

Everyday Mathematics and Math Performance in Minnesota

Executive Summary

The *Everyday Mathematics* (EM) team requested an analysis of math performance as assessed by the Minnesota Comprehensive Assessment (MCA) in Minnesota. State test results were retrieved from the Minnesota state website for school years 2018-2019, 2020-2021, and 2021-2022 and merged with McGraw Hill internal data to identify districts using EM. Those districts were compared with other Minnesota districts that used other math curricula. Coarsened Exact Matching was used to match EM districts with similar non-EM districts based on percentage of students receiving Free or Reduced Lunch and Special Education Services.

Sample

Data were analyzed at the district level, with grades 3-5 included in the analyses. In 18-19, 39 districts in Minnesota used EM, in 20-21, 42 districts used it, and in 2021-2022, there were 47 districts. EM districts were compared with more than 480 Minnesota districts that did not use EM. Districts without MCA scores were not included in the analyses.

Results

Overall, EM districts had higher scores than non-EM districts across grades and school years. Statistically significant differences emerged in 2018-19 and 2020-21, wherein grade 4 students in EM districts outperformed their non-EM matched peers, in 2018-19, 3rd grade students performed better, and in 2021-22, grade 5 EM students had higher scores. For all significant differences, the effect sizes were small to medium.

Conclusion

Everyday Mathematics districts in Minnesota experienced improved math performance in certain elementary school grades; four of the nine analyses revealed significantly higher scores in the MCA in EM districts compared to demographically matched non-EM districts. Overall, scores across grades were in the same achievement levels between the two types of districts.

As student level data is not available, it is not possible to examine the effects of continued exposure to the program on performance; however, most districts who used EM in 2018-2019 continued its use until at least 2021-2022. Additionally, the extent to which EM was used in the districts that had purchased licenses is unknown.

The learning losses associated with the COVID-19 pandemic can also be observed, with EM and non-EM districts showing average decreases of approximately 4 points from 2018-19 to 2020-2021.

Disclaimer

Mathematics assessment scores can improve due to a number of factors, including the innate ability and prior education of the students participating, as well as differences among teachers and their pedagogies. We believe that, even taking these factors into account, *Everyday Mathematics* can contribute to improvements in student outcomes.

Method

Data were analyzed separately across three school years: 2018-2019, 2020-2021, and 2021-2022, as well as across grades (3-5). District's *Everyday Mathematics* (EM) status (EM vs. non-EM) was determined by whether the district had an active EM license during the school year. Additionally, as the EM curriculum changes across school years, each grade was analyzed separately. Due to the COVID-19 pandemic, state test data were not available for the 2019-2020 school year.

The Minnesota Comprehensive Assessment (MCA) reports scale score ranges per grade. For grade 3, scores range from 315-399, with scores 340 and higher classified as 'Partially Meeting Expectations', and scores 350 and higher in the achievement level of 'Meeting Expectations'. For grade 4, scores range from 409-499, with scores 440 and higher classified as 'Partially Meeting Expectations' and scores 450 and higher 'Meeting Expectations'. Lastly, for grade 5, scores range from 515 to 586, with scores 540 and above classified as 'Partially Meeting Expectations' and scores 550 and higher 'Meeting Expectations'.

All analyses were conducted in R Studio. Coarsened Exact Matching (CEM) was used, with the goal of matching on the covariates (percent of students on free or reduced lunch [FRL %] and percent of students receiving special education services [SPED %]). To estimate treatment effect after matching, a linear regression model was fit to data to estimate the average treatment effect. Student math performance (MCA math average score) was the outcome, and treatment (i.e., EM districts vs. non-EM districts) and covariates (FRL % and SPED %) were included as predictors. The `lm()` function was used to estimate the effects and standard errors. The matching weights were applied in the estimation. The adjusted R-squared is provided, which indicates how much of the model variance can be explained by the predictors, with higher values indicating better model fit. Additionally, Analyses of Covariance (ANCOVA) were employed to determine the magnitude of the difference in scores between the two groups using FRL and SPED as covariates. Cohen's *d* was used as a measure of effect size. To control for the six statistical tests performed within school years, the Bonferroni correction was used; the alpha value of 0.01 (0.05/6) was set for each grade level within each school year.

On average, during the three school years examined, treatment districts used EM for an average of 2.33 years; the majority of treatment districts (60.42%) used EM for all school years examined. Out of the 39 districts who used EM in 2018-2019, 31 (79%) continued to use it in 2020-2021, and 29 (74%) in 2021-2022.

Results

2018-2019

Table 1. Average MCA scores and FRL and SPED % Before Matching 2018-2019

Grade	Non-EM Districts			EM Districts		
	MCA Average	FRL %	SPED %	MCA Average	FRL %	SPED %
3	353.21	47.70%	21.62%	357.11	37.25%	15.12%
4	452.94	48.74%	22.44%	457.05	38.24%	15.15%
5	547.04	47.03%	21.90%	549.38	36.55%	15.77%

Table 2. Average MCA scores and FRL and SPED % After Matching 2018-2019

Grade	Non – EM Districts			EM Districts		
	MCA Avg (SD)	FRL %	SPED %	MCA Avg (SD)	FRL %	SPED %
3	355 (5.30)	37.12%	15.50%	357 (3.74)	37.25%	15.12%
4	455 (5.57)	38.49	15.37%	457 (4.83)	38.24%	15.15%
5	549 (4.97)	36.13%	15.40%	549 (4.19)	36.55%	15.77%

Table 3. Matching Results 2018-2019

Grade	FRL %		SPED %	
	SMD	Variance Ratio	SMD	Variance Ratio
3	0.01	1.12	-0.07	0.88
4	-0.02	1.06	-0.04	0.85
5	0.03	1.09	0.06	1.22

Grade 3

There were 280 control districts matched with 39 treatment districts. A linear regression predicting MCA average score between control and treatment districts was significant, $F(3, 306) = 37.27, p < .001$. EM District status was a significant predictor, $B = 1.63, p = .038$, indicating that EM districts scored, on average, 1.63 points higher than non-EM districts. The model explained 26% of the variance. The ANCOVA comparing districts' average MCA was not significant after correcting for multiple comparisons, $F(1,306) = 4.59, p = 0.03, d = .44$; however, the effect size was medium.

Grade 4

There were 267 control districts matched with 39 treatment districts. The linear regression was significant, $F(3, 297) = 47.79, p < .001$. EM District status was a significant predictor, $B = 1.64, p = 0.04$, indicating that EM districts scored, on average, 1.64 points higher than non-EM districts. The model explained 32% of the variance. The ANCOVA comparing districts' average scores was not significant after correcting for multiple comparisons, $F(1,297) = 4.68, p = 0.03, d = .38$; however, the effect size was medium.

Grade 5

There were 268 control districts matched with 39 treatment districts. After matching, a linear regression predicting MCA average score between control and treatment districts was not significant. Similarly, results from an ANCOVA were not significant.

2020-2021

Table 4. Average MCA scores and FRL and SPED % Before Matching 2020-2021

Grade	Non-EM District			EM District		
	MCA Average	FRL %	SPED %	MCA Average	FRL %	SPED %
3	348.93	43.08%	22.09%	352.98	32.26%	18.00%
4	447.27	43.88%	22.54%	452.46	33.33%	17.26%
5	542.38	42.58%	22.19%	546.37	32.43%	15.45%

Table 5. Average MCA scores and FRL and SPED % After Matching 2020-2021

Grade	Non – EM Districts			EM Districts		
	MCA Avg (SD)	FRL %	SPED %	MCA Avg (SD)	FRL %	SPED %
3	352 (5.88)	30.80%	17.4%	353 (4.61)	31.00%	16.5%
4	450 (7.44)	34.33%	17.27%	452 (5.26)	33.33%	17.26%
5	545 (5.55)	31.20%	15.47%	546 (4.42)	31.49%	14.78%

Table 6. Matching Results 2020-2021

Grade	FRL %		SPED %	
	SMD	Variance Ratio	SMD	Variance Ratio
3	-0.02	1.03	-0.10	1.12
4	-0.06	0.96	-0.001	1.04
5	0.02	1.04	-0.09	1.32

Grade 3

249 control districts were matched with 40 treatment districts. After CEM, the linear regression model was significant, $F(3, 279) = 40.12, p < .001$; however, EM district status as a predictor was not significant. The ANCOVA was also non-significant, indicating that the districts performed comparably.

Grade 4

291 control districts were matched with 42 treatment districts. After CEM, the linear regression was significant, $F(3, 316) = 65.28, p < .001$, with districts' EM use as a significant predictor, $B = 2.40, p = 0.01$, indicating that EM districts scored, on average, 2.40 points higher than non-EM districts. The model explained 38% of the total variance. An ANCOVA examining districts' average MCA scores was significant, $F(1, 316) = 8.16, p = 0.01, d = 0.31$, with a small to medium effect sized.

Grade 5

263 control districts were matched with 41 treatment districts. After CEM, the linear regression was significant, $F(3, 294) = 36.61, p < .001$; however, districts' EM status was not a significant predictor. An ANCOVA was non-significant.

2021-2022

Table 7. Average MCA scores and FRL and SPED % Before Matching 2021-2022

Grade	Non-EM Districts			EM Districts		
	MCA Average	FRL %	SPED %	MCA Average	FRL %	SPED %
3	349.90	42.83%	22.20%	353.88	28.02%	19.32%
4	448.50	41.22%	23.20%	453.80	29.77%	18.55%
5	542.91	41.00%	22.94%	546.83	31.66%	17.47%

Table 8. Average MCA scores and FRL and SPED % After Matching 2021-2022

Grade	Non – EM Districts			EM Districts		
	MCA Avg (SD)	FRL %	SPED %	MCA Avg (SD)	FRL %	SPED %
3	353 (5.29)	28.37%	19.23%	354 (4.61)	28.02%	19.32%
4	452 (6.25)	28.99%	17.35%	454 (5.43)	28.91%	17.96%
5	545 (5.76)	31.23%	17.79%	547 (3.73)	31.66%	17.47%

Table 9. Matching Results 2021-2022

Grade	FRL %		SPED %	
	SMD	Variance Ratio	SMD	Variance Ratio
3	-0.02	1.01	0.01	0.88
4	-0.01	0.10	0.07	0.86
5	0.03	0.97	-0.06	0.86

Grade 3

239 control districts were matched with 47 EM districts. The linear regression was significant, $F(3, 278) = 38.43, p < .001$; however, EM district status was not a significant predictor. The ANCOVA was non-significant.

Grade 4

279 control districts were matched with 46 EM districts. The linear regression was significant, $F(3, 311) = 60.67, p < .001$; however, EM district status was not a significant predictor. The ANCOVA was similarly non-significant.

Grade 5

280 control districts were matched with 47 treatment districts. The linear regression was significant, $F(3,315) = 52.11, p < .001$, with EM district status as a significant predictor, $B = 1.69, p = 0.02$, indicating that EM Districts scored, on average, 1.69 points higher than non-EM districts. The model explained 33%

of the total variance. The ANCOVA was not significant after adjusting for multiple comparisons, $F(1, 315) = 5.90$, $p = 0.02$, $d = 0.41$; however, the effect size was medium sized.