

Comparative Effectiveness of Houghton Mifflin Harcourt's *Math in Focus*

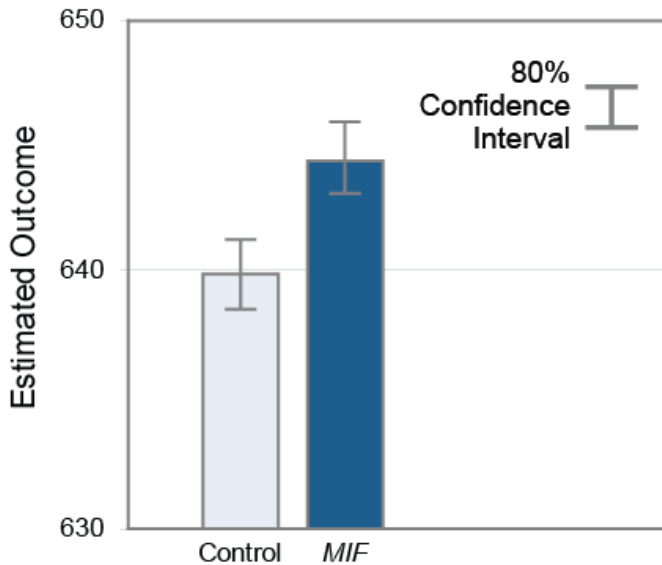
A REPORT OF A RANDOMIZED EXPERIMENT IN CLARK COUNTY SCHOOL DISTRICT

Houghton Mifflin Harcourt (HMH) contracted with Empirical Education Inc. to conduct a one-year randomized control trial (RCT) aimed at producing evidence of the effectiveness of *Math in Focus*[™] (*MIF*) for third, fourth, and fifth grade students. We report here on the final results of this research that began in Clark County School District, Nevada, in August 2011.

The *MIF* curriculum provides elementary math instruction based on the pedagogical approach used in Singapore, typified by a carefully sequenced and paced instructional style that focuses on fewer topics in greater depth at each grade level to ensure mastery. According to HMH, it is a “concrete to pictorial to abstract” (CPA) approach to instruction that is designed to support conceptual understanding. The instruction centers on problem solving using multiple models to help students visualize and understand math. HMH reports that the *MIF* curriculum is also closely aligned with the Common Core State Standards (CCSS). We compared grade-level teams using *MIF* with grade-level teams using their business-as-usual math curricula.

FINDINGS. We found a positive impact of *MIF* on math achievement. Taking into consideration both the benchmark and sensitivity analyses, we can have some confidence in a positive impact of *MIF* on problem solving skills but more limited confidence in a positive impact on procedural skills, where we found some inconsistent results when testing alternative statistical models. We did not find an impact of *MIF* on math achievement as measured by the CRT state test. Thus on the primary measure associated with *MIF* there is evidence of a positive impact. On the additional outcomes, we can say there is no evidence that *MIF* was detrimental. The following figure represents the impact of *MIF* on the SAT10 problem solving outcome.

The impact of *MIF* was not different depending on the student's pretest scores (i.e., as deviations from the grade-level means of the pretest) on the SAT 10 Problem Solving assessment, the SAT 10 Procedures assessment, or the CRT. There was also no moderating effect of minority status on the SAT 10 Problem Solving assessment. However, in the case of CRT and SAT 10 Procedures assessments, we found a negative differential effect of the program favoring non-minority students (based on the p values we should have some confidence in there being a differential effect for CRT, and limited confidence in a difference of impact for SAT 10 Procedures.)



CONCLUSION. After a one-year pilot implementation with *MIF* we have evidence of a positive effect of the program on math problem solving but less confidence in an effect on math procedures achievement. We saw no difference between the groups on student achievement as measured by the state CRT assessment. These results largely correspond with the expectations we had from the beginning of the study.

EFFECT OF *MIF* ON SAT 10 PROBLEM SOLVING OUTCOME

We also gathered implementation data via teacher and principal surveys, classroom and training observations, and a teacher focus group. Teachers did not receive sufficient materials or training at the beginning of the school year, and many reported on the pressures they faced while implementing with *MIF*, caused by a disconnect between *MIF* pacing and the district pacing that was suggested for preparing students for the CRT. These reported pressures help to explain the few differences found in classroom practices between *MIF* and control teachers, as well as the large proportion of teachers who did not implement *MIF* with fidelity, as prescribed by HMH. At the end of the study, though, the majority of teachers and principals reported satisfaction with *MIF* and a desire to have more time to implement with the program.

RESEARCH METHODS. This was a randomized control trial (RCT) in which we randomly assigned grade-level teams to the program condition, in which they use *MIF*. The remaining grade-level teams formed the control group assigned to use their business-as-usual math program. Statistical modeling took full advantage of the pretest (SAT 10 Problem Solving, SAT 10 Procedures, and the CRT) and demographic information to provide appropriate controls and adjustments were made for clustering of students in sections.