

I CAN Learn[®] Algebra I in Catoosa County, Georgia

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Setting

Lakeview-Fort Ogelthorpe High School is one of two high schools in Catoosa County, Georgia. A part of the Standard Metropolitan Area of Chattanooga, Tennessee, Catoosa has changed recently from a rural county to a more suburban one. The majority student population is White (95%), with 36% of the students eligible to receive free or reduced price lunch. Lakeview-Fort Ogelthorpe High also has 95% White students; 27% qualify for free or reduced price lunch

(<http://reportcard.gaosa.org/yr2004/k12/Demographics.aspx?TestType=Demographics&ID=623:1052>). It is recognized as a State and National Blue Ribbon School. Its Spring 2004 enrollment consisted of 1,205 students, with 361 in 9th grade.

Algebra I is a Georgia requirement for a college prep high school program. The course emphasizes the theory and application of variables, graphing, linear equations, inequalities, and quadratics. I CAN Learn[®] Algebra I is aligned 100% to the Georgia Quality Core Curriculum Standards for Algebra I (see Appendix A).

Intervention

The entire I CAN Learn[®] Algebra I course consists of 177 lessons and a 23,550 question bank in 17 units. The I CAN Learn[®] Algebra curriculum includes "real-world" applications delivered through engaging multimedia presentations. The system allows students to work at their own pace, having the advantage of working independently on

the computer and interacting one-on-one with the teacher. The system is intended to be the primary source of instruction, freeing the teacher to engage individuals or small groups needing extra attention.

Students at Lakeview-Fort Ogelthorpe began using the I CAN Learn[®] system in August 2002. Students take Algebra I on a semester basis. This report is based on data provided by the school for the 137 students enrolled in Algebra I during the 2004 Winter Semester (August through December 2004).

Eighty-four (84) students were randomly assigned to take Algebra I through the I CAN Learn[®] system and 53 in traditional classes. The I CAN Learn classes were taught by a teacher trained in its use during the summer of 2004. Training consisted of a two-day workshop on how to use the software and how to manage the instructional environment.

According to the I CAN Learn[®] educational representative who visited Lakeview-Fort Ogelthorpe regularly, the school administrator, and the classroom teachers, the system was implemented as intended at Lakeview-Fort Ogelthorpe. Students used the software daily, teachers facilitated individual and small-group discussions, and the Classroom Explorer management tool was used to identify students in need of help and track student progress.

Traditional-class students were taught with the teacher as the primary deliverer of instruction; their curriculum was based on the Georgia QCC, using Larson, Boswell, Kanold, and Stiff's 2001 *Algebra I* textbook published by McDougal Littell.

Dependent Measure

At the end of the semester, all Algebra I students are required to take a state-mandated End-of-Course Test (EOCT). Unequal cell sizes are due to the fact that the school wanted to maximize use of its investment in the software. This did not affect randomization.

According to the Georgia Department of Education web, the EOCT is completely aligned with the Georgia Quality Core Curriculum standards as mandated by law. As of Fall 2004, student success with the EOCT must be considered in determining the course grade (http://www.doe.k12.ga.us/_documents/curriculum/testing/handbook_2.pdf).

Results

Students pass the EOCT if they receive a score of 600 or above. A Chi square analysis was used to determine whether method of instruction was related to the proportion of students passing the test, 85.7% in the I CAN Learn[®] group and 71.7% in the traditional group. The Chi square was significant (Chi square=4.03, $p < .05$; see Table 1 and Figure 1).

Table 1

Cross-tabulation of EOC performance by instructional method

<u>Performance level</u>		<u>Instructional method</u>		<u>Total</u>
		<u>Traditional</u>	<u>I CAN Learn</u>	
FAIL	Count	15	12	27
	% within method	28.3%	14.3%	19.7%
PASS	Count	38	72	110
	% within method	71.7%	85.7%	80.3%
Total	Count	53	84	137
	% within method	100.0%	100.0%	100.0%

Chi-Square=4.03, $p=.045$

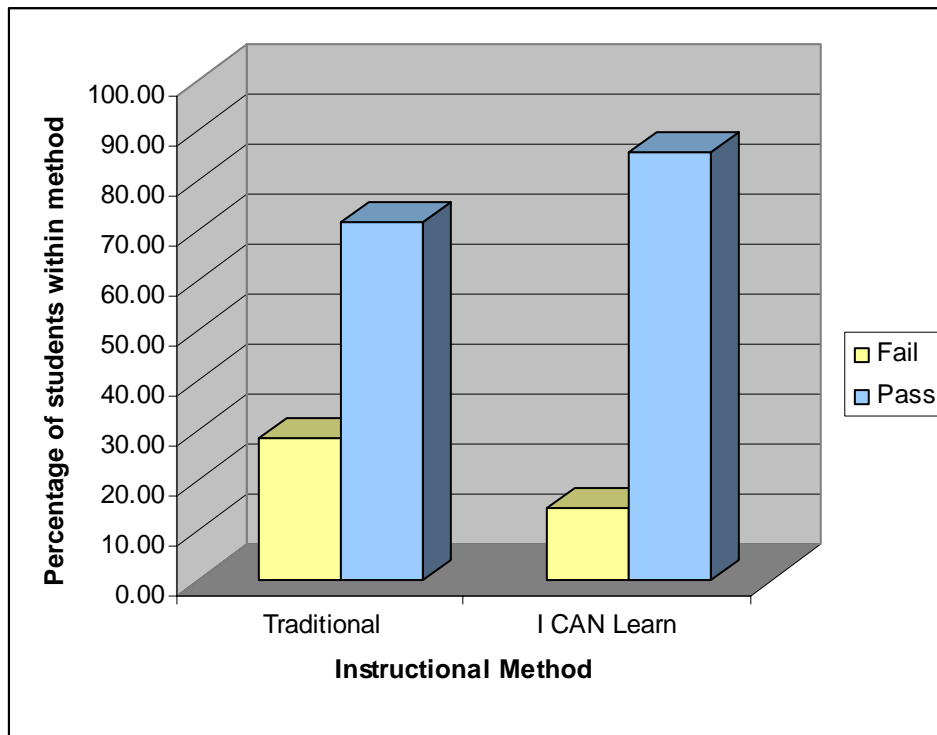


Fig. 1 Algebra I End of Course Test Performance by Instructional Method (I CAN Learn[®] vs Traditional)

The relative effect of a treatment using Chi square can be calculated in a number of ways. Kline (2004) suggests reporting the sample risk difference (RD), risk ration (RR), and odds ration (OR). RD is the proportion of undesirable outcomes, calculated by subtracting the proportion of undesirable outcomes (in this case, failures) in the treatment group from the proportion of undesirable outcomes in the control group. Thus, the RD is $.283 - .143$ or $.140$. The RD of $.14$ indicates a failure rate 14% higher in the control group.

The risk ratio is the proportion of undesirable outcomes in the control group divided by the proportion of undesirable outcomes in the treatment group. Thus, RR for this sample is $.283 / .143$ or 1.98 , indicating risk of failure that is 1.98 times higher among the traditionally-taught students.

The odds ratio is the ratio of the odds for failure in the control group over the ratio in the treatment group. In this case, the OR would be $(.283/.717)/(.143/.857)$ or 2.37. This means that the odds of failure are 2.37 times higher in the traditional group than in the I CAN Learn[®] group.

Finally, the ϕ coefficient is the Pearson correlation between the treatment-control and pass-fail dichotomies. The ϕ of .297 gives a measure of association between instructional method and pass/fail. The square of ϕ , 0.09, gives the proportion of variance in the outcome explained by membership in I CAN Learn[®] or traditional classes. Kline (2004) cautions that ϕ is margin-bound when the marginal proportions for rows and columns are unequal as is the case in this study. The unequal group sizes will limit the correlation to a maximum value less than 1. Therefore, previously reported measures of effects (i.e., RD, RR, and OR) are more meaningful.

Conclusion

Although the sample in this study is limited to 137 students in one school, the I CAN Learn[®] math students outperformed the traditionally-taught students, with failure rates 14% less than in traditional classes. This finding is consistent with other studies from Georgia in both Gwinnett (Scafide, 2004) and Gilmer Counties (Kirby, 2004). Together, these studies provide compelling evidence of the efficacy of one instructional technology method for teaching mathematics.

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 available from JRL Enterprises, Inc. (www.icanlearn.com). Reviewed by What Works Clearinghouse 2004.

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