



WWC Intervention Report

A summary of findings from a systematic review of the evidence



Beginning Reading

Updated June 2016

Accelerated Reader™

Program Description¹

Accelerated Reader™ is a computerized supplementary reading program that provides guided reading instruction to students in grades K–12. It aims to improve students’ reading skills through reading practice and by providing frequent feedback on students’ progress to teachers. The *Accelerated Reader™* program requires students to select and read a book based on their area of interest and reading level. Upon completion of a book, students take a computerized quiz based on the book’s content and vocabulary. Quiz performance allows teachers to monitor student progress and to identify students who may need additional reading assistance. This review of the program for the Beginning Reading topic area focuses on studies that examine outcomes for beginning readers in grades K–3.

Research²

The What Works Clearinghouse (WWC) identified two studies of *Accelerated Reader™* that both fall within the scope of the Beginning Reading topic area and meet WWC group design standards. Both studies meet WWC group design standards without reservations. Together, these studies included 265 beginning readers in grades 1–3 in four schools.

The WWC considers the extent of evidence for *Accelerated Reader™* on the reading achievement of beginning readers to be small for two student outcome domains—comprehension and reading fluency.

There were no studies that met WWC group design standards in two other domains specified by the Beginning Reading topic area, so this intervention report does not report on the effectiveness of *Accelerated Reader™* for those domains. (See the Effectiveness Summary on p. 4 for more details of effectiveness by domain.)

Effectiveness

Accelerated Reader™ was found to have mixed effects on comprehension and no discernible effects on reading fluency for beginning readers.

Table 1. Summary of findings³

Outcome domain	Rating of effectiveness	Improvement index (percentile points)		Number of studies	Number of students	Extent of evidence
		Average	Range			
Comprehension	Mixed effects	–2	–11 to +7	2	265	Small
Reading fluency	No discernible effects	3	na	1	32	Small

na = not applicable

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This intervention report presents findings from a systematic review of *Accelerated Reader™*, conducted using the WWC Procedures and Standards Handbook, version 3.0, and the Beginning Reading review protocol, version 3.0.

Program Information

Background

The *Accelerated Reader*[™] software prototype was created in 1984 by Judi Paul, and was first marketed to schools in 1986. In 1992, a series of studies on the program were started to identify best practices related to *Accelerated Reader*[™]. These efforts led to the development of the *Accelerated Reader*[™] *Best Classroom Practices*, first introduced to educators in 1996 through professional development seminars. For several years, Renaissance Learning sold *Accelerated Reader*[™] *Best Classroom Practices* together with *Accelerated Reader*[™] under the name *Reading Renaissance*. In 2004, Renaissance Learning introduced a hosted, web-based version of *Accelerated Reader*[™] featuring a subscription service payment model, called *Renaissance Place*[™]. In 2006, this was replaced by *Accelerated Reader Enterprise*[™], which was hosted on the same web-based platform and included access to the entire library of *Accelerated Reader*[™] quizzes. In 2014, Renaissance Learning released a new version, called *Accelerated Reader 360*[™], which expanded the independent reading practice component to include (1) both fiction and nonfiction literature and (2) a teacher dashboard that summarizes results for each student and across students. The WWC refers to all of these packages as *Accelerated Reader*[™] in this intervention report. This program is distributed by Renaissance Learning, Inc. Address: PO Box 8036, Wisconsin Rapids, WI 54495-8036. Email: answers@renaissance.com. Web: <http://www.renaissance.com/>. Telephone: (800) 338-4204.

Program details

As a first step, students independently use *Accelerated Reader*[™], a computerized supplementary reading program, to determine their reading level by completing a norm-referenced, standardized measure of general reading achievement. The teacher and student then use these reading level data to develop personalized reading practice goals along three dimensions: comprehension, quantity, and complexity. The students develop their reading skills by participating in reading practice sessions. In the beginning of a session, students choose to read books in their area of interest and within a recommended readability range from a list of books available from *Accelerated Reader*[™]. Depending on their age and skill level, students read the books with the help of a teacher—for example, the teacher may read books to students or with students using a paired-reading technique—or independently. Students reading with the help of a teacher transition to independent reading as they develop decoding skills. After reading each book, students take a comprehension quiz and earn points based on the number of correct responses, the length of the book, and the readability level of the book. Teachers can use data from the quizzes to monitor student progress, adjust students' reading ranges, or identify students who may need additional reading assistance. Teachers can use points to set goals for the quantity and quality of reading practice for each student. Point accumulation, as well as other optional teacher-provided rewards, are intended to motivate student learning; however, the intervention does not recommend or require the use of external rewards. The developer recommends using *Accelerated Reader*[™] during in-class time dedicated to reading practice for at least 35 minutes.

Cost

Accelerated Reader[™] and *Accelerated Reader 360*[™] are sold on an annual, per-student subscription. Additional cost information is available from the distributor.

Research Summary

The WWC identified 11 eligible studies that investigated the effects of *Accelerated Reader*[™] on the reading skills of beginning readers. An additional 60 studies were identified but do not meet WWC eligibility criteria for review in this topic area. Citations for all 71 studies are in the References section, which begins on p. 6.

The WWC reviewed the 11 eligible studies against group design standards. Two studies are randomized controlled trials that meet WWC group design standards without reservations. Those two studies are summarized in this report. Nine studies do not meet WWC group design standards.

Table 2. Scope of reviewed research

Grades	1–3
Delivery method	Individual
Program type	Supplement

Summary of studies meeting WWC group design standards without reservations

Bullock (2005) conducted a cluster randomized controlled trial that examined the effect of *Accelerated Reader*[™] on the reading achievement of students in one elementary school near Eugene, Oregon. Within each of two classrooms, students were ordered by baseline oral reading fluency score. Students whose rank order was an odd number were placed into one group, and students whose rank order was an even number were placed into another group. Within each classroom, one group of students was then randomly assigned to the intervention condition, while the other group was assigned to the comparison condition. The WWC based its effectiveness rating on findings from 32 third-grade students from two classrooms; 16 students were assigned to the intervention group and 16 to the comparison group. Students in the intervention group used *Accelerated Reader*[™] for 10 weeks, spending at least 90 minutes a week independently reading trade books and taking *Accelerated Reader*[™] quizzes on each book. The comparison group also spent at least 90 minutes per week reading independently, and had the option to choose any book available in the school library, but did not use *Accelerated Reader*[™] software. Each week, both classrooms also visited a library for 30 minutes. Students were tested immediately prior to and after the 10-week intervention period. Outcomes for an additional 82 students from two fourth-grade and two fifth-grade classrooms were not used to determine the WWC effectiveness rating because these grades are out of the scope of the Beginning Reading protocol. The study did not specify which version of the *Accelerated Reader*[™] software was used.

Shannon, Styers, and Siceloff (2010) conducted a cluster randomized controlled trial that examined the effect of *Accelerated Reader*[™] on the reading achievement of students in three Catholic schools in a large city in the North Central region in the United States. Within each grade and school block, evaluators randomly assigned participating classrooms to intervention or comparison conditions. The WWC based its effectiveness rating on findings from 233 students in grades 1–3 from 14 classrooms; 144 students in eight classrooms were assigned to the intervention group, and 89 students in six classrooms were assigned to the comparison group. Over the course of the school year, students in the intervention condition used *Accelerated Reader*[™] for 4–5 days a week, spending 30–45 minutes per day practicing independent reading and taking quizzes on each book. Comparison group teachers reported using 30 minutes or fewer of daily independent reading in their classrooms. Students were tested in the beginning of the year, mid-year, and at the end of the school year. The study did not specify which version of the *Accelerated Reader*[™] software was used.

Summary of studies meeting WWC group design standards with reservations

No studies of *Accelerated Reader*[™] met WWC group design standards with reservations.

Effectiveness Summary

The WWC review of studies for the Beginning Reading topic area includes outcomes for students in four domains: alphabetics, comprehension, reading fluency, and general reading achievement. The two studies of *Accelerated Reader*[™] that meet WWC group design standards reported findings in two of the four domains: (a) comprehension and (b) reading fluency. The findings below present the authors' estimates and WWC-calculated estimates of the size and statistical significance of the effects of *Accelerated Reader*[™] on beginning readers. For a more detailed description of the rating of effectiveness and extent of evidence criteria, see the WWC Rating Criteria on p. 20.

Summary of effectiveness for the comprehension domain

Table 3. Rating of effectiveness and extent of evidence for the comprehension domain

Rating of effectiveness	Criteria met
Mixed effects <i>Evidence of inconsistent effects.</i>	In the two studies that reported findings, the estimated impact of the intervention on outcomes in the <i>comprehension</i> domain were (1) a statistically significant positive effect and (2) a substantively important negative effect.
Extent of evidence	Criteria met
Small	Two studies that included 265 students in four schools reported evidence of effectiveness in the <i>comprehension</i> domain.

Two studies that meet WWC group design standards without reservations reported findings in the comprehension domain.

Bullock (2005) found, and the WWC confirmed, effects of *Accelerated Reader*[™] that were negative but not statistically significant, as measured by the STAR Reading Test. The effect size was large enough to be considered substantively important according to WWC criteria. The WWC characterizes this study finding as a substantively important negative effect.

Shannon et al. (2010) found, and the WWC confirmed, effects of *Accelerated Reader*[™] that were positive and statistically significant, as measured by the STAR Reading Test. The WWC characterizes this study finding as a statistically significant positive effect.

Thus, for the comprehension domain, one study found a negative effect that was substantively important but not statistically significant, and one study found a positive and statistically significant effect. This results in a rating of mixed effects, with a small extent of evidence.

Summary of effectiveness for the reading fluency domain

Table 4. Rating of effectiveness and extent of evidence for the reading fluency domain

Rating of effectiveness	Criteria met
No discernible effects <i>No affirmative evidence of effects.</i>	In the one study that reported findings, the estimated impact of the intervention on outcomes in the <i>reading fluency</i> domain was neither statistically significant nor large enough to be substantively important.
Extent of evidence	Criteria met
Small	One study that included 32 students in one school reported evidence of effectiveness in the <i>reading fluency</i> domain.

One study that meets WWC group design standards without reservations reported findings in the reading fluency domain.

Bullock (2005) found, and the WWC confirmed, effects of *Accelerated Reader*[™] that were not statistically significant, based on the Oral Reading Fluency subtest of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS). The effect size was not large enough to be considered substantively important according to WWC criteria. The WWC characterizes this study finding as an indeterminate effect.

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

References

Studies that meet WWC group design standards without reservations

Bullock, J. C. (2005). *Effects of the Accelerated Reader on reading performance of third, fourth, and fifth-grade students in one western Oregon elementary school* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3181085)

Shannon, L. C., Styers, M. K., & Siceloff, E. R. (2010). *A final report for the evaluation of Renaissance Learning's Accelerated Reader Program*. Charlottesville, VA: Magnolia Consulting.

Additional sources:

Shannon, L. C., Styers, M. K., Wilkerson, S. B., & Peery, E. (2014). *Computer-assisted learning in elementary reading: A randomized control trial*. Charlottesville, VA: Magnolia Consulting.

Shannon, L. C., Styers, M. K., Wilkerson, S. B., & Peery, E. (2015). Computer-assisted learning in elementary reading: A randomized control trial. *Computers in the Schools*, 32(1), 20–34.

Studies that meet WWC group design standards with reservations

None

Studies that do not meet WWC group design standards

Brown, K. L. (2010). *The impact of Accelerated Reader (AR) program on students' MCT reading scores* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3432203). The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups is necessary and not demonstrated.

Duke, J. E. (2012). *The Accelerated Reader program in conjunction with best-practice reading instruction: The effects on elementary-school reading scores* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3481422) The study does not meet WWC group design standards because the measures of effectiveness cannot be attributed solely to the intervention.

Nunnery, J. A., Ross, S. M., & Goldfeder, E. (2003). *The effect of School Renaissance on TAAS scores in the McKinney ISD*. Memphis, TN: University of Memphis, Center for Research in Educational Policy. <http://files.eric.ed.gov/fulltext/ED500027.pdf>. The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups is necessary and not demonstrated.

Paul, T. D., VanderZee, D., Rue, R., & Swanson, S. (1996, October). *Impact of Accelerated Reader on overall academic achievement and school attendance*. Paper presented at the National Reading Research Center Conference, Literacy and Technology for the 21st Century, Atlanta, GA. <http://files.eric.ed.gov/fulltext/ED421684.pdf>. The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups is necessary and not demonstrated.

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*. Memphis, TN: University of Memphis, Center for Research in Educational Policy. <http://files.eric.ed.gov/fulltext/ED500028.pdf>. The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups is necessary and not demonstrated.

Additional source:

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. <http://files.eric.ed.gov/fulltext/ED484275.pdf>.

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. The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups is necessary and not demonstrated.

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.

Rudd, P., & Wade, P. (2006). *Evaluation of Renaissance Learning mathematics and reading programs in UK specialist and feeder schools*. Slough, Berkshire, UK: National Foundation for Education Research. <http://files.eric.ed.gov/fulltext/ED502474.pdf>. The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups is necessary and not demonstrated.

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. The study does not meet WWC group design standards because the measures of effectiveness cannot be attributed solely to the intervention.

Waddell, S. M. (2011). *The impact of the Accelerated Reader software on the reading achievement of third grade students in a rural southeastern Mississippi school district* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3432269) The study does not meet WWC group design standards because the measures of effectiveness cannot be attributed solely to the intervention.

Studies that are ineligible for review using the Beginning Reading Evidence Review Protocol

Algozzine, B. (2006). Promoting academic success for all students. *Academic Exchange Quarterly*, 10(3), 142. The study is ineligible for review because it does not use a sample aligned with the protocol.

Borman, G. D., & Dowling, N. M. (2004). *Testing the Reading Renaissance program theory: A multilevel analysis of student and classroom effects on reading achievement* (Unpublished manuscript). University of Wisconsin–Madison. The study is ineligible for review because it does not use an eligible design.

Brem, S., Husman, J., & Duggan, M. A. (2005). *Findings from a three-year study of Reading Renaissance in a Title I urban elementary school: The effects of Reading Renaissance on students' standardized reading performance and motivation towards independent reading*. Tempe: Arizona State University, Division of Psychology in Education. The study is ineligible for review because it is out of scope of the protocol.

Bryant, W. E. (2008). *Effect of the Accelerated Reader program on academic achievement* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3302744) The study is ineligible for review because it does not use an eligible design.

Calhoun, V. L. (2007). *The effects of a supplemental program on the reading achievement of learning-disabled students* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3262897) The study is ineligible for review because it does not use a sample aligned with the protocol.

The Carmel Hill Fund Education Program. (2007). *The Carmel Hill Fund Education Program: Evaluation of 2005–2006 school results*. New York: Author. The study is ineligible for review because it does not use an eligible design.

Cheung, A., & Slavin, R. E. (2012). *The effectiveness of educational technology applications for enhancing reading achievement in K–12 classrooms: A meta-analysis*. Baltimore, MD: Johns Hopkins University, Center for Research and Reform in Education. The study is ineligible for review because it does not use an eligible design.

Christianson, P. (2005). *Is Accelerated Reader a viable reading enhancement program for an elementary school?* (Unpublished alternate plan paper). Minnesota State University–Mankato. The study is ineligible for review because it does not use an eligible design.

- Cox, D. (2012). Is Accelerated Reader best practice for all? *California Reader*, 46(2), 14–22. The study is ineligible for review because it is out of scope of the protocol.
- Cuddeback, M., & Ceprano, M. (2002). The use of Accelerated Reader with emergent readers. *Reading Improvement*, 39(2), 89–96. The study is ineligible for review because it does not use an eligible design.
- 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. The study is ineligible for review because it does not use a sample aligned with the protocol.
- Gomez, F., II. (2009). *English language learners utilizing the Accelerated Reader program* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3389458) The study is ineligible for review because it does not use a sample aligned with the protocol.
- Hart, S. S. (2007). *Accelerated Reader in a primary school: An evaluation of time spent on classroom implementation and student achievement* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 5259654) The study is ineligible for review because it does not use an eligible design.
- Hodgins, G. (2009). *The Accelerated Reader program at a “model” elementary school* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3370622) The study is ineligible for review because it is out of scope of the protocol.
- Holmes, C. T., & Brown C. L. (2003, February). *A controlled evaluation of a total school improvement process, School Renaissance*. Paper presented at the National Renaissance Conference, Nashville, TN. <http://files.eric.ed.gov/fulltext/ED474261.pdf>. The study is ineligible for review because it is out of scope of the protocol.
- Howard, C. (1999). *An evaluation of the Accelerated Reader program in grades 3-5 on reading vocabulary, comprehension, and attitude in an urban southeastern school district in Virginia*. (Unpublished doctoral dissertation). Old Dominion University, VA. The study is ineligible for review because it does not use an eligible design.
- Hunter, T. A. (2013). *The effect of Accelerated Reader on reading scores in a rural school district* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3552499) The study is ineligible for review because it does not use a sample aligned with the protocol.
- Husman, J., Brem, S., & Duggan, M. A. (2005). Student goal orientation and formative assessment. *Academic Exchange Quarterly*, 9(3), 355–359. The study is ineligible for review because it does not use an eligible design.
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- Kunz, J. R. R. (1999). *Does the Accelerated Reader program have an impact on the improvement of children’s reading scores in Illinois?* (Unpublished doctoral dissertation). Saint Louis University, MO. The study is ineligible for review because it does not use an eligible design.

- Myers, M. (2013). *The implementation of the Accelerated Reader program and its contribution to success on standardized tests* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3512966) The study is ineligible for review because it does not use a sample aligned with the protocol.
- Nunnery, J. A., & Ross, S. M. (2007). The effects of the School Renaissance program on student achievement in reading and mathematics. *Research in the Schools, 14*(1), 40–59. The study is ineligible for review because it does not use a sample aligned with the protocol.
- Paul, T. (2003). *Guided independent reading: An examination of the reading practice database and the scientific research supporting guided independent reading as implemented in Reading Renaissance*. Wisconsin Rapids, WI: Renaissance Learning. The study is ineligible for review because it does not use an eligible design.
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- Peak, J., & Dewalt, M. W. (1994). Reading achievement: Effects of computerized reading management and enrichment. *ERS Spectrum, 12*(1), 31–34. The study is ineligible for review because it does not use a sample aligned with the protocol.
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- Renaissance Learning. (2001). *Arkansas school sees schoolwide improvements in reading achievement*. Wisconsin Rapids, WI: Author. The study is ineligible for review because it does not use an eligible design.
- 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*. Wisconsin Rapids, WI: Author. The study is ineligible for review because it does not use an eligible design.
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- Renaissance Learning. (2005). *Iowa school boosts ITBS reading and math scores*. Wisconsin Rapids, WI: Author. The study is ineligible for review because it does not use an eligible design.
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- Renaissance Learning. (2006). *Accelerated Reader: Understanding reliability and validity*. Wisconsin Rapids, WI: Author. The study is ineligible for review because it does not use an eligible design.
- Renaissance Learning. (2006). *An increase in Delaware Student Testing Program (DSTP) reading scores and improved student attitudes about reading accredited to Reading Renaissance*. Wisconsin Rapids, WI: Author. The study is ineligible for review because it does not use an eligible design.
- Renaissance Learning. (2006). *Iowa elementary school pairs best practices with student motivation and sees significant gains in ITBS scores*. Wisconsin Rapids, WI: Author. The study is ineligible for review because it does not use an eligible design.
- Renaissance Learning. (2006). *Kentucky school district makes great strides in reading with AR*. Wisconsin Rapids, WI: Author. The study is ineligible for review because it does not use an eligible design.
- Renaissance Learning. (2006). *Reading and math state test scores climb at rural Texas school*. Wisconsin Rapids, WI: Author. The study is ineligible for review because it does not use an eligible design.
- Renaissance Learning. (2007). *Reading more and monitoring progress spell success for Texas elementary school*. Wisconsin Rapids, WI: Author. The study is ineligible for review because it does not use an eligible design.
- Renaissance Learning. (2007). *Test scores on the rise and library growth skyrocketing at Indiana elementary school*. Wisconsin Rapids, WI: Author. The study is ineligible for review because it does not use an eligible design.
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- 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* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3080207) The study is ineligible for review because it does not use an eligible design.
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- Additional source:**
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- Yee, V. N. (2007). *An evaluation of the impact of a standards-based intervention on the academic achievement of English language learners* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3261828) The study is ineligible for review because it does not use a sample aligned with the protocol.

Appendix A.1: Research details for Bullock (2005)

Bullock, J. C. (2005). *Effects of the Accelerated Reader on reading performance of third, fourth, and fifth-grade students in one western Oregon elementary school* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3181085)

Table A1. Summary of findings

Meets WWC group design standards without reservations

Outcome domain	Sample size	Study findings	
		Average improvement index (percentile points)	Statistically significant
Comprehension	32 students	-11	No
Reading fluency	32 students	+ 3	No

Setting The study was conducted in one elementary school in Lane County, Oregon.

Study sample The study examined students in grades 3–5 in one elementary school; however, this WWC review focuses on results for the third-grade students only, as specified in the Beginning Reading protocol. This third-grade sample consisted of 32 students from two classrooms. Within each classroom, the students were ordered by baseline oral reading fluency score; students whose rank order was an odd number were placed into one group, and students whose rank order was an even number were placed into another group. Within each classroom, one group of students was then randomly assigned to the intervention condition (*Accelerated Reader™*), while the other group was assigned to the comparison condition (business-as-usual). The *Accelerated Reader™* group consisted of 11 female and five male students, while the business-as-usual comparison group consisted of nine female and seven male students. There was no attrition of students between the pretest and the posttest.

At the time of the study, the participating elementary school had approximately 325 students. The school population was approximately 91% White, 5% other race/ethnicity, and 4% Hispanic. A majority (60.5%) of the overall school population were eligible for free or reduced-price lunch.

Intervention group Students in the intervention group used *Accelerated Reader™* over a 10-week period. They were provided with a minimum of 90 minutes per week of independent reading during class time and required to visit a library for 30 minutes per week. They also had access to *Accelerated Reader™* books that were within their reading level and took *Accelerated Reader™* quizzes on each book. The *Accelerated Reader™* intervention was used to supplement a standard core reading curriculum; however, the author did not identify which core curriculum was used.

Comparison group In addition to using the same core reading curriculum as the intervention group, students in the comparison group spent at least 90 minutes a week over a 10-week period reading independently and were required to visit a library for 30 minutes per week. However, they were free to choose any book available in the school library and did not use *Accelerated Reader™* software. Comparison group students were asked to keep track of the books they read.

Outcomes and measurement

Comprehension was measured using the STAR Reading Test, a norm-referenced, computer-adaptive test. Reading fluency was measured using the Oral Reading Fluency subtest of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS), which was administered individually by a trained educational assistant. The two assessments were administered twice: at the beginning and end of the 10-week study period. For a more detailed description of these outcome measures, see Appendix B.

Support for implementation

No information is provided about any special training or support for implementation offered to these teachers. Reading classes for the intervention and comparison groups were taught by the school's regular teachers.

Appendix A.2: Research details for Shannon et al. (2010)

Shannon, L. C., Styers, M. K., & Sicheloff, E. R. (2010). *A final report for the evaluation of Renaissance Learning's Accelerated Reader program*. Charlottesville, VA: Magnolia Consulting.

Table A2. Summary of findings

Meets WWC group design standards without reservations

Outcome domain	Sample size	Study findings	
		Average improvement index (percentile points)	Statistically significant
Comprehension	233 students	+7	Yes

Setting

This study took place in three Catholic private schools in a large city in the North Central region of the United States.

Study sample

The study examined students in grades 1–4 in three schools; however, this WWC review focuses on students in grades 1–3 only, as specified in the Beginning Reading protocol. This sample consisted of 233 students from 14 classrooms. Within each grade, teachers were randomly assigned to either the intervention condition (*Accelerated Reader*TM) or the comparison condition (business-as-usual). The study had no attrition at the classroom level and low attrition at the student level based on WWC “liberal” attrition assumptions.

The full study sample, which included 344 first, second, third, and fourth-grade students in 19 classrooms, was approximately evenly split between female and male students (52% vs. 48%, respectively). The majority of study participants (66%) were White, 13% were Asian/Pacific Islander, and 11% were Hispanic. None of the students were classified as English learners, less than 2% were receiving special education, and less than 3% were eligible for free or reduced-price lunch.

Intervention group

Students in the intervention group used *Accelerated Reader*TM over the course of 1 school year. Teachers reported using the intervention daily (on average, 4.9 out of 5 days a week) in their classrooms, allowing for 30–45 minutes of independent reading practice per day. During this time, students read books within their reading and interest levels and took *Accelerated Reader*TM quizzes that tested their understanding of the book. The intervention was used to supplement the standard reading curriculum (*Scott Foresman*).

Comparison group

Students in the comparison group were taught using a similar set of reading curricula as the intervention group, but without the addition of *Accelerated Reader*[™]. Both groups supplemented their core curricula—*Scott Foresman*—with other materials.

Outcomes and measurement

Comprehension was measured using the STAR Reading Test, a norm-referenced, computer-adaptive test. The assessment was administered three times: at the beginning, middle, and end of the school year. This report focuses on impacts only at the end of the year, which coincided with the end of the intervention.

In addition to the findings for the combined sample of students in grades 1–3, the study presented supplemental findings for grade-specific subgroups. The findings for students in first grade on the STAR Reading Test did not meet WWC design standards because attrition rates were high, and baseline equivalence of the intervention and comparison groups' analytic sample was not demonstrated. The findings for students in grades 2 and 3 on the STAR Reading Test are presented in Appendix D. These supplemental findings do not factor into the intervention's rating of effectiveness. For a more detailed description of these outcome measures, see Appendix B.

Support for implementation

Renaissance Learning, the program developer, provided a training seminar to intervention teachers at the beginning of the school year and conducted training visits to each school throughout the study period.

Appendix B: Outcome measures for each domain

Comprehension

STAR Reading Test

This is a norm-referenced computer-adaptive test which assesses a student's vocabulary-in-context knowledge and reading comprehension (as cited in Bullock, 2005 and Shannon et al., 2010). Students in grades K–2 answer 25 vocabulary-in-context items, which require a student to fill in a missing word by gathering contextual clues from the rest of the sentence. In grades 3 and higher, the test consists of two parts: (1) 20 vocabulary-in-context items, and (2) five passages followed by multiple-choice comprehension questions. This assessment takes 10–15 minutes to complete. The test was developed by Renaissance Learning, the developer of *Accelerated Reader*[™]. For grades 1–5, split-half reliability of the STAR Reading Test ranges from .89 to .90, while the test-retest reliability ranges from .84 to .91 (Shannon et al., 2010).

Reading fluency

Oral Reading Fluency subtest of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS)

This is a standardized assessment of a student's reading accuracy and fluency (as cited in Bullock, 2005). It was administered individually by a trained educational assistant. This assessment measures the number of words read correctly in 1 minute.

Appendix C.1: Findings included in the rating for the 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	
Bullock, 2005^a								
<i>STAR Reading Test</i>	Grade 3	4 groups/ 32 students	412.40 (149.50)	462.30 (182.40)	-49.90	-0.29	-11	nr
Domain average for comprehension (Bullock, 2005)						-0.29	-11	Not statistically significant
Shannon et al., 2010^b								
<i>STAR Reading Test</i>	Grades 1-3	14 classrooms/ 233 students	426.13 (159.92)	396.30 (166.08)	29.83	0.18	+7	.04
Domain average for comprehension (Shannon et al., 2010)						0.18	+7	Statistically significant
Domain average for comprehension across all studies						-0.05	-2	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 outcomes, representing the average change expected for all individuals 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 individual's percentile rank that can be expected if the individual 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. The statistical significance of each study's domain average was determined by the WWC. Some statistics may not sum as expected due to rounding. na = not applicable. nr = not reported.

^a For Bullock (2005), a correction for clustering was needed and resulted in a WWC-computed *p*-value of .62 for STAR Reading Test; therefore, the WWC does not find the result to be statistically significant. The effect size was calculated by using unadjusted posttest means and standard deviations (reported on p. 30 of the study). Please see the WWC Procedures and Standards Handbook (version 3.0) for more information. This study is characterized as having a substantively important negative effect because the effect is negative and not statistically significant but is substantively important. For more information, please refer to the WWC Standards and Procedures Handbook (version 3.0), p. 26. Note that a slightly different improvement index (of -0.12 and corresponding effect size of -0.30 that did not use Hedges' small sample size correction in the denominator of effect size formula) was reported in the previous intervention report (2008) for the same outcome analysis.

^b For Shannon et al. (2010), the WWC did not need to make corrections for clustering, multiple comparisons, or to adjust for baseline differences. The *p*-value presented here was reported in the original study. The intervention group mean was calculated by adding the hierarchical linear modeling (HLM) coefficient to the comparison group posttest mean. Post-test standard deviations and the comparison group mean were calculated by aggregating corresponding statistics across the three grades of students (reported on p. 56 of the study). This study is characterized as having a statistically significant positive effect because the estimated effect is positive and statistically significant. For more information, please refer to the WWC Standards and Procedures Handbook (version 3.0), p. 26.

Appendix C.2: Findings included in the rating for the reading fluency domain

Outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			p-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Bullock, 2005^a								
<i>Oral Reading Fluency subtest of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS)</i>	Grade 3	4 groups/ 32 students	116.30 (40.90)	112.80 (55.40)	3.50	0.07	+3	nr
Domain average for reading fluency (Bullock, 2005)						0.07	+3	Not statistically significant
Domain average for reading fluency across all studies						0.07	+3	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 outcomes, representing the average change expected for all individuals 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 individual's percentile rank that can be expected if the individual is given the intervention. na = not applicable. nr = not reported.

^a For Bullock (2005), a correction for clustering was needed and resulted in a WWC-computed p-value of .90 for DIBELS; therefore, the WWC does not find the result to be statistically significant. The effect size was calculated by using unadjusted posttest means and standard deviations (reported on p. 30 of the study). Please see the WWC Procedures and Standards Handbook (version 3.0) for more information. This study is characterized as having an indeterminate effect because the estimated effect is neither statistically significant nor substantively important. For more information, please refer to the WWC Standards and Procedures Handbook (version 3.0), p. 26.

Appendix D: Description of supplemental findings for the 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	
Shannon et al., 2010^a								
<i>STAR Reading Test</i>	Grade 2	4 classrooms/ 69 students	453.14 (86.06)	398.30 (128.68)	54.84	0.50	+19	nr
<i>STAR Reading Test</i>	Grade 3	5 classrooms/ 82 students	510.08 (127.08)	475.65 (185.04)	34.43	0.23	+9	nr

Table Notes: The supplemental findings presented in this table are additional findings from studies in this report that meet WWC design standards without reservations, but 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 outcomes, representing the average change expected for all individuals 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 individual's percentile rank that can be expected if the individual is given the intervention. Some statistics may not sum as expected due to rounding. nr = not reported.

^a For Shannon et al. (2010), a correction for clustering was needed for STAR Reading and resulted in a WWC-computed p-value of .34 for grade 2 students and .64 for grade 3 students; therefore, the WWC does not find these results to be statistically significant. The WWC calculated the program group mean using a difference-in-differences approach by adding the impact of the program (i.e., difference in mean gains between the intervention and comparison groups) to the unadjusted comparison group posttest means. Please see the WWC Procedures and Standards Handbook (version 3.0) for more information. The results for the first-grade sample are not included in this table because they did not meet WWC group design standards. The sample of first-grade students experienced high attrition, and the authors were unable to demonstrate baseline equivalence for the analytic sample.

Endnotes

¹ The descriptive information for this program was obtained from a publicly available source: the program's website (<http://www.renaissance.com>, downloaded November 2014). The WWC requests developers review the program description sections for accuracy from their perspective. The program description was provided to the developer in November 2014, and the WWC incorporated feedback from the developer. Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review.

² The literature search reflects documents publicly available by August 2015. The previous WWC intervention report for this intervention was released in October 2008 and was prepared using the WWC Procedures and Standards Handbook (version 1.0), and the Beginning Reading review protocol (version 1.0). The studies in this updated intervention report were reviewed using the Standards from the WWC Procedures and Standards Handbook (version 3.0), along with those described in the Beginning Reading review protocol (version 3.0). This report has also been updated to include 25 studies that have been conducted since 2008. Of the additional studies, 20 were not within the scope of the review protocol for Beginning Reading, four were within the review's scope but did not meet WWC group design standards, and one study (Shannon, Styers, & Siceloff, 2010) met WWC group design standards without reservations. A complete list and disposition of all studies reviewed are provided in the references. The report also includes reviews of all previous studies that met WWC group design standards with or without reservations and resulted in a revised disposition for Ross, Nunnery, and Goldfeder (2004). The study, which met WWC design standards without reservations in the previous report, does not meet WWC design standards in this report. The revised disposition is due to changes in the WWC's attrition standards since publication of the previous report. For Ross, Nunnery, and Goldfeder (2004), the randomized controlled trial included outcomes that had a combination of overall and differential attrition rates that exceeded the WWC standards (version 3.0), and the analytic intervention and comparison groups were not shown to be equivalent. The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.

³ For criteria used in the determination of the rating of effectiveness and extent of evidence, see the WWC Rating Criteria on p. 20. These improvement index numbers show the average and range of individual-level improvement indices for all findings across the studies.

Recommended Citation

U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2016, June). *Beginning Reading intervention report: Accelerated Reader™*. Retrieved from <http://whatworks.ed.gov>

WWC Rating Criteria

Criteria used to determine the rating of a study

Study rating	Criteria
Meets WWC group design standards without reservations	A study that provides strong evidence for an intervention's effectiveness, such as a well-implemented RCT.
Meets WWC group design standards with reservations	A 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

Rating of effectiveness	Criteria
Positive effects	Two or more studies show statistically significant positive effects, at least one of which met WWC group design 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 group design 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 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.

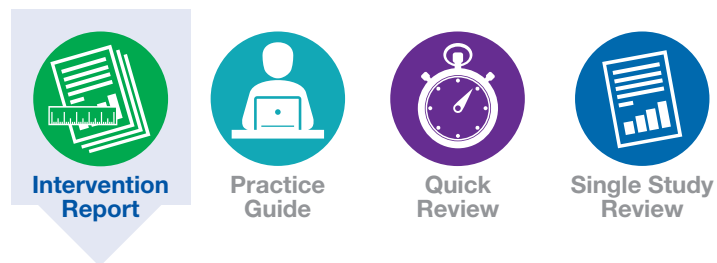
Glossary of Terms

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.
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. 20.
Improvement index	Along a percentile distribution of individuals, the improvement index represents the gain or loss of the average individual due to the intervention. As the average individual starts at the 50th percentile, the measure ranges from -50 to +50.
Intervention	An educational program, product, practice, or policy aimed at improving student outcomes.
Intervention report	A summary of the findings of the highest-quality research on a given program, product, practice, or policy in education. The WWC searches for all research studies on an intervention, reviews each against design standards, and summarizes the findings of those that meet WWC design standards.
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.
Quasi-experimental design (QED)	A quasi-experimental design (QED) is a research design in which study participants 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 eligible study participants are randomly assigned to 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. 20.
Single-case design	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.

Glossary of Terms

- 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% ($p < .05$).
- Substantively important** A substantively important finding is one that has an effect size of 0.25 or greater, regardless of statistical significance.
- Systematic review** A review of existing literature on a topic that is identified and reviewed using explicit methods. A WWC systematic review has five steps: 1) developing a review protocol; 2) searching the literature; 3) reviewing studies, including screening studies for eligibility, reviewing the methodological quality of each study, and reporting on high quality studies and their findings; 4) combining findings within and across studies; and, 5) summarizing the review.

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



An **intervention report** summarizes the findings of high-quality research on a given program, practice, or policy in education. The WWC searches for all research studies on an intervention, reviews each against evidence standards, and summarizes the findings of those that meet standards.

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