What Works Clearinghouse
IES Institute of Education Sciences
Curriculum-based interventions for increasing K-12 math achievement—middle school

Intervention report: I CAN Learn® Mathematics Curriculum

Updated December 1, 2004

Intervention

The *I CAN Learn® Mathematics Curriculum* is an interactive software system for pre-algebra and algebra. It consists of 326 lessons from basic mathematics to advanced algebra concepts. Designed for students to learn at their own pace, the *I CAN Learn®* program is intended primarily for use in grades 7 through 10 by ethnically diverse, inner-city students.

For

Middle school students.

Findings

The one randomized controlled trial (254 students in one school) found that *I CAN Learn®* students scored significantly higher on the state math test than did students in the comparison group who used a "traditional" curriculum. Both quasi-experimental design studies found that *I CAN Learn®* students outscored comparison students. One study found that *I CAN Learn®* students scored higher than comparison students, but the differences were not statistically significant. The second study found that *I CAN Learn®* students scored higher than comparison students, but a flaw in the analysis makes it impossible to accurately determine the significance of the finding.

Evidence base

1 randomized controlled trial meets evidence standards.

2 quasi-experimental design studies meet evidence standards with reservations.

4 studies of this curriculum do not meet evidence screens.

(see symbol key on page 10)

Evidence limits

The evidence base for the *I CAN Learn® Mathematics Curriculum* includes three studies, only one of which was a randomized controlled trial. The others were quasi-experimental design studies, which provide weaker evidence of effects because unmeasured differences between the groups can affect the findings. None of the studies provided evidence of strong implementation. One quasi-experimental design study had flaws in analysis that preclude calculation of the confidence intervals around the estimated impacts of the intervention.

Scope of use

The curriculum was first implemented in 1995. By October 2004 it was being used in 23 states by 501 schools. The software has typically been used in Title I schools and by at-risk and minority children in large urban school districts.

Developer and contact

JRL Enterprises, Inc., 400 Poydras Street, Suite 100, New Orleans, LA 70130; telephone: (504) 263-1380; www.icanlearn.com.

Profile

The *I CAN Learn® Mathematics Curriculum* is designed to help ethnically diverse, inner-city students in grades 7 through 10 achieve parity in mathematics and problem-solving skills. It uses an interactive software program to teach pre-algebra and algebra. The *I CAN Learn® Algebra 1* course, which was used in all of the studies included in this intervention report, consists of 177 algebra lessons. The developer describes the curriculum as meeting National Council of Teachers of Mathematics standards and configurable to meet state and local grade-level expectations.

Lessons are grouped much like those in a textbook chapter. Students receive verbal and visual assistance in progressing through the lesson. After completing a lesson, students take a cumulative review of the concepts taught, and teachers can monitor student progress through real-time assessment. The software also handles taking attendance, assigning homework, and administering and grading tests. Tests are randomly generated from a test database, so no two students receive the same test. Similarly, homework is generated for students, and the software conducts random homework checks to make sure the assignments are being completed.

Implementation of the *I CAN Learn® Mathematics Curriculum* involves the creation of an *I CAN Learn®* classroom with computers, custom desks, software installation, and typically three years of support from the developer. Desks are set up in a "conference room" arrangement, which the developer argues encourages cooperative learning and group work.

Teaching

Although much of the instruction is individualized for students in the *I CAN Learn® Mathematics Curriculum*, teachers are expected to help determine the content of the lesson and other aspects of the class. At the beginning of the year, the teacher determines the homework assignments, lesson organization, lesson presentation, manipulatives, assessments, and grade evaluations. The program follows the teacher's lesson plan and provides constant feedback to both the student and the teacher.

As part of the *I CAN Learn®* system, teachers receive an initial two days of training in how to use the system. Teachers also have "best practices" training and unlimited access to training and on-site technical and pedagogical support in the classroom for three years. The *I CAN Learn®* personnel call or visit *I CAN Learn®* teachers weekly.

Typical lesson

Each *I CAN Learn®* lesson follows a six-part format: pretest, review, lesson presentation, guided practice, post-lesson quiz, and cumulative review. The pretest covers material from the upcoming lesson. If students miss one question on the pretest, they continue into the current lesson. If students get all the questions right on the pretest, they may advance to the next lesson if the teacher enables the software's advancement option.

In the review section, students are presented with prerequisite material that is necessary for understanding the current lesson. During the lesson, a "cyber-teacher" presents concepts and problems that increase in complexity as the lesson progresses. Students work out the problems presented in a notebook and compare their answers with the ones presented by the program. If students complete the problems incorrectly, the "cyber-teacher" is available to work through the problems in detail—to help students figure out where they may have made an error.

The post-lesson quiz contains a variety of problem styles that the developer indicates conform to national standardized tests. The classroom teacher determines completion time, the number of questions, and their respective difficulty.

After students complete a group of lessons, they go to a cumulative review, which presents three problems from each lesson. If more than one is incorrect, the lesson presentations for those areas are reviewed.

Scope of use

By October 2004 the *I CAN Learn® Mathematics Curriculum* was being used in 23 states by 501 schools. It is typically used in large urban school districts and smaller rural school districts whose students are predominantly at risk and members of minority groups.

Profile *(continued)*

Cost

The cost of an *I CAN Learn*® classroom depends on its configuration and terms of support. A typical full installation—30 workstations in a classroom with all curriculum and classroom management software, computer hardware, network wiring, furniture, and three years of comprehensive onsite educational and technical support—costs $300,000, a one-time expense.

Study findings

Randomized controlled trial

One randomized controlled trial with 254 students in one school (Kirby 2004) found that *I CAN Learn*® students scored significantly higher on the state math test than students in the comparison group, which was using a traditional math curriculum.

Quasi-experimental design studies

One quasi-experimental design study (Brooks 1999) found that 7th- through 10th-grade students scored higher on a researcher-developed test than students in the comparison group; however, due to limitations in the way the analysis was conducted, it is not possible to determine whether the difference is due to the curriculum or to chance. A second quasi-experimental design study (Kerstyn 2001) found that 8th-grade *I CAN Learn*® students outscored comparison students on the FCAT, but the differences were not statistically significant.

Strength of the evidence base

The WWC collected more than 800 studies for the Middle School Math Curriculum review. Seven were on the *I CAN Learn*® *Mathematics Curriculum*. Of these, one met standards while two studies met standards with reservations. The other four studies did not meet standards. They were quasi-experimental design studies that did not account for pre-existing differences between groups with matching or equating.

Studies were rated according to the strength of their causal evidence. Studies that placed students into the intervention and comparison groups randomly (randomized controlled trials) without notable design or implementation flaws are classified as meeting evidence standards ([a]). Other studies that use comparison groups (quasi-experimental designs) and randomized control trials with notable flaws are classified as meeting evidence standards with reservations ([a]).

Studies are further rated for intervention fidelity, outcome measures, breadth of evidence, reporting on subgroups, analysis, and statistical reporting. That information is provided in study reports, but does not affect the overall rating.

None of these studies provided evidence of strong implementation. Implementation was not discussed in one of the studies. And there were variations in implementation in the other two studies.

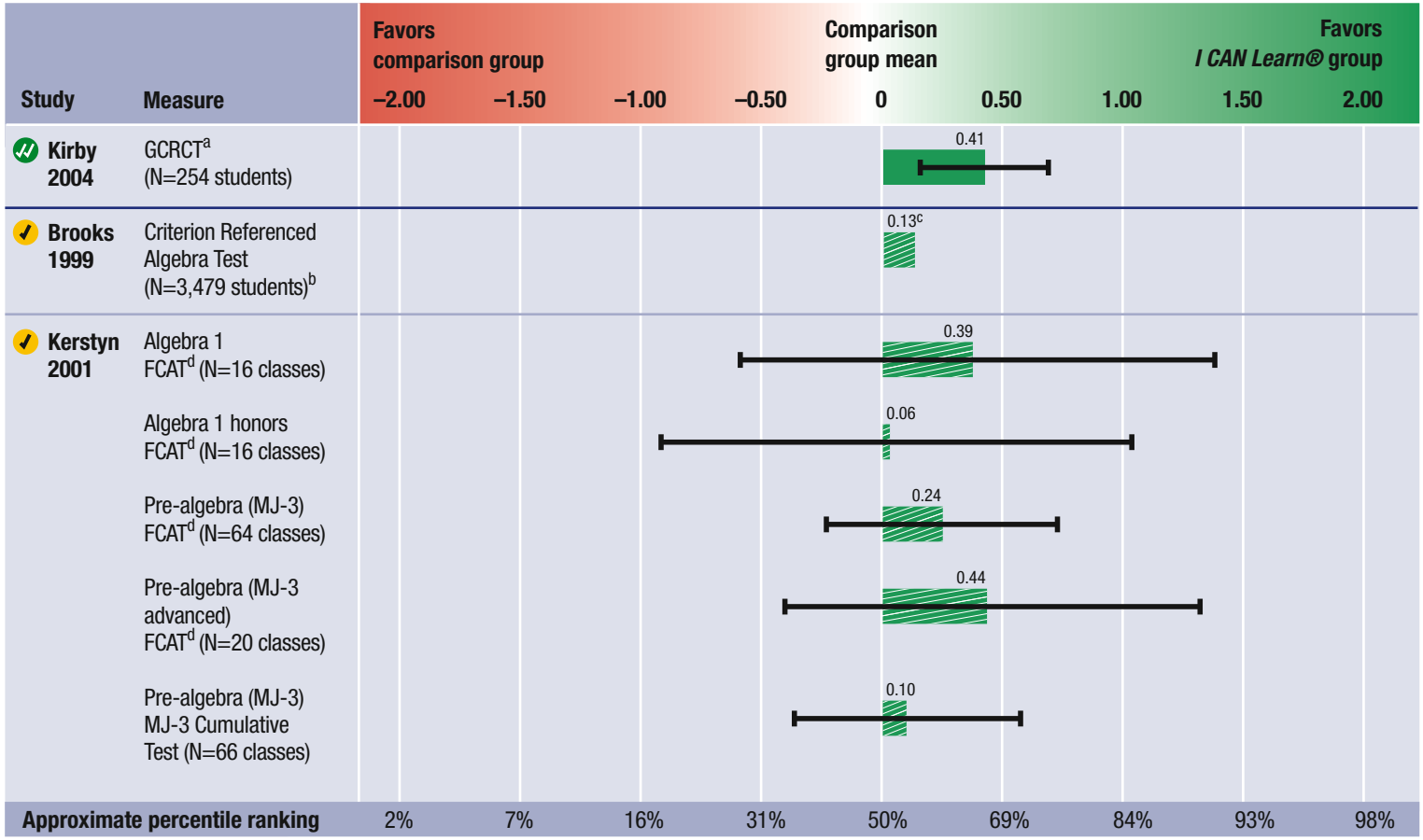
All three studies used valid tests that appear aligned to the curriculum, including state tests in two of the three studies. The third study demonstrated the reliability and validity of its locally developed test.

Although each study looked at a narrow population and settings, collectively they looked at and reported on 8th- through 10th-grade students of diverse racial and economic backgrounds in urban and rural districts. Two provided enough information to compute effects. One other study had flaws in the analysis that may affect the findings.

Tables A3–A5 describe the outcome studies on the *I CAN Learn*® Mathematics Curriculum that meet WWC standards and meet WWC standards with reservations. For more detailed descriptions of the studies, see the *Detailed Study Reports* or *Brief Study Reports.*

a See symbol key on page 10.

Table 1
Effects



a Georgia Criterion Referenced Competency Test.
b Sample size reported is unit of analysis, not unit of assignment.
c When there is no solid line, the study did not provide data to correctly compute the confidence interval.
d Florida Comprehensive Assessment Test.
How to read this table: The wide, shaded bar indicates both the direction and estimated size of the effect of the intervention. The estimated effects reported here are standardized differences in the mean values between the intervention and comparison groups. Bars extending to the right of zero denote estimated effects that favor the intervention group and those extending to the left of zero denote estimated effects that favor the comparison group. The solid line through the shaded bar marks the 95% confidence interval of the estimated effect. When the line does not cross zero, the estimate is statistically significant. The bar is hatched if the effect is not significant or if significance could not be accurately computed. The scale at the bottom of the chart indicates the approximate percentile distribution of students in the control group. The percentile ranking at the end of the shaded bar can be used to interpret the standardized mean difference in the outcome. For example, an effect of .5 is roughly equivalent to an increase in the mean value from that of the average student in the comparison group (50th percentile) to that of the average student at the 69th percentile.

References

Kirby, P. C. (2004). *Comparison of I CAN Learn® and traditionally-taught 8th grade student performance on the Georgia Criterion-Referenced Competency Test*. Unpublished manuscript.

Brooks, C. (1999, August). *Evaluation of Jefferson Parish Technology grant: I CAN Learn® Algebra I*. (Available from the Department of Educational Leadership, University of New Orleans, New Orleans, LA 70148).

Kerstyn, C. (2001). *Evaluation of the I CAN Learn® mathematics classroom: First year of implementation (2000–2001 school year).* (Available from the Division of Instruction, Hillsborough County Public Schools, Tampa, FL).

Brooks, C. (2000, September). *Evaluation of Jefferson Parish Technology Grant I CAN Learn Algebra I.* (Available from the Department of Educational Leadership, University of New Orleans, New Orleans, LA 70148).

Gill, J.C., & Gifford, C.S. (2001). *Evaluation of Jefferson Parish Technology Grant I CAN Learn Algebra I.* Unpublished manuscript, University of New Orleans, New Orleans, LA.

Kirby, P.C. (2004). *I CAN Learn® in Orelans Parish Public Schools: Effects on LEAP 8th grade math achievement, 2003–2004.* Unpublished manuscript.

Oescher, J. (2002, January). *I CAN Learn education success in California.* (Available from JRL Enterprises Inc., 3520 General DeGaulle Drive, Suite 1100, New Orleans, LA 70114).

Appendix

Table A1 **Summary characteristics and findings from randomized controlled trials on the *I CAN Learn® Mathematics Curriculum***

Study	Study sample	Measure	Sample size			Mean outcome		Standard deviation[a]		Estimated impact[b]	
			Intervention group	Comparison group	Total	Intervention group	Comparison group	Intervention group	Comparison group	Mean difference	Standardized mean difference
Kirby 2004	8th-graders in regular education	GCRCT[c]	91	163	254 students	333.5	319.9	35.7	31.7	13.6	0.41 (±0.26)

a Shows how dispersed the participants' outcomes are. A small standard deviation would suggest that participants had similar outcomes.
b The WWC estimated impact based on statistics reported by the study author.
c Georgia Criterion Referenced Competency Test.

Table A2 **Summary characteristics and findings from quasi-experimental design studies on the *I CAN Learn® Mathematics Curriculum***

Study	Study sample	Measure	Sample size			Mean outcome		Standard deviation[a]		Estimated impact[b]	
			Intervention group	Comparison group	Total	Intervention group	Comparison group	Intervention group	Comparison group	Mean difference	Standardized mean difference
Brooks 1999	7th- through 10th-graders	A 30-item criterion reference algebra test[c]	2,230	1,249	3,479 students[d]	7.5	6.9	4.7	4.0	0.6	0.13[e]
Kerstyn 2001	Algebra 1	FCAT[f]	8	8	16 classes	351.1	345.4	15.6	11.4	5.7	0.39 (±0.99)
	Algebra 1 honors		8	8	16 classes	374.2	373.1	11.1	20.5	1.1	0.06 (±0.98)
	MJ-3		32[g]	32	64 classes	298.0	294.4	15.6	13.8	3.6	0.24 (±0.49)
	MJ-3 advanced		10	10	20 classes	331.5	326.1	12.6	11.0	5.4	0.44 (±0.89)
	MJ-3	MJ-3 Cumulative Test	33	33	66 classes	31.4	30.9	4.6	5.1	0.5	0.10 (±0.48)

a Shows how dispersed the participants' outcomes are. A small standard deviation would suggest that participants had similar outcomes.

b The WWC estimated impact based on statistics reported by the study author.

c Test developed by evaluation team based on textbooks.

d The sample size reported is unit of analysis, not unit of assigment.

e The unit of analysis (students) did not match the unit of assignment. For that reason, accurate confidence intervals could not be computed.

f Florida Comprehensive Assessment Test.

g One student left the study after the MJ-3 Cumulative Test was administered and before the FCAT was administered.

Table A3 **Characteristics of interventions in reviewed studies on the *I CAN Learn® Mathematics Curriculum:* Kirby 2004**

Evidence base rating[a]	Characteristic	Description
✓✓	Study citation	Kirby, P. C. (2004). *Comparison of I CAN Learn® and traditionally-taught 8th grade student performance on the Georgia Criterion-Referenced Competency Test*. Unpublished manuscript.
	Participants	254 8th-grade students in Gilmer Middle School. The study was limited to regular education students.
	Setting	One middle school in the Gilmer County school district in northwestern Georgia. The county has a population of 25,000 and is located in the Northwest Georgia mountains.
	Intervention	Students were taught using the *I CAN Learn® Mathematics Curriculum*. The author does not indicate how many of the lessons are required to be completed for the curriculum to be implemented as intended. In this study the intervention lasted for one school year.
	Comparison	Classes were taught using a traditional math curriculum. The author does not provide further information on the curriculum.
	Primary oucomes and measurement	Georgia Criterion Reference Competency Test (GCRCT), a state test. The GCRCT math test was implemented in Georgia in 2000 in grades 4, 6, and 8 and in 2002, in grades 1, 2, 3, 5, and 7. The math test contains 60 items in six areas: number sense and numeration, geometry and measurement, patterns and relationships/algebra, statistics and probability, computation and estimation, and problem-solving.
	Teacher training	There was only one *I CAN Learn®* teacher in this study. She was trained the prior year.

a See symbol key on page 10.

Table A4 **Characteristics of interventions in reviewed studies on the *I CAN Learn® Mathematics Curriculum:* Kerstyn 2001**

Evidence base rating[a]	Characteristic	Description
✓	Study citation	Kerstyn, C. (2001). *Evaluation of the I CAN Learn® mathematics classroom: First year of implementation (2000–2001 school year).* (Available from the Division of Instruction, Hillsborough County Public Schools, Tampa, FL)
	Participants	8th-grade students in Title I middle schools. The study was limited to regular education students. The students were racially diverse and many were eligible for free or reduced-price lunches. There were 58 intervention classrooms and 58 comparison classes used in the analysis.
	Setting	36 middle schools in the Hillsborough County Public School system in Florida. This county includes the Tampa metro area.
	Intervention	Students were taught using the *I CAN Learn® Mathematics Curriculum*. The author does not indicate how many of the lessons are required to be completed for the curriculum to be implemented as intended. The author indicates that the *I CAN Learn® Mathematics Curriculum* was implemented in class periods of 45, 50, 80, and 90 minutes in length. When surveyed, the teachers reported that 45 minutes was not long enough to make it through the curriculum. In this study, the intervention lasted for one school year.
	Comparison	Classes were taught using a traditional math curriculum. The author does not provide further information on the curriculum.
	Primary outcome and measurement	Florida Comprehensive Assessment Test, a state test, and MJ-3 Cumulative Test (an end of semester exam administered at the end of the first semester). The MJ-3 Cumulative Test is not a state or nationally normed, standardized test, but it has established reliability.
	Teacher training	Teachers in this study participated in training sessions on the use of the software and hardware, but not on use of the software in instruction.

a See symbol key on page 10.

Table A5 **Characteristics of interventions in reviewed studies on the *I CAN Learn® Mathematics Curriculum:* Brooks 1999**

Evidence base rating	Characteristic	Description
✓	Study citation	Brooks, C. (1999, August). *Evaluation of Jefferson Parish Technology grant: I CAN Learn® Algebra I.* (Available from the Department of Educational Leadership, University of New Orleans, New Orleans, LA 70148)
	Participants	3,479 students enrolled in 7th- through 10th-grades and came from honors, gifted, and remedial classes. There were 102 intervention classes and 67 comparison classes at the start of the study.
	Setting	21 schools (20 public, 1 parochial) with five school districts in Louisiana.
	Intervention	Students were taught using the *I CAN Learn® Mathematics Curriculum*. The author does not indicate how many of the lessons are required to be completed for the curriculum to be implemented as intended. In this study the intervention lasted for one school year.
	Comparison	Classes were traditionally taught. No other information provided.
	Primary outcomes and measurement	30-item criterion referenced achievement test developed by the evaluation team based on student textbooks. This test is not a state or nationally normed, standardized test, but it has established reliability.
	Teacher training	Teachers received training before the start of the 1998/99 school year.

Symbol key for evidence base rating

- Study meets evidence standards (randomized controlled trial without notable flaws).
- ✓ Study meets evidence standards with reservations (randomized controlled trial with notable flaws or quasi-experimental design study without notable flaws).
- ✗ Study does not meet evidence screens.