I CAN Learn® Program Evaluation

Pinellas County Schools
April 2006

Executive Summary

I CAN Learn® (ICL) is a computer-based instructional program that facilitates the individualized teaching of standards-based algebra skills to secondary school students. Pinellas County Schools began utilizing the program in 2001-2002, and it is still being used. This study provides the first analysis of the program's effectiveness since its inception.

The study analyzed the FCAT mathematics performance of ICL and traditionally taught students. ICL students did not score higher on the mathematics portion of the FCAT than the comparison group during any of the three years in which the program was implemented. Additionally, students enrolled in the ICL program consistently had higher scores on the math FCAT from the previous year than those students who were matched to them on various demographics. Conversely, the analysis of subsequent math course difficulty levels showed ICL students consistently enrolled in more challenging courses than the comparison students in the years following ICL instruction. Unfortunately this does not provide any definitive information in light of the fact that the students who were enrolled in the program were consistently of a higher math skill level (as measured by the Math FCAT).

The program has been relatively inexpensive for the district. The initial start-up costs for the program were largely covered by donations and federal grants. The cost of continuing the programs are relatively inexpensive: $0.50 to $0.88 per student per day.

Recommendations:

- Make an effort to assign more students who need help with math skills to the ICL classes.
- Monitor the ICL program students to ensure that the program is providing positive gains for them.

Background Information

I CAN Learn® – "Interactive Computer Aided Natural Learning" – is a commercial algebra skills enhancement program. Pinellas County Schools began implementing the program in two middle schools and one high school during the 2001–2002 school year. The program was expanded to include one additional middle school and one new high school during the 2002-2003 school year, raising the total usage to three middle schools and two high schools in the district in 2002-2003 and 2003-2004.

Program Description

I CAN Learn® is a software program that facilitates the teaching of standards-based algebra skills to secondary school students. The program features one-on-one computer based instruction that is designed to assist schools by allowing students to work through their lessons at individual computer stations at their own pace. The instructor circulates throughout the room to assist struggling students, without holding back the progress of more advanced students.

Teachers who utilize the I CAN Learn® program in their classrooms receive extensive training and technical support from the software publisher. The program also includes classroom management software to enable teachers to track the progress of individual students and their classroom as a whole. I CAN Learn® offers a teacher mentoring program and focus group meetings on an as-needed basis for teachers enrolled in the program.

Only teachers who received I CAN Learn® training were eligible to offer the program in their classrooms. All students who were enrolled in a classroom where the teacher had been trained to use I CAN Learn® received this computer based instruction. All other students at the school received traditional mathematics instruction.

Although ample data extolling the virtues of I CAN Learn® exists on the company's website, to date no analysis has been completed in Pinellas County Schools to determine the effectiveness of the I CAN Learn® program for improving algebra skills. The present study will examine FCAT scores and the complexity level of subsequent courses taken by ICL participants and a matched comparison group for each year of the program.

Sample

Due to yearly differences in the number of ICL teachers and the number of students assigned to each classroom, the sample sizes for the analyses varied from year to year. For each year, a cohort of ICL students was obtained based on students enrolled in a course taught by an ICL teacher. Each ICL participant in the cohort was then matched with another student at the same school who was receiving traditional mathematics instruction. Students were matched based on the math course they were enrolled in, student grade level, gender, ethnicity, free/reduced lunch status, and primary exceptionality. If an exact match could not be found for any student within the same school, an attempt was made to match them with a student from a different school that has a similar ethnic makeup and free/reduced lunch population.

Florida Comprehensive Assessment Test (FCAT) scores were used to analyze student performance. The present analyses utilize the Sunshine State Standard (SSS) Math Scale Scores, ranging from 100 to 500, to assess students' achievement of the Sunshine State Standards in Mathematics. Higher Math Scale Scores indicate greater mastery of grade-level mathematics content.

A limited number of students in each cohort did not have any suitable match and were therefore excluded from the analyses. Also, any student who was missing an FCAT Math Scale Score for any of the years

included in a given analysis was excluded from the sample. See Table 1 for a breakdown of the sample sizes for each cohort.

Table 1. Sample Sizes

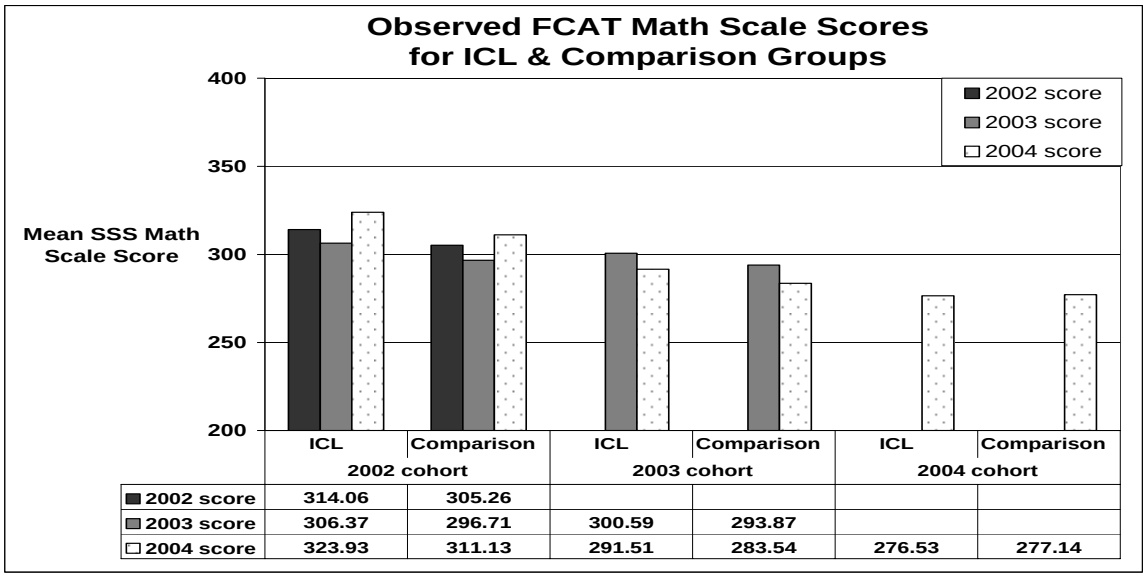
	N (Have Match)
2001-2002	164
2002-2003	700
2003-2004	424

Analysis

FCAT Performance

The premise of this evaluation is that students participating in the I CAN Learn® program will improve their math skills, and should have higher FCAT scores in Mathematics than their traditionally taught counterparts. Initial analyses examined students' Sunshine State Standards Mathematics Scale Scores on the FCAT for each of the years that I CAN Learn® was used in Pinellas County Schools. In addition, the lasting impact of ICL instruction on students' FCAT scores and the difficulty level of their subsequent mathematics courses (in relation to the level of Algebra 1) were also examined. Students who received ICL instruction beginning in 2001-2002 were tracked through the 2002-2003 and 2003-2004 school years to determine if ICL instruction impacted subsequent FCAT scores and the level of difficulty of their future mathematics courses during their academic career. Similar analyses were conducted for students receiving ICL instruction for the first time in 2002-2003, based on data from the 2002-2003 and 2003-2004 school years. The 2003-2004 ICL participants did not have information on subsequent courses, therefore only FCAT performance was analyzed for this group.

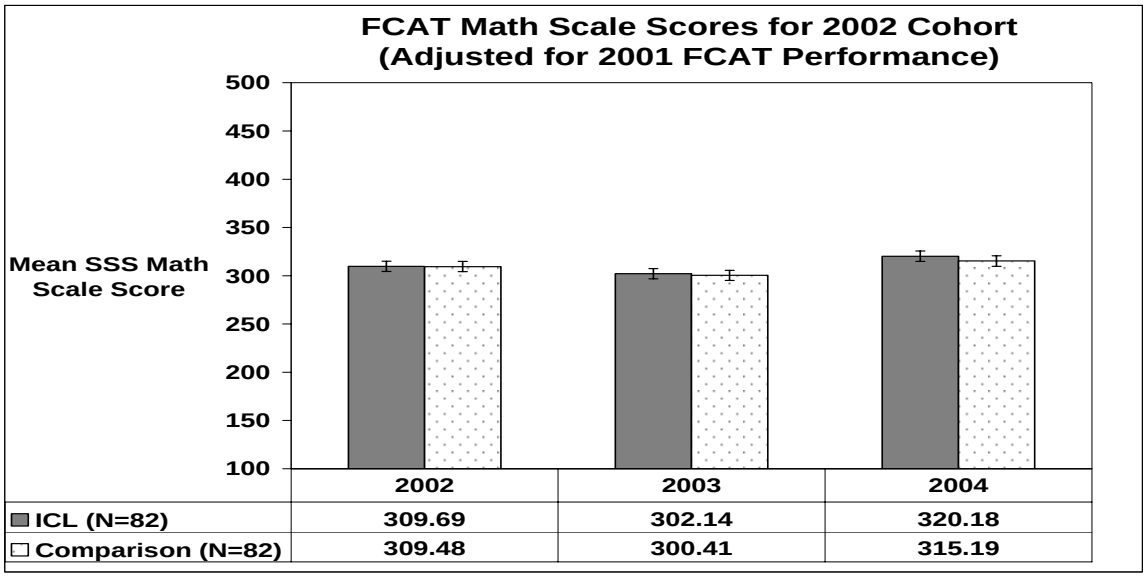
As shown in the graph below, initial analyses seemed to indicate that I CAN Learn® students did outperform the traditionally taught students on the mathematics portion of the FCAT.



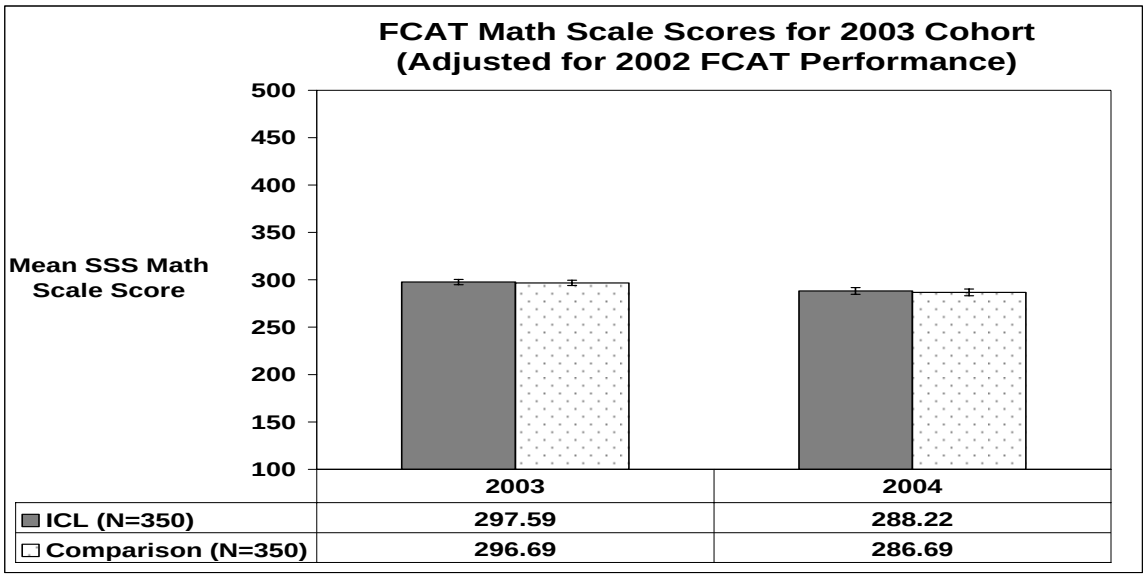
However, it is important to recognize that any observed differences in FCAT scores between ICL and comparison students is due to the fact that these students differed initially, before receiving differentiated instruction. To control for pre-existing differences in mathematics ability prior to the start of the ICL program, analyses of covariance (ANCOVA) designs were utilized. This statistical procedure adjusts the observed means for each group relative to their pre-program FCAT mathematics performance. This allows a

comparison of the students on statistically "even ground". The covariate for each of the analyses was students' Sunshine State Standards Mathematics Scale Score for the year prior to taking part in I CAN Learn®. All FCAT scores for the 2001-2002 cohort were adjusted to take into account students' 2000-2001 FCAT performance. Similarly, FCAT scores for the 2002-2003 cohort were adjusted for students' 2001-2002 performance, and the scores of the 2003-2004 cohort were adjusted for 2002-2003 performance.

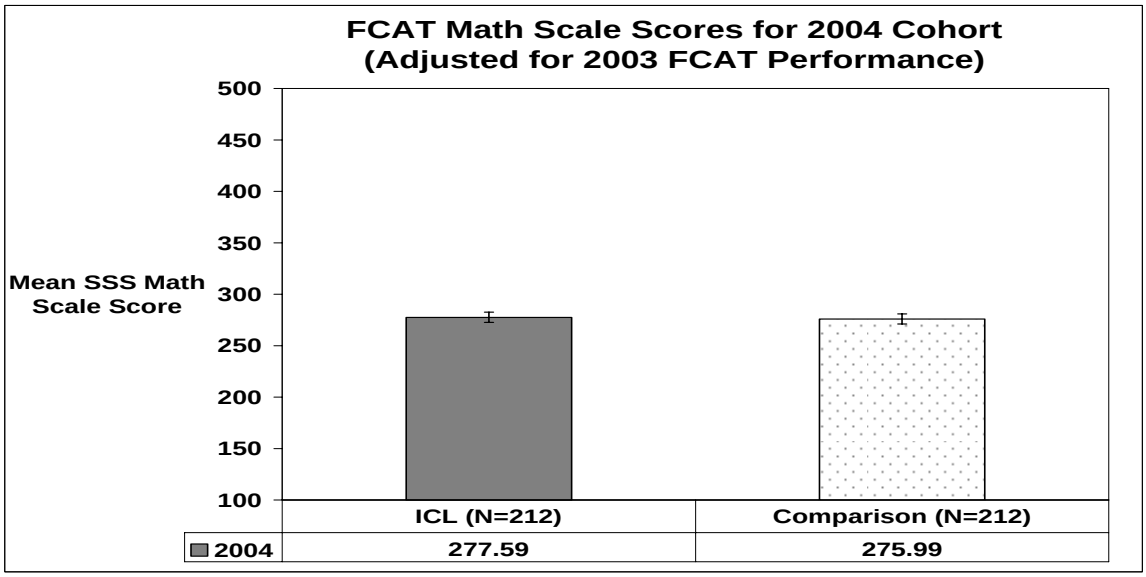
An analysis of covariance comparing students' mean FCAT scores from the 2001-2002 school year, adjusted for 2000-2001 performance, indicated no difference between ICL students and their matched peers. This pattern of results continued for these students over the next two school years. Figure 2 illustrates this trend, indicating the average SSS Math Scale Score for each instructional group, with error bars depicting the 95% confidence interval around those means. Clearly, students participating in I CAN Learn® did not obtain higher mathematics in the year of ICL instruction (2001-2002) or over the next two school years.



A similar pattern was evident in the FCAT performance of students receiving ICL and traditional instruction in 2002-2003. These students' scores, adjusted for differences on their 2002 FCAT performance, also did not show a difference in test scores between the ICL and comparison groups. As shown in Figure 3, FCAT scores were equivalent for the two groups in both the 2002-2003 and 2003-2004 school years (the slight differences seen in the graph are not meaningful).



Finally, students receiving ICL instruction in 2003-2004 were compared to their matched peers. As in previous analyses, the results did not indicate any benefit of ICL instruction on student FCAT scores. Figure 4 shows the equivalence of the two groups' scores.



Course Difficulty Level

Finally, ICL students were compared to their matched peers on the difficulty level of the subsequent mathematics courses in which they chose to enroll. Existing mathematics courses were rated in relation to the difficulty level of Algebra 1.

Mathematics courses such as Liberal Arts Math, Business Math, and Pre-Algebra were considered below the level of Algebra 1, while courses such as Geometry, Algebra 2, and Trigonometry were considered above Algebra 1 level because these courses require successful completion of Algebra 1 as a prerequisite.

In the 2002-2003 school year, the cohort of students who received ICL instruction in 2001-2002 took more courses at or above the level of Algebra 1 (34.49%) than the comparison students (25.08%). The trend

continued for these students in 2003-2004, with 42.48% of ICL students from 2001-2002 enrolled in a course at or above the level of Algebra 1, compared to 27.16% of comparison students.

This benefit of ICL instruction was also evident in the students who first received ICL instruction in 2002-2003; they did enroll in a higher percentage of difficult math courses the following year than the comparison group. In 2003-2004, 29.73% of the ICL students from 2002-2003 took a course at or above the level of Algebra 1, compared to only 24.10% of the comparison students.

Although ICL and comparison students were chosen from the same schools and were matched on numerous demographic variables, it is possible that the children who sought out ICL instruction for their math classes were inherently more comfortable with computers and/or mathematics in general and tended to have greater natural math ability, while other students who were less familiar with computers were not willing to participate in computer-based mathematics instruction. Thus, while the finding that ICL students enrolled in more difficult subsequent math courses is a promising result for Pinellas County Schools, it is not at all clear that these results are due to a beneficial effect of the I Can Learn ® program.

Limitations of the Study

One of the best methods that can be used to identify definite benefits attributable to a program requires a good experimental design. The best experimental design allows the researcher to randomly assign students to the treatment and control groups, helping to minimize pre-existing differences between the groups. Using this method, any changes noted in the treatment group may be assumed to be caused by the treatment, and not some other variable on which the groups differed. Such a design is rarely possible in educational evaluations and research for ethical reasons; instead, quasi experimental matched sample designs are often used. While quasi experimental designs are useful, because it is not a true experimental model, it is difficult to assert that the observed results are directly attributable to the program being evaluated. Further, students in the treatment group may be inherently different from other students in the comparison group. The matched comparison model is often used to eliminate possible differences between the control group and the treatment group. Unfortunately in this evaluation, even when variables that are known to contribute to student differences were matched, there was a significant pre-existing difference in FCAT scores between the I CAN Learn® and comparison group students. This is problematic. The initial difference in math ability between the two groups implicates student assignment practices as possibly being responsible for any differences in Math FCAT scores between ICL students and the matched control sample. However, a comparison of the students based on changes to their FCAT scores is still feasible, using statistical methods. ANCOVA, a statistical method of controlling for pre-program differences in scores, was used to compare the students.

Results

Results were clear regarding the effectiveness of I CAN Learn® on improving the mathematics achievement of students in Pinellas County Schools. There were **no differences** in students' adjusted FCAT mathematics performance **as a result of the program**. Additionally, the **students who received ICL instruction** in Pinellas County **tended to have higher pre-program mathematics FCAT scores** than students taught with traditional methods.

However, a greater percentage of ICL students enrolled in more challenging math classes throughout the course of their academic careers in Pinellas County than those in the comparison group. While this seems like a positive result of the program, it is important to remember that the members of the I CAN Learn® cohorts were higher math achievers as measured by their baseline math FCAT scores. To imply that these students selected more difficult future mathematics classes based on their participation in the program, while desirable, would not be accurate. This difference could be due to simple class assignment techniques, but a

more likely cause is the existence of a selection bias. Although ICL and comparison students were chosen from the same schools and were matched on numerous demographic variables, it is possible that the students who sought out ICL instruction were inherently more comfortable with computers and/or mathematics in general and tended to have greater natural math ability, while other students who were less familiar with computers were not willing to participate in computer-based mathematics instruction. While these results indicate that the ICL program does not necessarily improve FCAT scores, clear conclusions cannot be drawn based on this analysis.

Program costs:

I Can Learn ® utilizes a computer lab to facilitate the teaching of algebra skills to middle and high school students. The program costs were calculated using figures provided by the program administrator. There are no restrictions on admittance to the ICL program, therefore a breakdown by per student cost is not included. Further, the costs provided represent the cost of the program over and above the expenditures for a regular secondary math classroom. The ICL system is an added pedagogical tool used to supplement individual instructors' delivery of course content; it is not designed to supplant the instructor's role in providing course content or direction.

The initial start up costs of a lab for the ICL program are approximately $300,000 per school; this price includes 30 student workstations, one teacher workstation, software, maintenance, support and training for a 3 year period. Divided over three years, the expenditures amount to $100,000 per year, or $555.56 per day. Within each ICL classroom there are 30 stations; each station can be used during each period of the day. The average cost per seat per day for a six period middle school is $3.09. The cost is $2.65 per seat per day for a regular seven period high school, and increases to $4.63 per seat per day for a high school with a 4 x 4 bell schedule. Interestingly for each of the schools where ICL was instituted the district received the ICL start-up costs from donations and grants ($1,200,000 from JRL Enterprises, publisher of the I CAN Learn ® software). Thus the actual cost to the district for each of the start-up schools from 2001-2002 through 2003-2004 was actually $0.00.

After the first 3 years of the program, an extension was purchased which includes upgraded hardware, software, maintenance support and training for an additional 5 years. The cost of the five year contract is approximately $95,000 per school. When spread across the five years of the contract, the yearly cost of the program extension will be $19,000, or $105.56 per day. Under the extension contract, the average cost per seat per day for a six period middle school will be $0.59, for a regular seven period high school will be $0.50, and for a 4 x 4 high school will be $0.88. The extension was purchased in the 2004-2005 school year with a three year payment plan; the final payment will be made in August of 2006.

Discussion

Great care was taken to ensure that ICL students were as similar as possible to the comparison group on multiple demographic variables so that any differences in performance could be attributed to the different instructional methods that each group received. Despite these efforts, the results do not indicate a clear superiority of I CAN Learn® over traditional mathematics instruction based on analyses of both standardized test scores and the subjective difficulty level of subsequent mathematics courses taken after participating in I CAN Learn®. The initial difference in math ability implicates a possible mechanism in the assignment of students to classes that may actually be responsible for any differences after the students leave the ICL program. Thus, the enrollment in more difficult classes would be a more impressive finding if the students were not at a higher math skill level before they were enrolled in the program.

Recommendations

It is possible that certain changes to the method of student assignment to classes may provide an opportunity to utilize this program in a positive manner for those students who are not at the highest functioning levels for math ability. The ICL program provides an opportunity to provide highly individualized instruction to students. However, the data imply that students who are being placed in the ICL classes are the higher functioning students. These students are apparently not gaining the purported benefits over and above what their matched peers demonstrate in a traditional classroom environment. There is no evidence that any gains demonstrated by the students who participated in this program are a result of the program. However, the individual instruction that the program fosters may be beneficial to students who are not already high math achievers. Therefore, school administrators who assign students to classes should be made aware that assigning students who need help with math skills to the ICL classes would theoretically be a better application of this pedagogical program. However, care should be taken not to overload the classes with low functioning students. Thus, it will be extremely important to continue monitoring the students in the program to ensure that the program is providing positive gains in math related skills.