Evaluation of the IDEA Public Schools Education Innovation and Research Grant [U411C190117]

Math Curriculum Redesign

Elizabeth Kurban, Yinmei Wan, Mariesa Hawkins, and Dana Shaat
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Project Evaluation Overview

The American Institutes for Research® (AIR®) conducted an external evaluation of IDEA Public Schools' Education Innovation and Research (EIR) grant project Pathways to STEM Success (MSS). The goals of the MSS project were expanding access to and participation in rigorous math and computer science coursework for traditionally underrepresented students, ultimately preparing more students, particularly those from low-income and minoritized backgrounds, for college. AIR studied the impact of two interventions implemented as part of the MSS project: the AP Computer Science Support (APCSS) program and the Mathematics Curriculum Redesign (MCR). In addition, AIR collected formative data to provide feedback to IDEA Public Schools for ongoing improvement of the implementation of these two interventions. This report focuses on the evaluation of the effectiveness of MCR. An accompanying report presents the results of the evaluation of the effectiveness of the AP Computer Science Support Program.

Independence of the Impact Evaluation

AIR independently conducted the impact evaluation. The AIR team was responsible for conducting all key evaluation activities independently, and no staff member on the evaluation team was affiliated with IDEA, the grantee for the project. The impact analyses described here were not subject to the approval of IDEA.

Background

The MCR intervention includes the design and creation of a comprehensive, educative middle and high school mathematics curriculum that is aligned to state standards, Advanced Placement (AP) standards and vertical alignment progressions, and IDEA's lesson planning and coaching structures. The was designed to address the needs for an educational curriculum and high-quality, curriculum-embedded professional learning.

Schools require high-quality, curriculum-embedded professional learning that improves the abilities of their educators to implement the curriculum effectively. This educative piece for educators is often missing from even the most well-known curriculum products, which are built on the assumption that an educator in each content area has deep knowledge of that content. In reality, many educators—though degreed and certified—are underqualified for their job assignment (Hobbs & Porsch, 2021; Ingersoll, 1999) or limited in the depth of course content knowledge. This can be attributed to a shortage of teacher candidates, an increase in out-of-field teaching assignments, or other causes, but the fact remains: Schools and school districts

serving students from predominantly low-income backgrounds often have access to fewer teacher applicants, less qualified applicants, and applicants with less experience than school districts serving students from wealthier backgrounds (Krei, 1998). These districts increasingly rely on novice teachers to meet demand for their high-quality school models, necessitating improvements to both curriculum and professional development and support.

To help build teacher capacity and bolster student performance, an educative curriculum should

- describe exemplary instructional practices in the teacher's manual,
- situate teacher learning within the context of the lesson,
- link different knowledge areas within lessons to support teachers and students making connections,
- offer short scenarios or models of practice as examples, and
- address immediate needs for understanding as teachers plan for their lessons (Schneider & Krajcik, 2002).

All materials should include resources that support teacher knowledge of the subject matter, help teachers anticipate what learners might say or do in response to activities, help teachers consider how to relate units throughout the year, make visible the developers' pedagogical judgments, and promote teachers' pedagogical design capacity to make adaptations for learners (Schneider & Krajcik, 2002). Research has shown that teachers using highly educative mathematics curriculum materials are more likely to work to identify the big ideas in a curriculum program while planning collaboratively and are more likely to maintain cognitive demand and elicit student thinking during lesson enactment (Stein & Kaufman, 2010).

The MCR curriculum includes foundational concepts linked to success in computer science courses (e.g., logic progressions, computational thinking) and embeds teacher and leader content booster training pathways to build teacher and leader content knowledge. This training pathway features full-day quarterly sessions with content experts, focused on giving teachers lesson internalization support and opportunities to stamp key pedagogical moves that are high-leverage aspects of the lessons. Relative to the existing business-as-usual (BAU) curriculum used in IDEA schools, MCR focuses on conceptual understanding rather than performing operations/completing problems. Furthermore, MCR is fully scripted, provides exit tickets to check understanding at the end of each lesson, and is meant to be more student driven.

The logic model and goals of MCR are presented in Appendix A. MCR's short-term goals related to student outcomes are to increase student engagement in school and to boost student understanding of and confidence in math. The mid- and long-term goals are to improve

performance on standardized math assessments (e.g., State of Texas Assessments of Academic Readiness [STAAR], AP exams, ACT), increase the proportion of students enrolled in AP math and computer science courses, and maintain and improve postsecondary outcomes, such as improving college matriculation rates, especially at highly competitive institutions of higher education. MCR's short-term goals related to teacher outcomes include improved teacher perceptions of the math curriculum and enhanced teacher understanding of and confidence in math concepts, curriculum, and instruction. IDEA Public Schools intends for these short-term goals to lead to the midterm goals of improved teacher performance on annual reviews/ratings and increased retention of top-performing teachers.

Program Rollout and Implementation

The study was conducted in a single district, IDEA Public Schools. IDEA is a charter school network that served approximately 45,000 students across 79 schools at the time when the EIR grant was awarded.[1] MCR was designed to be implemented over the course of 5 years in IDEA's 46 college preparatory schools that serve students in Grades 6–12. Each MCR course was piloted in a small number of schools in the Rio Grande Valley, Austin, and San Antonio regions in Texas for 1 year and then rolled out to all remaining IDEA schools. The pilot period is the basis for the impact evaluation of MCR, when pilot schools implementing MCR are the treatment condition and are compared to nonpilot schools as the comparison condition that continue to implement their BAU math curriculum. Exhibit 1 illustrates the timeline for piloting and fully implementing the curriculum.[2] For each MCR course, IDEA refers to the treatment implementation year as the pilot year.

Exhibit 1. Timeline for MCR Implementation

Project year (school year)	Pilot MCR course—Number of pilot schools	MCR course in district-wide implementation
Year 1 (2019–20)	• Grade 7 Pre-Algebra—10 • Grade 8 Algebra 1 (partial pilot) —10	
Year 2 (2020–21)	• Grade 8 Algebra 1 (pilot continued)—10	• Grade 6 Math[a] • Grade 7 Pre-Algebra
Year 3 (2021–22)	• Geometry—13 • Algebra 2—9 • Pre-Calculus—7	• Grade 6 Math • Grade 7 Pre-Algebra • Grade 8 Algebra 1

[1] According to its website, the network currently serves over 80,000 students in 143 schools across Texas and its affiliates. See https://ideapublicschools.org/our-story/.

[2] Prior to the start of the grant, the IDEA team developed and implemented a redesigned Grade 6 math curriculum in all of their schools. We therefore do not evaluate the impact of the Grade 6 math redesign.

Project year (school year)	Pilot MCR course—Number of pilot schools	MCR course in district-wide implementation
Year 4 (2022–23)	• AP Calculus AB—8 • AP Statistics—6	• Grade 6 Math • Grade 7 Pre-Algebra • Grade 8 Algebra 1 • Geometry • Algebra 2 • Pre-Calculus
Year 5 (2023–24)		• Grade 6 Math • Grade 7 Pre-Algebra • Grade 8 Algebra 1 • Geometry • Algebra 2 • Pre-Calculus • AP Calculus AB • AP Statistics

[a] Grade 6 math was not piloted during the grant period.

The IDEA team developed and began implementing a redesigned Pre-Algebra and Algebra 1 curriculum in 2019–20, but due to staffing challenges and unanticipated delays unique to the Algebra 1 redesign, they were not able to implement Algebra 1 as intended. The onset of the COVID-19 pandemic that shuttered schools created further challenges with fully implementing the curriculum. As a result, IDEA continued the Algebra 1 pilot for an additional year (2020–21). For this evaluation, we are considering the implementation of the MCR Algebra 1 in 2019–20 to have been a partial implementation. In addition, the IDEA team piloted Geometry in Year 3, instead of Year 2 as originally planned, due to delays and interruptions caused by the pandemic.

Intervention Condition

Given the rollout timeline for the redesigned curriculum, different cohorts of students in the pilot schools experienced varying amounts of the redesigned curriculum. As stated earlier, the treatment cohorts comprised students in the pilot (treatment) schools. Each cohort comprised students in a different anticipated graduating class. Cohort 1 (class of 2024–25) has received the full MCR curriculum pathway as they have progressed through Grades 7–12.[3] Cohort 2 (class of 2023–24) experienced a slightly disrupted pathway as they progressed through Grades 8–12, given the partial implementation of MCR Algebra 1 and the delay, due to COVID-19, in plans to implement MCR Geometry (originally planned for Year 2). Cohort 3 (class of 2022–23) received the latter portion of the MCR as they progressed through Grades 11 and 12. The

[3] This class did not experience the full curriculum during the evaluation timeline under the grant.

comparison cohorts comprised similar-grade students at nonpilot schools. ***Only Cohorts 1 and 3 are included in the impact analysis.*** Exhibit 2 illustrates these two cohorts of students and the curriculum they have experienced or will be experiencing. The comparison group for each cohort comprised similar-grade students at nonpilot schools.

Comparison Condition

The comparison condition was the IDEA schools BAU math curriculum. Exhibit 2 illustrates the BAU curriculum in comparison schools. BAU in Grades 7 and 8 includes the pre-AP curriculum. In Grades 9–12, BAU includes "AP for All" course offerings. Unlike MCR, the BAU curriculum did not provide scripted lessons and instead required teachers to develop lesson plans and assignments, emphasized procedural skills (e.g., performing operations, completing problems), and provided limited exploration of the concepts underlying the skills. The BAU curriculum delivered content in a more traditional lecture-based format and was not designed for vertical alignment.

The blue-shaded cells in Exhibit 2 indicate the portions of MCR that were uniquely experienced by treatment students, allowing for analyses that tests the impact of these curriculum combinations. Because of the plan for rolling out the MCR curriculum to comparison schools before a cohort of pilot-school students had completed the full pathway, we were unable to test the impact of the entire MCR pathway. The evaluation examined outcomes in years 2019–20 through 2022–23 (the last year of data that the evaluation team was able to obtain).

Exhibit 2. Impact Study Cohorts and Courses Implemented for Treatment and Comparison Students

Cohort	Year 1: 2019–20	Year 2: 2020–21	Year 3: 2021–22	Year 4: 2022–23	Year 5: 2023–24	Year 6: 2024–25
1 (Class of 2024–25)	**Grade 7**	**Grade 8**	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**
Treatment	MCR Pre-Algebra[a]	MCR Algebra 1[a]	MCR Geometry[a]	MCR Algebra 2	MCR Pre-Calculus	• MCR AP Calculus AB • MCR AP Statistics
Comparison	BAU Pre-Algebra	BAU Algebra 1	BAU Geometry	MCR Algebra 2	MCR Pre-Calculus	• MCR AP Calculus AB • MCR AP Statistics
3 (Class of 2022–23)	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**	**College entry**	
Treatment	BAU Geometry	BAU Algebra 2	MCR Pre-Calculus[a]	• MCR AP Calculus AB • MCR AP Statistics[a]		
Comparison	BAU Geometry	BAU Algebra 2	BAU Pre-Calculus	BAU AP Calculus BAU AP Statistics		

Note. BAU = business as usual; MCR = Mathematics Curriculum Redesign.

[a] These blue-shaded cells indicate the portions of MCR that were uniquely experienced by treatment students, allowing for analyses that test the impact of these curriculum combinations.

Impact Evaluation Research Questions

This evaluation addresses four research questions (RQs) about the impact of MCR on the math achievement of students in Cohort 1 and four RQs about the impact of MCR on the math achievement of students in Cohort 3. Given the planned rollout for MCR (see Exhibit 2), treatment students in Cohort 1 experienced a 3-year pathway of MCR curriculum in Grades 7 through 9—MCR Pre-Algebra in Grade 7 followed by MCR Algebra 1 in Grade 8 and MCR Geometry in Grade 9 (referred to as sequence A hereafter).[4] Treatment students in Cohort 3 experienced two different 2-year pathways of MCR curriculum in Grades 11 and 12—MCR Pre-Calculus in Grade 11 followed by MCR AP Statistics, or Pre-Calculus in Grade 11 followed by MCR AP Calculus in Grade 12 (referred to as sequence B1 and B2 hereafter).

Exhibit 3 presents the impact research questions and the outcome measure for each research question. Several outcomes were measured for each cohort as students were making their way through their MCR sequence. We designate research questions as exploratory if they are answered using an outcome measure that does not have established validity and reliability (e.g., IDEA exams that are not standardized tests).

[4] As illustrated in Exhibit 2, Cohort 1 treatment students also take MCR Algebra 2, MCR Pre-Calculus, MCR AP Calculus, and MCR AP Statistics, but because the comparison students take these courses too, we could not test the impact of taking those courses for Cohort 1 students. We only tested the impact of the earlier part of the MCR sequence that was only delivered to Cohort 1 treatment students.

Exhibit 3. Impact Research Questions and Outcome Measures

Research question	Outcome measure	Confirmatory or exploratory	WWC domain for outcome	Measure(s) for establishing baseline equivalence
Cohort 1 treatment students received **sequence A**: MCR Pre-Algebra in Grade 7, followed by MCR Algebra 1 in Grade 8, and MCR Geometry in Grade 9)				
1. What is the effect of taking **MCR Pre-Algebra in Grade 7** on mathematics achievement of Grade 7 students compared with Grade 7 students in the BAU math course in Grade 7?	State of Texas Assessments of Academic Readiness (STAAR) Grade 7 math midyear practice exam[a]	Confirmatory	Mathematics achievement	STAAR Grade 6 math exam
2. What is the effect of taking **MCR Pre-Algebra in Grade 7 followed by MCR Algebra 1 in Grade 8** on algebra skills of Grade 8 students compared with Grade 9 students in the BAU math courses in Grades 7 and 8?	STAAR end-of-course algebra 1 exam	Confirmatory	Algebra	STAAR Grade 6 math exam
3. What is the effect of taking **MCR Pre-Algebra followed by MCR Algebra 1 and then MCR Geometry in Grades 7– 9** on geometry skills of Grade 9 students compared with Grade 9 students in the BAU math courses in Grades 7– 9?	IDEA geometry final exam	Exploratory	Geometry and measurement	STAAR Grade 6 math exam
4. What is the effect of taking **MCR Pre-Algebra followed by MCR Algebra 1 and then MCR Geometry in Grades 7– 9** on computer science skills of Grade 10 students compared with Grade 10 students who were in BAU math courses in in Grades 7– 9?	AP computer science principles exam score	Confirmatory	Technology and engineering	STAAR Grade 6 math exam

Research question	Outcome measure	Confirmatory or exploratory	WWC domain for outcome	Measure(s) for establishing baseline equivalence
Cohort 3 treatment students received **sequence B1** (MCR Pre-Calculus in Grade 11 followed by MCR AP Statistics in Grade 12) or **sequence B2** (MCR Pre-Calculus in Grade 11 followed by MCR AP Calculus in Grade 12)				
5. What is the effect of taking **MCR Pre-Calculus in Grade 11** on mathematics achievement of Grade 11 students compared with Grade 11 students taking the BAU pre-calculus course in Grade 11?	ACT Math score	Confirmatory	Mathematics achievement	STAAR Grade 8 math exam
6. What is the effect of taking **MCR Pre-Calculus in Grade 11** on pre-calculus skills of Grade 11 students compared with Grade 11 students taking the BAU pre-calculus course in Grade 11?	IDEA pre-calculus final exam score	Exploratory	Calculus and pre-calculus	STAAR Grade 8 math exam
7. What is the effect of taking **MCR Pre-Calculus in Grade 11 followed by AP Statistics in Grade 12** on statistics skills of Grade 12 students compared with Grade 12 students taking the BAU courses in Grades 11 and 2?	AP Statistics exam score	Confirmatory	Data analysis, statistics, and Probability	STAAR Grade 8 math exam
8. What is the effect taking **MCR Pre-Calculus in Grade 11 followed by AP Calculus in Grade 12** on calculus skills of Grade 12 students compared with Grade 12 students taking the BAU courses in Grades 11 and 12?	AP Calculus exam score	Confirmatory	Calculus and pre-calculus	STAAR Grade 8 math exam

Note. BAU = business as usual.

[a] Due to COVID-19, the end-of-year STAAR assessments were not administered in 2019–20. IDEA administers midyear practice STAAR assessments, which were used as the outcome measure in 2019–20. This outcome therefore does not reflect the impact of the full year of MCR curriculum implementation

Impact Evaluation Design and Measures

Design

The study used a quasi-experimental matching design to examine the effect of MCR on student achievement outcomes. We compared outcomes between the two cohorts of students at IDEA Public Schools that piloted the MCR and matched cohorts of students in IDEA schools in San Antonio, Austin, and the Rio Grande Valley regions that had delayed implementation of MCR.

The study team conducted propensity score matching separately for each outcome. We used the PSMATCH2 module in STATA to conduct the matching. We estimated student-level propensity scores for participating in the intervention based on multiple student-level characteristics (age, gender, Hispanic students, English learner status, special education status, economic disadvantaged status, and prior achievement) and multiple school-level characteristics (region, preintervention demographic makeup, size, and prior year achievement). The estimated propensity scores were used to match students. The study team used nearest-neighbor matching without replacement within a 1:1 matching ratio.[5] The matches were based on students with the closest propensity scores. For each matching, the study team assessed whether the two matched groups of students were balanced on prior achievement, using a threshold of 0.25 standard deviation for standardized differences. Although the matching reduced differences between the two groups on prior achievement and other observed student and school characteristics, we included these variables as covariates in the impact analyses to further control for any residual observable differences between the two groups that remain after the matching and to provide more precise impact estimates.

Only students with complete data (including demographic data, prior academic achievement, and outcome data) were included in the matching and thus in the analysis.

After matching, the impact of MCR was measured using a multilevel model that incorporated student- and school-level covariates (the same as those used in propensity score matching) as well as fixed effects for matched pairs. The equation to be used is as follows:

$$Y_{ij} = \beta_0 + \beta_1 MCR_j + \boldsymbol{X_{ij}}\beta_{StudCov} + \boldsymbol{W_j}\beta_{SchoolCov} + \boldsymbol{MatchFE} + v_j + e_{ij}$$

[5] The study team explored other matching strategies as well, for example, matching with a 1:2 ratio, matching with calipers, and matching with replacement. Those strategies did not lead to significant advantage or improvement of the matching results over matching without replacement with a 1:1 ratio, as measured by baseline balance after matching.

wherein

Y_{ij} measures the outcome of interest

$\boldsymbol{X}_{ij}$ is a vector of student covariates

$\boldsymbol{W}_{\boldsymbol{j}}$ is a vector of school-level covariates

MatchFE is a vector of dummy indicators for each matched pair

v_j measures the school-level residual

e_{ij} measures the student-level residual.

β_1 provides a covariate-adjusted estimate of the specific MCR course or course sequence being tested. In other words, it represents the average difference in outcomes between students in MCR pilot schools and those not in MCR pilot schools after controlling for the covariates in the model.

Outcome Measures

The outcomes that were examined include standardized state test scores (STAAR), AP exam scores, ACT Math scores, as well as IDEA final exam scores (for outcomes where no standardized test scores are available; see Exhibit 3). Exhibit 4 describes each measure as well as the relevant baseline measures that were used to test for baseline equivalence. After each outcome measure, we list the relevant research question in parentheses. Research Questions 1–4 focus on the effects on students who experienced sequence A (MCR Pre-Algebra in Grade 7 followed by MCR Algebra 1 in Grade 8 and MCR Geometry in Grade 9). Research Questions 5–8 focus on the effects on students who experienced Sequence B1 (MCR Pre-Calculus in Grade 11 followed by MCR AP Statistics in Grade 12) or sequence B2 (MCR Pre-Calculus in Grade 11 followed by MCR AP Calculus in Grade 12).

Exhibit 4. Outcome Measures

Measure	Domain	Unit of measurement	Baseline measure	Variable construction
STAAR Grade 7 math midyear practice exam (RQ 1)	Mathematics achievement	Student	STAAR Grade 6 math exam	Use scale score as provided
STAAR end-of-course Algebra 1 (RQ 2)	Algebra	Student	STAAR Grade 6 math exam	Use scale score as provided
IDEA geometry final exam (RQ 3)	Geometry and measurement	Student	STAAR Grade 6 math exam	Use scale score as provided
AP Computer Science exam (RQ 4)	Technology and engineering	Student	STAAR mathematics scores, Grade 6	Use the integer scale score (1–5)

Measure	Domain	Unit of measurement	Baseline measure	Variable construction
IDEA pre-calculus final exam (RQ 5)	Calculus and pre-calculus	Student	STAAR mathematics scores, Grade 8	Use scale score as provided
ACT Math score (RQ 6)	Mathematics achievement	Student	STAAR mathematics scores, Grade 8	Use scale score as provided
AP Statistics exam (RQ 7)	Data analysis, statistics, and probability	Student	Cohort 3: STAAR mathematics scores, Grade 8	Use the integer scale score (1–5)
AP Calculus exam (RQ 8)	Calculus and pre-calculus	Student	Cohort 3: STAAR mathematics scores, Grade 8	Use the integer scale score (1–5)

Note. STAAR = State of Texas Assessment of Academic Readiness, RQ = research question.

Sample Sizes

The number of schools and students that were included in the analysis are provided in Exhibit 5. Because IDEA was primarily interested in examining the impact of the full sequence of the curriculum, for each outcome, students were included in the matching pool for the treatment group only if they were enrolled in an MCR school (i.e., a school that piloted the target MCR curriculum) in the current year and had been enrolled in an MCR school (not necessarily in the same school as in the current year) in the prior years. For example, for the first outcome for Cohort 1 in Exhibit 5 (STAAR Math midyear practice exam; Grade 7), the matching pool for treatment students included those who were enrolled in any of the 10 schools that piloted MCR Pre-Algebra in 2019–20. However, for the second outcome (STAAR end-of-course Algebra 1; Grade 8), the matching pool for treatment students included those who enrolled in a school that piloted MCR Algebra 1 in 2020–21 and who had enrolled in a school (not necessarily the same school as in 2020–21) that piloted MCR Pre-Algebra in the previous year. Similarly, for the third outcome for Cohort 1 (IDEA Geometry final exam; Grade 9), only students who experienced the full sequence A (MCR Pre-Algebra in Grade 7 followed by MCR Algebra 1 in Grade 8 and MCR Geometry in Grade 9) were included in the matching pool for the treatment group. For each analysis, the matching pool for the comparison group included students who were enrolled in a non-pilot school during the year when a given MCR curriculum was piloted. Thus comparison students were exposed to the BAU curriculum during the same period and did not experience any of the MCR curriculum. As a result, sample sizes went down as students progressed toward higher grade levels because (1) fewer schools piloted the full sequence, (2) students moved out of pilot schools or out of the district in later years, and (3) fewer students took higher level courses (e.g., AP courses).

Exhibit 5. Number of Schools and Students in the Analytic Sample for Each Outcome

Outcome measure	Treatment group		Comparison group	
	Schools	Students	Schools	Students
Cohort 1				
STAAR math midyear practice exam (Grade 7)	10	884	19	884
STAAR end-of-course Algebra 1 (Grade 8)	10	773	20	773
IDEA geometry final exam (Grade 9)	8	479	13	479
AP Computer Science Principles exam (Grade 10)	5	69	6	69
Cohort 3				
IDEA pre-calculus final exam (Grade 11)	7	478	13	478
ACT Math (Grade 11)	7	542	14	542
AP Statistics exam (Grade 12)	4	116	7	116
AP Calculus exam (Grade 12)	6	76	8	76

Impact Findings

Baseline Equivalence

For each outcome, we assessed whether the pretest measure, the standardized average difference in prior student achievement between the two groups, was less than or equal to the What Works Clearinghouse (WWC) threshold of 0.25 standard deviation (see Exhibit 6). For both cohorts, the observed differences between matched treatment and comparison students on prior achievement for all outcomes are less than 0.25 SD (Exhibit 6).

Exhibit 6. Baseline Differences on the Pretest Measures

Outcome measure	Treatment group			Comparison group			Treatment–control difference	Standardized difference
	Sample size	Mean	Standard deviation	Sample size	Mean	Standard deviation		
Cohort 1: Baseline measure is students' Grade 6 STAAR math score								
STAAR math midyear practice exam (Grade 7)	884	1661.89	139.70	884	1657.58	138.72	4.30	0.03
STAAR end-of-course Algebra 1 (Grade 8)	773	1665.02	138.63	773	1670.70	141.11	–5.67	–0.04

Outcome measure	Treatment group			Comparison group			Treatment–control difference	Standardized difference
	Sample size	Mean	Standard deviation	Sample size	Mean	Standard deviation		
IDEA geometry final exam (Grade 9)	479	1669.81	137.42	479	1675.77	143.61	–5.96	–0.04
AP Computer Science Principles exam (Grade 10)	69	1669.83	127.43	69	1675.16	147.91	–5.33	–0.04
Cohort 2: Baseline measure is students' Grade 8 STAAR math score								
IDEA pre-calculus final exam (Grade 11)	478	4201.39	488.47	478	4295.90	533.34	–94.51	–0.18
ACT Math (Grade 11)	542	4236.16	542.16	542	4292.30	529.43	–56.14	–0.10
AP Statistics exam (Grade 12)	116	4438.04	548.92	116	4550.97	567.43	–112.92	–0.20
AP Calculus exam (Grade 12)	76	4607.38	577.25	76	4608.49	579.74	–1.11	0.00

Note. Means and differences were unadjusted. The standardized difference was computed by dividing the difference by the pooled standard deviation of the two groups (Hedges' *g*).
Source. AIR's analysis based on data provided by IDEA Public Schools.

We also present comparisons of baseline student demographic characteristics in Appendix B (Exhibits B2 and B3). For Cohort 1, the observed differences on student characteristics were generally less than 0.25 SD, with a few exceptions. Treatment students in the samples for the Grade 8 outcome (STAAR EOC Algebra 1) and for the Grade 10 outcome (AP Computer Science) were less likely to be in special education. Treatment students in the sample for the Grade 10 outcome (AP Computer Science) were less likely to be Hispanic. For Cohort 3, the baseline differences in several student demographic characteristics were found to be larger than 0.25 SD for the AP Statistics and AP Calculus outcomes. For the AP Statistics outcome, treatment students were less likely to be Hispanic, English learners, in special education, or economically disadvantaged. For the AP Calculus outcome, treatment students were less likely to be Hispanic and more likely to be economically disadvantaged.[6] To alleviate these residual imbalances, we controlled for these characteristics by including them as covariates in the analysis models.

[6] All outcomes can still meet WWC standards with reservations because the differences in the most critical baseline characteristics—prior achievement—were less than the WWC threshold of 0.25 SD.

Program Effects

Exhibit 7 presents the impact analysis results for all outcomes for Cohorts 1 and 3. Our analysis found statistically significant differences in achievement between Cohort 1 treatment and comparison group students on their Grade 9 IDEA Geometry test scores (ES = 0.39).[7] This finding suggests that students who received MCR Pre-Algebra in Grade 7 followed by MCR Algebra 1 in Grade 8 and MCR Geometry in Grade 9 (i.e., sequence A) performed better than similar students who took the same courses but with the BAU curricula.

The analysis also found statistically significant differences in AP Calculus exam scores between treatment and comparison group students in Cohort 3 (ES = 0.57).[8] This finding suggests that students who received MCR Pre-Calculus in Grade 11 followed by MCR AP Calculus in Grade 12 (i.e., sequence B2) performed better than their peers who took the same courses but with the BAU curricula. The estimated differences in other achievement outcomes are not statistically significant.

Exhibit 7. Differences in Outcomes

Outcome measure	Treatment group		Comparison group		Treatment–control difference	Standard error	Standardized difference	*p*-value
	Mean	Standard deviation	Model-adjusted mean	Standard deviation				
Cohort 1								
STAAR math midyear practice exam (Grade 7)	18.59	7.57	19.40	7.71	-0.82	0.54	–0.11	.130
STAAR end-of-course Algebra 1 (Grade 8)	3741.27	471.34	3848.66	507.37	–107.39	58.13	–0.22	.065
IDEA geometry final exam (Grade 9)	17.31	6.57	14.87	5.93	2.45**	0.86	0.39	.004
AP Computer Science Principles exam (Grade 10)	1.48	0.70	1.68	0.89	–0.20	0.32	–0.24	.541

[7] With an effect size of 0.39 SD, a student in the comparison group at the 50th percentile (i.e., the median student) would have improved 15 percentile points had the student received the intervention. An effect size of 0.39 SD would be considered "large" according to the effect-size benchmarks proposed by Kraft (2020), who proposed the following benchmarks from causal studies of preK–12 education interventions evaluating effects on student achievement: less than 0.05 is small, 0.05 to less than 0.20 is medium, and 0.20 or greater is large. These benchmarks were developed based on the distribution of 1,942 effect sizes from 747 randomized controlled trials with standardized test outcomes.

[8] With an effect size of 0.57 SD, a student in the comparison group at the 50th percentile (i.e., the median student) would have improved 22 percentile points had the student received the intervention. An effect size of 0.57 SD would be considered "large" according to the effect-size benchmarks proposed by Kraft (2020).

Outcome measure	Treatment group		Comparison group		Treatment–control difference	Standard error	Standardized difference	*p*-value
	Mean	Standard deviation	Model-adjusted mean	Standard deviation				
Cohort 3								
IDEA pre-calculus final exam (Grade 11)	17.59	6.84	16.21	6.05	1.38	1.57	0.21	.379
ACT Math (Grade 11)	18.16	3.58	18.19	3.83	–0.04	0.40	–0.01	.927
AP Statistics exam (Grade 12)	1.19	0.49	1.21	0.47	–0.03	0.25	–0.06	.909
AP Calculus exam (Grade 12)	1.48	0.79	1.12	0.40	0.36**	0.14	0.57	.010

Note. Means and differences were regression adjusted. The standardized difference was computed by dividing the difference by the pooled standard deviation of the two groups (Hedges' *g*).

** Difference is significant at .01 level.

Source. AIR's analysis based on data provided by IDEA.

Limitations in Impact Analysis

The propensity score matching process selects matched cases on the basis of the available common data on student and school characteristics. Although the matching process resulted in similar groups of students in terms of prior achievement, for a few of the outcomes (AP exam scores), students in the samples differed on some demographic characteristics. Moreover, students may have differed systematically on measures that were not available for the analysis. To reduce this risk, AIR obtained data from the district on common characteristics that are known to be among the most important predictors of student achievement. Moreover, those student characteristics were included in the analysis to account for residual differences after matching.

Due to COVID-19, the end-of-course STAAR assessments were not administered in 2019–20. IDEA administers midyear practice STAAR assessments, which were used as the outcome measure in 2019–20 for Cohort 1. This outcome therefore does not reflect the impact of the full year of MCR curriculum (Pre-Algebra) implementation for Cohort 1 students.

Two of the outcome measures (IDEA Geometry final exam and IDEA Pre-Calculus exam) were developed by IDEA. Information on the measures' validity and reliability was not available. The WWC likely will view these two measures as ineligible for review or nonindependent.

Fidelity of Implementation

AIR examined the fidelity of program implementation in 2019–20, 2020–21, 2021–22, and 2022–23 using indicators for three program components. The focus of the fidelity of implementation analyses was to understand the extent to which the MCR was implemented as expected, based on program records provided by IDEA and results from teacher surveys (see Box 1).

Fidelity Measurement

AIR examined IDEA records of program implementation from Years 1 through 4 to generate scores across three components of implementation: development of redesigned math curriculum, teacher training and professional development to use redesigned math curriculum, and teacher use of math curriculum. For each component, AIR calculated a fidelity of implementation score for each year focused on the occurrence of key program activities. Multiple indicators were examined within each component, with scores rolling up to an overall (program-level) fidelity of implementation score for each component. AIR and IDEA set a predetermined threshold for adequate implementation for each indicator and for each program component (see Exhibit 8 for a list of indicators and thresholds).

Box 1. Measures of Fidelity of Implementation

AIR examined fidelity of program implementation in pilot schools using a set of indicators from program records and teacher surveys.

- **Program records** include curriculum development and production tracker, proof (invoices) of curriculum, and teacher professional development schedules and attendance records.
- **Teacher surveys.** AIR conducted surveys of math teachers in spring of 2022 and 2023 to collect data on teachers' use of curriculum materials and receipt of professional development and support.

Exhibit 8. Fidelity of Implementation Indicator and Thresholds for Adequate Implementation

Indicator	Unit of measurement	Indicator scoring at unit level	Indicator scoring at sample level	Threshold for adequate implementation
Key Component 1. Development of redesigned math curriculum				
(1.1) IDEA headquarters staff develop curriculum materials on a rolling basis for all math grades/subjects. (Years 1–3)	Program (district)	**(Year 1)** 1 = 7th-grade Pre-algebra and 8th-grade Algebra 1 curriculum materials developed 0 = 7th- and 8th-grade math curriculum materials not developed **(Year 2)** 1 = Geometry, Algebra 2, and Pre-calculus curriculum materials developed 0= Geometry, Algebra 2, and Pre-calculus curriculum materials not developed **(Year 3)** 1 = AP Calculus and AP Statistics curriculum materials developed 0 = AP Calculus and AP Statistics curriculum materials not developed	Same as unit level	1

Indicator	Unit of measurement	Indicator scoring at unit level	Indicator scoring at sample level	Threshold for adequate implementation
(1.2) IDEA headquarters staff release curriculum materials to teachers on a rolling basis for all math grades/subjects. (Years 1–4)	Program (district)	**(Year 1)** 1 = 7th-grade Pre-algebra and 8th-grade Algebra 1 curriculum materials provided to teachers in pilot schools 0 = 7th grade Pre-algebra and 8th-grade Algebra 1 curriculum materials not provided to teachers in pilot schools **(Year 2)** 1 = 8th-grade Algebra 1 curriculum materials provided to teachers in pilot schools 0 = 8th-grade Algebra 1 curriculum materials not provided to teachers in pilot schools **(Year 3)** 1 = Geometry curriculum provided to teachers in 10 schools, Algebra 2 curriculum provided to teachers in pilot schools, Pre-calculus provided to teachers in 7 schools 0 = Geometry curriculum not provided to teachers in 10 schools, Algebra 2 curriculum not provided to teachers in pilot schools, Pre-calculus not provided to teachers in pilot schools. **(Year 4)** 1 = AP Calculus and AP Statistics curriculum provided to teachers in pilot schools 0 = AP Calculus and AP Statistics curriculum not provided to teachers in pilot schools	Same as unit level	1
Key Component 1 total score			Sum of sample-level indicator scores (range = 0–2)	**2 for Years 1–3** **1 for Year 4**
Key Component 2. Teacher training and professional development to use Redesigned math curriculum				

Indicator	Unit of measurement	Indicator scoring at unit level	Indicator scoring at sample level	Threshold for adequate implementation
(2.1) IDEA headquarters and campus-based staff provide quarterly training/professional development to teachers throughout the school year to support pilot curriculum use. (Years 1–4)	Program (district)	1 = yes, quarterly training/PD provided 0 = no	Same as unit level	1
(2.2) Teachers attend quarterly training/professional development throughout the school year to support pilot curriculum use. (Years 1–4)	Teacher	1 = yes, teacher attended the quarterly training 0 = no	1 = percentage of teachers who attended training averaged across trainings is 75% or higher 0 = percentage of teachers who attended training averaged across trainings is lower than 75%	1
(2.3) IDEA headquarters and campus-based staff provide ongoing support to teachers throughout the school year to support pilot curriculum use. (Years 1–4)	Program (district)	1 = yes, ongoing support provided 0 = no	Same as unit level	1

Indicator	Unit of measurement	Indicator scoring at unit level	Indicator scoring at sample level	Threshold for adequate implementation
(2.4) Teachers receive ongoing support throughout the school year to support pilot curriculum use (Years 3 and 4)	Teacher	1 = yes, teachers reported receive ongoing support 0 = no, teachers reported not receiving ongoing support	1 = percentage of teachers who reported receiving ongoing support is 75% or higher 0 = percentage of teachers who reported receiving ongoing support is lower than 75%	1
Key Component 2 total score			Sum of sample-level indicator scores (range = 0–4)	**3 for Years 1 and 2** **4 for Years 3 and 4**
Key Component 3. Teacher use of math curriculum				
(3.1) Teachers use revised curriculum materials in classes with students. (Years 3 and 4)	Teacher	1 = on surveys teachers report that they used (or primarily used) only their current curriculum 0 = otherwise	1=90% or more of pilot teachers on surveys report that they used (or primarily used) only their current curriculum 0= Percentage of pilot teachers on surveys report that they used (or primarily used) only their current curriculum is lower than 90%	1

Indicator	Unit of measurement	Indicator scoring at unit level	Indicator scoring at sample level	Threshold for adequate implementation
(3.2) Teachers access curriculum materials on IDEA's Teams site. (Years 1–4)	Program (district)	1 = teachers can access curriculum materials on IDEA's Teams site 0 = curriculum materials are not available on IDEA's Teams site	Same as unit level	1
Key Component 3 total score			Sum of sample-level indicator scores (range = 0–2)	**1 for Years 1 and 2** **2 for Years 3 and 4**

Fidelity Findings

The MCR program met the evaluation threshold for fidelity of implementation for the first key program component (development of redesigned math curriculum) in Years 2–4 (see Exhibit 9). In Year 1 the program did not meet the evaluation threshold for fidelity of implementation for this component because there is insufficient evidence that the Grade 7 Pre-Algebra and Grade 8 Algebra 1 curriculum materials were provided to teachers in pilot schools.

The MCR program did not meet the evaluation threshold for fidelity of implementation for the second key program component (teacher training and professional development to use redesigned math curriculum) in any year (see Exhibit 9). Specifically, the program fell short of the threshold for Indicator 2.2 (see Exhibit 8) because on average less than 75% of teachers participated in the quarterly training each year.

The program met the evaluation threshold for fidelity of implementation for the third key program component (teacher use of math curriculum) in Years 1 and 2 but not in Years 3 and 4 (see Exhibit 9). Specifically, the program fell short of the threshold for Indicator 3.1 (see Exhibit 8) because less than 75% of teachers who responded to the teacher survey in Years 3 and 4 reported that they taught using only the adopted MCR materials or taught primarily with the adopted MCR materials (along with a few other supplementary materials).

Exhibit 9. Fidelity of Implementation Results by Component in Each Year of Implementation

Key component	Year 1		Year 2		Year 3		Year 4	
	Total # of measurable indicators	Fidelity score and whether program met sample-level threshold	Total # of measurable indicators	Fidelity score and whether program met sample-level threshold	Total # of measurable indicators	Fidelity score and whether program met sample-level threshold	Total # of measurable indicators	Fidelity score and whether program met sample-level threshold
Development of redesigned math curriculum	2 program-level indicators	Score is 1 **Program fidelity = No**	2 program-level indicators	Score is 2 **Program fidelity = Yes**	2 program-level indicators	Score is 2 **Program fidelity = Yes**	1 program-level indicator	Score is 1 **Program fidelity = Yes**
Teacher training and professional development to use redesigned math curriculum	2 program-level indicators and 1 teacher-level indicator (*n* of teachers = 24)	Score is 1 **Program fidelity = No**	2 program-level indicators and 1 teacher-level indicator (*n* of teachers = 24)	Score is 2 **Program fidelity = No**	2 program-level indicators and 2 teacher-level indicator (*n* of teachers = 41, 24)	Score is 3 **Program fidelity = No**	2 program-level indicators and 2 teacher-level indicator (*n* of teachers = 14, 14)	Score is 3 **Program fidelity = No**
Teacher use of math curriculum	1 program-level indicator	Score is 1 **Program fidelity = Yes**	1 program-level indicator	Score is 1 **Program fidelity = Yes**	1 program-level indicator and 1 teacher level indicator (*n* of teachers = 23)	Score is 1 **Program fidelity = No**	1 program-level indicator and 1 teacher level indicator (*n* of teachers = 13)	Score is 1 **Program fidelity = No**

Limitations in Fidelity of Implementation Analysis

As described earlier in the report, the implementation of MCR was affected by COVID-19 in 2019–20 and to some extent in 2020–21 as well. Data collection was also affected. AIR and IDEA were not able to administer a teacher survey in spring 2020 or spring 2021. Hence survey-based indicators (e.g., teachers' reported use of curriculum materials and receipt of ongoing support) were not included in fidelity of implementation measurement in Years 1 and 2. Moreover, the program records provided by IDEA and the teacher survey responses did not allow for identification of schools. We therefore were not able to calculate fidelity of implementation scores at the school level to examine variation in implementation across schools.

Survey

Student Survey Data Collection and Analysis

To facilitate answering one of the research questions (How do students, teachers, and leadership experience the curriculum implementation?), surveys were administered to mathematics students. The survey was administered to all students participating in courses using the redesigned curriculum. Student survey data were collected in the fall of 2021 and 2022 and the spring of 2022, 2023, and 2024.

The student survey collected information on the following areas: engagement (including cognitive, behavioral, emotional, and social), confidence, interest, and postsecondary and mathematics as a career. For each area, there were multiple items measuring different aspects, so one scale score could be created that took all these aspects into account (see Appendix C for student survey items). The scale score was created using the Rasch model. For one question, regarding plans to take a mathematics class next year, a scale score could not be created because there was only one item, so frequencies were calculated and reported.

Exhibit 10 shows the student survey response rates for each administration.

Exhibit 10. Student Response Rates

Time	Student survey response rates
Mathematics	
Fall 2021	**50%** (1,935/14,000)
Spring 2022	**5%** (687/14,000)
Fall 2022	**24%** (5,698/24,073)
Spring 2023	**15%** (3,618/24,832)
Spring 2024	**12%** (2,939/25,384)

From the first year of administration to the end, eight parents opted their students out of participating in the survey and an average of 2% of students opted themselves out.

Student Survey Findings

In every survey administration period (fall 2021–spring 2024), most students reported that they were engaged and had confidence and interest in mathematics. They also agreed that they would pursue mathematics in postsecondary education and were positive toward mathematics as a career.

There were a few differences between students in treatment and comparison schools and between years. Fall 2021 was the first data collection and investigated whether there were differences between students in treatment and comparison schools. No differences were observed for that year. During the next administration, in spring 2022, treatment students reported higher cognitive, behavioral, and emotional engagement. No differences were observed for the fall 2022 administration. In the following administration, in spring 2023, treatment students reported higher cognitive, behavioral, and emotional engagement and higher interest and postsecondary intentions. In the last administration, in spring 2024, comparison students reported marginally higher emotional engagement and treatment students reported higher postsecondary intentions.

Regarding change between years, all students reported an increase in confidence between fall 2021 and spring 2022 and between spring 2022 and spring 2023. No difference between years was found between spring 2023 and spring 2024.

When students were asked, “Do you plan to take any math classes next year that are not required (elective math courses)?”, many students replied “I don’t know” in every survey administration period (fall 2021–spring 2024). In each administration, there were differences between grade levels when responding to this question. For example, in 2024, 36% of students in 12th grade replied “I don’t know,” while 30% of students in 11th grade and 43% of students in seventh grade replied this way (see Appendix C for responses to this question).

Teacher Survey Data Collection and Analysis

To facilitate answering one of the research questions (How do students, teachers, and leadership experience the curriculum implementation?), surveys were administered to mathematics teachers. There was a pilot of the teacher survey in the spring of 2020, then regular administrations were conducted in the fall of 2022 and the spring of 2022, 2023, and 2024.

The teacher survey collected information on teachers’ perceptions and use of the redesigned curriculum, instructional practices, and how prepared they felt to teach mathematics. The survey was administered to all teachers participating in courses using the redesigned

curriculum: Pre-Algebra, Algebra 1, Algebra 2, Geometry, Pre-Calculus, AP Calculus, and AP Statistics. An average was taken of each item to create a numerical score.

Exhibit 11 shows the teacher survey response rates for each administration.

Exhibit 11. Teacher Response Rates

Time	Teacher survey response rates
Mathematics	
(Pilot in spring 2020)	
Spring 2022	**24%** (41/172)
Fall 2022	**14%** (38/263)
Spring 2023	**30%** (85/285)
Spring 2024	**22%** (69/315)

Teacher Survey Findings

AP Calculus and Statistics teachers had the lowest percentage of responses, making up 4%–11% of responses across years. Algebra 1 teachers had the highest percentage of responses, making up 22%–40% of response across years. Across all years, 51% of teachers reported teaching primarily with their school's adopted materials along with a few other supplementary materials. Teachers reported at a lower rate that they taught using only their school's adopted materials (20%) or didn't use their schools adopted materials (4%). Most teachers reported that their school's adopted curriculum materials were easier or about the same to use as other curricula for the same course. This was similar across years and courses. The highest percentage of Algebra 1, Geometry, and Pre-Calculus teachers reported that their school's adopted curriculum materials strongly promote deeper conceptual understanding. Algebra 2 teachers reported that their school's adopted curriculum moderately promotes deeper conceptual understanding. Other content areas also fell into these areas in general but had too few responses to report on definitively. Most teachers reported that their school's adopted curriculum materials are strongly aligned to state standards. They also reported that they felt well prepared to teach various aspects of mathematics and used best practices. These reports were similar across years and courses.

Overall key findings remained steady across all years. Teachers reported that they taught primarily with their school's adopted materials along with a few other supplementary materials. They also reported that they found their school's adopted curriculum easier or about the same to use as other curricula for their course. Teachers said they felt well prepared to teach mathematics and expressed self-efficacy in teaching these courses. Their responses demonstrated that they

implemented recommended mathematic instructional strategies and engaged students in mathematics instruction (see Appendix C for response options' percentages).

Limitations

The survey results are descriptive only. Comparing groups should be done with caution because of small differences between groups and low response rates in the spring administrations. Not all schools participated in the survey, which could impact the validity of findings. Some responses were incomplete and so could not be included in the analysis.

Qualitative Data Collection and Analysis

Overview of Qualitative Data Collection

To supplement the quantitative findings, AIR conducted interviews and focus groups with members of the IDEA headquarters staff, school leaders, and teachers to learn more about the implementation of the MCR. The data from interviews provide additional information and context for addressing the study's research questions. The interviews and focus groups allowed for more detailed responses than the fixed-response survey and enabled AIR to probe stakeholder perceptions of implementation and program effectiveness. In particular, the interview and focus group data contributed to a richer understanding of challenges experienced during implementation, the resources and supports needed to ensure successful implementation, and the experiences of teachers, school leaders, and students involved in the MSS project.

In 2019–20, AIR interviewed 31 IDEA staff members in person in the Austin, San Antonio, and Rio Grande Valley regions of Texas. The sample of staff members included 16 seventh- and eighth-grade math teachers piloting the new math curriculum, 10 school leaders (including principals, assistant principals, and instructional coaches), and 5 headquarters staff. Interviews were conducted during 2-hour timeslots at 12 IDEA school locations. The purpose of this round of interviews was to collect formative information on the implementation of the math curriculum redesign from the perspectives of teachers and support staff. Due to the COVID-19 pandemic, data collection was halted and postponed in the 2020–21 school year. Data collection resumed in a virtual format in the subsequent years.

In the 2021–22 school year, all math teachers and headquarters staff were recruited to participate in interviews or focus groups. Seventeen focus groups were conducted in April and May 2022. In 2022, the study sample included eight headquarters staff and eight math teachers, including five math teachers who had participated in the MCR pilot and three teachers who were new to the MCR.

In the 2022–23 school year, math and computer science teachers were randomly selected to participate in focus groups and invited to sign up for participation. If teachers elected not to participate, additional groups of math and computer science teachers were recruited. At the end of the recruitment cycle, the sample was exhausted, and all math and computer science teachers were invited to participate. In 2023, the study sample included 13 math teachers and four headquarters staff/curriculum managers.

Findings From Interviews and Focus Groups

The interviews and focus groups, which lasted approximately 30–60 minutes each, explored changes observed from MCR in instructional planning, math content knowledge, math instruction, student engagement, and student learning, which provided additional depth and richness to the findings regarding benefits, challenges, and recommendations for improvement.

Recordings from all interviews and focus groups were transcribed and coded using NVivo. Qualitative data were coded and analyzed through both deductive and inductive approaches, using a codebook guided by the research questions and interview protocols.

General Feedback on Curriculum

Teachers and headquarters staff were asked to provide general feedback on their experiences with the development and implementation of the math curriculum redesign. Overall, feedback on the curriculum itself was consistent and positive from headquarters staff and teachers with varying levels of experience. Participants described the curriculum to be highly structured, standardized, and undergoing continual development and improvement.

Guided and Structured

The curriculum provided to teachers is highly structured and guided, providing several components of curriculum to support teachers (novice and experienced) in implementation. IDEA headquarters staff noted that the curriculum is also designed to help educate less experienced teachers (or those with less math expertise) alongside students so that nonexperts in math could deliver and implement the same lesson. Teachers shared that it helped them save time in planning and preparation. Teachers and headquarters staff noted that the curriculum also provides integrated professional development for teachers as they are increasing their own content knowledge and strategies for teaching.

Consistent and Standardized

The curriculum has been intentional and deliberate in its design and is consistent across schools so that all students are moving through lessons and units together. Headquarters staff remarked that this was done to improve the quality of teaching in the classroom, regardless of the tenure of the teacher.

Ongoing Development

Headquarters staff noted that curriculum development is ongoing and "will never be done." There is a continuous process of revising to incorporate feedback, and the curriculum is and will be continuously improved upon. Federal standards and state requirements change, so the curriculum will be refined and revised each year to improve. The headquarters staff are seeking to learn more about educative elements that are most impactful for teachers to transfer to other content areas. As stated by one headquarters staff member, "We will continue to refine and revise our curriculum year after year just to make it better and better. So that is a never-ending project that my team will have."

Changes Observed

Teachers and headquarters staff were asked to describe in what ways the curriculum may or may not have impacted changes in instructional planning, math content knowledge, math instruction, and student engagement. This section expands responses from teachers and headquarters staff about changes in each of these areas of interest.

Changes in Instructional Planning

Saved time in instructional planning. Almost all teachers noted that the MCR has saved them a significant amount of time in instructional planning. Rather than building the curriculum and lesson plan each week, teachers could use the materials to prepare for class each day and each week. All materials (e.g., worksheets/workbooks) were provided for them as well, so they saved time that used to be spent making copies or printing and preparing materials.

Headquarters staff and teachers said that the time teachers saved in lesson planning was able to be used "bringing the lesson to life" and creating a more exciting and engaging lesson for students through their more personalized touch. Naturally, this benefit of saving time for teachers has improved the quality of life for teachers as well. One headquarters staff member remarked:

> The improvement of their quality of life as a teacher and their experience with teaching impacts them wanting to stay with the program and with the organization, because now they have a resource that is directly [tied] to our scope and sequence and their pace of days, and they're now internalizing quality materials instead of trying to find and develop from scratch lessons that they were doing with a variety of different resources that they've had over the years prior to this program.

One teacher shared:

> It saves so much time for teachers in terms of… lesson planning. That's the biggest benefit… the exit ticket is already there; the homework is already there. You don't have

> to be printing anything because in the morning like it's a big line of teachers, you know, trying to print everything.… Just get your workbooks and you have the homework there, the exit tickets.

Changes in Math Content Knowledge

Expanded approaches to instruction. For some teachers, the MCR helped them consider how to represent and share the knowledge in different ways. It expanded their own approaches with methods they hadn't previously known or learned. The new methods helped teachers build more helpful approaches for students. One teacher described that the MCR "provided some different insight to how things can be taught and some different ways to approach problems."

Improved conceptual understanding. Teachers and staff noted that, overall, the MCR helped teachers consider the foundational understanding of mathematics concepts, guided by a step-by-step process. Not only did this help to improve their own math content knowledge, but it strengthened the ways in which they could instruct on the concept and help build foundational understanding for students. One math teacher shared:

> I struggle with like probability and the fact that I'm on probability right now. It's really good to be able to [have] the source as it has the key… so it can help me understand material better to help me instruct it better.

Changes in Math Instruction

Supported structured class time. Teachers shared that the MCR has given more structure to their lesson plans, which has helped with allocating time for the lesson and practice time. Although it can still be a challenge to strike a balance in class time to cover all elements of the lesson before the exit ticket, teachers noted that the MCR is helpful in guiding each class lesson.

Introduced new pacing. As teachers were beginning to implement the MCR lessons, there was a learning curve in terms of implementing the lessons provided in the time allotted during class. Many teachers remarked that it took some time and practice to figure out the appropriate pacing through the lesson plans to make it work for their students and the content/lesson for that day. For example, some teachers found it more valuable for their students to have more practice time to work through problems and less of the scripted language that is provided for teachers. However, teachers shared that the predictable pace and flow for each class and each unit often helped to set expectations and consistency for students. Though the content is different, the consistency supported some teachers with classroom management and expectation setting. Other teachers shared that it could be mundane, at times, to follow the same process in each lesson.

Centered student-led problem-solving. The curriculum seems to incorporate a "student-focused way of teaching math," with evidence supporting the belief that this student-focused approach can better prepare students for success in college and college-level math as well as improve their self-directed problem-solving. One math teacher shared:

> I'm seeing my students' math abilities improve. A large portion of that [improvement] is because I have the curriculum and can plan for the entire month and know exactly which questions I'm going to ask students.... I build upon it to ask even more thought-provoking questions, critical thinking questions. So, my confidence has gone up dramatically.

Changes in Student Engagement

Increased confidence. Many teachers reported seeing more confidence in their students overall. They see that they are trying more, with some students catching on more quickly than others. Many teachers reported students feeling proud of themselves in catching onto concepts and feeling confident in their ability to figure it out. The MRC seems to be challenging students, but in ways that allow them to work through problems conceptually in a process. One teacher shared that students who are more interested in mathematics "really enjoy" the proof and working through the challenging problems. And for students who may struggle more with math, they appreciate the procedural approach with MCR, which seems to be a different approach from what they were taught in the past.

> *"Having those hands-on activities I think is helping those who may not have the strongest math idea or content or concepts… [and] may be able to kind of … at least have something to grasp onto so that they can be able to refer to it and utilize it, internalize it as it needed it."* —Math teacher

Enhanced collaboration. Some teachers also reported students working together and asking each other for help. Some elements of the MRC seem to incorporate time for students to work together on problem sets, and teachers have witnessed collaboration among students in working together to figure out problems. For some teachers this is new growth.

Improved engagement. Most teachers shared that students were more engaged with the class, which could be attributed to the structure, flow, and clear expectations or to their improved self-efficacy in math. Another teacher shared that they felt students were more engaged because the teacher felt better prepared with the MCR and more rested from not spending as much time outside of class planning. A few teachers shared that they felt students were not engaged and more bored with the predictability of the same lesson structure each day/week.

"Even my lower performing students still are engaged. I'm able to show them that they are capable.… Students are a lot more engaged because of this curriculum, I would say." —Math teacher

Perspectives on Professional Opportunities, Support, and Feedback

Teachers and headquarters staff were asked to describe the supports and opportunities teachers were given throughout the implementation of the MCR. These supports and opportunities included professional development opportunities, trainings, meetings, and resources for teachers to support their implementation of the MCR.

Opportunities for Teachers

Quarterly meetings. Curriculum managers shared that they facilitated professional development meetings to provide support for teachers. Teachers and curriculum managers noted that these meetings were offered about four times per year (at the end of each quarter) for teachers to share experiences with the curriculum and to discuss best practices.

Biweekly webinars. Biweekly webinars were offered by curriculum managers for additional sharing of best practices and lesson planning. Curriculum managers noted that during the webinar sessions they reviewed the upcoming 2 weeks of lessons for the unit, providing resources and tips on delivering the content and offering a space for Q&A. Headquarters staff explained that attendance at the webinars in the beginning of the year was estimated at 80%. However, throughout the year attendance dwindled.

New Teacher Institute. At the beginning of each school year, new teachers shared that they were offered a training session to introduce the curriculum, walk through the units, and discuss general implementation strategies. Though this was helpful for new teachers and served as an introduction to the curriculum, some teachers noted a desire for more "deep dive" sessions like this throughout the year, once the curriculum was being implemented. New teachers noted that it may be helpful to have professional development focused on lessons and strategies for supporting the curriculum implementation for specific units.

Direct support from curriculum managers. In addition to more structured opportunities for teachers, some teachers described receiving more direct "on the ground" support from curriculum managers in facilitating implementation of the curriculum. Curriculum managers explained that based on their involvement in the development of and ongoing revisions to the curriculum, they made themselves available to support teachers in implementing the lessons they created.

Feedback Provided to and From Teachers

Minimal feedback to teachers. Many teachers reported minimal feedback from their curriculum managers on their instruction and implementation of the curriculum. Some indicated that their curriculum managers would visit the classroom occasionally and briefly and make a quick note of feedback, but the feedback was not extensive. Headquarters staff indicated that they try to do regular observations of classroom instruction to see the curriculum implemented; however, it is mostly the curriculum manager who observes and provides feedback to teachers. One math teacher noted, however, that he received regular feedback from his curriculum manager on a weekly basis through the online teaching platform.

Opportunities for feedback from teachers. Teachers described multiple avenues by which they could share feedback on the MCR implementation process and the curriculum. Teachers received survey forms associated with each unit of the curriculum. In the surveys they were asked to offer general feedback on the lessons and share any issues or errors found, such as typos or incorrect answers to math problems. Soliciting this feedback from surveys was a helpful way for curriculum managers to identify issues and address them through revisions to the curriculum. For more urgent feedback, teachers used a Microsoft Teams account, which provided them with a chat forum. This was useful for some teachers in communicating typos/errors found in lessons or problem sets in real time as well as alerting others when links or other resources were having issues. Finally, teachers also noted that they exchanged feedback during the regularly scheduled webinar sessions.

Perceptions on Opportunities for Improvement

Throughout focus groups and interviews, teachers and headquarters staff offered recommendations and opportunities for improvement across the curriculum and implementation process. Curriculum managers noted that curriculum development is an ongoing process, with curriculum being continually examined, reviewed, and revised. They noted this was helpful in enabling them to implement regular improvements and new adaptations to technological advances and tools.

Accessibility and relevance. According to one of the headquarters staff, there is opportunity for improvement in the curriculum particularly in accessibility and relevance. They hoped to not only increase the quality of the curriculum and its content but also ensure that the content is relevant and connected to students in meaningful ways. The curriculum development team also sought to make the curriculum more accessible through more specialized guidance and support to students who may need it, better serve students who have different learning styles and abilities, and provide support for students with accommodations. As stated by one curriculum manager, "[What] we've all wanted to be able to incorporate better is more inclusion for a diverse amount of learners and

the best way to implement supports for students with disabilities." Teachers and curriculum managers revealed a few ways in which accessibility and relevance could be improved:

1. *Cultural inclusion in the lesson.* Many teachers recommended the curriculum integrate more cultural diversity and inclusion. In particular, teachers suggested using word problems as an opportunity to include demographics or cultural references that reflect the demographics of their classroom. This opportunity may be as simple as including students' names in the word problems.

2. *Incorporating Spanish.* Many teachers have made an effort to incorporate Spanish in some way into their lessons, given that for many teachers the majority of their students are Spanish speaking. A couple teachers suggested incorporating more Spanish in the curriculum or materials with math terminology in both English and Spanish that teachers can include around the classroom.

3. *Relevance to high school student experiences.* Teachers also suggested connecting the content more to the lives and experiences of high school students. Teachers could use more guidance on how to help students understand the importance and future use of the concepts they learn in the new curriculum. Making it relevant and relatable could help students have more fun in learning the material and encourage them to become more invested and engaged in the learning process. Teachers also recommended having more visuals in the workbooks, such as pictures alongside word problems, to make the material more intriguing and interesting to students.

> *"I think a … big part of DEI [diversity, equity, and inclusion] is making sure that every kid has a voice and every kid gets to talk and share, [so that] you know what they think about things. And I know that [inclusion of students] is written in the curriculum, but I know that not every [teacher is] always… letting [students] do all that talking. So, I think that's a big thing our PD [professional development] needs to focus even more on."* —Headquarters staff/curriculum manager

Additional support/training for teachers. Some teachers, as well curriculum managers, expressed a desire for teachers to have more support in implementing the curriculum. This support may come in the form of modeling the lesson plans and providing opportunities for teachers to role-play and sample the lesson prior to implementation in their own classrooms. This could be a helpful way to prepare for the materials ahead and identify any challenges or issues with the lessons as well as opportunities for additional support. One curriculum manager suggested,

> Maybe a training specific, you know, to how to implement and maybe if [at] all possible, maybe even model, you know, to a class or something similar to it so that they can kind of feel the pacing of it all so that they can get through it.

Limitations to Qualitative Data

Though all teachers and headquarters staff were recruited to participate in individual interviews or focus groups as part of the data collection for this portion of the study, only a limited sample of teachers opted to participate each year of data collection. The lack of participation in the study may have been due to the lack of incentives for participation, which may have impacted the extent to which teachers were motivated to participate. The small participant sample limits the extent to which the findings from this study can be generalized to the larger population of teachers. However, the findings from this portion of the study supplement and strengthen existing findings from the overall evaluation.

Summary of Findings From Qualitative Data

Through implementation of the MCR, teachers experienced several benefits, including improved foundational and conceptual understanding of mathematics concepts, time savings in lesson planning, expanded approaches to instruction, and stability through structured and predictable curriculum. Students experienced benefits through a student-focused approach to instruction, with improved self-directed problem solving, as well as access to improved quality and teaching/instruction. Students also benefited from the structured, predictable, and consistent curriculum.

The challenges teachers faced in implementing the MCR included adjusting to pacing and timing of the lesson plans, encountering and working around errors and typos in the workbook, and adjusting/scaffolding lessons when the rigor seemed too high for some students.

There is opportunity for improvement in the curriculum through making the content more accessible and culturally relevant to students and connecting to students in meaningful ways. Although the leadership has been successful in leading and managing the MCR process, it would be helpful for leaders to have training and exposure to the content in order to provide more informed feedback and support. Additional support for teachers in implementing the curriculum, such as modeling or sampling lesson plans more frequently, could strengthen overall implementation and address challenges in advance.

Conclusion

Through implementation of the MCR, teachers experienced several benefits, including improved foundational and conceptual understanding of mathematics concepts, time savings in lesson planning, expanded approaches to instruction, and stability through structured and predictable curriculum. Students who received the full sequence A of MCR (i.e., MCR Pre-Algebra in Grade 7,

followed by MCR Algebra 1 in Grade 8 and MCR Geometry in Grade 9) achieved better test scores at the end of Grade 9 than similar students who did not experience any of the MCR curricula. Generally, students experienced benefits through a student-focused approach to instruction, with improved self-directed problem solving, as well as access to improved quality and teaching/instruction. Students also benefited from the structured, predictable, and consistent curriculum. The challenges teachers faced in implementing the MCR included adjusting to pacing and timing of the lesson plans, encountering and working around errors and typos in the workbook, and adjusting/scaffolding lessons when the rigor seemed too high for some students.

In general, developing and implementing a curriculum is a challenging and ongoing process. There is a need for continued alignment of goals, priorities, and expectations. Adjustments to and implementation of new curriculum requires careful consideration of the needs of teachers and students to ensure that all needs are being met and resources are available for support.

Because curriculum development and implementation are ongoing and iterative, realizing all of the benefits is not immediate and may take more time to achieve desired results. IDEA Public Schools recognizes that it is important to provide continued support and resources for teachers (including professional development and training) and an ongoing feedback loop to continue to revise and improve curriculum implementation processes. Continuous improvement and consistent supports will contribute to continued benefits for teachers and students while moving toward reaching anticipated student outcomes.

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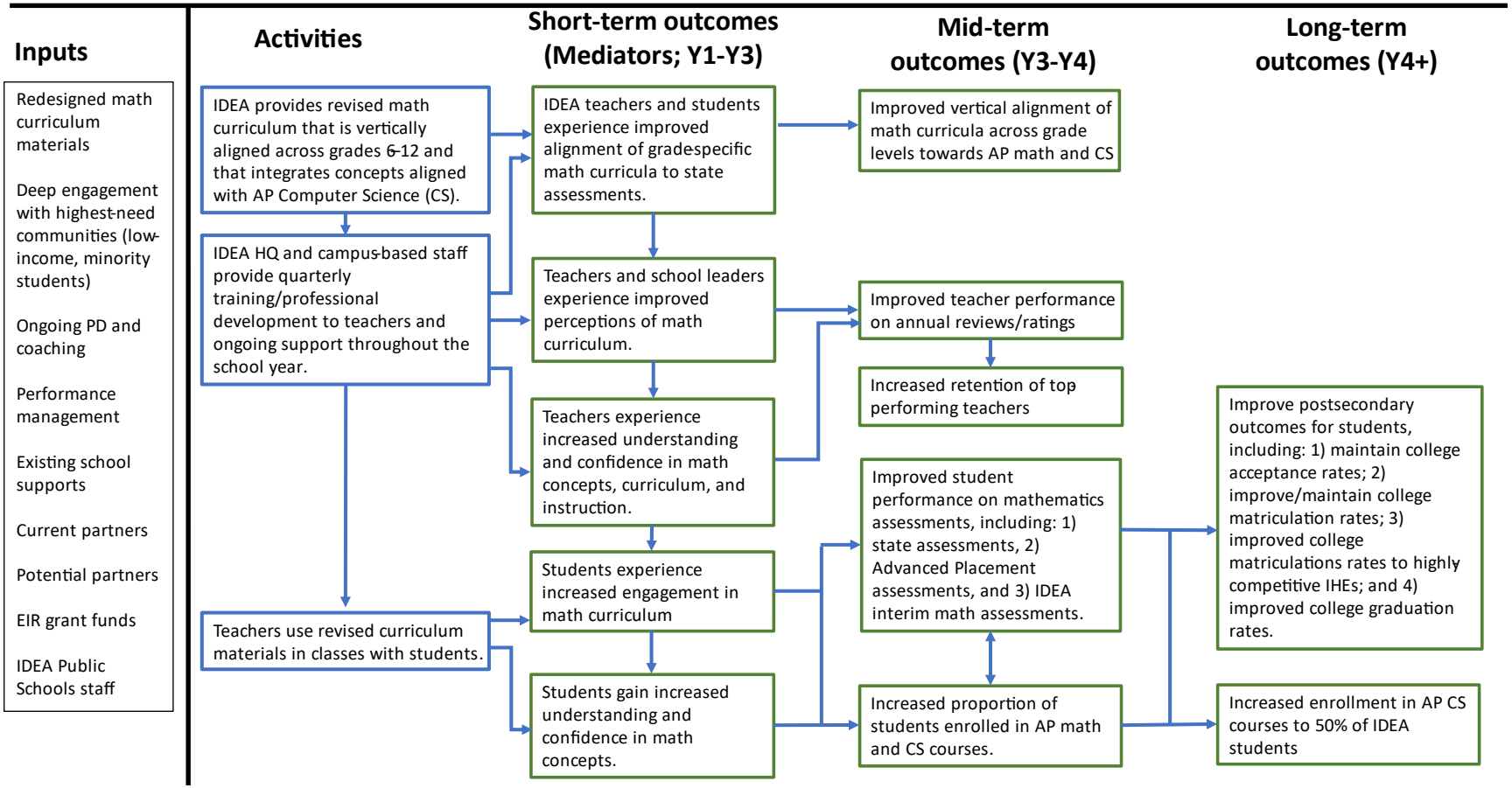
Appendix A. Math Curriculum Redesign Logic Model and Goals



Appendix B. Additional Information for the Impact Evaluation

Exhibit B1. Number of Students in the Matching Pool and in the Analytic Sample for Each Outcome

Outcome measure	Treatment group		Comparison group	
	Included in matching	Included in analysis	Included in matching	Included in analysis
Cohort 1				
STAAR Math midyear practice exam (Grade 7)	1095	884	2,848	884
STAAR EOC Algebra 1 (Grade 8)	936	773	2,201	773
IDEA Geometry final exam (Grade 9)	581	479	1,417	479
AP Computer Science Principles exam (Grade 10)	91	69	149	69
Cohort 3				
IDEA Pre-Calculus final exam (Grade 11)	588	478	797	478
ACT Math (Grade 11)	642	542	1,473	542
AP Statistics exam (Grade 12)	210	116	302	116
AP Calculus exam (Grade 12)	123	76	159	76

Exhibit B2. Baseline Differences in Student Demographic Characteristics for Cohort 1

Student baseline characteristic	Outcome			
	STAAR Math midyear practice exam (Grade 7)	STAAR EOC Algebra 1 (Grade 8)	IDEA Geometry final exam (Grade 9)	AP Computer Science Principles exam (Grade 10)
Age	–0.03	0.01	0.01	–0.02
Is male	–0.02	–0.03	–0.17	–0.04
Is Hispanic	0.12	0.02	–0.04	–0.43
Is an English learner	–0.13	0.09	0.15	–0.11
Is in special education	–0.09	–0.29	–0.20	–0.42
Is economically disadvantaged	0.06	0.01	–0.03	0.00

Exhibit B3. Baseline Differences in Student Demographic Characteristics for Cohort 3

Student baseline characteristic	Outcome			
	IDEA Pre-Calculus final exam (Grade 11)	ACT Math (Grade 11)	AP Statistics exam (Grade 12)	AP Calculus exam (Grade 12)
Age	–0.06	–0.04	0.19	0.07
Is male	0.01	0.11	0.23	–0.13
Is Hispanic	–0.13	–0.34	–0.69	–0.45
Is an English learner	0.12	–0.13	–0.39	0.16
Is in special education	–0.14	0.16	–0.43	0.00
Is economically disadvantaged	–0.25	0.01	–0.55	0.60

Appendix C. Student Survey Instrument

IDEA EIR Mathways to STEM Success: Student Survey

Survey Introduction and Assent

The following survey will ask for your feedback about your experiences as a student taking math classes in IDEA Public Schools. Your survey responses will be collected by researchers at the American Institutes for Research (AIR).

Your participation in the survey is voluntary, and you may choose to stop taking the survey at any time. Your response is very important to us to learn about your experiences in your math class.

Your responses to the survey will be confidential and will not be shared with your teacher or anyone else at your school. Only the research staff at AIR will be able to see your individual responses to the survey. Your name and identifying information about you will not be included in any reports.

This study is not an evaluation of you as an individual. Rather, it is an evaluation of IDEA's math classes and student experiences with math.

1. **If you understand this information and agree to have your responses included in research by the AIR research team, please select the "agree" box below.**

   ☐ I agree to participate in this survey.

   ☐ I do not agree to participate in this survey.

Identification

2. **What is your FIRST name? _____**
3. **What is your LAST name? _____**
4. **What is the name of your school? _____**
5. **What is your Math Teacher's LAST Name? _____**
6. **What is your date of birth? _____**

Math Engagement

Think about the math class you are in right now.

7. How much do you agree or disagree with the following **about the math class you are currently in now?**

	Strongly Disagree	Disagree	Agree	Strongly Agree
I go through the work that I do for my math class and make sure that it's right.				
I think about different ways to solve a problem.				
I try to connect what I am learning to things I have learned before.				
I try to understand my mistakes when I get something wrong.				
I would rather be told the answer than have to do the work.				
I don’t think that hard when I am doing work for class.				
When work is hard I only study the easy parts.				
I do just enough to get by.				

8. How much do you agree or disagree with the following **about the math class you are currently in now?**

	Strongly Disagree	Disagree	Agree	Strongly Agree
I stay focused in math class.				
I put effort into learning math.				
I keep trying even if something is hard.				
I complete my math homework on time.				
I talk about math outside of class.				
I don't participate in class.				
I do other things when I am supposed to be paying attention.				
If don't understand, I give up right away.				

9. How much do you agree or disagree with the following statements **about the math class you are currently in right now?**

	Strongly Disagree	Disagree	Agree	Strongly Agree
I look forward to math class.				
I enjoy learning new things about math.				
I want to understand what is learned in math class.				
I feel good when I am in math class.				
I often feel frustrated in math class.				
I think that math class is boring.				
I don't want to be in math class.				
I don't care about learning math.				
I often feel down when I am in math class.				

10. How much do you agree or disagree with the following statements **about the math class you are currently in right now?**

	Strongly Disagree	Disagree	Agree	Strongly Agree
I build on others' ideas.				
I try to understand other people's ideas in math class.				
I try to work with others who can help me in math.				
I try to help others who are struggling in math.				
I don't care about other people's ideas. When working with others, I don't share ideas.				
I don't like working with classmates.				

11. How much do you agree or disagree with the following statements **about the math class you are currently in right now?**

	Strongly Disagree	Disagree	Agree	Strongly Agree
What I learn in this class is useful for everyday life.				
What I learn in this class will be useful for college.				

	Strongly Disagree	Disagree	Agree	Strongly Agree
What I learn in this class will be useful for a future career.				

Confidence and Interest in Math

12. How much do you agree or disagree with the following statements **about the math class you are currently in right now?**

	Strongly Disagree	Disagree	Agree	Strongly Agree
I am confident that I can do an excellent job on tests in this class.				
I am certain that I can understand the most difficult material presented in the textbook or course materials used in this class.				
I am certain that I can master the skills being taught in this class.				
I am confident that I can do an excellent job on assignments in this class.				

13. How much do you agree or disagree with the following statements **about math in general?**

	Strongly Disagree	Disagree	Agree	Strongly Agree
I can usually figure out a way to solve math problems.				
I find the challenge of solving math problems motivating.				
I enjoy solving math problems.				
I am interested in learning more about math.				

Math-Related College and Careers

14. How much do you agree or disagree with the following statements **based on your future goals?**

	Strongly Disagree	Disagree	Agree	Strongly Agree
I will take more math classes in college.				
I will major in a math-related field in college.				
I will pursue a career in a math-related field.				

15. How much do you agree or disagree with the following statements **based on your future goals?**

	Strongly Disagree	Disagree	Agree	Strongly Agree
A career in a math-related field would enable me to work with others in a meaningful way.				
People in math-related careers make a meaningful difference in the world.				
Having a career in a math-related field would be challenging.				

16. Do you plan to take any math classes next year that are not required (elective math courses)?

- ☐ Yes
- ☐ No
- ☐ I would take an elective math class, but my school does not offer any others.
- ☐ I don't know

Student Background Information

17. What grade are you in this year?

- ☐ 6th grade
- ☐ 7th grade
- ☐ 8th grade
- ☐ 9th grade
- ☐ 10th grade
- ☐ 11th grade
- ☐ 12th grade

18. Which of the following categories best describes your race/ethnicity? [Check all that apply]

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic or Latino/a/x
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Prefer not to answer
- ☐ Other (please specify)_____

19. How do you identify your gender?

- ☐ Female
- ☐ Male
- ☐ Non-binary
- ☐ Prefer not to answer
- ☐ Other (please specify)_____

Appendix D. Teacher Survey Instrument

IDEA EIR Mathways to STEM Success: Math Teacher Survey

Survey Introduction

IDEA Public Schools partnered with the American Institutes for Research® (AIR®) to conduct an evaluation of IDEA's mathematics curricula and associated supports. As part of the evaluation, AIR is surveying IDEA teachers who are teaching Grades 7 and 8 mathematics, Algebra 1, Algebra 2, Geometry, Pre-Calculus, AP Calculus, or AP Statistics, during the 2023–24 school year. We are surveying all teachers who taught these subjects, regardless of the curriculum used, to learn about teacher experiences with the mathematics curricula.

Your participation in this survey is voluntary, and you may choose to stop participating at any time. Your responses will be sent directly to AIR; IDEA will not see any individual responses. We will treat the data collected during this survey as confidential, and your name and any identifying information about you will not be shared. This study is not an evaluation of any staff member or school; rather, the study is a way to provide information about IDEA's mathematics curricula and related materials for programmatic improvement.

Thank you for your time and for contributing to this important study. If you consent to participate, please click 'Next' to begin the survey.

SCREEN: Which mathematics course(s) did you teach this year? Select all that apply.

- ○ Pre-Algebra
- ○ Algebra 1
- ○ Algebra 2
- ○ Geometry
- ○ Pre-Calculus
- ○ AP Calculus
- ○ AP Statistics

[Note: From here on, replace [course] with one of the options above in the SCREEN question. In the web version, an option is chosen based on the answers given in the SCREEN question.]

Section 1. [course] Curriculum Use and Perceptions

Please answer the following question based on your [course].

1. What materials did you use when you taught [course] in the classroom this year?
   - I taught only using my school's adopted [course] materials.
   - I taught primarily with my school's adopted [course] materials, along with a few other supplementary materials.
   - I taught with about half (50%) with my school's adopted [course] materials and half (50%) with other materials.
   - I taught primarily with other materials and only used my school's [course] materials as a guide or to supplement my other, primary materials.
   - I didn't use my school's adopted [course] materials at all in my teaching.

2. Have you ever taught using a different [course] curriculum than the one you used this year?
   - Yes
   - No [SKIP TO 5]

3. [IF YES TO 2]: Which [course] curriculum or curricula have you used before?
   - [open-ended response]

4. [IF YES TO 2]: How do your school's adopted [course] curriculum materials compare to other [course] curricula you have used?
   - My school's [course] curriculum materials are easier to use than other [course] curricula.
   - My school's [course] curriculum materials are about the same as other [course] curricula in terms of ease of use.
   - My school's [course] curriculum materials are harder to use than other [course] curricula.

5. How well do your school's adopted [course] curriculum materials promote the development of students' conceptual understanding of mathematics (e.g., understanding "why," connecting to prior knowledge or applying knowledge to new situations, or providing evidence to justify answers)?
   - My school's [course] curriculum materials **strongly promote** deeper conceptual understanding.
   - My school's [course] curriculum materials **moderately promote** deeper conceptual understanding.
   - My school's [course] curriculum materials **weakly promote** deeper conceptual understanding.
   - My school's [course] curriculum materials **do not promote** deeper conceptual understanding.

6. How closely are your school's adopted [course] curriculum materials aligned to your state's mathematics standards?
   - ○ My school's [course] curriculum materials are **strongly aligned** to state standards.
   - ○ My school's [course] curriculum materials are **moderately aligned** to state standards.
   - ○ My school's [course] curriculum materials are **weakly aligned** to state standards.
   - ○ My school's [course] curriculum materials are **not aligned** to state standards.

Section 2. Preparedness to Teach Mathematics

7. Will you teach any mathematics course(s) in IDEA Public Schools next year?
   - ○ Yes
   - ○ No [SKIP TO 9]
   - ○ Unsure

   [If no] You indicated that you will **not** be teaching any mathematics courses in IDEA Public Schools next year.

   Why not?
   - ○ Teaching courses in another subject instead
   - ○ Leaving IDEA to teach elsewhere
   - ○ Leaving the teaching profession
   - ○ Other (Please explain)_____

8. [IF YES TO 7]: How well prepared do you feel to do each of the following in your future (e.g., 2024–25 school year) mathematics instruction?

	Not adequately prepared	Somewhat prepared	Fairly well prepared	Very well prepared
a. Develop students' conceptual understanding of the mathematics you teach	○	○	○	○
b. Develop students' abilities to perform mathematical procedures	○	○	○	○
c. Develop students' abilities to use mathematical tools (e.g., calculators, computer applications, physical models)	○	○	○	○
d. Develop students' awareness of STEM careers	○	○	○	○
e. Develop students' plans to pursue a STEM career	○	○	○	○

	Not adequately prepared	Somewhat prepared	Fairly well prepared	Very well prepared
f. Provide mathematics instruction that is based on students' ideas (regardless of whether the ideas are completely correct) about the topics you teach	○	○	○	○
g. Use formative assessment to monitor student learning	○	○	○	○
h. Differentiate mathematics instruction to meet the needs of diverse learners	○	○	○	○
i. Incorporate students' cultural backgrounds into mathematics instruction	○	○	○	○
j. Encourage students' interests in mathematics	○	○	○	○
k. Encourage participation of all students in mathematics	○	○	○	○

Section 3. Classroom Instruction: [course]

9. How often did **you** do each of the following in your [course] class(es) this year?

	Never	A few times a year	Once or twice a month	Once or twice a week	In all or almost all lessons
a. Explain mathematics concepts and skills or demonstrate mathematics procedures to the whole class	○	○	○	○	○
b. Engage the whole class in discussions	○	○	○	○	○
c. Have students work in small groups	○	○	○	○	○
d. Use multiple representations (e.g., graphs, symbols, diagrams, language) when explaining concepts	○	○	○	○	○
e. Use physical or virtual manipulatives to explore or represent mathematical concepts	○	○	○	○	○
f. Have students work on mathematical problem solving or exploration using a computer	○	○	○	○	○

	Never	A few times a year	Once or twice a month	Once or twice a week	In all or almost all lessons
g. Have students use computer applications to create graphs, charts, and tables	○	○	○	○	○
h. Have students work to solve a problem before teaching solution methods for that type of problem	○	○	○	○	○

10. How often did you have **students** do each of the following in your [course] class(es) this year? Please consider instructional time only, rather than homework or out-of-class activities.

	Never	A few times a year	Once or twice a month	Once or twice a week	In all or almost all lessons
a. Solve multistep problems	○	○	○	○	○
b. Solve problems that include real-world data or situations	○	○	○	○	○
c. Identify real-world problems that might be solved mathematically	○	○	○	○	○
d. Estimate quantities or check the reasonableness of an answer	○	○	○	○	○
e. Create symbolic or graphical models to represent a situation or problem	○	○	○	○	○
f. Compare and contrast different methods for solving a problem	○	○	○	○	○
g. Present their solution strategies to the rest of the class	○	○	○	○	○
h. Provide feedback on other students' mathematical products (e.g., solution strategies, explanations, data representations)	○	○	○	○	○
i. Analyze or summarize sets of data	○	○	○	○	○
j. Represent their thinking with diagrams	○	○	○	○	○
k. Explain and justify their methods for solving a problem	○	○	○	○	○
l. Write mathematical explanations or arguments	○	○	○	○	○

	Never	A few times a year	Once or twice a month	Once or twice a week	In all or almost all lessons
m. Write reflections (e.g., in their journals, on exit tickets) in class or for homework	○	○	○	○	○
n. Use properties and relationships to develop solutions to complex problems	○	○	○	○	○

Section 4. Mathematics Teaching Efficacy and Beliefs

11. How much do you agree or disagree with the following statements regarding your feelings about teaching mathematics?

	Strongly disagree	Disagree	Agree	Strongly agree
a. I am continually improving my mathematics teaching practice.	○	○	○	○
b. I know the pedagogical strategies needed to teach mathematics effectively.	○	○	○	○
c. I am confident that I can explain to students why mathematics procedures work.	○	○	○	○
d. I am confident that I can teach mathematics effectively.	○	○	○	○
e. I wonder if I have the necessary skills to teach mathematics.	○	○	○	○
f. I understand mathematics concepts well enough to be effective in teaching mathematics.	○	○	○	○
g. Given the choice, I would invite a colleague to evaluate my mathematics teaching.	○	○	○	○
h. I am confident that I can answer students' mathematics questions.	○	○	○	○
i. When a student has difficulty understanding a mathematics concept, I am confident that I know how to help the student understand it better.	○	○	○	○

	Strongly disagree	Disagree	Agree	Strongly agree
j. When teaching mathematics, I am confident enough to welcome student questions.	○	○	○	○
k. I know what to do to increase student interest in mathematics.	○	○	○	○
l. Students learn mathematics best by paying attention when I demonstrate what to do, by asking questions if they do not understand, and then by practicing.	○	○	○	○
m. A lot of things in mathematics must simply be accepted as true and remembered.	○	○	○	○
n. Students who produce correct answers have a good understanding of the mathematical concepts.	○	○	○	○
o. Students need to master basic mathematical operations before they tackle complex problems.	○	○	○	○
p. Students can figure out how to solve many new mathematics problems without being told what to do.	○	○	○	○
q. When students ask mathematics questions, it is best if I don't give the solution immediately but instead pose questions or prompt students to puzzle things out for themselves.	○	○	○	○
r. It is more beneficial to assess students based on their mathematical problem-solving methods rather than whether they got the correct answer.	○	○	○	○

Section 4(2). Feedback on [course] Curriculum Materials

12. What feedback do you have about your school's current [course] curriculum materials?

- ○ [open ended response]

Section 5. Background Information

13. Which of the following categories best describes your race/ethnicity (select all that apply)?

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic or Latino/a/x
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Other
- ☐ Prefer not to answer

14. Please indicate the highest level of education you have completed.

- o Some college, but no degree
- o Associates degree (e.g., AA, AS)
- o Bachelor's degree (e.g., BA, BS)
- o Some graduate or professional education, but no degree
- o Master's degree (e.g., MA, MS)
- o Professional degree beyond bachelor's degree (MD, DDS, JD, LLB, Specialist)
- o Doctorate degree (e.g., PhD, EdD)
- o Prefer not to answer

15. In what areas do you currently hold an endorsement, certificate, or other teaching credential (select all that apply)?

- ☐ Elementary core subjects
- ☐ Middle school core subjects
- ☐ English
- ☐ Social studies/humanities
- ☐ Mathematics
- ☐ Science
- ☐ Computer science
- ☐ Career or technical education
- ☐ Special education
- ☐ None
- ☐ Other _____

16. How much experience do you have (including this year) teaching **any subject** at any grade level?
    - 1 year; this was my first year of teaching
    - 2 years
    - 3–4 years
    - 5–7 years
    - 8–10 years
    - 11 or more years

17. How much experience do you have (including this year) teaching **any mathematics course** at any grade level?
    - 1 year; this was my first year teaching mathematics
    - 2 years
    - 3–4 years
    - 5–7 years
    - 8–10 years
    - 11 or more years

18. How much experience do you have (including this year) teaching [course]?
    - 1 year; this was my first year teaching [course]
    - 2 years
    - 3–4 years
    - 5–7 years
    - 8–10 years
    - 11 or more years

19. Have you received professional development or other supports for the [course] curriculum during 2023-2024 school year to help your instruction?
    - Yes
    - No

    19.a. [IF YES TO 19]: You indicated that you received professional development or other supports for a mathematics curriculum during the 2023-2024 school year.

    Please describe the professional development or other supports you received.
    - [open ended response]

20. If you would like us to follow up with you about your survey responses, please select one of the "Yes" responses below. If not, please select "No".
    - Yes, via phone call (Please enter your phone number) _____

- Yes, via text message (Please enter your phone number) _____
- Yes, via phone call or text message (Please enter your phone number) _____
- No

You have now reached the end of the survey. If you are ready to submit, please click the 'Submit' button below. If you would like to review your responses, you may use the 'Previous' button.

Appendix E. Teacher Survey Tables

Exhibit E–1. Spring 2022 - Spring 2024 - SCREEN: Which mathematics course(s) did you teach?

Prompt	Count	Pct
Pre-Algebra	68	21%
Algebra 1	77	23%
Algebra 2	57	17%
Geometry	64	19%
Pre-Calculus	27	8%
AP Calculus	21	6%
AP Statistics	15	5%
Count	**329**	

Exhibit E–2. Q1-1: What materials did you use when you taught Pre-Algebra in the classroom this year?

	Spring 2022	Fall 2022	Spring 2023	Spring 2024		
Prompt	Count	Count	Count	Count	Total	Pct
I taught only using my school's adopted Pre-Algebra materials.	*	*	6	5	11	25%
I taught primarily with my school's adopted Pre-Algebra materials along with a few other supplementary materials.	8	7	10	8	33	75%
I taught about half (50%) with my school's adopted Pre-Algebra materials and half (50%) with other materials.	*	0	*	*	0	0%
I taught primarily with other materials and only used my school's Pre-Algebra materials as a guide or to supplement my other, primary materials.	*	*	*	*	0	0%
I didn't use my school's adopted Pre-Algebra materials at all in my teaching.	0	*	*	0	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–3. Q2-1: Have you ever taught using a different Pre-Algebra curriculum than the one you used this year?

	Spring 2022	Fall 2022	Spring 2023	Spring 2024		
Prompt	Count	Count	Count	Count	Total	Pct
Yes	9	5	11	*	25	38%
No	8	7	10	15	40	62%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–4. Spring 2022 - Spring 2024 - Q4-1: How do your school's adopted Pre-Algebra curriculum materials compare to the other Pre-Algebra curricula you have used?

Prompt	Total	Pct
My school's Pre-Algebra curriculum materials are easier to use than other Pre-Algebra curricula.	8	31%
My school's Pre-Algebra curriculum materials are about the same as other Pre-Algebra curricula in terms of ease of use.	12	46%
My school's Pre-Algebra curriculum materials are harder to use than other Pre-Algebra curricula.	6	23%

Exhibit E–5. Spring 2022 - Spring 2024 – Q5-1: How well do your school's adopted Pre-Algebra curriculum materials promote the development of students' conceptual understanding of mathematics (e.g., understanding why, connecting to prior knowledge or applying knowledge to new situations, or providing evidence to justify answers)?

Prompt	Total	Pct
My school's Pre-Algebra curriculum materials strongly promote deeper conceptual understanding.	23	40%
My school's Pre-Algebra curriculum materials moderately promote deeper conceptual understanding.	34	60%
My school's Pre-Algebra curriculum materials weakly promote deeper conceptual understanding.	*	N/A
My school's Pre-Algebra curriculum materials do not promote deeper conceptual understanding.	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–6. Spring 2022 - Spring 2024 – Q6-1: How closely are your school's adopted Pre-Algebra curriculum materials aligned to your state's mathematics standards?

Prompt	Total	Pct
My school's Pre-Algebra curriculum materials are strongly aligned to state standards.	26	44%
My school's Pre-Algebra curriculum materials are moderately aligned to state standards.	25	42%
My school's Pre-Algebra curriculum materials are weakly aligned to state standards.	8	14%
My school's Pre-Algebra curriculum materials are not aligned to state standards.	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–7. Spring 2022 - Spring 2024 – Q1-2: What materials did you use when you taught Algebra 1 in the classroom this year?

Prompt	Total	Pct
I taught only using my school's adopted Algebra 1 materials.	12	17%
I taught primarily with my school's adopted Algebra 1 materials along with a few other supplementary materials.	30	43%
I taught about half (50%) with my school's adopted Algebra 1 materials and half (50%) with other materials.	12	17%
I taught primarily with other materials and only used my school's Algebra 1 materials as a guide or to supplement my other, primary materials.	15	22%
I didn't use my school's adopted Algebra 1 materials at all in my teaching.	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–8. Q2-2: Have you ever taught using a different Algebra 1 curriculum than the one you used this year?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Yes	6	7	8	7	28	39%
No	5	11	9	18	43	61%

Exhibit E–9. Spring 2022 - Spring 2024 – Q4-2: How do your school's adopted Algebra 1 curriculum materials compare to the other Algebra 1 curricula you have used?

Prompt	Total	Pct
My school's Algebra 1 curriculum materials are easier to use than other curriculum materials for my Algebra 1 classes.	12	43%
My school's Algebra 1 curriculum materials are about the same as other curriculum materials for Algebra 1 in terms of ease of use.	6	21%
My school's Algebra 1 curriculum materials are harder to use than other curriculum materials for Algebra 1 classes.	10	36%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–10. Q5-2: How well do your school's adopted Algebra 1 curriculum materials promote the development of students' conceptual understanding of mathematics (e.g., understanding why, connecting to prior knowledge or applying knowledge to new situations, or providing evidence to justify answers)?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
My school's Algebra 1 curriculum materials strongly promote deeper conceptual understanding.	5	10	7	11	33	61%
My school's Algebra 1 curriculum materials moderately promote deeper conceptual understanding.	*	5	5	11	21	39%
My school's Algebra 1 curriculum materials weakly promote deeper conceptual understanding.	*	*	*	*	0	0%
My school's Algebra 1 curriculum materials do not promote deeper conceptual understanding.	*	*	*	0	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–11. Q6-2: How closely are your school's adopted Algebra 1 curriculum materials aligned to your state's mathematics standards?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
My school's Algebra 1 curriculum materials are strongly aligned to state standards.	5	11	10	14	40	68%
My school's Algebra 1 curriculum materials are moderately aligned to state standards.	5	5	*	9	19	32%

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
My school's Algebra 1 curriculum materials are weakly aligned to state standards.	*	*	*	*	0	0%
My school's Algebra 1 curriculum materials are not aligned to state standards.	0	0	*	0	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–12. Q1-3: What materials did you use when you taught Algebra 2 in the classroom this year?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
I taught only using my school's adopted Algebra 2 materials.	*	*	*	10	10	32%
I taught primarily with my school's adopted Algebra 2 materials along with a few other supplementary materials.	*	5	10	6	21	68%
I taught about half (50%) with my school's adopted Algebra 2 materials and half (50%) with other materials.	0	0	*	*	0	0%
I taught primarily with other materials and only used my school's Algebra 2 materials as a guide or to supplement my other, primary materials.	0	0	*	*	0	0%
I didn't use my school's adopted Algebra 2 materials at all in my teaching.	*	0	0	0	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–13. Q2-3: Have you ever taught using a different Algebra 2 curriculum than the one you used this year?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Yes	*	7	8	7	22	45%
No	5	*	9	13	27	55%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–14. Spring 2022 - Spring 2024 – Q4-3: How do your school's adopted Algebra 2 curriculum materials compare to the other Algebra 2 curricula you have used?

Prompt	Total	Pct
My school's Algebra 2 curriculum materials are easier to use than other curriculum materials for my Algebra 2 classes.	10	45%
My school's Algebra 2 curriculum materials are about the same as other curriculum materials for Algebra 2 in terms of ease of use.	12	55%
My school's Algebra 2 curriculum materials are harder to use than other curriculum materials for Algebra 2 classes.	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–15. Q5-3: How well do your school's adopted Algebra 2 curriculum materials promote the development of students' conceptual understanding of mathematics (e.g., understanding why, connecting to prior knowledge or applying knowledge to new situations, or providing evidence to justify answers)?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
My school's Algebra 2 curriculum materials strongly promote deeper conceptual understanding.	*	*	6	7	13	28%
My school's Algebra 2 curriculum materials moderately promote deeper conceptual understanding.	5	7	8	8	28	61%
My school's Algebra 2 curriculum materials weakly promote deeper conceptual understanding.	*	0	*	5	5	11%
My school's Algebra 2 curriculum materials do not promote deeper conceptual understanding.	0	0	*	0	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–16. Q6-3: How closely are your school's adopted Algebra 2 curriculum materials aligned to your state's mathematics standards?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
My school's Algebra 2 curriculum materials are strongly aligned to state standards.	*	7	8	14	29	83%
My school's Algebra 2 curriculum materials are moderately aligned to state standards.	*	*	6	*	6	17%

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
My school's Algebra 2 curriculum materials are weakly aligned to state standards.	*	*	0	*	0	0%
My school's Algebra 2 curriculum materials are not aligned to state standards.	0	0	*	0	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–17. Spring 2022 - Spring 2024 – Q1-4: What materials did you use when you taught Geometry in the classroom this year?

Prompt	Total	Pct
I taught only using my school's adopted Geometry materials.	9	16%
I taught primarily with my school's adopted Geometry materials along with a few other supplementary materials.	30	52%
I taught about half (50%) with my school's adopted Geometry materials and half (50%) with other materials.	7	12%
I taught primarily with other materials and only used my school's Geometry materials as a guide or to supplement my other, primary materials.	7	12%
I didn't use my school's adopted Geometry materials at all in my teaching.	5	9%

Exhibit E–18. Q2-4: Have you ever taught using a different Geometry curriculum than the one you used this year?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Yes	*	*	10	15	25	56%
No	*	*	5	15	20	44%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–19. Spring 2022 - Spring 2024 – Q4-4: How do your school's adopted Geometry curriculum materials compare to the other Geometry curricula you have used?

Prompt	Total	Pct
My school's Geometry curriculum materials are easier to use than other curriculum materials for my Geometry classes.	8	29%

Prompt	Total	Pct
My school's Geometry curriculum materials are about the same as other curriculum materials for Geometry in terms of ease of use.	12	43%
My school's Geometry curriculum materials are harder to use than other curriculum materials for Geometry classes.	8	29%

Exhibit E–20. Q5-4: How well do your school's adopted Geometry curriculum materials promote the development of students' conceptual understanding of mathematics (e.g., understanding why, connecting to prior knowledge or applying knowledge to new situations, or providing evidence to justify answers)?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
My school's Geometry curriculum materials strongly promote deeper conceptual understanding.	*	*	5	14	19	42%
My school's Geometry curriculum materials moderately promote deeper conceptual understanding.	5	*	7	9	21	47%
My school's Geometry curriculum materials weakly promote deeper conceptual understanding.	0	0	0	5	5	11%
My school's Geometry curriculum materials do not promote deeper conceptual understanding.	*	0	*	*	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–21. Q6-4: How closely are your school's adopted Geometry curriculum materials aligned to your state's mathematics standards?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
My school's Geometry curriculum materials are strongly aligned to state standards.	*	*	7	17	24	77%
My school's Geometry curriculum materials are moderately aligned to state standards.	*	*	*	7	7	23%
My school's Geometry curriculum materials are weakly aligned to state standards.	*	0	*	*	*	N/A
My school's Geometry curriculum materials are not aligned to state standards.	*	0	*	0	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–22. Spring 2022 - Spring 2024 – Q1-5: What materials did you use when you taught Pre-Calculus in the classroom this year?

Prompt	Total	Pct
I taught only using my school's adopted Pre-Calculus materials.	*	N/A
I taught primarily with my school's adopted Pre-Calculus materials along with a few other supplementary materials.	14	70%
I taught about half (50%) with my school's adopted Pre-Calculus materials and half (50%) with other materials.	*	N/A
I taught primarily with other materials and only used my school's Pre-Calculus materials as a guide or to supplement my other, primary materials.	6	30%
I didn't use my school's adopted Pre-Calculus materials at all in my teaching.	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–23. Spring 2022 - Spring 2024 – Q2-5: Have you ever taught using a different Pre-Calculus curriculum than the one you used this year?

Prompt	Total	Pct
Yes	7	26%
No	20	74%

Exhibit E–24. Spring 2022 - Spring 2024 – Q4-5: How do your school's adopted Pre-Calculus curriculum materials compare to the other Pre-Calculus curricula you have used?

Prompt	Total	Pct
My school's Pre-Calculus curriculum materials are easier to use than other curriculum materials for my Pre-Calculus classes.	6	100%
My school's Pre-Calculus curriculum materials are about the same as other curriculum materials for Pre-Calculus in terms of ease of use.	0	0%
My school's Pre-Calculus curriculum materials are harder to use than other curriculum materials for Pre-Calculus classes.	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–25. Spring 2022 - Spring 2024 – Q5-5: How well do your school's adopted Pre-Calculus curriculum materials promote the development of students' conceptual understanding of mathematics (e.g., understanding why, connecting to prior knowledge or applying knowledge to new situations, or providing evidence to justify answers)?

Prompt	Total	Pct
My school's Pre-Calculus curriculum materials strongly promote deeper conceptual understanding.	14	61%
My school's Pre-Calculus curriculum materials moderately promote deeper conceptual understanding.	9	39%
My school's Pre-Calculus curriculum materials weakly promote deeper conceptual understanding.	*	N/A
My school's Pre-Calculus curriculum materials do not promote deeper conceptual understanding.	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–26. Spring 2022 - Spring 2024 – Q6-5: How closely are your school's adopted Pre-Calculus curriculum materials aligned to your state's mathematics standards?

Prompt	Total	Pct
My school's Pre-Calculus curriculum materials are strongly aligned to state standards.	20	74%
My school's Pre-Calculus curriculum materials are moderately aligned to state standards.	7	26%
My school's Pre-Calculus curriculum materials are weakly aligned to state standards.	*	N/A
My school's Pre-Calculus curriculum materials are not aligned to state standards.	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–27. Fall 2022 - Spring 2024 – Q1-6: What materials did you use when you taught AP Calculus in the classroom this year?

Prompt	Total	Pct
I taught only using my school's adopted AP Calculus materials.	*	N/A
I taught primarily with my school's adopted AP Calculus materials along with a few other supplementary materials.	12	100%
I taught about half (50%) with my school's adopted AP Calculus materials and half (50%) with other materials.	*	N/A

Prompt	Total	Pct
I taught primarily with other materials and only used my school's AP Calculus materials as a guide or to supplement my other, primary materials.	*	N/A
I didn't use my school's adopted AP Calculus materials at all in my teaching.	0	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–28. Fall 2022 - Spring 2024 – Q2-6: Have you ever taught using a different AP Calculus curriculum than the one you used this year?

Prompt	Total	Pct
Yes	14	67%
No	7	33%

Exhibit E–29. Fall 2022 - Spring 2024 – Q4-6: How do your school's adopted AP Calculus curriculum materials compare to the other AP Calculus curricula you have used?

Prompt	Total	Pct
My school's AP Calculus curriculum materials are easier to use than other curriculum materials for my AP Calculus classes.	6	55%
My school's AP Calculus curriculum materials are about the same as other curriculum materials for AP Calculus in terms of ease of use.	5	45%
My school's AP Calculus curriculum materials are harder to use than other curriculum materials for AP Calculus classes.	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–30. Fall 2022 - Spring 2024 – Q5-6: How well do your school's adopted AP Calculus curriculum materials promote the development of students' conceptual understanding of mathematics (e.g., understanding why, connecting to prior knowledge or applying knowledge to new situations, or providing evidence to justify answers)?

Prompt	Total	Pct
My school's AP Calculus curriculum materials strongly promote deeper conceptual understanding.	7	39%
My school's AP Calculus curriculum materials moderately promote deeper conceptual understanding.	11	61%
My school's AP Calculus curriculum materials weakly promote deeper conceptual understanding.	*	N/A

Prompt	Total	Pct
My school's AP Calculus curriculum materials do not promote deeper conceptual understanding.	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–31. Fall 2022 - Spring 2024 – Q6-6: How closely are your school's adopted AP Calculus curriculum materials aligned to your state's mathematics standards?

Prompt	Total	Pct
My school's AP Calculus curriculum materials are strongly aligned to state standards.	9	45%
My school's AP Calculus curriculum materials are moderately aligned to state standards.	11	55%
My school's AP Calculus curriculum materials are weakly aligned to state standards.	*	N/A
My school's AP Calculus curriculum materials are not aligned to state standards.	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–32. Fall 2022 - Spring 2024 – Q1-7: What materials did you use when you taught AP Statistics in the classroom this year?

Prompt	Total	Pct
I taught only using my school's adopted AP Statistics materials.	5	42%
I taught primarily with my school's adopted AP Statistics materials along with a few other supplementary materials.	7	58%
I taught about half (50%) with my school's adopted AP Statistics materials and half (50%) with other materials.	*	N/A
I taught primarily with other materials and only used my school's AP Statistics materials as a guide or to supplement my other, primary materials.	*	N/A
I didn't use my school's adopted AP Statistics materials at all in my teaching.	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–33. Fall 2022 - Spring 2024 – Q2-7: Have you ever taught using a different AP Statistics curriculum than the one you used this year?

Prompt	Total	Pct
Yes	6	40%
No	9	60%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–34. Fall 2022 - Spring 2024 – Q4-7: How do your school's adopted AP Statistics curriculum materials compare to the other AP Statistics curricula you have used?

Prompt	Total	Pct
Yes	*	N/A
No	*	N/A

*Not enough responses to report, less than 5 responses reported.

Exhibit E–35. Fall 2022 - Spring 2024 – Q5-7: How well do your school's adopted AP Statistics curriculum materials promote the development of students' conceptual understanding of mathematics (e.g., understanding why, connecting to prior knowledge or applying knowledge to new situations, or providing evidence to justify answers)?

Prompt	Total	Pct
My school's AP Statistics curriculum materials strongly promote deeper conceptual understanding.	7	54%
My school's AP Statistics curriculum materials moderately promote deeper conceptual understanding.	6	46%
My school's AP Statistics curriculum materials weakly promote deeper conceptual understanding.	*	N/A
My school's AP Statistics curriculum materials do not promote deeper conceptual understanding.	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–36. Fall 2022 - Spring 2024 – Q5-7: How well do your school's adopted AP Statistics curriculum materials promote the development of students' conceptual understanding of mathematics (e.g., understanding why, connecting to prior knowledge or applying knowledge to new situations, or providing evidence to justify answers)?

Prompt	Total	Pct
My school's AP Statistics curriculum materials strongly promote deeper conceptual understanding.	6	40%
My school's AP Statistics curriculum materials moderately promote deeper conceptual understanding.	9	60%
My school's AP Statistics curriculum materials weakly promote deeper conceptual understanding.	0	0%
My school's AP Statistics curriculum materials do not promote deeper conceptual understanding.	0	0%

Exhibit E–37. Spring 2022 - Spring 2024 – Q7: Will you teach any mathematics course(s) in IDEA Public Schools next year?

Prompt	Total	Pct
Yes	207	86%
No	11	5%
Unsure	22	9%

Note. This exhibit includes data for all years and for all courses.

Exhibit E–38. Spring 2022 - Spring 2024 – Q7-2: You indicated that you will not be teaching any mathematics courses in IDEA Public Schools next year. Why not?

Prompt	Total	Pct
Teaching courses in another subject instead	5	100%
Leaving IDEA to teach elsewhere	*	N/A
Leaving the teaching profession	*	N/A
Other (Please explain)	*	N/A

Note. This exhibit includes data for all years and for all courses.

*Not enough responses to report, less than 5 responses reported.

Exhibit E–39. Q8_1: Develop students' conceptual understanding of the mathematics you teach

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	0	0	*	0	0	0%
Somewhat prepared	5	5	5	5	20	9%
Fairly well prepared	20	11	22	33	86	39%
Very well prepared	17	24	39	35	115	52%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–40. Q8_2: Develop students' abilities to perform mathematical procedures

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	0	0	0	0	0	0%
Somewhat prepared	*	*	6	5	11	5%
Fairly well prepared	15	11	17	31	74	34%
Very well prepared	25	26	44	37	132	61%

*Not enough responses to report, less than 5 responses reported

Exhibit E–41. Q8_3: Develop students' abilities to use mathematical tools (e.g., calculators, computer applications, physical models)

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	*	*	*	0	0	0%
Somewhat prepared	*	*	*	6	6	3%
Fairly well prepared	16	14	20	28	78	38%
Very well prepared	22	20	41	38	121	59%

*Not enough responses to report, less than 5 responses reported

Exhibit E–42. Q8_4: Develop students' awareness of STEM careers

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	*	*	5	0	5	2%
Somewhat prepared	6	7	8	15	36	17%
Fairly well prepared	16	7	23	29	75	36%
Very well prepared	16	20	31	28	95	45%

*Not enough responses to report, less than 5 responses reported

Exhibit E–43. Q8_5: Develop students' plans to pursue a STEM career

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	*	5	6	*	11	5%
Somewhat prepared	8	6	8	14	36	17%
Fairly well prepared	16	12	20	31	79	37%
Very well prepared	14	17	33	26	90	42%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–44. Q8_6: Provide mathematics instruction that is based on students' ideas (regardless of whether the ideas are completely correct) about the topics you teach

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	*	0	*	0	0	0%
Somewhat prepared	*	9	9	8	26	12%

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Fairly well prepared	23	9	19	35	86	40%
Very well prepared	13	22	37	30	102	48%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–45. Q8_7: Use formative assessment to monitor student learning

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	0	0	0	0	0	0%
Somewhat prepared	*	*	5	*	5	2%
Fairly well prepared	10	11	14	24	59	28%
Very well prepared	31	25	48	46	150	70%

*Not enough responses to report, less than 5 responses reported

Exhibit E–46. Q8_8: Differentiate mathematics instruction to meet the needs of diverse learners

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	*	*	*	*	0	0%
Somewhat prepared	5	*	9	8	22	10%
Fairly well prepared	16	12	23	33	84	38%
Very well prepared	20	23	34	41	118	53%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–47. Q8_9: Incorporate students' cultural backgrounds into mathematics instruction

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	5	*	*	*	5	2%
Somewhat prepared	*	6	9	9	24	11%
Fairly well prepared	17	9	26	34	86	40%
Very well prepared	16	24	30	29	99	46%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–48. Q8_10: Encourage students' interests in mathematics

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	*	0	*	0	0	0%
Somewhat prepared	*	5	6	5	16	7%
Fairly well prepared	15	10	20	33	78	36%
Very well prepared	22	25	39	35	121	56%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–49. Q8_11: Encourage participation of all students in mathematics

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Not adequately prepared	*	0	*	0	0	0%
Somewhat prepared	5	*	*	*	5	2%
Fairly well prepared	14	11	23	30	78	37%
Very well prepared	22	26	40	39	127	60%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–50. Spring 2022 - Spring 2024 – Q9_1: Explain mathematics concepts and skills or demonstrate mathematics procedures to the whole class

Prompt	Count	Pct
Never	0	0%
A few times a year	*	N/A
Once or twice a month	*	N/A
Once or twice a week	20	10%
In all or almost all lessons	183	90%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–51. Spring 2022 - Spring 2024 – Q9_2: Engage the whole class in discussions

Prompt	Count	Pct
Never	0	0%
A few times a year	5	2%
Once or twice a month	19	6%
Once or twice a week	79	26%
In all or almost all lessons	206	67%

Note. This exhibit includes data for all years and for all courses.

Exhibit E–52. Spring 2022 - Spring 2024 – Q9_3: Have students work in small groups

Prompt	Count	Pct
Never	*	N/A
A few times a year	*	N/A
Once or twice a month	26	10%
Once or twice a week	86	34%
In all or almost all lessons	140	56%

Note. This exhibit includes data for all years and for all courses.

*Not enough responses to report, less than 5 responses reported.

Exhibit E–53. Spring 2022 - Spring 2024 – Q9_4: Use multiple representations (e.g., graphs, symbols, diagrams, language) when explaining concepts

Prompt	Count	Pct
Never	0	0%
A few times a year	*	N/A
Once or twice a month	8	3%
Once or twice a week	55	21%
In all or almost all lessons	196	76%

Note. This exhibit includes data for all years and for all courses.

*Not enough responses to report, less than 5 responses reported.

Exhibit E–54. Spring 2022 - Spring 2024 – Q9_5: Use physical or virtual manipulatives to explore or represent mathematical concepts

Prompt	Count	Pct
Never	*	N/A
A few times a year	17	7%
Once or twice a month	51	20%
Once or twice a week	97	38%
In all or almost all lessons	90	35%

Note. This exhibit includes data for all years and for all courses.

*Not enough responses to report, less than 5 responses reported.

Exhibit E–55. Spring 2022 - Spring 2024 – Q9_6: Have students work on mathematical problem solving or exploration using a computer

Prompt	Count	Pct
Never	*	N/A
A few times a year	33	17%
Once or twice a month	44	22%
Once or twice a week	65	33%
In all or almost all lessons	57	29%

Note. This exhibit includes data for all years and for all courses.
* Not enough responses to report, less than 5 responses reported.

Exhibit E–56. Spring 2022 - Spring 2024 – Q9_7: Have students use computer applications to create graphs, charts, and tables

Prompt	Count	Pct
Never	28	11%
A few times a year	38	15%
Once or twice a month	57	22%
Once or twice a week	63	24%
In all or almost all lessons	74	28%

Note. This exhibit includes data for all years and for all courses.

Exhibit E–57. Spring 2022 - Spring 2024 – Q9_8: Have students work to solve a problem before teaching solution methods for that type of problem

Prompt	Count	Pct
Never	10	4%
A few times a year	23	9%
Once or twice a month	38	15%
Once or twice a week	81	31%
In all or almost all lessons	108	42%

Note. This exhibit includes data for all years and for all courses.

Exhibit E–58. Spring 2022 - Spring 2024 – Q10_1: Solve multistep problems

Prompt	Count	Pct
Never	0	0%
A few times a year	0	0%
Once or twice a month	*	N/A
Once or twice a week	39	16%
In all or almost all lessons	210	84%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–59. Spring 2022 - Spring 2024 – Q10_2: Solve problems that include real-world data or situations

Prompt	Count	Pct
Never	*	N/A
A few times a year	7	3%
Once or twice a month	10	4%
Once or twice a week	86	34%
In all or almost all lessons	149	59%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–60. Spring 2022 - Spring 2024 – Q10_3: Identify real-world problems that might be solved mathematically

Prompt	Count	Pct
Never	*	N/A
A few times a year	10	4%
Once or twice a month	24	10%
Once or twice a week	73	29%
In all or almost all lessons	142	57%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–61. Spring 2022 - Spring 2024 – Q10_4: Estimate quantities or check the reasonableness of an answer

Prompt	Count	Pct
Never	*	N/A
A few times a year	*	N/A
Once or twice a month	19	8%
Once or twice a week	84	34%
In all or almost all lessons	146	59%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–62. Spring 2022 - Spring 2024 – Q10_5: Create symbolic or graphical models to represent a situation or problem

Prompt	Count	Pct
Never	*	N/A
A few times a year	7	3%
Once or twice a month	15	6%
Once or twice a week	111	44%
In all or almost all lessons	117	47%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–63. Spring 2022 - Spring 2024 – Q10_6: Compare and contrast different methods for solving a problem

Prompt	Count	Pct
Never	*	N/A
A few times a year	10	4%
Once or twice a month	15	6%
Once or twice a week	85	34%
In all or almost all lessons	139	56%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–64. Spring 2022 - Spring 2024 – Q10_7: Present their solution strategies to the rest of the class

Prompt	Count	Pct
Never	*	N/A
A few times a year	12	5%
Once or twice a month	30	12%
Once or twice a week	96	38%
In all or almost all lessons	112	45%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–65. Spring 2022 - Spring 2024 – Q10_8: Provide feedback on other students' mathematical products (e.g., solution strategies, explanations, data representations)

Prompt	Count	Pct
Never	*	N/A
A few times a year	7	3%
Once or twice a month	28	11%
Once or twice a week	79	32%
In all or almost all lessons	132	54%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–66. Spring 2022 - Spring 2024 – Q10_9: Analyze or summarize sets of data

Prompt	Count	Pct
Never	7	3%
A few times a year	17	7%
Once or twice a month	34	14%
Once or twice a week	80	32%
In all or almost all lessons	111	45%

Note. This exhibit includes data for all years and for all courses.

Exhibit E–67. Spring 2022 - Spring 2024 – Q10_10: Represent their thinking with diagrams

Prompt	Count	Pct
Never	11	4%
A few times a year	19	8%
Once or twice a month	46	18%
Once or twice a week	83	33%
In all or almost all lessons	91	36%

Note. This exhibit includes data for all years and for all courses.

Exhibit E–68. Spring 2022 - Spring 2024 – Q10_11: Explain and justify their methods for solving a problem

Prompt	Count	Pct
Never	*	N/A
A few times a year	8	3%
Once or twice a month	22	9%
Once or twice a week	69	28%
In all or almost all lessons	149	60%

Note. This exhibit includes data for all years and for all courses.
*Not enough responses to report, less than 5 responses reported.

Exhibit E–69. Spring 2022 - Spring 2024 – Q10_12: Write mathematical explanations or arguments

Prompt	Count	Pct
Never	7	3%
A few times a year	21	8%
Once or twice a month	37	14%
Once or twice a week	75	28%
In all or almost all lessons	128	48%

Note. This exhibit includes data for all years and for all courses.

Exhibit E–70. Spring 2022 - Spring 2024 – Q10_13: Write reflections (e.g., in their journals, on exit tickets) in class or for homework

Prompt	Count	Pct
Never	22	9%
A few times a year	25	10%
Once or twice a month	42	17%
Once or twice a week	69	28%
In all or almost all lessons	92	37%

Note. This exhibit includes data for all years and for all courses.

Exhibit E–71. Spring 2022 - Spring 2024 – Q10_14: Use properties and relationships to develop solutions to complex problems

Prompt	Count	Pct
Never	8	3%
A few times a year	9	4%
Once or twice a month	21	8%
Once or twice a week	87	35%
In all or almost all lessons	125	50%

Note. This exhibit includes data for all years and for all courses.

Exhibit E–72. Q11_1: I am continually improving my mathematics teaching practice.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	0	0	0%
Disagree	*	0	*	0	0	0%
Agree	8	7	9	13	37	18%
Strongly agree	32	32	48	59	171	82%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–73. Q11_2: I know the pedagogical strategies needed to teach mathematics effectively.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	0	0	0%
Disagree	*	0	*	*	0	0%
Agree	17	20	22	27	86	42%
Strongly agree	22	19	35	44	120	58%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–74. Q11_3: I am confident that I can explain to students why mathematics procedures work.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	0	0	0%
Disagree	0	0	*	*	0	0%
Agree	15	12	17	20	64	31%
Strongly agree	25	27	40	51	143	69%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–75. Q11_4: I am confident that I can teach mathematics effectively.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	0	0	0%
Disagree	0	0	0	0	0	0%
Agree	10	14	15	22	61	29%
Strongly agree	31	25	43	50	149	71%

Exhibit E–76. Q11_5: I wonder if I have the necessary skills to teach mathematics.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	11	9	23	13	56	27%
Disagree	18	12	9	25	64	30%
Agree	5	5	8	15	33	16%
Strongly agree	7	13	18	19	57	27%

Exhibit E–77. Q11_6: I understand mathematics concepts well enough to be effective in teaching mathematics.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	*	0	0	0%
Disagree	0	0	0	*	0	0%
Agree	14	11	11	14	50	24%
Strongly agree	26	28	46	57	157	76%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–78. Q11_7: Given the choice, I would invite a colleague to evaluate my mathematics teaching.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	*	0	0%
Disagree	*	*	*	*	0	0%
Agree	21	14	16	32	83	42%
Strongly agree	17	23	39	38	117	59%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–79. Q11_8: I am confident that I can answer students' mathematics questions.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	0	0	0%
Disagree	*	0	0	0	0	0%
Agree	8	12	11	23	54	26%
Strongly agree	31	27	47	49	154	74%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–80. Q11_9: When a student has difficulty understanding a mathematics concept, I am confident that I know how to help the student understand it better.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	0	0	0%
Disagree	*	*	*	*	0	0%
Agree	14	13	14	27	68	33%
Strongly agree	25	25	43	44	137	66%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–81. Q11_10: When teaching mathematics, I am confident enough to welcome student questions.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	0	0	0%
Disagree	*	0	0	0	0	0%
Agree	*	9	9	23	41	20%
Strongly agree	36	30	49	48	163	80%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–82. Q11_11: I know what to do to increase student interest in mathematics.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	*	0	0	*	0	0%
Disagree	8	*	6	*	14	7%
Agree	15	20	22	40	97	48%
Strongly agree	17	15	30	29	91	45%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–83. Q11_12: Students learn mathematics best by paying attention when I demonstrate what to do, by asking questions if they do not understand, and then by practicing.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	*	0	0%
Disagree	*	*	6	*	6	3%
Agree	14	13	10	26	63	31%
Strongly agree	24	22	42	44	132	66%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–84. Q11_13: A lot of things in mathematics must simply be accepted as true and remembered.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	*	6	6	7	19	9%
Disagree	18	8	18	17	61	29%
Agree	13	14	11	27	65	31%
Strongly agree	8	11	23	21	63	30%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–85. Q11_14: Students who produce correct answers have a good understanding of the mathematical concepts.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	*	*	*	0	0	0%
Disagree	10	9	13	14	46	22%
Agree	20	15	21	32	88	43%
Strongly agree	10	13	22	26	71	35%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–86. Q11_15: Students need to master basic mathematical operations before they tackle complex problems.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	*	0	0	0	0%
Disagree	*	*	*	*	0	0%
Agree	10	16	16	23	65	33%
Strongly agree	29	17	40	47	133	67%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–87. Q11_16: Students can figure out how to solve many new mathematics problems without being told what to do.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	*	*	*	0	0	0%
Disagree	11	9	15	23	58	29%
Agree	15	14	23	24	76	37%
Strongly agree	12	14	18	25	69	34%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–88. Q11_17: When students ask mathematics questions, it is best if I don't give the solution immediately but instead pose questions or prompt students to puzzle things out for themselves.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	0	0	0%
Disagree	0	0	*	0	0	0%
Agree	10	15	16	30	71	34%
Strongly agree	31	24	40	42	137	66%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–89. Q11_18: It is more beneficial to assess students based on their mathematical problem-solving methods rather than whether they got the correct answer.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Strongly disagree	0	0	0	0	0	0%
Disagree	*	*	*	*	0	0%
Agree	11	13	18	32	74	37%
Strongly agree	28	23	37	37	125	63%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–90. Q3: Have students work in small groups

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	0	0	0	0	0%
A few times a year	0	0	*	0	0	0%
Once or twice a month	0	*	*	*	0	0%
Once or twice a week	*	*	*	7	7	26%
In all or almost all lessons	*	*	9	11	20	74%

*Not enough responses to report, less than 5 responses reported

Exhibit E–91. Q4: Use multiple representations (e.g., graphs, symbols, diagrams, language) when explaining concepts

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	0	0	0	0	0%
A few times a year	0	0	0	0	0	0%
Once or twice a month	0	0	*	*	0	0%
Once or twice a week	*	*	5	*	5	12%
In all or almost all lessons	7	6	9	14	36	88%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–92. Q5: Use physical or virtual manipulatives to explore or represent mathematical concepts

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	*	0	*	0	0%
A few times a year	0	0	*	*	0	0%
Once or twice a month	*	*	*	*	0	0%
Once or twice a week	*	5	*	6	11	48%
In all or almost all lessons	*	0	6	6	12	52%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–93. Q6: Have students work on mathematical problem solving or exploration using a computer

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	*	0	*	*	0	0%
A few times a year	*	*	0	7	7	39%
Once or twice a month	*	*	*	*	0	0%
Once or twice a week	0	*	5	6	11	61%
In all or almost all lessons	*	0	*	*	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–94. Q9: Have students use computer applications to create graphs, charts, and tables

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	*	0	*	*	0	0%
A few times a year	0	*	0	*	0	0%
Once or twice a month	*	*	5	*	5	50%
Once or twice a week	*	*	*	*	0	0%
In all or almost all lessons	*	*	*	5	5	50%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–95. Q10: Have students work to solve a problem before teaching solution methods for that type of problem

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	*	*	0	*	0	0%
A few times a year	*	*	0	*	0	0%
Once or twice a month	*	*	5	*	5	20%
Once or twice a week	*	*	*	8	8	32%
In all or almost all lessons	*	*	7	5	12	48%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–96. Q12: Solve multistep problems

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	0	0	0	0	0%
A few times a year	0	0	0	0	0	0%
Once or twice a month	0	0	0	0	0	0%
Once or twice a week	*	*	*	*	0	0%
In all or almost all lessons	6	6	12	17	41	100%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–97. Q17: Solve problems that include real-world data or situations

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	0	0	0	0	0%
A few times a year	0	0	*	0	0	0%
Once or twice a month	*	*	*	*	0	0%
Once or twice a week	*	*	*	10	10	31%
In all or almost all lessons	5	*	9	8	22	69%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–98. Q20: Identify real-world problems that might be solved mathematically

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	0	0	0	0	0%
A few times a year	0	0	*	0	0	0%
Once or twice a month	*	*	*	*	0	0%
Once or twice a week	*	*	*	10	10	38%
In all or almost all lessons	*	*	9	7	16	62%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–99. Q21: Estimate quantities or check the reasonableness of an answer

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	0	0	0	0	0%
A few times a year	*	0	0	0	0	0%
Once or twice a month	*	*	*	*	0	0%
Once or twice a week	0	*	5	6	11	31%
In all or almost all lessons	6	*	8	11	25	69%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–100. Q22: Create symbolic or graphical models to represent a situation or problem

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	0	0	0	0	0%
A few times a year	0	0	*	0	0	0%
Once or twice a month	*	0	*	0	0	0%
Once or twice a week	*	*	*	11	11	41%
In all or almost all lessons	*	*	8	8	16	59%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–101. Q23: Compare and contrast different methods for solving a problem

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	*	0	0	0	0	0%
A few times a year	0	0	*	0	0	0%
Once or twice a month	0	0	*	*	0	0%
Once or twice a week	*	*	*	7	7	23%
In all or almost all lessons	*	5	8	11	24	77%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–102. Q24: Present their solution strategies to the rest of the class

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	0	*	0	0	0%
A few times a year	0	0	*	*	0	0%
Once or twice a month	*	*	*	0	0	0%
Once or twice a week	*	*	6	9	15	43%
In all or almost all lessons	*	5	6	9	20	57%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–103. Q25: Provide feedback on other students' mathematical products (e.g., solution strategies, explanations, data representations)

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	*	0	*	0	0	0%
A few times a year	0	0	0	0	0	0%
Once or twice a month	0	*	5	*	5	17%
Once or twice a week	*	*	*	6	6	20%
In all or almost all lessons	*	5	8	11	24	80%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–104. Q26: Analyze or summarize sets of data

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	*	0	0	0	0	0%
A few times a year	*	*	*	*	0	0%
Once or twice a month	*	*	*	5	5	21%
Once or twice a week	*	0	*	5	5	21%
In all or almost all lessons	*	5	7	7	19	79%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–105. Q27: Represent their thinking with diagrams

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	*	0	*	0	0	0%
A few times a year	*	*	*	*	0	0%
Once or twice a month	*	0	*	*	0	0%
Once or twice a week	*	*	*	10	10	63%
In all or almost all lessons	*	*	6	*	6	38%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–106. Q28: Explain and justify their methods for solving a problem

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	0	0	*	0	0%
A few times a year	0	*	*	0	0	0%
Once or twice a month	*	0	*	*	0	0%
Once or twice a week	*	*	*	*	0	0%
In all or almost all lessons	*	5	9	13	27	100%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–107. Q29: Write mathematical explanations or arguments

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	0	0	0	*	0	0%
A few times a year	*	*	*	0	0	0%
Once or twice a month	*	*	*	*	0	0%
Once or twice a week	*	*	*	*	0	0%
In all or almost all lessons	*	*	7	13	20	100%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–108. Q30: Write reflections (e.g., in their journals, on exit tickets) in class or for homework

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	*	0	*	*	0	0%
A few times a year	*	*	*	*	0	0%
Once or twice a month	*	*	*	*	0	0%
Once or twice a week	*	*	*	7	7	37%
In all or almost all lessons	*	*	6	6	12	63%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–109. Q31: Use properties and relationships to develop solutions to complex problems

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Never	*	0	*	0	0	0%
A few times a year	0	*	0	0	0	0%
Once or twice a month	0	*	*	*	0	0%
Once or twice a week	5	*	*	9	14	45%
In all or almost all lessons	*	*	10	7	17	55%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–110. Q11_1: Q13: Which of the following categories best describes your race/ethnicity? Select all that apply.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
American Indian or Alaska Native	0	*	*	0	0	0%
Asian	*	*	*	*	0	0%
Black or African American	5	*	*	6	11	6%
Hispanic or Latino/a/x	20	22	38	51	131	66%
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	0%
White	10	13	15	19	57	29%
Other	*	*	*	0	0	0%
Prefer not to answer	*	*	*	*	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–111. Q14: Please indicate the highest level of education you have completed.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Some college, but no degree	0	0	0	0	0	0%
Associates degree (e.g., AA, AS)	0	0	0	0	0	0%
Bachelor's degree (e.g., BA, BS)	24	20	31	48	123	62%
Some graduate or professional education, but no degree	5	*	7	5	17	9%
Master's degree (e.g., MA, MS)	11	16	16	16	59	30%
Professional degree beyond Bachelor's degree (MD, DDS, JD, LLB, Specialist)	0	0	*	*	0	0%
Doctorate degree (e.g., PhD, EdD)	0	*	0	*	0	0%
Prefer not to answer	*	*	0	*	0	0%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–112. Q18: In what areas do you currently hold an endorsement, certificate, or other teaching credential? Select all that apply.

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
Elementary core subjects	*	*	*	10	10	5%
Middle school core subjects	*	9	7	11	27	12%
English	*	*	*	*	0	0%
Social studies/humanities	*	0	*	*	0	0%
Mathematics	22	22	31	37	112	50%
Science	*	*	5	*	5	2%
Computer science	0	0	0	*	0	0%
Career or technical education	*	0	*	0	0	0%
Special education	0	*	6	6	12	5%
None	12	11	13	10	46	21%
Other	5	*	5	*	10	5%
					222	

*Not enough responses to report, less than 5 responses reported.

Exhibit E–113. Q15: How much experience do you have (including this year) teaching any subject at any grade level?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
1 year; this was my first year of teaching	8	6	10	11	35	18%
2 years	*	5	7	5	17	9%
3-4 years	13	*	8	18	39	20%
5-7 years	8	6	9	12	35	18%
8-10 years	*	*	5	6	11	6%
11 or more years	10	15	18	20	63	32%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–114. Q16: How much experience do you have (including this year) teaching any mathematics course at any grade level?

Prompt	Spring 2022 Count	Fall 2022 Count	Spring 2023 Count	Spring 2024 Count	Total	Pct
1 year; this was my first year teaching mathematics	7	6	10	14	37	19%
2 years	6	5	7	7	25	13%
3-4 years	10	*	10	17	37	19%
5-7 years	9	6	9	11	35	18%
8-10 years	*	*	*	7	7	4%
11 or more years	8	15	17	16	56	28%

*Not enough responses to report, less than 5 responses reported.

Exhibit E–115. Spring 2022 - Spring 2024 – Q33-1: Have you received professional development or other supports during the school year to help your mathematics instruction?

Prompt	Count	Pct
Yes	174	82%
No	38	18%

Appendix F. Student Survey Tables

Exhibit F–1. Fall 2021

	Total	Total N	Treatment	Treatment N	Comparison	Comparison N
Behavioral Engagement	3.18	(1,789)	3.17	(943)	3.18	(846)
Cognitive Engagement	3.16	(1,719)	3.16	(909)	3.17	(810)
Emotional Engagement	3.05	(1,789)	3.08	(943)	3.02	(846)
Social Engagement	3.14	(1,789)	3.16	(943)	3.12	(846)
Confidence	2.97	(1,742)	2.98	(910)	2.97	(832)
Interest	2.93	(1,742)	2.93	(910)	2.93	(832)
Postsecondary Outcomes	2.83	(1,710)	2.85	(894)	2.81	(816)

Exhibit F–2. Fall 2021: Do you plan to take any math classes next year that are not required?

Answer option	What grade are you in this year?				Total
	9	10	11	12	
I don't know.	239	259	117	6	382
I would take an elective math class, but my school does not offer any others.	30	34	23	*	57
No	139	166	63	6	235
Yes	125	150	66	5	221
Total	533	609	269	17	895

*Not enough responses to report, less than 5 responses reported.

Exhibit F–3. Spring 2022

	Total	Total N	Treatment	Treatment N	Comparison	Comparison N
Behavioral Engagement	3.08	(588)	3.14	(240)	3.05	(348)
Cognitive Engagement	3.03	(588)	3.08	(240)	3.00	(348)
Emotional Engagement	2.82	(588)	2.91	(240)	2.76	(348)
Social Engagement	3.08	(588)	3.09	(240)	3.07	(348)
Confidence	2.88	(575)	2.89	(236)	2.88	(339)
Interest	2.85	(575)	2.86	(236)	2.84	(339)
Postsecondary Outcomes	2.82	(562)	2.78	(232)	2.85	(330)

Exhibit F–4. Spring 2022: Do you plan to take any math classes next year that are not required?

Answer option	Which grade are you in this year?				Total
	9	10	11	12	
I don't know	9	85	*	0	94
I would take an elective math class, but my school does not offer any others.	*	15	0	0	15
No	5	67	9	0	81
Yes	10	66	6	0	82
Total	24	233	15	0	272

*Not enough responses to report, less than 5 responses reported.

Exhibit F–5. Fall 2022

	Total	Total N	Treatment	Treatment N	Comparison	Comparison N
Behavioral Engagement	3.11	(4,658)	3.13	(1,158)	3.11	(3,500)
Cognitive Engagement	3.06	(4,658)	3.07	(1,158)	3.05	(3,500)
Emotional Engagement	3.03	(4,658)	3.05	(1,158)	3.03	(3,500)
Social Engagement	3.10	(4,658)	3.11	(1,158)	3.10	(3,500)
Confidence	2.94	(4,470)	2.96	(1,107)	2.94	(3,363)
Interest	2.92	(4,470)	2.94	(1,107)	2.91	(3,363)
Postsecondary Outcomes	2.86	(4,365)	2.89	(1,078)	2.85	(3,287)

Exhibit F–6. Fall 2022: Do you plan to take any math classes next year that are not required?

Answer option	What grade are you in this year?				Total
	9	10	11	12	
I don't know	144	181	97	13	435
I would take an elective math class, but my school does not offer any others.	20	62	17	0	99
No	101	208	75	10	394
Yes	112	173	91	*	376
Total	377	624	280	23	1,304

*Not enough responses to report, less than 5 responses reported.

Exhibit F–7. Spring 2023

	Total	Total N	Treatment	Treatment N	Comparison	Comparison N
Behavioral Engagement	3.05	(2,987)	3.16	(325)	3.04	(2,662)
Cognitive Engagement	3.04	(2,987)	3.10	(325)	3.03	(2,662)
Emotional Engagement	2.83	(2,987)	2.95	(325)	2.82	(2,662)
Social Engagement	3.06	(2,987)	3.09	(325)	3.06	(2,662)
Confidence	2.95	(2,939)	2.99	(322)	2.95	(2,617)
Interest	2.88	(2,939)	2.99	(322)	2.87	(2,617)
Postsecondary Outcomes	2.86	(2,896)	2.85	(322)	2.87	(2,578)

Exhibit F–8. Spring 2023: Do you plan to take any math classes next year that are not required?

Answer option	What grade are you in this year?				Total
	9	10	11	12	
I don't know	166	139	47	17	369
I would take an elective math class, but my school does not offer any others.	56	28	*	*	84
No	152	157	45	30	384
Yes	186	99	66	36	387
Total	560	423	158	83	1,224

*Not enough responses to report, less than 5 responses reported.

Exhibit F–9. Spring 2024

	Total	Total N	Treatment	Treatment N	Comparison	Comparison N
Behavioral Engagement	3.06	(2,399)	3.06	(398)	3.05	(2,001)
Cognitive Engagement	3.05	(2,399)	3.05	(398)	3.05	(2,001)
Emotional Engagement	2.86	(2,399)	2.79	(398)	2.87	(2,001)
Social Engagement	3.05	(2,399)	3.08	(398)	3.04	(2,001)
Confidence	2.86	(2,322)	2.86	(388)	3.04	(1,934)
Interest	2.80	(2,322)	2.81	(388)	2.80	(1,934)
Postsecondary Outcomes	2.75	(2,283)	2.82	(381)	2.74	(1,902)

Exhibit F–10. Spring 2024: Do you plan to take any math classes next year that are not required?

Answer option	What grade are you in this year?				Total
	9	10	11	12	
I don't know	192	132	31	85	440
I would take an elective math class, but my school does not offer any others.	53	38	9	5	105
No	129	127	40	90	386
Yes	159	115	22	61	357
Total	533	412	102	241	1,288

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AIR® Headquarters
1400 Crystal Drive, 10th Floor
Arlington, VA 22202-3289
+1.202.403.5000 | **AIR.ORG**

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