



After-School Math

A math program, adapted for use in the after-school setting, resulted in 49 more hours of math instruction during the school year (30 percent more) for math program students than for their counterparts. The math program students scored 2.8 scaled points higher on a test of math achievement at the end of one year, an 8.5 percent difference in achievement growth. The impacts did not vary significantly for students in different grades or with different prior levels of achievement. Nor did the math program students and their counterparts differ significantly on other in-school behavior.

After-school programs receive federal support through the 21st Century Community Learning Centers, established in 1999. A primary purpose of the program is to provide opportunities for academic enrichment to help students meet state and local standards in core content areas. Findings from a previous national evaluation of the program indicate that the program grants awarded between 1999 and 2002 had, on average, a limited academic impact on the academic achievement of participating elementary school students.

A possible factor is that most academic activities at the evaluation sites consisted of homework sessions in which students received limited additional academic assistance (such as instruction or assistance with homework). In addition, attendance was limited and sporadic. But analyses comparing the academic outcomes of frequent and infrequent participants suggest that increasing attendance alone is unlikely to improve the academic findings. So, the limited academic effects and the low levels of formal academic assistance offered in these programs highlight the need for better academic programming. In response, the Institute of Education Sciences supported the development and evaluation of instructional resources in core content areas that could be used in after-school programs.

This brief presents findings for the first of two years of program operations (school year 2005-06) on a study for math.

The math program

The curriculum developer—Harcourt School Publishers—was selected through a competitive process to adapt its school-day materials for use in the after-school setting. The developer was asked to create material that is engaging for students, tied to academic standards, appropriate for students from diverse economic and social backgrounds, and fairly easy for teachers to use with a small amount of preparation time.

Harcourt School Publishers adapted and expanded its existing school-day materials to develop Harcourt *Mathletics*, a structured math model with daily 45-minute sessions in which students progress through material at their own rate, with pretests at the beginning of each topic to guide lesson planning and posttests to assess mastery or the need for supplemental instruction. The model also includes games to build math fluency, hands-on activities, projects, and computer activities for guided instruction, practice, or enrichment.

The study

The math program was implemented in 25 after-school centers, chosen for their expressed interest and their ability to implement the program and research design. The study sample's 1,961 students, in grades 2 through 5, were identified by local staff as in need of supplemental academic support to meet local academic standards and were enrolled in the after-school programs. Students were assigned by lottery to either the Harcourt *Mathletics* program or to the regular after-school programming. The regular programming consisted primarily of help with homework or locally assembled materials that do not follow a structured curriculum.

The evaluation examines four primary questions:

- Does the Harcourt after-school math program improve math proficiency over what students would achieve in regular after-school programs, as measured by test scores?
- What are the impacts of the after-school math instruction for subgroups of students based on their prior academic performance and grade?
- Does the after-school math instruction affect other in-school academic behavior outcomes, as measured by reports from regular-school-day teachers of student engagement, behavior, and homework completion?
- What does program implementation look like, and was it implemented as intended?

The second and fourth questions address information to better target and implement the intervention. The third question addresses whether extended learning leads to additional positive or negative student academic behaviors.

Impact findings from the first year are based on data collected from students, regular-school-day teachers, and school records. The Stanford Achievement Test, Tenth Edition (SAT-10), abbreviated battery for math, was administered to students at the beginning and end of the school year to measure the gains in achievement. A survey of regular-school-day teachers measured student academic behavior. The study also collected information about program implementation and student attendance.

The study's findings after one year

In the first year of the study, *Mathletics*, the math model put in place in 25 after-school centers, produced the following interim findings.

Student math skills and other academic behaviors

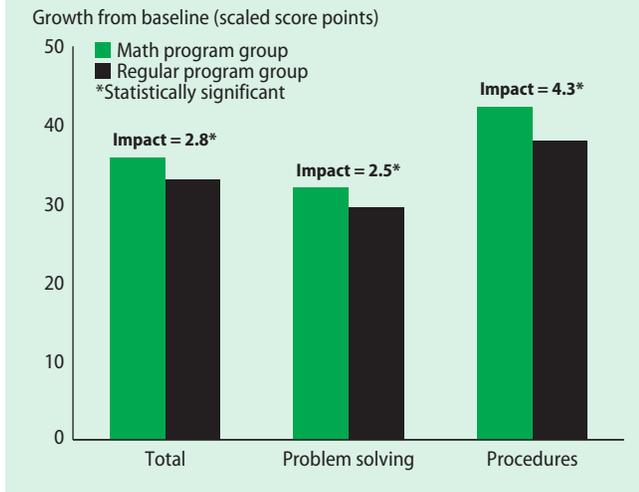
Students in the math program did experience a statistically significant impact on their performance on the SAT-10 math test. The program had no positive or negative effects on teacher reported student behaviors during the school day.

- The average math score of the *Mathletics* group increased over the school year by 35.8 scaled points, compared with 33.0 scaled points for the other group, a statistically significant difference of 2.8 scaled points overall (effect size = 0.06). Impacts of 2.5 and 4.3 scaled points for subtests of problem solving and procedures were also statistically significant (effect sizes of 0.05 and 0.08, respectively) (figure 1).
- *Mathletics* students in grades 4 and 5 scored significantly higher than their counterparts (effect size = 0.09), but those in grades 2 and 3 did not. The math program did not have a different impact for students in higher grades and in lower grades. *Mathletics* students who previously scored at the basic level scored significantly higher than their counterparts (effect size = 0.07), but those in the below basic or proficient levels did not. Again, the math program did not have a different impact for students in these three proficiency subgroups.
- The math program did not produce statistically significant impacts on any of the three academic behavior measures: homework completion, attentiveness in class, or classroom disruptiveness.

Program implementation

The strategies supporting the math program were implemented as intended; teacher feedback and program observations indicated few implementation challenges. Student participation in the program led to an estimated increase in math instruction of 30 percent more hours of math instruction (49 hours) during the school year.

FIGURE 1

Student growth on math test scores

- Of the math program staff, 97 percent were certified teachers, most often with three or more years of teaching experience. More than 90 percent reported daily preparation of at least 30 minutes. The average student-to-staff ratio of 9:1 was as intended.
- Observational data indicated that 93 percent of the classes used the materials and organized the transitions between the parts of the daily sessions as intended. When asked, 50 of 51 indicated challenges to varying degrees with using the materials, with 16 percent indicating this as a consistent problem. Based on interviews of the after-school teachers, the most common issue with implementation was maintaining the 15-minute rotation schedule between program activities.

NCEE developed the Evaluation Briefs to offer short synopses of complex technical evaluation reports. This brief was not prepared by the study authors.

- On average during instruction days, *Mathletics* students attended the after-school program for 73 days (77 percent of the instruction days offered), or 12 more days than the other group. This translated into an increase in math instruction of 49 hours (57 hours for *Mathletics* students compared with 8 hours for other students, who received regular after-school programming).

Upcoming report

The study was expanded to include a second year of implementation and data collection in 15 of the original participating math centers. This sample includes students who were part of the study in the first year and students who were new to the study in the second year, allowing the new wave of data collection to shed light both on the cumulative impact of the enhanced after-school program on returning students and on the impact of a more mature program on new students. The results will be presented in the final report of the evaluation.

For the full report, please visit:

<http://ies.ed.gov/pubsearch/pubsinfo.asp?pubid=NCEE20084021>

Black, A.R., Doolittle, F., Zhu P., Unterman, R., and Grossman, J. B. (2008). *The Evaluation of Enhanced Academic Instruction in After-School Programs: Findings After the First Year of Implementation* (NCEE 2008-4021). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.