What Works Clearinghouse

Detailed Study Report

Reviewed Study: **Brooks, C. (1999, August). *Evaluation of Jefferson Parish Technology Grant: I CAN Learn® Algebra I.* Unpublished report submitted to the Superintendent of Jefferson Parish Public Schools.**

WWC Study Reports are intended to support decision making; neither the What Works Clearinghouse (WWC) nor the U.S. Department of Education endorses any interventions. No single Study Report should be used as a basis for making policy decisions because (1) few studies are designed and implemented flawlessly and (2) all studies are tested on a limited number of participants, using a limited number of outcomes, at a limited number of times, so generalizing from one study to any context is very difficult. To highlight these issues, the WWC Study Reports describe in detail the specifics of each study, focusing primarily on studies that provide the best evidence of effects (randomized controlled trials). Systematic reviews of the evidence will be conducted to summarize the results of the individual studies.

See the WWC Brief Study Report (PDF) for a summary of this study.

Topic:	Curriculum-Based Interventions for Increasing K–12 Math Achievement—Middle School
Intervention:	I CAN Learn®
Research Design:	Quasi-Experimental Design with Statistical Equating
Study Rating:	✓
Date Released:	October 28, 2004
Summary of Results:	Brooks (1999) compared algebra achievement of students enrolled in the intervention group (I CAN Learn® classes) to that of students enrolled in the comparison group (traditional classes) at pretest, midyear, and posttest. Brooks found that students in the I CAN Learn® classes achieved higher scores in algebra than students in traditional classes at both midyear and posttest, and the difference was statistically significant. The results should be viewed with caution because the unit of analysis (student) does not match the unit of assignment (classrooms).

✓✓ = Meets Evidence Standards ✓ = Meets Evidence Standards with Reservations X = Does Not Meet Evidence Standards

Intervention: I CAN Learn®

Operational Features

I CAN Learn® Algebra, a software-based math curriculum for use in grades 7–10, was developed by New Orleans-based JRL Enterprises. The developer indicates that I CAN Learn® meets the National Council of Teachers of Mathematics standards. The I CAN Learn® software is designed to be interactive and to allow students to progress through lessons at their own pace. Teachers are expected to play a role in determining the content of the lesson and other aspects of the class. At the beginning of the year, the teacher determines many factors about the structure of the course, such as homework assignments, lesson organization, lesson presentation, manipulatives used, assessments, and grade evaluations.

Each I CAN Learn® lesson follows a five-part format consisting of pretest, review, lesson presentation, 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. The developer describes the lessons as being grouped together like the lessons in a textbook chapter. After they complete a lesson, students take a cumulative review of the concepts taught, and teachers are able to monitor student progress through continuous real-time assessment.

People, Settings, and Timing

The I CAN Learn®curriculum is designed for ethnically diverse, inner-city students in grades 7–10. The target population in this study is students enrolled in grades 7–10 in 21 schools (20 parochial, one public) within five school districts or parishes in Louisiana. The five parishes were Jefferson, Orleans, St. Tammany, Washington, and Vermillion. The study included students enrolled in honors, gifted, and remedial classes. Students in both I CAN Learn® and traditional groups were assessed on the outcomes measures at midyear and posttest.

Cost Information

Brooks (1999) does not provide cost information for implementing I CAN Learn® in the five school districts or parishes.

Intended Duration

I CAN Learn® is a curriculum that consists of a number of lessons. However, Brooks does not indicate how many lessons students in the I CAN Learn® classrooms completed and how many lessons must be completed for the curriculum to be implemented as intended. The I CAN Learn® curriculum was introduced to the classrooms during a two-month period in 1998. The quantity of implementation—the duration and the dosage—is not clear.

Scientific Rationale

No scientific rationale is offered for conducting the evaluation. Brooks conducted the evaluation for the Superintendent of the Jefferson Parish Public Schools to determine the effectiveness of I CAN Learn® on students' algebra achievement and time-on-task. This public school system had received a technology grant to implement this demonstration program.

Overview of the Study

Purpose

This evaluation was designed to compare students enrolled in I CAN Learn® (intervention) classes with those enrolled in traditional (comparison) classes on two outcomes: time-on-task behavior and algebra achievement.

Intervention Fidelity

Brooks does not provide any information about the implementation of the program beyond the program description. There was no measure of teacher implementation. However, Brooks does mention that teachers received three days of training before the start of the 1998–99 school year and that weekly support was available through JRL, the I CAN Learn® developers.

Outcome Measures

Brooks reports three outcome measures in this study: time-on-task, algebra achievement test, and the Louisiana Educational Assessment Program (LEAP). The WWC only reviews

measures that assess students' academic achievement; therefore, the time-on-task measure is not discussed in this report.

The algebra achievement test is a 30-item criterion-referenced test based on student textbooks. The test was developed by the evaluation team and administered three times (in October 1998, January 1999, and May 1999). The algebra achievement test had test–retest reliability ranging from .69–.78 and was well aligned to the I CAN Learn® intervention. The LEAP is a Louisiana-mandated, criterion-referenced test for 8th-graders developed by the Louisiana Department of Education and administered by local school districts. Brooks used only the math section of the LEAP; only one of the five components of the math section contains algebra questions. Thus, as determined by the WWC, this test was underaligned to the I CAN Learn® intervention (that is, students were taught algebra but tested on content other than algebra). Therefore, the only target outcome measure reviewed in this study report is the algebra achievement test.

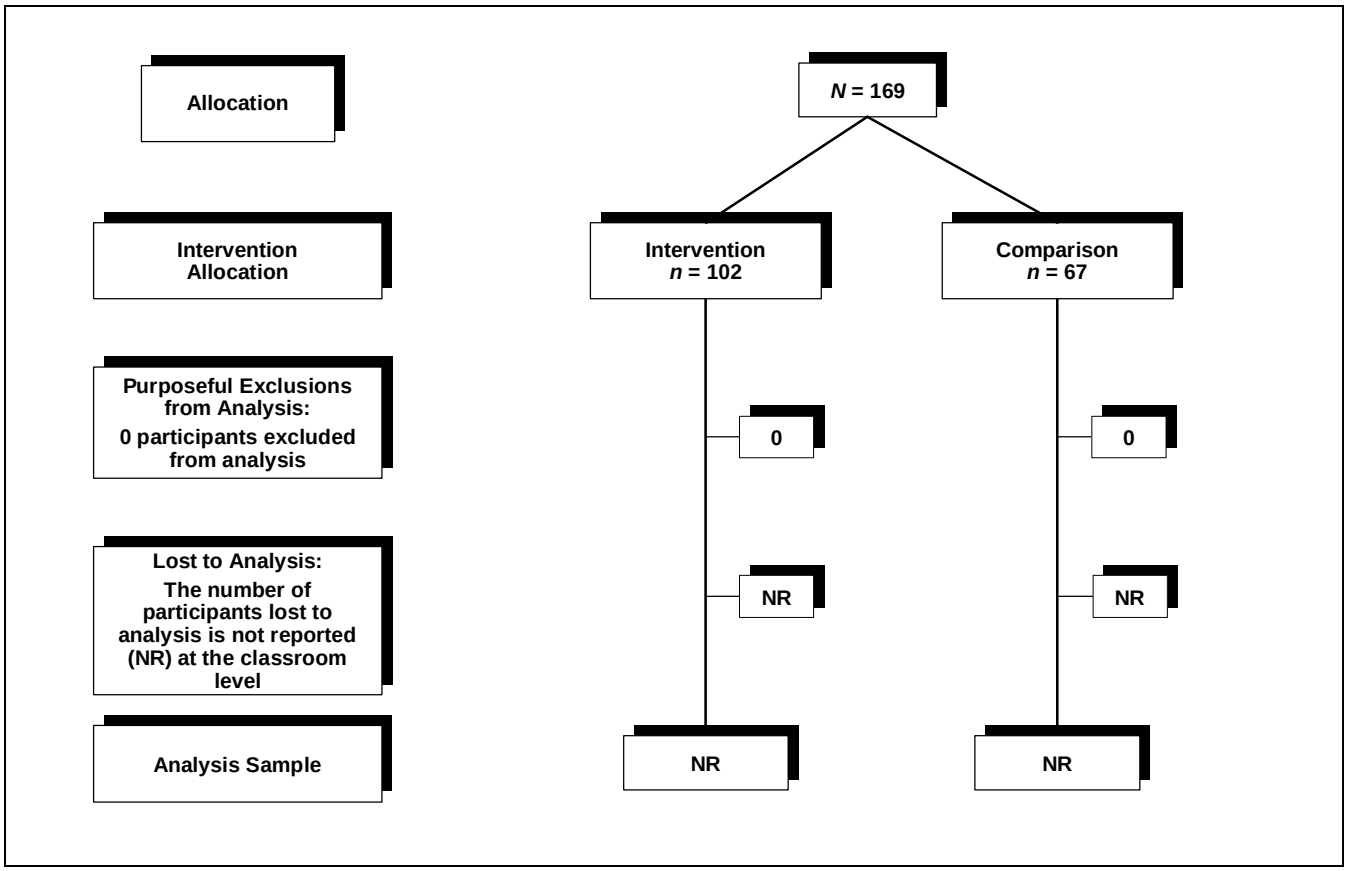
Research Design

The research design of this study is quasi-experimental with statistical equating. Brooks selected 102 I CAN Learn® (intervention) classes and 67 traditional (comparison) classes for participation. It is not clear how classes were identified for the study or how they were placed in groups, although schools that implemented I CAN Learn® seem to comprise a convenience sample. Brooks attempted to equate groups by balancing honors, gifted, and remedial classes. Brooks also statistically equated groups by using pretest scores in analyses. It is likely that teachers and students knew they were in a study and knew they were in the intervention group because the methods used in I CAN Learn® classes were different from those used in traditional classes.

Participant Flow

Brooks assigned participants to the intervention and comparison groups at the level of the classroom. At the beginning of the study, Brooks reports a total of 169 classes (102 in the intervention group and 67 in the comparison group). Brooks does not report the size of the sample at the correct level (classroom) in the analysis of midyear and posttest scores, but the report does not mention anything about attrition of classrooms. There was attrition at the student level, but Brooks does not mention reasons for the attrition. (See Figure 1, Participant Flow).

Figure 1. Participant Flow (Classrooms)



Note. Participant flow is reported at the unit of assignment (classroom). Brooks does not report the sample size at the level of the classroom except at the start of the study. Attrition at the classroom level in the study is not mentioned. At the student level, however, attrition occurs. At the start of the study, 3,304 students received I CAN Learn® instruction and 1,632 received a traditional curriculum. At pretest, only 3,012 I CAN Learn® students were available, representing a loss of 292 students prior to the pretest. In the analysis of the algebra achievement at midyear, there were 1,997 I CAN Learn® students and 1,190 traditional students. At posttest, there were 2,230 I CAN Learn® students and 1,249 traditional students. Brooks does not offer reasons for student attrition.

Reference Periods

Brooks indicates that I CAN Learn® was introduced in 21 schools in August/September 1998. The algebra achievement test was administered in October 1998 (pretest), January 1999 (midyear), and May 1999 (posttest).

Baseline Data

Brooks does not describe baseline characteristics of I CAN Learn® and traditional groups except for the grade level of the students. (See Table 1.) Brooks also pretested all participants on the algebra achievement test and used pretest scores in the statistical analyses.

Statistical Methods

A *t* test was conducted to compare student performance in the I CAN Learn® intervention groups and the comparison groups on the algebra achievement test at pretest, midyear, and posttest. All analyses showed that I CAN Learn® students performed significantly better than students in traditional classes at all measurement periods. A repeated measures analysis of covariance (ANCOVA) was performed, using pretest scores to control for initial differences between students; midyear and posttest scores were the dependent variables. Brooks presents midyear and posttest means and standard deviations along with the *F* statistics from the ANCOVA analyses.

Outcomes and Estimation

Table 2 presents the effects of the I CAN Learn® curriculum on algebra achievement at midyear and posttest, as reported by Brooks. The repeated measures ANCOVA indicated that students in the I CAN Learn® classrooms performed significantly better than students in the comparison classrooms at midyear and at posttest. Brooks does not calculate effect sizes; however, means, standard deviations, and sample sizes are given for the outcome measure at the student level. This information is not available for the unit of assignment (classroom).

Table 2 presents unadjusted midyear and posttest means and standard deviations.

Cautions

There is a mismatch between the unit of assignment (classroom) and the unit of analysis (student). This poses two issues. First, the results should be viewed with caution because of possible dependency issues. Second, the WWC is unable to determine if attrition occurred at the classroom level. The WWC can determine, however, that attrition occurred at the student level, as discussed in the note for Figure 1.

Table 1. Pretest Characteristics of the Study Sample Reported by Brooks (1999)

	Intervention (*n* = 3,304)	Comparison (*n* = 1,632)
Grade 7	114	NR
Grade 8	1,943	NR
Grades 9 and 10	1,247	NR
Pretest mean score	3.06 (*n* = 3,012)	2.52 (*n* = 1,632)

Note. Pretest characteristics are reported at the student level (this is the unit of analysis used by Brooks). Brooks assigned to the intervention and comparison groups at the level of the classroom; however, the number of classrooms in the analysis is not reported. Although 3,304 students received I CAN Learn® instruction, only 3,012 pretest scores were analyzed.

Table 2. Impact Reported by Brooks (1999): Midyear and Posttest Results

	Midyear		Posttest	
	Intervention	**Comparison**	**Intervention**	**Comparison**
Mean (*SD*)	3.48 (3.51)	3.06 (2.81)	7.50 (4.66)	6.90 (3.99)
Sample size	1,997	1,190	2,230	1,249

Note. These are midyear and posttest results for the algebra achievement test, calculated at the level of the student by Brooks. Brooks does not calculate the results at the level of the classroom. Also, Brooks does not explain why more students' scores were available at posttest than at midyear.

Intervention Developer Contact Information

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Related Studies

See reports on other studies of I CAN Learn®.

See reports on other studies of Middle School Math curricula.

Report Production

Date created: October 28, 2004

Topic area reviewed under: Curriculum-Based Interventions for Increasing K–12 Math Achievement—Middle School

WWC Study Ratings[a]: Brooks (1999)

Causal Validity: Meets WWC Standards with Reservations, Quasi-Experimental Design with Statistical Equating

Students in the intervention group (I CAN Learn® classes) were compared to students in the comparison group (traditional classes). It is not clear how classes were identified for the study or how they were placed in groups, although schools that implemented I CAN Learn® seem to have comprised a convenience sample. Brooks attempted to equate groups by balancing honors, gifted, and remedial classes. Students were pretested on algebra achievement, and Brooks used the scores as covariates in the analyses. There did not appear to be attrition at the level of assignment (classroom); however, attrition did occur at the level of analysis (student). No extraneous events were identified that appeared to confound the intervention's effect. However, it is likely that teachers and students knew what condition they were in because the curriculum is different from that traditionally implemented in the classrooms.

Other Study Characteristics	Study Rating	Study-Specific Information
Intervention Fidelity	●	The I CAN Learn® intervention meets the definition of Middle School Math. However, Brooks does not provide any information about the implementation of the program beyond program description. There was no measure of teacher implementation.
Outcome Measures	●●	Two achievement measures were reported in the study: algebra achievement and the Louisiana Educational Assessment Program (LEAP). Only the algebra achievement measure is targeted in this report because the LEAP measure was underaligned to the content of the intervention. Specifically, only a part of the LEAP consists of algebra questions, so students are tested on content they were not taught in the I CAN Learn® classroom. The algebra achievement measure is properly aligned to the curriculum and has adequate reliability.
People, Settings, and Timing	●	Although the sample of students was part of the identified middle school math population, it was relatively homogeneous other than variation in grade (students in the I CAN Learn® and traditional classes were enrolled in grades 7–10) and student ability (students in the I CAN Learn® and traditional classes were classified as honors, gifted, and remedial). The targeted outcome measure was implemented at a time appropriate to capture the effect of the intervention, but the specific content and skills that the achievement measure assesses were not reported.
Testing within Subgroups	●	The effect of I CAN Learn® on students' algebra achievement was tested across the entire sample, but the effect was not tested within subgroups of the sample or variations across settings.
Analysis	●	The unit of assignment (classrooms) was not the same as the unit of analysis (student). Although the statistical properties of the data allowed for valid estimates of the effect sizes, Brooks does not report the sample sizes at the appropriate level to allow for these calculations.
Statistical Reporting	●	The statistical tests are adequately reported, but they are reported at the level of the student. Effect sizes for the outcome of interest could be calculated using a standard formula if means, standard deviations, and sample sizes were reported at the level of the classroom.

Note. ●● Fully meets criteria; ● Meets minimum criteria; **X** Does not meet criteria.

[a] For more information on the criteria used to rate this study, see the WWC Evidence Standards: Middle School Math.