What Works Clearinghouse

ies INSTITUTE OF EDUCATION SCIENCES

I CAN Learn®

Program Description[1]

I CAN Learn® is a computer software system that provides math instruction through a series of interactive lessons. These lessons are delivered with a one-to-one student-to-computer ratio. Students determine the pace of each lesson and must demonstrate mastery of the lesson before progressing to the next one. Teachers provide individualized instruction to students on the basis of their performance on the lessons.

The available *I CAN Learn*® curricula include fifth- to sixth-grade math, pre-algebra, algebra, and geometry. These curricula are aligned to the National Council of Teachers of Mathematics standards and can be customized to meet state- or district-specific standards. Studies included in this What Works Clearinghouse (WWC) review assess the effectiveness of the pre-algebra and algebra components of *I CAN Learn*®.

Report Contents

Research[2]

One study of *I CAN Learn*® that falls within the scope of the High School Math review protocol meets WWC evidence standards with reservations. The study included 540 high school students in seven schools in two districts. Based on the one study, the WWC considers the extent of evidence for *I CAN Learn*® on high school students to be small for the math achievement domain, the only domain identified by the review protocol.

Effectiveness

I CAN Learn® was found to have no discernible effects on math achievement for high school students.

Table 1. Summary of findings[3]

Outcome domain	Rating of effectiveness	Improvement index *(percentile points)* Average	Range	Number of studies	Number of students	Extent of evidence
Math achievement	No discernible effects	+1	–2 to +4	1	540	Small

Program Information

Background

JRL Enterprises, Inc. is the developer and distributor of *I CAN Learn®*. Address: 1820 St. Charles Avenue, Suite 203, New Orleans, LA 70130. Email: info@icanlearn.com. Web: http://www.icanlearn.com. Telephone: (504) 263-1380.

Program details

Components of *I CAN Learn®* include *Fundamentals of Math* (fifth- and sixth-grade math), *Pre-Algebra, Algebra,* and *Geometry* curricula. Each of these curricula includes more than 100 self-paced, mastery-based lessons. Some lessons include multimedia content, such as instructional videos and animation. Custom curriculum alignment to state, district, and school standards is accomplished by selecting appropriate lessons from the *I CAN Learn®* Lesson Database, which contains more than 500 multimedia lessons. The curricula can be used online via the Internet or through school LANs or WANs, provided that the courseware is installed on a local server. In addition to the instructional content, *I CAN Learn®* allows teachers to conduct classroom administration tasks through the *I CAN Learn®* Classroom Explorer Class Management System, which keeps track of student attendance, homework, and test grades, and can help in developing individual learning plans.

Cost

The cost of an *I CAN Learn®* system depends on its configuration and terms of support. Using a school's existing hardware, individual subscriptions allowing access to more than 500 lessons cost $43.48 per student. Varying support plans, including training, professional development, curriculum alignments, implementation planning, and other pedagogical support, are available and encouraged, with the cost ranging from $400 to $20,000 per year. A complete traditional classroom installation of hardware and software is available and includes 30 workstations with all curriculum and class management software, computer hardware, network wiring, furniture, and three years of comprehensive onsite educational support. The cost for this traditional classroom installation is $200,000; the cost for a laptop cart configuration is $170,000.

Research Summary

Eleven studies reviewed by the WWC investigated the effects of *I CAN Learn*® on high school students. One study (Barrow, Markman, & Rouse, 2009) is a randomized controlled trial with high levels of attrition that meets WWC evidence standards with reservations. That study is summarized in this report. The remaining 10 studies do not meet either WWC eligibility screens or evidence standards. (See references beginning on p. 5 for citations for all 11 studies.)

Table 2. Scope of reviewed research

Grade	8, 9, 10
Delivery method	Whole class
Program type	Curriculum
Studies reviewed	11 studies
Meets WWC standards	0 studies
Meets WWC standards with reservations	1 study

Summary of studies meeting WWC evidence standards without reservations

No studies of *I CAN Learn*® meet WWC evidence standards without reservations.

Summary of studies meeting WWC evidence standards with reservations

Barrow et al. (2009) randomly assigned pre-algebra and algebra classes in seven high schools in two large, urban school districts (called Districts 2 and 3 in the study report) either to a treatment group that used *I CAN Learn*® or to a comparison group that used the method of instruction typically offered in the district. The study included an additional school district (called District 1 in the study report) that was excluded from this review because it was based only on students in grade 8 and therefore did not fall within the scope of the High School Math review protocol. For the analysis of state achievement test scores, the initial sample of 1,671 students in 70 classes resulted in an analysis sample of 540 students in 67 classes.[4] Because this analysis suffered from high attrition, it is treated as having a quasi-experimental design that demonstrated baseline equivalence of the analysis sample on a pretest and made the necessary statistical adjustments, resulting in a study rating of meets WWC evidence standards with reservations.

Effectiveness Summary

The WWC review of interventions for High School Math addresses student outcomes in one domain: math achievement. The findings below present the authors' estimates and WWC-calculated estimates of the size and statistical significance of the effects of *I CAN Learn®* on high school students. For a more detailed description of the rating of effectiveness and extent of evidence criteria, see the WWC Rating Criteria later in this report.

Summary of effectiveness for the math achievement domain

One study reported findings in the math achievement domain.

Barrow et al. (2009) reported, and the WWC confirmed, no statistically significant effects on the state achievement test in Districts 2 and 3. The size of these effects, regardless of their statistical significance, was not large enough to be considered substantively important according to WWC criteria (at least 0.25).

Thus, for the math achievement domain, one study of *I CAN Learn®* showed an indeterminate effect. This results in a rating of no discernible effects, with a small extent of evidence.

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

Rating of effectiveness	Criteria met
No discernible effects *No affirmative evidence of effects.*	The review of *I CAN Learn®* in the math achievement domain had one study showing no statistically significant or substantively important effect, either positive or negative.
Extent of evidence	**Criteria met**
Small	The review of *I CAN Learn®* in the math achievement domain was based on one study that included seven schools and 540 students.

References

Study that meets WWC evidence standards with reservations

Barrow, L., Markman, L., & Rouse, C. E. (2009). Technology's edge: The educational benefits of computer-aided instruction. *American Economic Journal: Economic Policy, 1*(1), 52–74.

Studies that do not meet WWC evidence standards

Kirby, P. C. (2004). *I CAN Learn in Collier County, Florida.* New Orleans, LA: Ed-Cet, Inc. The study does not meet WWC evidence standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.

Kirby, P. C. (2005). *Comparison of I CAN Learn and traditionally-taught 7th and 9th grade student performance on the Texas criterion-referenced tests, 2000–2004.* New Orleans, LA: Ed-Cet, Inc. The study does not meet WWC evidence standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.

Kirby, P. C. (2005). *I CAN Learn Algebra I in Catoosa County, Georgia*. New Orleans, LA: Ed-Cet, Inc. The study does not meet WWC evidence standards because the measures of effectiveness cannot be attributed solely to the intervention—there was only one unit assigned to one or both conditions.

Kirby, P. C. (2005). *I CAN Learn results in Milwaukee, Wisconsin.* New Orleans, LA: Ed-Cet, Inc. The study does not meet WWC evidence standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.

Kirby, P. C. (n.d.). *I CAN Learn® Algebra I in Central Falls, Rhode Island, 2005–2006*. New Orleans, LA: Ed-Cet, Inc. Retrieved from http://www.icanlearnresults.com/pdf/I CAN Learn Report 2005 2006 RI.pdf. The study does not meet WWC evidence standards because it does not provide adequate information to determine whether it uses an outcome that is valid or reliable.

Kirby, P. C. (n.d.). *I CAN Learn results in Mississippi.* New Orleans, LA: Ed-Cet, Inc. The study does not meet WWC evidence standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.

Kirby, P. C. (n.d.). *Texas district performance on TAAS and TAKS, 1999–2003. I CAN Learn in Fort Worth Independent School District.* New Orleans, LA: Ed-Cet, Inc. The study does not meet WWC evidence because the measures of effectiveness cannot be attributed solely to the intervention—there was only one unit assigned to one or both conditions.

Oescher, J., & Kirby, P. C. (2004). *I CAN Learn results in Dallas, Texas 9th grade 2003–2004*. New Orleans, LA: JRL Enterprises. The study does not meet WWC evidence standards because the measures of effectiveness cannot be attributed solely to the intervention—there was only one unit assigned to one or both conditions.

Studies that are ineligible for review using the High School Math Evidence Review Protocol

Cheung, C. K., & Slavin, R. E. (2011). *The effectiveness of educational technology applications for enhancing mathematics 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 is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

Slavin, R. E., Lake, C., & Groff, C. (2008). *Effective programs in middle and high school mathematics: A best evidence synthesis.* Baltimore, MD: Johns Hopkins University, Center for Data-Driven Reform in Education. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

Additional source:

Slavin, R. E., Lake, C., & Groff, C. (2009). Effective programs in middle and high school mathematics: A best-evidence synthesis. *Review of Educational Research, 79*(2), 839–911.

Appendix A: Research details for Barrow et al. (2009)

Barrow, L., Markman, L., & Rouse, C. E. (2009). Technology's edge: The educational benefits of computer-aided instruction. *American Economic Journal: Economic Policy, 1*(1), 52–74.

Table A1. Summary of findings

Meets WWC evidence standards with reservations

Outcome domain	Sample size	Study findings	
		Average improvement index *(percentile points)*	Statistically significant
Math achievement	540 students	+1	No

Setting

The study took place in three large urban school districts (called Districts 1, 2, and 3 in the study report) located in different parts of the United States, with one in the Northeast, one in the Midwest, and one in the South. However, analyses of one of these districts (District 1) was excluded from this review because the outcome measure was based only on students in grade 8 and therefore did not fall within the scope of the High School Math review protocol. Both districts that were included in this review were studied in the 2003–04 school year.

Study sample

The study was based on a within-school random assignment design. To be eligible for the study, each school had to have a computer lab and be willing to accommodate the randomized design. Schools were given the option of excluding particular teachers and/or classrooms from the study before randomization.

The participating schools provided the authors with the schedule of pre-algebra and algebra classes near the beginning of the academic year. The authors then randomly selected the treatment classes (taught using *I CAN Learn*®) and control group classes (taught using the method of instruction typically used in the district).

At baseline, the study sample included 1,062 students (in 46 classes) in District 2 and 609 students (in 24 classes) in District 3. State achievement test scores were available for only 341 students (in 46 classes) in District 2 and 199 students (in 21 classes) in District 3. Because of the high attrition in the state achievement test analysis, the study was treated as a quasi-experimental design that demonstrated baseline equivalence of the analysis sample on a pretest and made the necessary statistical adjustments, allowing it to meet WWC evidence standards with reservations.

A large number of students in the study were members of racial or ethnic minorities. In District 2, 47% of study students were African American and 45% were Hispanic. In District 3, 94% of study students were African American.

Intervention group

Students in classes assigned to the treatment condition were provided pre-algebra and algebra instruction through *I CAN Learn*®. Thus, these students received self-paced, mastery-based instruction through interactive, multimedia software.

Comparison group

Comparison group students received pre-algebra and algebra instruction with the curricula typically used in the district. The study does not provide further details about these curricula.

Outcomes and measurement

The outcome measures were statewide math achievement tests administered in the study districts' respective states. For a more detailed description of these outcome measures, see Appendix B.

Support for implementation

The study does not include information on teacher training.

Appendix B: Outcome measures for each domain

Math achievement	
State Achievement Test	State achievement tests were the math achievement tests administered by the respective states of the districts included in the study (as cited in Barrow et al., 2009). The exams tested math skills in addition to those covered by the study's pre-algebra and algebra curricula. In Districts 2 and 3, the baseline statewide test was administered in eighth grade, and the outcome measure was administered in tenth grade. State achievement test scores were standardized by dividing the scores by the standard deviation of the baseline test score for study students within each district.

Appendix C: Findings included in the rating for the math achievement domain

Outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			*p*-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Barrow et al., 2009[a]								
State Achievement Test	District 2	46 classes/ 341 students	6.43 (1.14)	6.34 (1.21)	0.09	0.09	+4	0.92
State Achievement Test	District 3	21 classes/ 199 students	17.6 (0.94)	17.7 (1.02)	–0.06	–0.06	–2	0.61
Domain average for math achievement (Barrow et al., 2009)						**0.02**	**+1**	**0.77**
Domain average for math achievement across all studies						**0.02**	**+1**	**na**

Table Notes: Positive results for mean difference, effect size, and improvement index favor the intervention group; negative results favor the comparison group. The effect size is a standardized measure of the effect of an intervention on student outcomes, representing the change (measured in standard deviations) in an average student's outcome that can be expected if that student is given the intervention. The improvement index is an alternate presentation of the effect size, reflecting the change in an average student's percentile rank that can be expected if the student is given the intervention. The WWC-computed average effect size is a simple average rounded to two decimal places; the average improvement index is calculated from the average effect size. The statistical significance of the study's domain average was determined by the WWC; for Barrow et al. (2009), the study effects were indeterminate. na = not applicable.

[a] For Barrow et al. (2009), no corrections for clustering and multiple comparisons were needed. The *p*-values presented here were derived from the original study. Comparison group means presented in this table reflect unadjusted group means in standard deviation units, provided to the WWC by the authors. Intervention group means are the sum of the comparison group mean and the intervention impact estimate presented in the original study. Standard deviations reflect the standard deviation of the unadjusted mean achievement test score for each group.

Endnotes

[1] The descriptive information for this program was obtained from publicly available sources: the program's website (www.icanlearn.com, downloaded May 2011) and Barrow, Markman, and Rouse (2009). The WWC requests developers review the program description sections for accuracy from their perspective. The program description was provided to the developer in July 2010 and we incorporated feedback from the developer. Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review. The literature search reflects documents publicly available by December 2011.

[2] The studies in this report were reviewed using WWC Evidence Standards, Version 2.1, as described in protocol Version 2.0. 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.11 of this report. These improvement index numbers show the average and range of student-level improvement indices for all findings across the studies.

[4] The study also reported findings for an algebra measure constructed for this study. The WWC was not able to verify the psychometric properties of this measure; therefore, it is not included in this review.

Recommended Citation

U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2012, February). *High School Math intervention report: I CAN Learn®*. Retrieved from http://whatworks.ed.gov.

WWC Rating Criteria

Criteria used to determine the rating of a study

Study rating	Criteria
Meets evidence standards	A study that provides strong evidence for an intervention's effectiveness, such as a well-implemented RCT.
Meets evidence 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 evidence standards for a strong design, AND No studies show statistically significant or substantively important negative effects.
Potentially positive effects	At least one study shows a statistically significant or substantively important positive effect, AND No studies show a statistically significant or substantively important negative effect AND fewer or the same number of studies show indeterminate effects than show statistically significant or substantively important positive effects.
Mixed effects	At least one study shows a statistically significant or substantively important positive effect AND at least one study shows a statistically significant or substantively important negative effect, but no more such studies than the number showing a statistically significant or substantively important positive effect, OR At least one study shows a statistically significant or substantively important effect AND more studies show an indeterminate effect than show a statistically significant or substantively important effect.
Potentially negative effects	One study shows a statistically significant or substantively important negative effect and no studies show a statistically significant or substantively important positive effect, OR Two or more studies show statistically significant or substantively important negative effects, at least one study shows a statistically significant or substantively important positive effect, and more studies show statistically significant or substantively important negative effects than show statistically significant or substantively important positive effects.
Negative effects	Two or more studies show statistically significant negative effects, at least one of which met WWC evidence standards for a strong design, AND No studies show statistically significant or substantively important positive effects.
No discernible effects	None of the studies shows a statistically significant or substantively important effect, either positive or negative.

Criteria used to determine the extent of 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 treatment 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 earlier in this report.

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

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 subjects are assigned to treatment and comparison groups through a process that is not random.

Randomized controlled trial (RCT) A randomized controlled trial (RCT) is an experiment in which investigators randomly assign eligible participants into treatment 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 earlier in this report.

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.

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

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

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

Please see the WWC Procedures and Standards Handbook (version 2.1) for additional details.