement the intervention in a way that falls within the scope of the review—the intervention is bundled with other components.

Devault, R., & Joseph, L. M. (2004). Repeated readings combined with word boxes phonics technique increases fluency levels of high school students with severe reading delays. *Preventing School Failure, 49*(1), 22–27. This study is ineligible for review because it does not use a comparison group design or a single-case design.

Dowhower, S. L. (1994). Repeated reading revisited: Research into practice. *Reading & Writing Quarterly: Overcoming Learning Difficulties, 10*(4), 343–358. This study is ineligible for review because it is a secondary analysis of the effectiveness of the intervention, such as a meta-analysis or research literature review.

Dufrene, B. A., & Warzak, W. J. (2007). Brief experimental analysis of Spanish reading fluency: An exploratory evaluation. *Journal of Behavioral Education, 16*(2), 143–154. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Duong, T. M. (2011). *Pathways to oral and written language competence among young Vietnamese English language learners* (Unpublished doctoral dissertation). University of California, Berkeley. This study is ineligible for review because it does not implement the intervention in a way that falls within the scope of the review—the intervention is bundled with other components.

Edmister, E. (2007). *Repeated reading and augmentative and alternative communication* (Unpublished doctoral dissertation). University of Kansas, Lawrence. This study is ineligible for review because it does not examine an intervention implemented in a way that falls within the scope of the review.

Erion, R. J. (1994). *Parent tutoring, reading instruction and curricular assessment* (Unpublished doctoral dissertation). Indiana University of Pennsylvania, Indiana. This study is ineligible for review because it does not examine an intervention implemented in a way that falls within the scope of the review.

Escarpio, R. (2011). *Comparison of repeated and two non-repeated readings conditions on reading abilities of students with emotional and/or behavioral disabilities* (Unpublished doctoral dissertation). Florida International University, Miami. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Farah, M. L. (2010). The efficacy of oral reading interventions on transitional readers' fluency. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 71*(3–A), 893. This study is ineligible for review because it does not implement the intervention in a way that falls within the scope of the review—the intervention is bundled with other components.

Foster, T. E., Ardoin, S. P., & Binder, K. S. (2013). Underlying changes in repeated reading: An eye movement study. *School Psychology Review, 42*(2), 140–156. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Frame, J. N. (2011). *The effect of repeated reading with pairs of students in a large-group setting on fluency and comprehension for students at risk for reading failure* (Unpublished doctoral dissertation). Andrews University, Berrien Springs, MI. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Freeland, J. T., Skinner, C. H., Jackson, B., McDaniel, C. E., & Smith, S. (2000). Measuring and increasing silent reading comprehension rates: Empirically validating a repeated readings intervention. *Psychology in the Schools, 37*(5), 415–429. This study is ineligible for review because it does not implement the intervention in a way that falls within the scope of the review.

Fry, M. E. (2010). The effect of repeated readings within Reader's Theater on the reading fluency rates of at-risk third grade students. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 71*(4–A), 1246. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Gereighty, C. J. (2005). *Effects of repeated reading on adults' fluency and reading comprehension* (Unpublished doctoral dissertation). University of Southern Mississippi, Hattiesburg. This study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Gertz, L. E. (2011). *The effects of two interventions on the generalization of oral reading fluency: Training to generalize versus repeated readings* (Unpublished doctoral dissertation). Syracuse University, NY. This study is ineli-

gible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Gettinger, M., & Stoiber, K. C. (2012). Curriculum-based early literacy assessment and differentiated instruction with high-risk preschoolers. *Reading Psychology, 33*(1), 11–46. This study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

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Scarborough, A. C. (2012). *Using empirically validated reading strategies to improve middle school students' reading fluency of classroom textbooks* (Unpublished doctoral dissertation). Georgia State University, Atlanta. This study is ineligible for review because it does not implement the intervention in a way that falls within the scope of the review—the intervention is bundled with other components.

Scarborough, H. S., Sabatini, J. P., Shore, J., Cutting, L. E., Pugh, K., & Katz, L. (2013). Meaningful reading gains by adult literacy learners. *Reading and Writing, 26*(4), 593–613. This study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

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Semonick, M. A. (2001). *The effects of paired repeated reading on second graders oral reading and on-task behavior.* (Unpublished doctoral dissertation). University of Minnesota, Minneapolis. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

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Shaywitz, S. E., Morris, R., & Shaywitz, B. A. (2008). The education of dyslexic children from childhood to young adulthood. *Annual Review of Psychology, 59*(1), 451–475. This study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

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Strong, A. C. (2004). *Antecedent and consequence-based interventions for improving the reading fluency of middle school students with emotional and behavioral disorders* (Unpublished doctoral dissertation). Vanderbilt University, Nashville, TN. This study is ineligible for review because it does not implement the intervention in a way that falls within the scope of the review—the intervention is bundled with other components.

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Additional source:

Swanson, E., Wanzek, J., Petscher, Y., Vaughn, S., Heckert, J., Cavanaugh, C., …Tackett, K. (2011). A synthesis of read-aloud interventions on early reading outcomes among preschool through third graders at risk for reading difficulties. *Journal of Learning Disabilities, 44*(4), 396.

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Therrien, W. J., Kirk, J. F., & Woods-Groves, S. (2012). Comparison of a reading fluency intervention with and without passage repetition on reading achievement. *Remedial and Special Education, 33*(5), 309–319. This study is ineligible for review because the authors could not confirm that at least 50% of the sample was classified as students with learning disabilities.

Thomas, H. K., & Healy, A. F. (2012). A comparison of rereading benefits in first and second language reading. *Language Learning, 62*(1), 198–235. This study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

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Additional source:

Turpie, J. J. (1995). *Effects of repeated readings to promote reading success in a heterogenously-grouped first-grade (literacy)* (Unpublished doctoral dissertation). Boston University, MA.

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because it does not implement the intervention in a way that falls within the scope of the review—the intervention is bundled with other components.

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Wilson, S. B. (1991). *The effects of repeated reading on the development of decoding skills in second-graders* (Unpublished doctoral dissertation). The University of Texas at Austin. This study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Wu, Y. (2004). *Effects of repeated reading on text comprehension for college students* (Unpublished doctoral dissertation). University of Minnesota, Minneapolis. This study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Yawn, C. D. (2008). *Effects of peer-mediated direct instruction and repeated reading on the reading skills of incarcerated juveniles with disabilities* (Unpublished doctoral dissertation). Ohio State University, Columbus. This intervention is ineligible for review because it does not use a comparison group design or a single-case design.

Additional source:

Yawn, C. D. (2010). Effects of peer-mediated direct instruction and repeated reading on the reading skills of incarcerated juveniles with disabilities. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 70*(10–A), 3796.

Appendix A.1: Research details for Ellis & Graves, 1990

Ellis, E. S., & Graves, A. W. (1990). Teaching rural students with learning disabilities: A paraphrasing strategy to increase comprehension of main ideas. *Rural Special Education Quarterly, 10*(2), 2–10.

Table A1. Summary of findings

Meets WWC group design standards without reservations

		Study findings	
Outcome domain	Sample size	Average improvement index *(percentile points)*	Statistically significant
Reading comprehension	16 students	+11	No
Reading comprehension (follow-up)	16 students	+12	No

Setting

The study was conducted with students from the fifth, sixth, and seventh grades from a small, rural middle school in the southeastern United States with a predominantly Black student population.

Study sample

Resource teachers identified 68 students classified as learning disabled with a minimum 15-point standard score discrepancy between achievement and intellectual ability. The students were screened to determine their decoding speed and accuracy and their skills at identifying main ideas when reading. From this initial list of 68 students, the authors then identified 47 students who could read third-grade material at 100 words per minute with 97% accuracy and who scored 60% or lower on comprehension tasks. Finally, the authors then selected 32 students who were randomly assigned to one of four groups: *repeated reading*, paraphrasing, *repeated reading* combined with paraphrasing, and comparison. The authors did not report how the 32 students were selected from the 47 identified students, and there was no attrition of students from the final study sample. This report focuses on findings for 16 students who were assigned to the *repeated reading* group (eight students) and the comparison group (eight students). Findings for the comparison between the *repeated reading* combined with paraphrasing group and the comparison group (reported in Appendix D) are not included in the evidence rating but are presented in this WWC report for completeness.

Intervention group

During two 4-day training sessions, students were taught how to use a *repeated reading* technique to find main ideas in reading. During the first 4 days of training, students were given a brief definition of main ideas. The *repeated reading* technique for finding main ideas was modeled by the teacher. Students practiced by first reading a story at a comfortable rate and then rereading the story several times, increasing speed with each reading. Main ideas were then selected from multiple-choice items. During the second 4 days of training, students used the same *repeated reading* approach but were asked to generate main ideas instead of selecting main ideas from multiple-choice items. In all cases, students were allowed 12 minutes to read the story and use the *repeated reading* procedure.

Comparison group

Comparison students were given a brief definition of a story's main idea. During the first 4 days, students read a story and answered main idea multiple-choice questions. During the second 4 days, students read a story and then generated main ideas.

Outcomes and measurement

The study authors assessed reading comprehension by analyzing raw scores on a series of 10-item multiple-choice Main Idea Tests taken from *Reading for Concepts, Book C*. These are tests of the student's ability to identify main ideas. Students were tested three times: after the first 4 days of the intervention (midtest), after the next 4 days of the intervention (posttest), and 14 days after completion of the intervention (follow-up). This review includes analysis of the Main Idea posttest and the follow-up test. The immediate posttest is used to determine the evidence rating, and the follow-up (reported in Appendix D) is not. The midtest was not reviewed by the WWC since it was administered half-way through the intervention. For a more detailed description of this outcome measure, see Appendix B.

Support for implementation

There was no information provided on support for implementation.

Appendix A.2: Research details for Wexler et al., 2010

Wexler, J., Vaughn, S., Roberts, G., & Denton, C. (2010). The efficacy of repeated reading and wide reading practice for high school students with severe reading disabilities. *Learning Disabilities Research & Practice, 25*(1), 2–10.

Table A2. Summary of findings **Meets WWC group design standards without reservations**

		Study findings	
Outcome domain	Sample size	Average improvement index *(percentile points)*	Statistically significant
Reading comprehension	62 students	+2	No
Alphabetics	62 students	+4	No
Reading fluency	62 students	–1	No
General reading achievement	62 students	–7	No

Setting

The study was conducted in 11 classrooms serving grades 9–12 from schools in a metropolitan area in the southwestern United States.

Study sample

The study included 106 students from 11 special education English and reading classes who were randomly assigned to three conditions. This report only reviews findings for the 62 students in the *repeated reading* group (33 students) and comparison group (29 students). Students within each class were paired based on median pretest oral reading fluency scores—higher scorers were paired with lower scorers in such a way that practice texts would be appropriate for both students in the pair. Each pair was then randomly assigned to one of the intervention conditions. The overall attrition rate for this sample was 9%, and the differential attrition rate was about 4%. All students in the study had significant reading difficulties, as indicated by failing reading scores on the Texas Assessment of Knowledge and Skills (TAKS), and were enrolled in special education English and reading classes. Seventy-seven percent of the 62 students in the *repeated reading* and comparison groups were learning disabled (the study does not indicate how the students were identified as learning disabled).

Intervention group

The *repeated reading* intervention was administered by two graduate research assistants and a full-time school employee for 15 to 20 minutes each day, five times a week, for 10 weeks. Intervention materials were taken from *The Six-Minute Solution*,[7] *Read Naturally*®,[8] and *Quick Reads*®.[9] Selections were based on the lower-level reader from each pair.

Comparison group

Students in the comparison group received the instruction they would normally receive from their classroom teachers.

Outcomes and measurement

Seven reading measures were administered before and after the intervention. Reading comprehension was measured by the Passage Comprehension subtest of the WJ III. Alphabetics was measured by the Letter-Word Identification subtest of the WJ III. Reading fluency was measured by administration of the TOSCRF and by three oral reading fluency passages taken from the AIMSweb system. General reading achievement was measured by the TOSRE. For a more detailed description of these outcome measures, see Appendix B.

Support for implementation

The *repeated reading* instructors were trained in two 3-hour sessions on partner reading, intervention procedures, and monitoring procedures.

Appendix B: Group design outcome measures for each domain

Reading comprehension	
Main Idea Test	The Main Idea Test is an author-constructed assessment. A pool of stories was assembled, each with an accompanying 10-item multiple-choice test taken from *Reading for Concepts, Book C*. From this pool, 10 stories were randomly selected to use as the screening instrument (pretest). Six stories were randomly selected for use during training and 10 for evaluation of intervention effects (midtest, posttest, follow-up test). Directions were held constant across conditions, and students were given 30 minutes to complete each test (as cited in Ellis & Graves, 1990).
Woodcock-Johnson III (WJ III) Tests of Achievement: Passage Comprehension subtest	The WJ III is a nationally-standardized individually-administered battery of cognitive and achievement tests. The Passage Comprehension subtest is a measure of reading comprehension at the sentence level that uses a modified cloze procedure, where students review text passages with particular words missing and determine the missing words using the context. Reliability ranges from 0.87 to 0.97 (as cited in Wexler et al., 2010).
Alphabetics	
WJ III Tests of Achievement: Letter-Word Identification subtest	The WJ III is a nationally-standardized individually-administered battery of cognitive and achievement tests. The Letter-Word Identification subtest measures basic word reading skills and requires the student to read aloud isolated words that range in frequency and difficulty. The reliability for the Letter-Word Identification subtest is greater than 0.93 (as cited in Wexler et al., 2010).
Reading fluency	
AIMSweb system: Words read correctly per minute (WCPM)	The AIMSweb system provides a measure of oral reading fluency using standard reading assessment passages. The oral reading fluency passages assess a student's accuracy and reading rate in connected text. Student performance is measured by having a student read a passage aloud for 1 minute. Errors are noted, and the score is the number of WCPM. The AIMSweb measures for grade 8 have reliabilities ranging from 0.77 to 0.95 (as cited in Wexler et al., 2010).
Test of Silent Contextual Reading Fluency (TOSCRF)	The TOSCRF is a group-administered assessment of silent reading fluency that measures a student's contextual reading abilities (i.e., word identification, word meaning, sentence structure, fluency, and comprehension). Students are presented with rows of contextually related words, ordered by reading difficulty. All words are printed in uppercase without any spaces or punctuation between the words (e.g., AYELLOWBIRDWITHBLUEWINGS). Students draw a line between the boundaries of as many recognizable words as possible within 3 minutes (e.g., A/YELLOW/BIRD/WITH/BLUE/WINGS). The passages become gradually more complex in their content, vocabulary, and grammar (e.g., embedded phrases, sequenced adjectives, affixes). Reliabilities range from 0.82 to 0.87 for students ranging in age ranging from 13 to 17 (as cited in Wexler et al., 2010).
General reading achievement	
Test of Silent Reading Efficiency (TOSRE)	The TOSRE is a group-administered assessment of silent reading fluency that measures a student's contextual reading abilities (i.e., word identification, word meaning, sentence structure, comprehension, and fluency). Students are presented with individual sentences, ordered by reading difficulty, that become gradually more complex in their content, grammar, and vocabulary. Sentences range in length from four to 10 words. Students read each sentence silently and circle "yes" if the sentence is true or "no" if the sentence is not true. If the item is read correctly, it can be completed using general background knowledge (e.g., A fish lives on land). Students complete as many items as possible within 3 minutes (as cited in Wexler et al., 2010).

Appendix C.1: Group design findings included in the rating for the reading comprehension domain

Outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			*p*-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Ellis & Graves, 1990[a]								
Main Idea Test	Grades 5–7	16 students	4.50 (1.85)	4.00 (1.51)	0.50	0.28	+11	0.79
Domain average for reading comprehension (Ellis & Graves, 1990)						**0.28**	**+11**	**Not statistically significant**
Wexler et al., 2010[b]								
Woodcock-Johnson III (WJ III) Tests of Achievement: Passage Comprehension subtest	Grades 9–12	62 students	71.86 (14.21)	71.12 (18.04)	0.74	0.05	+2	> 0.05
Domain average for reading comprehension (Wexler et al., 2010)						**0.05**	**+2**	**Not statistically significant**
Domain average for reading comprehension across all studies						**0.17**	**+7**	**na**

Table Notes: For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on student outcomes, representing the average change expected for all students who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average student's percentile rank that can be expected if the student is given the intervention. The WWC-computed average effect size is a simple average rounded to two decimal places; the average improvement index is calculated from the average effect size. na = not applicable.

[a] For Ellis and Graves (1990), no corrections for clustering or multiple comparisons were needed. The authors calculated nonparametric *z*-scores, applying Dunn's method to multiple Wilcoxon two-sample tests. The WWC converted these *z*-scores to the *p*-values that are reported in the table. The WWC used the raw student scores presented in the study to compute the means and standard deviations. These means and standard deviations were used for WWC calculations.

[b] For Wexler et al. (2010), a correction for clustering was needed but did not affect significance levels. The WWC computed statistics using the reported adjusted means and unadjusted standard deviations. The authors reported that there were no statistically significant differences among any of the three groups based on a one-way ANCOVA. The authors only reported *p*-values for the analysis comparing all three groups, not the comparison of interest for this report (*repeated reading* and comparison).

Appendix C.2: Group design findings included in the rating for the alphabetics domain

Outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			*p*-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Wexler et al., 2010[a]								
Woodcock-Johnson III (WJ III) Tests of Achievement: Letter-Word Identification subtest	Grades 9–12	62 students	73.02 (15.49)	71.51 (16.38)	1.51	0.09	+4	> 0.05
Domain average for alphabetics (Wexler et al., 2010)						**0.09**	**+4**	**Not statistically significant**
Domain average for alphabetics across all studies						**0.09**	**+4**	**na**

Table Notes: For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on student outcomes, representing the average change expected for all students who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average student's percentile rank that can be expected if the student is given the intervention. na = not applicable.

[a] For Wexler et al. (2010), a correction for clustering was needed but did not affect significance levels. The WWC computed statistics using the reported adjusted means and unadjusted standard deviations. The authors reported that there were no statistically significant differences among any of the three groups based on a one-way ANCOVA. The authors only reported *p*-values for the analysis comparing all three groups, not the comparison of interest for this report (*repeated reading* and comparison).

Appendix C.3: Group design findings included in the rating for the reading fluency domain

Outcome measure	Study sample	Sample size	Mean (standard deviation) Intervention group	Mean (standard deviation) Comparison group	WWC calculations Mean difference	WWC calculations Effect size	WWC calculations Improvement index	*p*-value
Wexler et al., 2010[a]								
Test of Silent Contextual Reading Fluency (TOSCRF)	Grades 9–12	62 students	75.60 (13.16)	76.16 (14.41)	–0.56	–0.04	–2	> 0.05
AIMSweb system: Words read correctly per minute (WCPM) #1	Grades 9–12	62 students	86.70 (40.25)	91.62 (48.39)	–4.92	–0.11	–4	nr
WCPM #2	Grades 9–12	62 students	83.00 (38.88)	86.28 (41.85)	–3.28	–0.08	–3	nr
WCPM #3	Grades 9–12	62 students	83.81 (39.38)	78.86 (41.21)	4.95	0.12	+5	nr
Domain average for reading fluency (Wexler et al., 2010)						**–0.03**	**–1**	**Not statistically significant**
Domain average for reading fluency across all studies						**–0.03**	**–1**	**na**

Table Notes: For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on student outcomes, representing the average change expected for all students who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average student's percentile rank that can be expected if the student is given the intervention. The WWC-computed average effect size is a simple average rounded to two decimal places; the average improvement index is calculated from the average effect size. nr = not reported. na = not applicable.

[a] For Wexler et al. (2010), a correction for clustering and multiple comparisons was needed but did not affect significance levels. The WWC computed statistics using the reported means (adjusted means for the TOSCRF) and standard deviations. For the three WCPM measures, the WWC calculated the intervention group mean using a difference-in-differences approach (see the WWC Handbook) by adding the impact of the program (difference in mean gains between the intervention and comparison groups) to the unadjusted comparison group posttest means. To compute *p*-values for the WCPM measures, the authors use the median score from the three passages for the analysis ($p > 0.05$). Since this median could be based on a different passage for each participant, the WWC reports outcomes for all three passages. The authors do not report *p*-values for each passage. For the TOSCRF, the authors reported that there were no statistically significant differences among any of the three groups based on a one-way ANCOVA. The authors only reported *p*-values for the analysis comparing all three groups, not the comparison of interest for this report (*repeated reading* and comparison).

Appendix C.4: Group design findings included in the rating for the general reading achievement domain

Outcome measure	Study sample	Sample size	Mean (standard deviation) Intervention group	Mean (standard deviation) Comparison group	WWC calculations Mean difference	WWC calculations Effect size	WWC calculations Improvement index	*p*-value
Wexler et al., 2010[a]								
Test of Silent Reading Efficiency (TOSRE)	Grades 9–12	62 students	13.72 (5.78)	14.84 (7.42)	–1.12	–0.17	–7	> 0.05
Domain average for general reading achievement (Wexler et al., 2010)						**–0.17**	**–7**	**Not statistically significant**
Domain average for general reading achievement across all studies						**–0.17**	**–7**	**na**

Table Notes: For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on student outcomes, representing the average change expected for all students who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average student's percentile rank that can be expected if the student is given the intervention. na = not applicable.

[a] For Wexler et al. (2010), a correction for clustering was needed but did not affect significance levels. The WWC computed statistics using the reported adjusted means and unadjusted standard deviations. The authors reported that there were no statistically significant differences among any of the three groups based on a one-way ANCOVA. The authors only reported *p*-values for the analysis comparing all three groups, not the comparison of interest for this report (*repeated reading* and comparison).

Appendix D.1: Group design follow-up test findings in the reading comprehension domain

Outcome measure	Study sample	Sample size	Mean (standard deviation) Intervention group	Mean (standard deviation) Comparison group	WWC calculations Mean difference	WWC calculations Effect size	WWC calculations Improvement index	*p*-value
Ellis & Graves, 1990[a]								
Main Idea Test	Grades 5–7	16 students	4.25 (2.38)	3.63 (1.51)	0.63	0.30	+12	0.92
Domain average for reading comprehension (Ellis & Graves, 1990)						**0.30**	**+12**	**Not statistically significant**
Domain average for reading comprehension across all studies						**0.30**	**+12**	**na**

Table Notes: The supplemental findings presented in this table are additional findings from the studies in this report that do not factor into the determination of the intervention rating. For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on student outcomes, representing the average change expected for all students who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average student's percentile rank that can be expected if the student is given the intervention. na = not applicable.

[a] For Ellis and Graves (1990), no corrections for clustering or multiple comparisons were needed. The authors calculated nonparametric *z*-scores, applying Dunn's method to multiple Wilcoxon two-sample tests. The WWC converted these *z*-scores to the *p*-value that is reported in the table. The WWC used the raw student scores presented in the study to compute the means and standard deviations. These means and standard deviations were used for WWC calculations.

Appendix D.2: Group design posttest comparison of *repeated reading* and paraphrasing versus comparison in the reading comprehension domain

Outcome measure	Study sample	Sample size	Mean (standard deviation) Intervention group	Mean (standard deviation) Comparison group	WWC calculations Mean difference	WWC calculations Effect size	WWC calculations Improvement index	*p*-value
Ellis & Graves, 1990[a]								
Main Idea Test	Grades 5–7	16 students	9.13 (0.83)	4.00 (1.51)	5.13	3.97	+50	< 0.01
Domain average for reading comprehension (Ellis & Graves, 1990)						**3.97**	**+50**	**Statistically significant**
Domain average for reading comprehension across all studies						**3.97**	**+50**	**na**

Table Notes: The supplemental findings presented in this table are additional findings from the studies in this report that do not factor into the determination of the intervention rating. For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on student outcomes, representing the average change expected for all students who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average student's percentile rank that can be expected if the student is given the intervention. na = not applicable.

[a] For Ellis and Graves (1990), no corrections for clustering or multiple comparisons were needed. The authors calculated nonparametric *z*-scores, applying Dunn's method to multiple Wilcoxon two-sample tests. The WWC converted these *z*-scores to the *p*-value that is reported in the table. The WWC used the raw student scores presented in the study to compute the means and standard deviations. These means and standard deviations were used for WWC calculations.

Appendix D.3: Group design follow-up test comparison of *repeated reading* and paraphrasing versus comparison in the reading comprehension domain

Outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			*p*-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Ellis & Graves, 1990[a]								
Main Idea Test	Grades 5–7	16 students	9.00 (0.76)	3.63 (1.51)	5.38	4.27	+50	< 0.01
Domain average for reading comprehension (Ellis & Graves, 1990)						**4.27**	**+50**	**Statistically significant**
Domain average for reading comprehension across all studies						**4.27**	**+50**	**na**

Table Notes: The supplemental findings presented in this table are additional findings from the studies in this report that do not factor into the determination of the intervention rating. For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on student outcomes, representing the average change expected for all students who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average student's percentile rank that can be expected if the student is given the intervention. na = not applicable.

[a] For Ellis and Graves (1990), no corrections for clustering or multiple comparisons were needed. The authors calculated nonparametric *z*-scores, applying Dunn's method to multiple Wilcoxon two-sample tests. The WWC converted these *z*-scores to the *p*-value that is reported in the table. The WWC used the raw student scores presented in the study to compute the means and standard deviations. These means and standard deviations were used for WWC calculations.

Appendix E.1: Single-case design study that meets WWC pilot standards[10]

Steventon, C. E. (2004). Repeated reading within the context of a peer-mediated remedial reading program. *Dissertation Abstracts International, 65*(06A), 105-2162. Meets WWC pilot single-case design standards without reservations.

Table E1. Single-case design outcome measures for each domain

Reading comprehension	
10-question quiz	Students read a 400-word nonfiction passage and then answered 10 multiple choice questions about the passage (five fact questions and five inferential questions). Calculated by dividing the number of questions answered correctly by ten (as cited in Steventon, 2004).
Reading fluency	
Words per minute (WPM)	The number of words read per minute orally from a 400-word nonfiction passage. Calculated by dividing the total number of words read by the number of seconds needed to complete the reading (as cited in Steventon, 2004).
Correct words per minute (CWPM)	The percentage of words read correctly from a 400-word nonfiction passage. Calculated by dividing the number of words read accurately by the total number of words read (as cited in Steventon, 2004).

Table E2. Single-case design findings for the reading comprehension domain

	Study characteristics			WWC summary	
Outcome measure	**Sample size**	**Age(s)**	**Design type**	**Design rating**	**Visual analysis rating**
Steventon (2004)[a]					
10-question quiz	2	Grade 9	Reversal	Meets without reservations	No evidence

Table Notes: The WWC does not currently calculate effect sizes for single-case design research and does not currently summarize findings across single-case design studies. The author did not report session-by-session data points for the 10-question quiz because there were no visible effects. Based on a review of the reported ranges and means for each phase, the review team leadership determined that a rating of No Evidence can be assigned for this outcome.

[a] Steventon (2004) took place in a suburban high school in the southeastern United States with roughly 2,700 students, about 1% of whom received free or reduced-price lunch. Instruction took place in a general education classroom. The study included two ninth-grade students who met state criteria for a specific learning disability and had received special education services for at least 6 years. The first student was classified as learning disabled because of a weakness in writing expression, but his individualized education plan included a reading goal and he was receiving special education reading instruction. The second student was classified as learning disabled due to a significant weakness in reading skills. During the baseline portion of the study, the students received Corrective Reading Decoding Strategies (level B2), in which the students read the first part of a story they had just read and the peer instructor provided corrective feedback. Students earned points based on mastery criteria.

Table E3. Single-case design findings for the reading fluency domain

	Study characteristics			WWC summary	
Outcome measure	Sample size	Age(s)	Design type	Design rating	Visual analysis rating
Steventon (2004)[a]					
Words per minute (WPM)	2	Grade 9	Reversal	Meets without reservations	No evidence
Correct words per minute (CWPM)	2	Grade 9	Reversal	Meets without reservations	No evidence

Table Notes: The WWC does not currently calculate effect sizes for single-case design research and does not currently summarize findings across single-case design studies. The author did not report session-by-session data points for correct words per minute because there were no visible effects. Based on a review of the reported ranges and means for each phase, the review team leadership determined that a rating of No Evidence can be assigned for this outcome.

[a] Steventon (2004) took place in a suburban high school in the southeastern United States with roughly 2,700 students, about 1% of whom received free or reduced-price lunch. Instruction took place in a general education classroom. The study included two ninth-grade students who met state criteria for a specific learning disability and had received special education services for at least 6 years. The first student was classified as learning disabled because of a weakness in writing expression, but his individualized education plan included a reading goal and he was receiving special education reading instruction. The second student was classified as learning disabled due to a significant weakness in reading skills. During the baseline portion of the study, the students received Corrective Reading Decoding Strategies (level B2), in which the students read the first part of a story they had just read and the peer instructor provided corrective feedback. Students earned points based on mastery criteria.

Endnotes

[1] The descriptive information for this program was obtained from publicly available sources: the research literature (Samuels, S. J. (1979). The method of repeated readings. The Reading Teacher, 32(4), 403–408) and the website (http://www.interventioncentral.org/index.php/reading-fluency/110-repeated-reading, downloaded August 2013). Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review.

[2] There is no consensus about how many repetitions are required for *repeated reading*. A meta-analysis found that *repeated reading* had substantially larger impacts when the passage was read three times compared to two times, and recommended that the passage be read at least three times (Therrien, 2004). Based on this recommendation, the Students with Learning Disabilities review leadership team decided that the passage must be read at least three times to qualify as *repeated reading* for this review. Therrien, W. J. (2004). Fluency and comprehension gains as a result of repeated reading: A meta-analysis. *Remedial and Special Education, 25*(4), 252–261.

[3] The literature search reflects documents publicly available by August 2013. The studies in this report were reviewed using design standards from the WWC Procedures and Standards Handbook (version 3.0), along with those described in the Students with Learning Disabilities review protocol (version 2.2). The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.

[4] For criteria used in the determination of the rating of effectiveness and extent of evidence, see the WWC Rating Criteria on p. 35. These improvement index numbers show the average and range of student-level improvement indices for all findings across the studies.

[5] Samuels, S. J. (1979). The method of repeated readings. *The Reading Teacher, 32*(4), 403–408.

[6] The results from single-case design studies do not affect the intervention effectiveness ratings until the studies collectively meet the criteria described on p. 36. All eligible single-case design studies are reviewed against the WWC pilot single-case design standards to determine if the studies *meet WWC pilot single-case design standards without reservations*, *meet WWC pilot single-case design standards with reservations*, or *do not meet WWC pilot single-case design standards*. Only studies that *meet WWC pilot single-case design standards without reservations* or *meet WWC pilot single-case design standards with reservations* are assessed further to determine whether they provide *strong evidence*, *moderate evidence*, or *no evidence* of a causal relationship for each outcome.

[7] Adams, G., & Brown, S. (2006). *Six-minute solution: A reading fluency program (secondary level)*. Longmont, CO: Sopris West.

[8] Ihnot, C. (2003). *Read Naturally (fluency curriculum, levels .8–8.0)*. St. Paul, MN: Read Naturally, Inc.

[9] Hiebert, E. H. (2006). *QuickReads: A research-based fluency program*. Lebanon, IN: Pearson Learning.

[10] The evidence from the single-case design studies on *repeated reading* does not reach the threshold to include single-case design evidence in the effectiveness ratings for any of the eligible outcome domains.

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WWC Rating Criteria

Criteria used to determine the rating of a group design study

Study rating	Criteria
Meets WWC group design standards without reservations	A group design study that provides strong evidence for an intervention's effectiveness, such as a well-implemented RCT.
Meets WWC group design standards with reservations	A group design study that provides weaker evidence for an intervention's effectiveness, such as a QED or an RCT with high attrition that has established equivalence of the analytic samples.

Criteria used to determine the rating of effectiveness for an intervention based on group design studies

Rating of effectiveness	Criteria
Positive effects	Two or more studies show statistically significant positive effects, at least one of which met WWC evidence standards for a strong design, AND No studies show statistically significant or substantively important negative effects.
Potentially positive effects	At least one study shows a statistically significant or substantively important positive effect, AND No studies show a statistically significant or substantively important negative effect AND fewer or the same number of studies show indeterminate effects than show statistically significant or substantively important positive effects.
Mixed effects	At least one study shows a statistically significant or substantively important positive effect AND at least one study shows a statistically significant or substantively important negative effect, but no more such studies than the number showing a statistically significant or substantively important positive effect, OR At least one study shows a statistically significant or substantively important effect AND more studies show an indeterminate effect than show a statistically significant or substantively important effect.
Potentially negative effects	One study shows a statistically significant or substantively important negative effect and no studies show a statistically significant or substantively important positive effect, OR Two or more studies show statistically significant or substantively important negative effects, at least one study shows a statistically significant or substantively important positive effect, and more studies show statistically significant or substantively important negative effects than show statistically significant or substantively important positive effects.
Negative effects	Two or more studies show statistically significant negative effects, at least one of which met WWC evidence standards for a strong design, AND No studies show statistically significant or substantively important positive effects.
No discernible effects	None of the studies shows a statistically significant or substantively important effect, either positive or negative.

Criteria used to determine the extent of group design evidence for an intervention

Extent of evidence	Criteria
Medium to large	The domain includes more than one study, AND The domain includes more than one school, AND The domain findings are based on a total sample size of at least 350 students, OR, assuming 25 students in a class, a total of at least 14 classrooms across studies.
Small	The domain includes only one study, OR The domain includes only one school, OR The domain findings are based on a total sample size of fewer than 350 students, AND, assuming 25 students in a class, a total of fewer than 14 classrooms across studies.

Criteria used to determine the rating of a single-case design study

Study rating	Criteria
Meets WWC pilot single-case design standards without reservations	A single-case design study that provides strong evidence for an intervention's effectiveness.
Meets WWC pilot single-case design standards with reservations	A single-case design study with fewer attempts to demonstrate an effect over time or fewer data points per phase.

Criteria used to determine evidence of a causal relation in a single-case design study

Evidence level	Criteria
Strong evidence of a causal relationship	A single-case design study with at least three demonstrations of the intervention effect and no non-effects.
Moderate evidence of a causal relationship	A single-case design study with at least three demonstrations of the intervention effect and at least one non-effect.
No evidence of a causal relationship	A single-case design study with fewer than three demonstrations of the intervention effect.

Criteria used to determine whether the single-case design evidence for an intervention is collectively enough to include in effectiveness rating

Threshold to include single-case design evidence	Criteria
Threshold met	At least five studies examining the intervention *meet WWC pilot single-case design standards without reservations* or *meet WWC pilot single-case design standards with reservations*, AND The single-case design studies are conducted by at least three different research teams with no overlapping authorship at three different institutions, AND The combined number of cases (i.e., participants, classrooms, etc.) totals at least 20.

Glossary of Terms

ABAB design An ABAB design is a single-case design that introduces the intervention twice and withdraws the intervention once (also known as withdrawal or reversal designs).

Alternating treatment design An alternating treatment design is a single-case design that repeatedly introduces and withdraws the intervention(s); each phase only lasts one or two sessions.

Attrition Attrition occurs when an outcome variable is not available for all participants initially assigned to the intervention and comparison groups. The WWC considers the total attrition rate and the difference in attrition rates across groups within a study.

Baseline In a single-case design, baseline is the condition when participants are not receiving the intervention.

Case A case is the unit of intervention administration and data analysis in a single-case design. A case may be a single participant or a cluster of participants like a classroom.

Clustering adjustment If intervention assignment is made at a cluster level and the analysis is conducted at the student level, the WWC will adjust the statistical significance to account for this mismatch, if necessary.

Confounding factor A confounding factor is a component of a study that is completely aligned with one of the study conditions, making it impossible to separate how much of the observed effect was due to the intervention and how much was due to the factor.

Design The design of a study is the method by which intervention and comparison groups were assigned.

Domain A domain is a group of closely related outcomes.

Effect size The effect size is a measure of the magnitude of an effect. The WWC uses a standardized measure to facilitate comparisons across studies and outcomes.

Eligibility A study is eligible for review and inclusion in this report if it falls within the scope of the review protocol and uses either an experimental or matched comparison group design.

Equivalence A demonstration that the analysis sample groups are similar on observed characteristics defined in the review area protocol.

Extent of evidence An indication of how much evidence supports the findings. The criteria for the extent of evidence levels are given in the WWC Rating Criteria on p. 35.

Fidelity Fidelity indicates the extent to which the intervention as implemented replicates the intervention's design.

Improvement index Along a percentile distribution of students, the improvement index represents the gain or loss of the average student due to the intervention. As the average student starts at the 50th percentile, the measure ranges from –50 to +50.

Maintenance probes Maintenance probes measure outcomes after all phases have ended.

Multiple baseline design A multiple baseline design is a single-case design that staggers the introduction of the intervention to different cases.

Multiple comparison adjustment When a study includes multiple outcomes or comparison groups, the WWC will adjust the statistical significance to account for the multiple comparisons, if necessary.

Multiple probe design A multiple probe design is a variation on the multiple baseline single-case design that features intermittent pre-intervention data collection.

Phase In a single-case design, a phase is consecutive sessions when a case receives or does not receive the intervention.

Quasi-experimental design (QED) A quasi-experimental design (QED) is a research design in which subjects are assigned to intervention and comparison groups through a process that is not random.

Randomized controlled trial (RCT) A randomized controlled trial (RCT) is an experiment in which investigators randomly assign eligible participants into intervention and comparison groups.

Rating of effectiveness The WWC rates the effects of an intervention in each domain based on the quality of the research design and the magnitude, statistical significance, and consistency in findings. The criteria for the ratings of effectiveness are given in the WWC Rating Criteria on p. 35.

Single-case design (SCD) A single-case design (SCD) is a research approach in which an outcome variable is measured repeatedly within and across different conditions that are defined by the presence or absence of an intervention.

Standard deviation The standard deviation of a measure shows how much variation exists across observations in the sample. A low standard deviation indicates that the observations in the sample tend to be very close to the mean; a high standard deviation indicates that the observations in the sample tend to be spread out over a large range of values.

Statistical significance Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups. The WWC labels a finding statistically significant if the likelihood that the difference is due to chance is less than 5% ($p < 0.05$).

Substantively important A substantively important finding is one that has an effect size of 0.25 or greater, regardless of statistical significance.

Threshold to include single-case design evidence For single-case design studies to contribute to the evidence rating, there must be a sufficient combination of participants, authors, and studies that meet pilot single-case standards. The criteria for the threshold to include single-case design evidence are listed on p. 36.

Visual analysis A visual analysis reviews the pattern of outcome data in a single-case design to determine whether a relationship exists between the intervention and the outcome.

Please see the WWC Procedures and Standards Handbook (version 3.0) for additional details.