WestEd

The Impact of the Illustrative Math Curriculum in Oakland Unified

Math Achievement 5 Years After Adoption

Noman Khanani

June 2026

Suggested citation: Khanani, N. (2026). *The impact of the Illustrative Math Curriculum in Oakland Unified*. WestEd.

This report was made possible through support from the Gates Foundation.

WestEd is a nonpartisan, nonprofit organization that aims to improve the lives of children and adults at all ages of learning and development. We do this by addressing challenges in education and human development, increasing opportunity, and helping build communities where all can thrive. WestEd staff conduct and apply research, provide technical assistance, and support professional learning. We work with early learning educators, classroom teachers, local and state leaders, and policymakers at all levels of government.

For more information, visit WestEd.org. For regular updates on research, free resources, solutions, and job postings from WestEd, subscribe to the *E-Bulletin*, our semimonthly e-newsletter, at WestEd.org/subscribe.

Introduction

The study described in this brief examined whether the adoption of the Illustrative Mathematics (IM) curriculum in middle schools in the Oakland Unified School District (OUSD) improved students' math achievement over a 5-year period. All 11 traditional middle schools in OUSD began using IM during the 2018–19 school year. This analysis examines what happened to students' math scores in those schools through the 2023–24 school year relative to similar schools in California that did not use IM.

- The OUSD middle schools that implemented IM experienced an overall decline in math achievement during the 5-year period. However, the results suggest that the decline was significantly larger in schools across the state that did not implement IM.
- Relative to similar schools, OUSD middle schools performed significantly better in math in grades 6–8 beginning in the 3rd year of IM implementation (2021–22 school year), with effect sizes ranging from 0.28 to 0.53 standard deviations.
- Effect sizes of approximately 0.40 to 0.50 standard deviations were observed following the 2023–24 school year.

Oakland Unified School District

OUSD serves approximately 34,000 students across more than 80 school sites in Alameda County, California. The district's student population is predominantly low-income, with more than 80 percent of students qualifying for free or reduced-price lunch, a share that has grown over the past decade. The student body is racially and linguistically diverse, with large Hispanic and Black student populations and a significant share of English Learners. These demographics mattered for the study because high-need districts like OUSD face the highest stakes when it comes to curriculum choices: The right tools can accelerate learning; the wrong ones can widen gaps.

Math has historically been a challenge throughout OUSD. During the 2023–24 school year, fewer than 27 percent of OUSD students met or exceeded state standards in math on California's annual standardized assessment—well below the California average. Closing this gap requires both high-quality instructional materials and the conditions needed to implement them well. The adoption of IM during the 2018–19 school year in all 11 traditional middle schools was a deliberate effort to provide all students with access to rigorous, standards-aligned math instruction.

The Illustrative Math Curriculum

IM is a nonprofit organization that develops free, open-source K–12 math curricula. Its middle school program, IM 6–8 Math, is one of the most widely adopted high-quality math curricula in the United States and has received top ratings across every review category from EdReports, an independent reviewer of instructional materials. The curriculum is built

around a problem-based instructional model in which students learn math by doing math: working through meaningful problems, discussing their reasoning with peers, and developing deep conceptual understanding rather than relying solely on memorized procedures.

The IM approach represents a meaningful shift from traditional math instruction. Rather than providing lessons in which teachers demonstrate procedures and students practice them, IM lessons are structured around student thinking and discourse. This approach requires a period of adjustment for both teachers and students, which is why implementation of the curriculum typically takes 2 to 3 years as teachers become familiar with the curriculum and students develop new mathematical habits of mind (Perry et al., 2026). Two prior studies have explored the impact of IM on math achievement, with both finding positive impacts on math achievement in Massachusetts (Khanani et al., 2025) and California (Reyes et al., 2026).

What the Study Examined

This study addressed one central question: Did OUSD's adoption of IM in grades 6–8 improve students' math achievement relative to what would have been expected without IM?

Data and Sample

The study used annual math test score data from the California Assessment of Student Performance and Progress (CAASPP) for the period spanning the 2015–16 through 2023–24 school years. CAASPP scores measure how well students are meeting California's math standards and are reported on a scale that allows for year-over-year comparisons. These data were combined with school demographic data and statewide IM-purchased data available through the 2023–24 school year.

The treatment group is made up of the 11 OUSD middle schools that adopted IM for the 2018–19 school year. Because OUSD adopted IM for all its middle schools at the same

time, there is no natural "control group" within the district. Instead, the study drew comparisons from the full pool of California public middle schools (grades 6–8) that were not using IM as of the 2023–24 school year. To keep comparisons clean, magnet schools, charter schools, virtual schools, and schools that serve grade spans other than 6–8 were excluded.

Analyses were conducted separately for each grade level (6, 7, and 8) to allow for grade-specific conclusions. This matters because IM may affect different grades in different ways, and the composition of students and teachers varies across grade levels.

Methodology

The study used a difference-in-differences approach to explore whether the scores of OUSD schools improved after adopting IM compared with expected changes based on the scores of similar schools that did not adopt IM. To increase comparability with non-OUSD schools, researchers applied weights based on school-level characteristics such as prior achievement, enrollment size, share of students who qualify for free or reduced-price lunch, and racial composition.

A key assumption of this methodology was that if math achievement in OUSD schools were trending in the same direction and at the same rate as the weighted comparison group prior to IM adoption, then they likely would have continued to follow such parallel trends in the post-IM years if the curriculum had not been adopted. A divergence in trends following IM adoption would indicate that IM had an impact on math achievement. The extent to which the study's results reflect these pre-IM trends are incorporated into the discussion of the results in the next section.

Impacts are measured as standardized *z*-scores to better contextualize the magnitude of the results. However, a positive *z*-score impact does not necessarily mean that student achievement increased in IM schools. A positive impact could also indicate that scores in IM schools did not decline as much as those of comparison schools or that scores in IM schools did not decline but did in the comparison schools. Because this study overlaps with the COVID-19 pandemic, average scores in all grades for both IM and non-IM comparison schools declined between the 2018–19 and 2023–24 school years.

Results

Results are presented separately for each grade. For each, we describe what scores looked like before IM was implemented, what changed after adoption, and whether the observed changes appear to be meaningfully different from what occurred in the comparison schools.

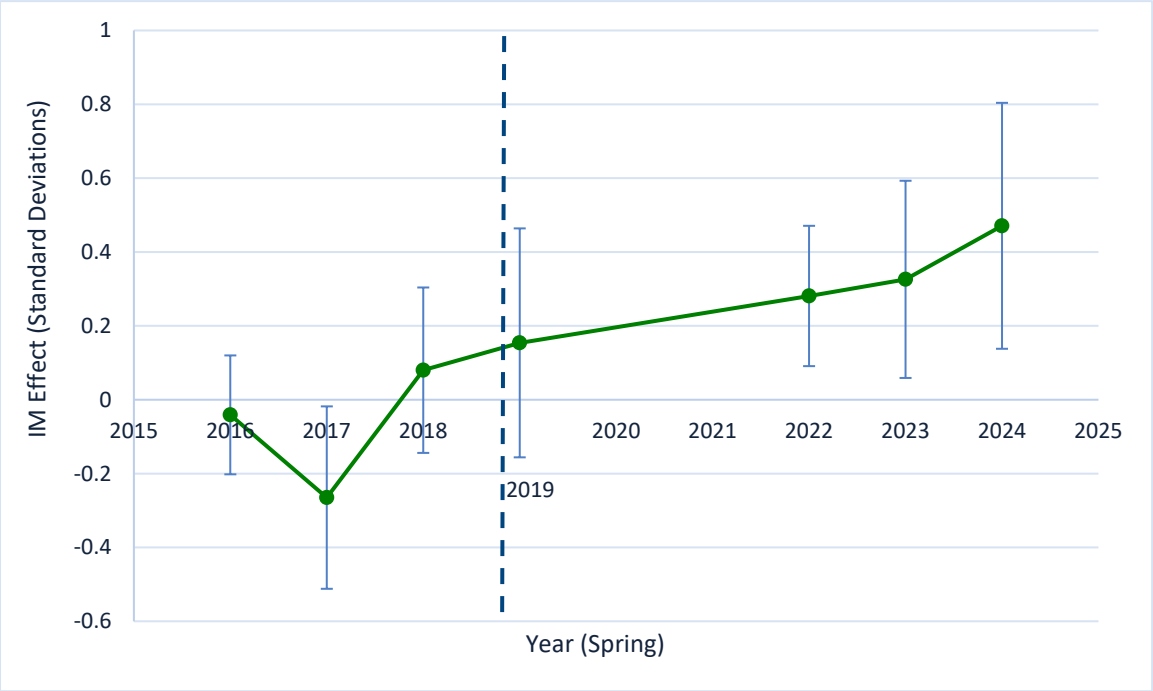
Figures 1 through 3 provide these results as event-study plots to show how math achievement changed in OUSD before and after the adoption of IM. The vertical dashed line represents the start of implementation (2018–19 school year), the points represent the IM effect, and the whiskers indicate 95 percent confidence intervals.

The points to the left of the dashed line indicate the pre-IM period trend. When points are close to 0 and the whiskers overlap with 0, it suggests that OUSD schools were trending at the same rate and direction as the non-IM schools were before IM was implemented (i.e., the assumption of parallel trends was met). The points to the right of the line show the actual impact of IM in the years following its rollout. Because state testing was suspended during the 2020–21 and 2021–22 school years because of the pandemic, point estimates for those years are omitted from the figures. For post-treatment years, if the 95 percent confidence intervals stay entirely above the zero line, it indicates a statistically significant improvement in achievement for IM schools that is unlikely to be due to random chance.

IM schools outperformed comparison schools in grade 6 math scores after IM adoption, with a relative difference of 0.47 standard deviations (28 scaled score points) by 2024.

As shown in Figure 1, grade 6 math scores were stable in OUSD during the 1st year IM was implemented (2019). Beginning in 2022, scores deviated significantly from those of the comparison groups, and by 2024, OUSD grade 6 students were scoring approximately 0.47 standard deviations (equivalent to 28 scaled score points) higher than were grade 6 students in the comparison schools.

Figure 1. Impact of IM Adoption in Oakland on Grade 6 Math Scores



Note. **This event study plots the average treatment effect on the treated (ATT) of the IM curriculum relative to the 2019 baseline. Coefficients to the left of the dashed line represent pretreatment trends, and those to the right show the impact of IM in the years following implementation. Data for 2020 and 2021 are excluded because of the suspension of state testing during the pandemic. Vertical whiskers indicate 95 percent confidence intervals; effects are considered statistically significant where these intervals do not cross the zero line. The numerical values for this figure can be found in Table A1 in the Appendix.**

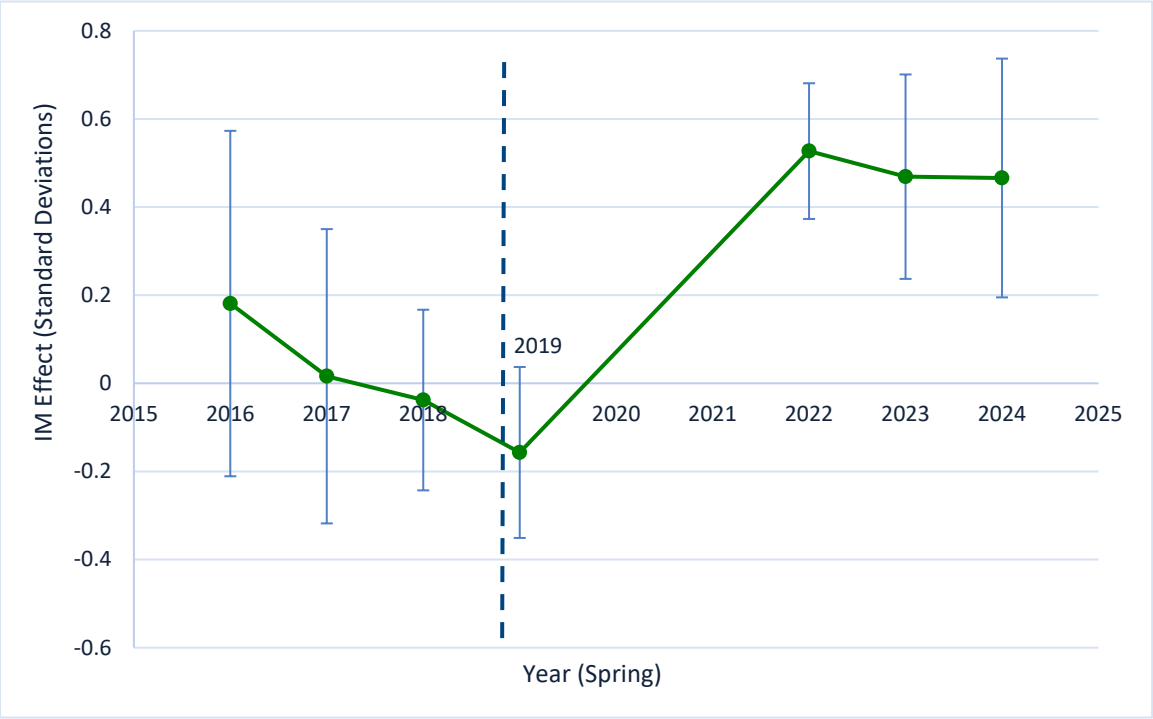
The trends prior to IM adoption present some uncertainty regarding the robustness of the results. Trends in grade 6 math scores in OUSD's middle schools were stable between 2015 and 2016 relative to the comparison schools but then dropped in 2017 and plateaued at this lower level through the year before IM was implemented. Although this decline pre-dates IM, it may suggest some incomparability regarding grade 6 math scores between OUSD and the non-IM schools.

Grade 7 showed statistically significant effects of 0.50 standard deviations (30 scaled score points) from 2022 onward.

The evidence of IM's impact in OUSD is clearest for grade 7. As shown in Figure 2, math scores decreased slightly during the 1st year IM was implemented (2019), although this was not statistically significant. However, beginning in 2022, IM schools were performing

approximately a half standard deviation greater (30 scaled score points) than were comparison schools, and this gap remained constant through 2024.

Figure 2. Impact of IM Adoption in Oakland on Grade 7 Math Scores



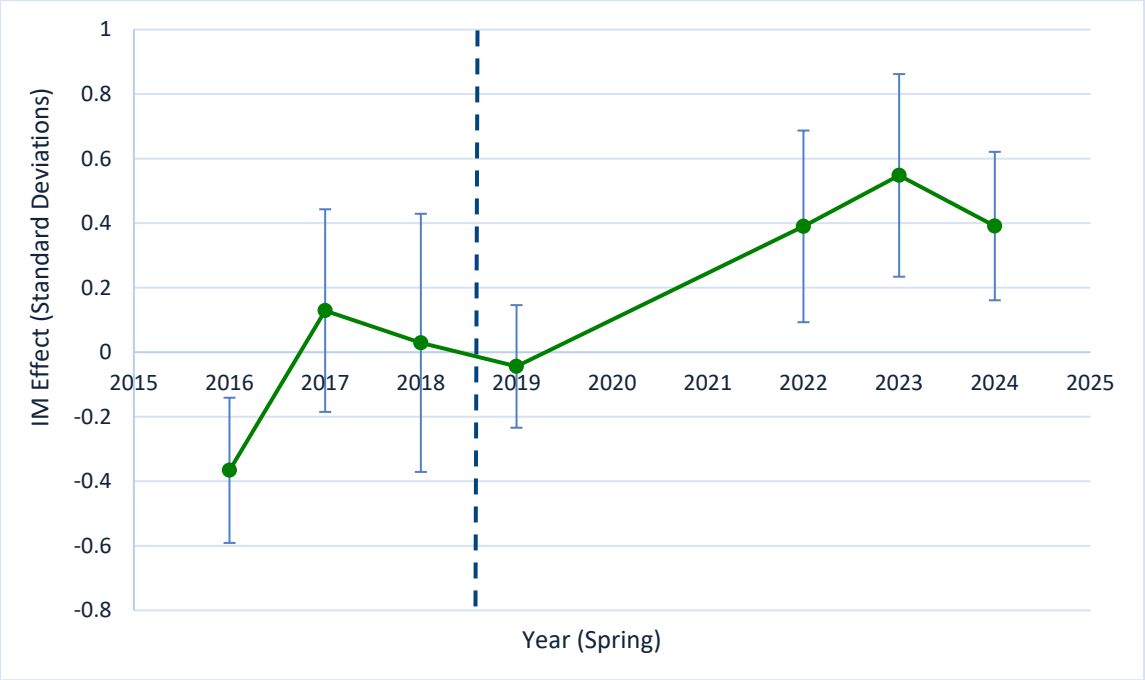
Note. **This event study plots the average treatment effect on the treated (ATT) of the IM curriculum relative to the 2019 baseline. Coefficients to the left of the dashed line represent pretreatment trends, and those to the right show the impact of IM in the years following implementation. Data for 2020 and 2021 are excluded because of the suspension of state testing during the pandemic. Vertical whiskers indicate 95 percent confidence intervals; effects are considered statistically significant where these intervals do not cross the zero line. The numerical values for this figure can be found in Table A2 in the Appendix.**

Prior to IM adoption, the trend in OUSD grade 7 scores were stable relative to comparison schools, as shown by the 2016 through 2018 coefficients being close to 0 and not statistically significant. These pretreatment results provide strong evidence of parallel trends, increasing confidence in the comparability between OUSD schools and non-IM schools.

Grade 8 showed the largest single-year effect in the study: 0.55 standard deviations (36 scale score points) in 2023. Effects in adjacent years were also large (0.40 standard deviations).

In the 1st year IM was implemented (2019), there was no change in achievement. Scores then rose markedly relative to those of comparison schools, with a peak effect of 0.55 standard deviations in 2023. This represents the largest single-year effect observed in the study. In 2022 and 2024, effects of 0.40 standard deviations were observed.

Figure 3. Impact of IM Adoption in Oakland on Grade 8 Math Scores



Note. **This event study plots the average treatment effect on the treated (ATT) of the IM curriculum relative to the 2019 baseline. Coefficients to the left of the dashed line represent pretreatment trends, and those to the right show the impact of IM in the years following implementation. Data for 2020 and 2021 are excluded because of the suspension of state testing during the pandemic. Vertical whiskers indicate 95 percent confidence intervals; effects are considered statistically significant where these intervals do not cross the zero line. The numerical values for this figure can be found in Table A3 in the Appendix.**

Prior to IM adoption, trends between OUSD and the comparison schools were not comparable between 2015 and 2016. However, from 2016 to 2018, the trends were similar, providing plausible evidence of parallel trends.

Implications

This study provides plausible evidence of the impact of IM in OUSD in grade 7 and potential evidence of impact in grades 6 and 8, particularly 3 years following adoption. Substantively, however, scores in the IM schools still declined across all grades on average, but not as significantly as in the comparison schools.

Importantly, these results replicate prior research in Massachusetts that shows that adoption of IM prior to 2020 appears to have mitigated some of the learning loss that most schools experienced—and have yet to recover from—because of the pandemic (Khanani et al., 2025). Future research should continue to explore whether impact replicates in other contexts, particularly in schools that adopted IM more recently. In addition, there is a need to study the extent to which the impact of IM differs for particular student subgroups.

Limitations

There are multiple limitations to consider when interpreting the findings. First, all treatment schools are located within a single district, which makes it difficult to isolate the effect of IM from other districtwide initiatives or contextual factors occurring at the same time. OUSD may have implemented complementary reforms—such as professional development, leadership changes, or broader instructional shifts—that coincided with IM adoption. As a result, the estimated effects may partially reflect the combined influence of these efforts rather than the influence of the curriculum alone, limiting the ability to attribute impact exclusively to IM.

Second, the validity of the difference-in-differences design depends on the assumption of parallel pretreatment trends between OUSD and the comparison schools. This assumption appears reasonably well supported in grade 7, but it is less clearly met in grades 6 and 8, where pre-IM trends show some divergence or instability. These deviations introduce uncertainty in the counterfactual trajectory for OUSD schools and suggest that estimates for

those grades should be interpreted with greater caution because they may be influenced by pre-existing differences rather than due to the effect of IM alone.

Finally, the study does not account for what was occurring in non-IM schools during the study period. These schools may have adopted other instructional materials, implemented their own reforms, or experienced disruptions that influenced student achievement trends. Without detailed information about these concurrent changes, it is difficult to determine the extent to which the observed relative gains in OUSD reflect improvements in IM schools, declines in comparison schools, or a combination of both. This limitation is particularly salient given the broader disruptions to schooling during the pandemic, which may have affected districts unevenly.

References

Khanani, N., Zabala, D., Stackhouse, S., Gu, J., & Walters, K. (2025). *Impact of the Illustrative Math Curriculum on math achievement: A matched-comparison study in Massachusetts*. WestEd. https://www.wested.org/resource/impact-of-the-illustrative-math-curriculum-on-math-achievement/

Perry, R., Nucci, D., Walters, K., McKinney, D., Nielsen, S., & Hannan, M. (2026). *Measuring what matters: Considerations for measuring the implementation of high-quality instructional materials in mathematics*. WestEd. https://www.wested.org/resource/measuring-what-matters-considerations-for-measuring-the-implementation-of-hqim-mathematics/

Reyes, L. M., Cook, M. A., & Ross, S. M. (2026). *Impact of Imagine Learning Illustrative Mathematics in California: A school-level quasi-experimental study*. Center for Research and Reform in Education, Johns Hopkins University.

Appendix: Data Tables

Table A1. Numerical Values for Figure 1 (Grade 6)

Year (spring)	IM effect (standard deviations)
2016	–0.04
2017	–0.27*
2018	0.08
2019	0.15
2020	excluded
2021	excluded
2022	0.28**
2023	0.33*
2024	0.47**

Note. **One asterisk indicates that $p < 0.05$, and two asterisks indicate that $p < 0.01$. See Figure 1 for the graph.**

Table A2. Numerical Values for Figure 2 (Grade 7)

Year (spring)	IM effect (standard deviations)
2016	0.18
2017	0.02
2018	–0.04

Year (spring)	IM effect (standard deviations)
2019	–0.16
2020	excluded
2021	excluded
2022	0.53***
2023	0.47***
2024	0.47***

Note. Three asterisks indicate that $p < 0.001$. See Figure 2 for the graph.

Table A3. Numerical Values for Figure 3 (Grade 8)

Year (spring)	IM effect (standard deviations)
2016	–0.37***
2017	0.13
2018	0.03
2019	–0.04
2020	excluded
2021	excluded
2022	0.39**
2023	0.55***
2024	0.39***

Note. Two asterisks indicate that $p < 0.01$, and three asterisks indicate that $p < 0.001$. See Figure 3 for the graph.