What Works Clearinghouse

INSTITUTE OF EDUCATION SCIENCES

Beginning Reading April 23, 2007

Accelerated Reader/Reading Renaissance

Program description

The *Accelerated Reader/Reading Renaissance* program (now called *Accelerated Reader Best Classroom Practices*) is a guided reading intervention in which teachers direct student reading of text. It involves two components. *Reading Renaissance,* the first component, is a set of recommended principles on guided reading (or teachers' direction of students' interactions with text). Accelerated Reader (AR), the second component, is a computer program that facilitates reading practice by providing students and teachers feedback from quizzes based on the books the students read. The program gives students opportunity to practice reading books at their level, provides feedback on student comprehension of books, and helps students establish goals for their reading.

Research

One study of *Accelerated Reader/Reading Renaissance* met the What Works Clearinghouse (WWC) evidence standards. The study included 910 students from grades K to 3 attending 11 schools in a southern school district in the United States.[1]

The WWC considers the extent of evidence for *Accelerated Reader/Reading Renaissance* to be small for comprehension and for general reading achievement. No studies that met WWC standards with or without reservations addressed alphabetics or fluency.

Effectiveness

Accelerated Reader/Reading Renaissance was found to have potentially positive effects on comprehension and general reading achievement.

	Alphabetics	*Fluency*	*Comprehension*	*General reading achievement*
Rating of effectiveness	na	na	Potentially positive effects	Potentially positive effects
Improvement index[2]	na	na	+12 percentile points	Average: +17 percentile points Range: +10 to +25 percentile points

na = not applicable

1. The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.
2. These numbers show the average and range of improvement indices for all findings across the study.

Additional program information

Developer and contact

Developed by Judi and Terry Paul, *Accelerated Reader/Reading Renaissance* is distributed by Renaissance Learning, Inc. Address: PO Box 8036, Wisconsin Rapids, Wisconsin 54495-8036, USA. Email: answers@renlearn.com. Web: www.renlearn.com/reading.htm. Telephone: (800) 656-6740.

Scope of use

The *Accelerated Reader* software prototype was created in 1984. In 1992, research began to focus on best practices related to Accelerated Reader. These efforts led to the development of *Reading Renaissance,* first introduced to educators in 1996 through professional development seminars. According to the developers, more than 65,000 schools nationwide are using *Reading Renaissance* components in a wide variety of academic settings.

Teaching

A primary component of *Reading Renaissance* is a dedicated 30–60 minute block of time for reading practice. Depending on the age and skill levels of the students, three activities might occur during the reading block: reading texts to a child, reading texts to a child using a paired-reading technique, or independent reading by the child. In pre-K through third grade, reading practice is heavily weighted toward the first two segments. As children develop decoding skills, they transition increasingly to independent reading. Initially, students take an *Accelerated Reader* test to determine their independent reading level and select books marked at this level. After completing each subsequent book, students take a comprehension quiz and earn points based on the number of correct responses and the reading level of the book. Teachers use the quizzes to identify appropriate reading texts for each student, monitor student progress, and identify students who may need remediation.

Schools or classrooms use points to set individual student goals for the quantity and quality of student reading and to monitor the student's progress. Accumulating of points is intended to be motivational; teachers also may choose to implement a system of rewards.

Cost

The school version of *Accelerated Reader* software can be ordered for $4 a student a year with a one-time school fee of $1,499. Professional development for using *Accelerated Reader/Reading Renaissance* is available at additional cost and can be customized in terms of length and mode of delivery (onsite, telephone/online, regional seminars). The annual cost of full implementation, which may vary depending on the school size and components implemented, ranges from $3,000 to $10,000 a school year.

Research

Thirty-five studies reviewed by the WWC investigated the effects of *Accelerated Reader/Reading Renaissance* or some subset of its components. One study (Ross, Nunnery, & Goldfeder, 2004) was a randomized controlled trial that met WWC evidence standards. The remaining studies did not meet WWC evidence standards.

Met evidence standards

Ross, Nunnery, & Goldfeder (2004) was a randomized controlled trial that included 45 teachers and 910 students in grades K- 3 in 11 schools in a southern school district of the United States.[3] Within each school, a minimum of two teachers within one grade volunteered to be randomly assigned to implement either the intervention, *Accelerated Reader/Reading Renaissance,* or the comparison, a commercially available basal reading program used across all schools.

3. The full study includes 77 teachers in grades K–6, but since the focus of this topic review is on outcomes of students in grades K–3, this intervention report focuses on results for the sub-sample of 45 teachers and 910 students in grades K–3.

Research *(continued)*

Extent of evidence

The WWC categorizes the extent of evidence in each domain as small or moderate to large (see the What Works Clearinghouse Extent of Evidence Categorization Scheme). The extent of evidence takes into account the number of studies and the total sample size across the studies that met WWC evidence standards with or without reservations.[4]

The WWC considers the extent of evidence for *Accelerated Reader/Reading Renaissance* to be small for comprehension and for general reading achievement. No studies that met WWC standards with or without reservations addressed alphabetics or fluency.

Effectiveness

Findings

The WWC review of beginning reading addresses student outcomes in four domains: alphabetics, reading fluency, comprehension, and general reading achievement.[5] The *Accelerated Reader/Reading Renaissance* study addressed outcomes in comprehension and general reading achievement. The findings below include both the authors' estimates and WWC-calculated estimates of the size and statistical significance of the effects of *Accelerated Reader/Reading Renaissance* on students.

The STAR Early Literacy test and STAR reading test are the only outcomes reported in the study. The STAR tests are developed and distributed by Renaissance Learning, which also distributes *Accelerated Reader/Reading Renaissance*.[6]

Comprehension. Ross, Nunnery, & Goldfeder (2004) reported a positive and statistically significant effect of *Accelerated Reader/Reading Renaissance* on third grade student performance on the reading comprehension measure (Star Reading test). In WWC computations, this positive effect was not statistically significant, but considered substantively important according to WWC criteria (an effect size greater than 0.25).

General reading achievement. Ross, Nunnery, & Goldfeder (2004) showed that *Accelerated Reader/Reading Renaissance* had positive and statistically significant effects on the general reading measure (Star Early Literacy test) for kindergarten, first, and second grade students. According to WWC analysis, the average effect size across grade levels was statistically significant.

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,[7] the size of the difference between participants in the intervention and the comparison conditions, and the consistency in findings across studies (see the WWC Intervention Rating Scheme).

4. 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 students' demographics and the types of settings in which studies took place, are not taken into account for the categorization.
5. For definitions of the domains, see the Beginning Reading Protocol.
6. According to Renaissance Reading research, STAR and STAR Early Literacy tests are correlated to other standardized reading tests (see Appendix A2.1 and A2.2).
7. The level of statistical significance was reported by the study authors or, where necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation, see the WWC Tutorial on Mismatch. See Technical Details of WWC-Conducted Computations for the formulas the WWC used to calculate the statistical significance of the findings. In the case of *Accelerated Reader/Reading Renaissance,* a correction for clustering was needed and the statistical significance of the authors' findings and WWC findings differ.

The WWC found *Accelerated Reader/ Reading Renaissance* to have potentially positive effects for comprehension and general reading achievement

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 Technical Details of WWC-Conducted Computations). The improvement index represents the difference between the percentile rank of the average student in the intervention condition versus the percentile rank of the average student in the comparison condition. Unlike the rating of effectiveness, the improvement index is based entirely on the size of the effect, regardless of the statistical significance of the effect, the study design, or the analyses. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.

The improvement index for comprehension for third grade students is +12 percentile points. The average improvement index for general reading achievement is +17 percentile points with a range of +10 to +25 percentile points across kindergarten, first, and second grade students.

Summary

The WWC reviewed 35 studies on *Accelerated Reader/Reading Renaissance* or some of its components. One of these studies met WWC evidence standards; the remaining studies did not meet WWC evidence screens. Based on this study, the WWC found potentially positive effects in the comprehension and general reading achievement domains. The evidence presented in this report is limited and may change as new research emerges.

References

Met WWC evidence standards

Ross, S.M., Nunnery, J., & Goldfeder, E. (2004). *A randomized experiment on the effects of Accelerated Reader/Reading Renaissance in an urban school district: Preliminary evaluation report.* Memphis, TN: The University of Memphis, Center for Research in Educational Policy.

Additional source:

Nunnery J., Ross, S., & McDonald A. (2006). A randomized experimental evaluation of the impact of Accelerated Reader/Reading Renaissance implementation on reading achievement in grades 3 to 6. *Journal of Education for Students Placed at Risk, 11* (1), 1–18.

Did not meet WWC evidence screens

DiLuzio, M. (1999). *California students achieve 28 percent higher Stanford reading scores after only one semester of Accelerated Reader implementation.* Madison, WI: Renaissance Learning, Inc.[8]

Facemire, N. E. (2000). *The effect of the Accelerated Reader on the reading comprehension of third graders.* Unpublished master's thesis, Salem-Teikyo University, Salem, WV. (ERIC Document Reproduction Service No. ED442097)[9]

Friesen, C. (2001). *Improving reading in grade three students.* Unpublished master's thesis, San Diego State University, San Diego, CA.[10]

Ganter, J. (2000). Capture the power of reading. *Illinois Libraries, 82* (3), 176–180.[8]

Goodman, G. (1999). *The Reading Renaissance/Accelerated Reader Program. Pinal county school-to-work evaluation report.* Tucson, AZ: Creative Research, Inc. (ERIC Document Reproduction Service No. ED427299)[8]

8. The sample is not appropriate to this review: the parameters for this WWC review specified that students should be in grades K–3 during the time of the intervention; this study did not focus on the targeted grades.
9. Does not use a strong causal design: there was only one intervention and/or one comparison unit, so the analysis could not separate the effects of the intervention from other factors.
10. The sample is not appropriate to this review: the parameters for this WWC review specified that students should be in grades K–3; this study did not disaggregate students in the eligible range from those outside the range.

Hagerman, T. E. (2003). A quasi-experimental study on the effects of Accelerated Reader at middle school. *Dissertation Abstracts International, 64* (06), 2027A. (UMI No. 3095250)[8]

Holman, G. G. (1998). Correlational study to determine the effects of the Accelerated Reader Program on the reading comprehension of fourth and fifth-grade students in Early County, Georgia (Fourth-Grade, Blakely, Reading Practice). *Dissertation Abstracts International, 59* (03), 0771A. (UMI No. 9826801)[8]

Holmes, C. T., & Brown C. L. (2002). *A controlled evaluation of a total school improvement process, School Renaissance.* Athens: University of Georgia. (ERIC Document Reproduction Service No. ED474261)[11]

Johnson, R. A. (2003). The effects of the Accelerated Reader program on the reading comprehension of pupils in grades three, four, and five. *The Reading Matrix, 3* (3), 87-96.[10]

Kambarian, V. N., Jr. (2001). *The role of reading instruction and the effect of a reading management system on at-risk students.* Doctoral digest, Saint Louis University. (ERIC Document Reproduction Service No. ED461835)[10]

Knox, M. L. (1996). An experimental study of the effects of 'the Accelerated Reader Program' and a teacher directed program on reading comprehension and vocabulary of fourth and fifth grade students. *Dissertation Abstracts International, 57* (10), 4208A. (UMI No. 9710798)[8]

Kohel, P. R. (2003). Using Accelerated Reader: Its impact on the reading levels and Delaware state testing scores of 10th grade students in Delaware's Milford High School. *Dissertation Abstracts International, 63* (10), 3507A. (UMI No. 3067785)[8]

Lawson, S. (2000). Accelerated Reader boosts student achievement. *California School Library Association Journal, 23* (2), 11–12.[8]

Mallette, M. H., Henk, W. A., & Melnick, S. A. (2004). The influence of Accelerated Reader on the affective learning orientations of intermediate grade students. *Journal of Literacy Research, 36* (1), 72–75.[12]

McDurmon, A. (2001). *The effects of guided and repeated reading on English Language Learners.* Unpublished master's thesis, Berry College, Mount Berry, GA.[8]

Melton, C. M., Smothers, B. C., & Anderson, E. (2004). A study of the effects of the Accelerated Reader program on fifth grade students' reading achievement growth. *Reading Improvement, 41* (1), 18–23.[8]

Nunnery, J. A., Ross, S. M., & Goldfeder, E. (2003). *The effect of School Renaissance on TAAS scores in the McKinney ISD.* Retrieved from University of Memphis, Center for Research in Educational Policy Web site: http://crep.memphis.edu/web/research/pub/McKinney_Renaissance_CR_09-09-03.pdf[13]

Paul, T. D. (2003). *Guided independent reading: An examination of the reading practice database and the scientific research supporting guided independent reading as implemented in Reading Renaissance.* Retrieved from Renaissance Learning website: http://research.renlearn.com/research/pdfs/165.pdf[14]

Peak, J., & Dewalt, M. W. (1994). Reading achievement: Effects of computerized reading management and enrichment. *ERS Spectrum, 12* (1), 31–34.[10]

Putman, S. M. (2004). Effects of Accelerated Reader on reading motivation and achievement of fourth-grade students.

11. Does not use a strong causal design: in this study, which used a quasi-experimental design, the comparison group schools also used the intervention, which does not provide a direct test of the intervention.
12. The outcome measures are not relevant to this review: the parameters for this WWC review specified student achievement outcomes but this study did not focus on achievement.
13. Does not use a strong causal design: this study was a quasi-experimental design but did not use achievement pretests to establish that the comparison group was equivalent to the intervention group at baseline.
14. Does not use a strong causal design: this study did not use a comparison group.

Dissertation Abstracts International, 65 (02), 415A. (UMI No. 3123939)[8]

Renaissance Learning. (2002). *Results from a three-year statewide implementation of Reading Renaissance in Idaho: Including a review of the first two years of Reading Renaissance implementation.* Retrieved from http://research.renlearn.com/research/pdfs/106.pdf[14]

Ross, S. M., & Nunnery, J. A. (2005). *The effect of School Renaissance on student achievement in two Mississippi school districts.* Memphis, TN: University of Memphis, Center for Research in Educational Policy.[15]

Additional source:

Ross, S., Nunnery, J., Avis, A., & Borek, T. (2005). *The effects of School Renaissance on student achievement in two Mississippi school districts: A longitudinal quasi-experimental study.* Retrieved from University of Memphis, Center for Research in Educational Policy Web site: http://crep.memphis.edu/web/research/pub/School%20Ren%20Year2%20FINAL%207-25-05.pdf

Sadusky, L. A., & Brem, S. K. (2002). *The integration of Renaissance programs into an urban Title I elementary school, and its effect on school-wide improvement.* Madison, WI: Renaissance Learning, Inc.[10]

Samuels, S. J., & Wu, Y. C. (2003). *The effects of immediate feedback on reading achievement.* Minneapolis: University of Minnesota, Department of Educational Psychology.[10]

Samuels, S. J., Lewis, M., Wu, Y. C., Reininger, J., & Murphy, A. (2004). *Accelerated Reader vs. non-Accelerated Reader: How students using the Accelerated Reader outperformed the control condition in a tightly controlled experimental study.* Minneapolis: University of Minnesota.[16]

School Renaissance Institute. (2001). *Early literacy survey: How Renaissance supports Reading Excellence Act (REA) goals.* Madison, WI. (ERIC Document Reproduction Service No. ED454496)[17]

School Renaissance Institute. (2000). *South Bay Union School District, Imperial Beach California: Informational report on Accelerated Reader.* Retrieved from http://research.renlearn.com/research/pdfs/73.pdf[14]

Scott, L. S. (1999). *The Accelerated Reader program, reading achievement, and attitudes of students with learning disabilities.* Atlanta: Georgia State University. (ERIC Document Reproduction Service No. ED434431)[8]

Steele, C. T. (2003). The effectiveness of the Accelerated Reader program on the reading level of second-grade students as measured by the student test for assessment of reading. *Dissertation Abstracts International, 64* (03), 845A. (UMI No. 3080207)[14]

Topping, K. J., & Paul, T. (1999). Computer-assisted assessment of practice at reading: A large scale survey using Accelerated Reader data. *Reading & Writing Quarterly, 15* (3), 213–231.[14]

Topping, K. J., & Sanders, W. L. (2000). Teacher effectiveness and computer assessment of reading: Relating value added and learning information system data. *School Effectiveness and School Improvement, 11* (3), 305–337.[14]

Additional source:

Renaissance Learning. (2000). *Accelerated Reader and Reading Renaissance lead to increased teacher effective-*

15. Incomparable groups: this study was a quasi-experimental design that used achievement pretests but it did not establish that the comparison group was comparable to the treatment group prior to the start of the intervention.
16. Does not use a strong causal design: for the portion of the sample of interest to this WWC review, there was only one intervention and/or one comparison unit, so the analysis could not separate the effects of the intervention from other factors.
17. The outcome measures are not relevant to this review: the parameters for this WWC review specified student outcome measures but this study did not focus on students.

Research *(continued)*

ness. Retrieved from Renaissance Learning Web site: http://research.renlearn.com/research/pdfs/19.pdf

Vollands, S. R., Topping, K. J., & Evans, R. M. (1999). Computerized self-assessment of reading comprehension with the Accelerated Reader: Action research. *Reading and Writing Quarterly, 15,* 197–211.[8]

Walberg, H. J. (2001). *Final evaluation of the reading initiative.* Retrieved from Waterford Institute website: www.waterford.org/corporate_pages/IdahoStudy.pdf[14]

Watts, B. D. (2004). Accelerated Reader: Its motivational effects on advanced adolescent readers. *Masters Abstracts International, 43* (02), 386. (UMI No. 1423331)[8]

For more information about specific studies and WWC calculations, please see the WWC *Accelerated Reader/Reading Renaissance* Technical Appendices.

Appendix

Appendix A1 Study characteristics: Ross, Nunnery, & Goldfeder, 2004 (randomized controlled trial)

Characteristic	Description
Study citation	Ross, S.M., Nunnery, J., & Goldfeder, E. (2004). *A Randomized Experiment on the Effects of Accelerated Reader/Reading Renaissance in an Urban School District: Preliminary Evaluation Report.* Memphis, TN: University of Memphis, Center for Research in Educational Policy.
Participants	In each of 11 schools, a minimum of two teachers at the same grade level volunteered to be randomly assigned either to implement Accelerated Reader (AR)/Reading Renaissance or to serve as a comparison teacher. Although participants were in grades K-6, only students in grades K-3 are relevant for this review. For grades K-2, 32 teachers (642 students) were randomly assigned to an intervention or comparison group. The analysis sample of kindergarten to second grade students included 394 students for whom pre- and posttest scores were available. There was no attrition of classrooms, but there was considerable student-level attrition in some grades and the authors established equivalence of pretest scores for intervention and comparison students in the post-attrition sample. For third grade, 13 teachers (268 students) were randomly assigned to an intervention or a comparison group. There was also no attrition of classrooms for the third grade sample, but approximately one-third of the students were missing either a pre- or posttest score, and 178 students are included in the analysis. Pretest scores were used as a covariate in outcome analyses. Over 80 percent of the students were eligible for free or reduced price lunch and approximately 3 percent were identified as having a learning disability.[1]
Setting	Students attended 11 schools in Memphis, Tennessee.
Intervention	Teachers assigned to the intervention group implemented the *Accelerated Reader/Reading Renaissance* program (the computer software and the professional development on best practices for AR). The authors report that the study occurred over an eight-month period during the 2002–2003 school year.
Comparison	The participating district required a 90-minute reading block in the participating grades. All schools in the study used the same commercially available basal reading program. Participating schools were implementing sustained silent reading programs to support fluency, comprehension, and vocabulary development. Comparison teachers were told that the *Accelerated Reader/Reading Renaissance* program would be available to them in the following school year.
Primary outcomes and measurement	The STAR Early Literacy Test was administered to students in kindergarten to second grade in September (pretest) and April (posttest). The STAR Reading Test was administered to third graders at the same time points (see Appendix A2.1–2.2 for more detailed descriptions of outcome measures).
Teacher training	The developer of the program, Renaissance Learning, trained teachers assigned to the intervention group to implement *Accelerated Reader/Reading Renaissance*. In addition, at least once a month throughout the year, Renaissance consultants met with teachers in order to provide technical assistance and provide feedback on implementation.

1. These demographic characteristics pertain to the entire K-6 grade sample, not only to the K-3 sample of interest for this review.

Appendix A2.1 Outcome measures in the comprehension domain

Outcome measure	Description
STAR Reading Test[1]	The test is a computer-adaptive, norm-referenced test that measures student reading comprehension. It is designed for students who have at least a 100-word reading vocabulary and can be used with all students in grades 1–12. Students read passages of text and fill in key missing words from a set of options (modified cloze procedure). The assessment is designed for repeated administration throughout the school year to monitor progress (as cited in Ross, Nunnery, & Goldfeder, 2004).

1. This test was developed by Renaissance Learning, the developer of *Accelerated Reader/Reading Renaissance*. According to Renaissance Reading research, STAR reading scale scores are correlated to other standardized reading tests (such as, depending on the grade and time point, .67 to .85 for California Achievement Test; .62 to .89 for the Gates McGinitie Test; and .71 for the Degrees of Reading Power test). See Nebelsick-Gullett, L. Review of STAR Reading®, version 2.2. In B. S. Plake, J. C. Impara, & R. A. Spies (Eds.), *The fifteenth mental measurements yearbook.* Lincoln, NE: Buros Institute of Mental Measurements. Retrieved March 02, 2007, from Buros Institute of Mental Measurements Web site: http://www.unl.edu/buros/.

Appendix A2.2 Outcome measures in the general reading achievement domain

Outcome measure	Description
STAR Early Literacy Test[1]	The test measures seven major domains: general readiness, grapho-phonemic knowledge, phonemic awareness, phonics, comprehension, structural analysis, and vocabulary. It is a computer-adaptive audio test (students wear headphones and the test is read to them). The test can be administered to non-readers and to students who do not have a high enough reading vocabulary (100 words) to take the STAR Reading Test on their own. The assessment is designed for repeated administration throughout the school year to monitor progress (as cited in Ross, Nunnery, & Goldfeder, 2004).

1. This test was developed by Renaissance Learning, the developer of *Accelerated Reader/Reading Renaissance*. According to research conducted by Renaissance Learning, STAR Early Literacy Test is correlated to other standardized reading tests (average correlations range from .57 to .64 between STAR Early Literacy and Brigance K & 1 Screen for Kindergarten and First Grade, DIAL, Iowa Test of Basic Skills, and Stanford Achievement Test). See Graham, T. (2003). Review of STAR Literacy®. In B. S. Plake, J. C. Impara, & R. A. Spies (Eds.), *The fifteenth mental measurements yearbook.* Lincoln, NE: Buros Institute of Mental Measurements. Retrieved March 02, 2007, from Buros Institute of Mental Measurements Web site: http://www.unl.edu/buros/.

Appendix A3.1 Summary of study findings included in the rating for the comprehension domain[1]

Outcome measure	Study sample	Sample size (teachers/ students)	Authors' findings from the study[2]: Mean outcome (standard deviation[3]) *AR/RR* group	Authors' findings from the study[2]: Mean outcome (standard deviation[3]) Comparison group	WWC calculations: Mean difference[4] (*AR/RR* – comparison)	WWC calculations: Effect size[5]	WWC calculations: Statistical significance[6] (at $\alpha = 0.05$)	WWC calculations: Improvement index[7]
Ross, Nunnery, & Goldfeder, 2004 (randomized controlled trial)[8]								
STAR Reading Test	Grade 3	13/178	389.5 (139.6)	336.8 (198.3)	52.70	0.31	ns	+12
Average[9] for comprehension (Ross, Nunnery, & Goldfeder, 2004)						0.31	ns	+12

ns = not statistically significant

1. This appendix reports findings considered for the effectiveness rating and the improvement index.
2. The authors adjusted posttest scores for pretest differences between study groups.
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. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see Technical Details of WWC-Conducted Computations.
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 versus the percentile rank of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, where necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. See Technical Details of WWC-Conducted Computations for the formulas the WWC used to calculate statistical significance. In the case of Ross, Nunnery, & Goldfeder (2004), a correction for clustering was needed, so the significance levels may differ from those reported in the original study.
9. The WWC-computed average effect sizes are simple averages rounded to two decimal places and the average improvement indices are calculated from the average effect size. In this case, the average is the same as the single outcome measure for the single study.

Appendix A3.2 Summary of study findings included in the rating for the general reading achievement domain[1]

Outcome measure	Study sample	Sample size (teachers/ students)	Authors' findings from the study[2]: Mean outcome[3] (standard deviation[4]) *AR/RR* group	Authors' findings from the study[2]: Mean outcome[3] (standard deviation[4]) Comparison group	WWC calculations: Mean difference[5] (*AR/RR* – comparison)	WWC calculations: Effect size[6]	WWC calculations: Statistical significance[7] (at $\alpha = 0.05$)	WWC calculations: Improvement index[8]
Ross, Nunnery, & Goldfeder, 2004 (randomized controlled trial)[8]								
STAR Early Literacy test	Kindergarten	7/92	644.40 (114.40)	569.20 (94.10)	75.20	0.69	ns	+25
STAR Early Literacy test	Grade 1	9/97	733.60 (96.20)	698.00 (97.80)	35.60	0.36	ns	+14
STAR Early Literacy test	Grade 2	16/205	791.70 (72.10)	772.70 (82.20)	19.00	0.25	ns	+10
Average[10] for general reading achievement (Ross, Nunnery, & Goldfeder, 2004)						0.43	Statistically significant	+17

ns = not statistically significant

1. This appendix reports findings considered for the effectiveness rating and the average improvement indices.
2. The authors adjusted posttest scores for pretest differences between study groups
3. Means were adjusted for pretest score and free lunch status differences.
4. 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.
5. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
6. For an explanation of the effect size calculation, see Technical Details of WWC-Conducted Computations.
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 versus the percentile rank of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
9. The level of statistical significance was reported by the study authors or, where necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. See Technical Details of WWC-Conducted Computations for the formulas the WWC used to calculate statistical significance. In the case of Ross, Nunnery, & Goldfeder (2004), a correction for clustering was needed, so the significance levels may differ from those reported in the original study.
10. The WWC-computed average effect sizes are simple averages rounded to two decimal places. The average improvement indices are calculated from the average effect size. This row provides the study average based on the findings in all three grades.

Appendix A4.1 *Accelerated Reader/Reading Renaissance* rating for the comprehension domain

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

For the outcome domain of comprehension, the WWC rated *Accelerated Reader/Reading Renaissance* as having potentially positive effects. It did not meet the criteria for having positive effects because there was only one study for this domain. The remaining ratings (mixed effects, no discernable effects, potentially negative effects, negative effects) were not considered because *Accelerated Reader/Reading Renaissance* was assigned a higher 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. *Accelerated Reader/Reading Renaissance* had one study showing a substantively important positive effect on the comprehension domain.

- 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. *Accelerated Reader/Reading Renaissance* had no studies showing negative or indeterminate effects on the comprehension domain.

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. *Accelerated Reader/Reading Renaissance* had only one study that met WWC evidence standards.

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

  Met. No studies showed statistically significant or substantively important negative effects.

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. See the WWC Intervention Rating Scheme for a complete description.

Appendix A4.2 *Accelerated Reader/Reading Renaissance* rating for the general reading achievement domain

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

For the outcome domain of general reading achievement, the WWC rated *Accelerated Reader/Reading Renaissance* as having potentially positive effects. It did not meet the criteria for having positive effects because there was only one study for this domain. The remaining ratings (mixed effects, no discernable effects, potentially negative effects, negative effects) were not considered because *Accelerated Reader/Reading Renaissance* was assigned a higher 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. *Accelerated Reader/Reading Renaissance* had one study showing a statistically significant positive effect on the general reading achievement domain.

- 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. *Accelerated Reader/Reading Renaissance* had no studies showing negative or indeterminate effects on the general reading achievement domain.

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. *Accelerated Reader/Reading Renaissance* had only one study that met WWC evidence standards.

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

  Met. No studies showed statistically significant or substantively important negative effects.

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. See the WWC Intervention Rating Scheme for a complete description.

Appendix A5 Extent of evidence by domain

Outcome domain	Number of studies	Sample size		Extent of evidence[1]
		Schools	Students	
Alphabetics	0	0	0	na
Fluency	0	0	0	na
Comprehension	1	not specified	178	Small
General reading achievement	1	not specified	394	Small

na = not applicable/not studied

1. A rating of "moderate 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. Otherwise, the rating is "small."