Which Front Range School Districts Deliver the Most Student Achievement Growth?

By Tom Coyne

Front Range taxpayers spend billions of dollars each year on our schools, yet our student achievement results remain unimpressive, even as globalization and accelerating technology continue to raise the bar for college and career readiness.

The last comprehensive measure we have of the cumulative result of our investment in K-12 education is the ACT assessment that is taken by every 11th grader in Colorado (which next year will be replaced by the SAT). Not only is the ACT important for college admissions, its results are also highly correlated with other tests that students may take, including the Armed Services Vocational Aptitude Battery (ASVAB), and the WorkKeys assessment for students seeking a National Career Readiness Certificate.

Consider the 2015 ACT results for Grade 11 students not eligible for the free and reduced lunch program who live in six relatively affluent suburban districts: Boulder Valley, Cherry Creek, Douglas County, Jefferson County, Littleton, and St. Vrain Valley. Only 52% of these students met the ACT's "college and career ready" standard in reading, only 54% in math, and only 50% in science.

The results for students eligible for free and reduced lunch were much worse.

Whether a child graduates from high school college and career ready fundamentally depends on two factors: Their family and their schools.

For this reason, it is unfair to judge districts' and schools' performance just by the percent of their students who meet or exceed absolute achievement standards, because that would unfairly benefit those educators who work in districts and schools with favorable student

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socio-economic demographics. This runs the risk of committing the error that was so colorfully described by Barry Switzer, Oklahoma's legendary football coach: "Some people are born on third base and go through life thinking they hit a triple."

In this column, I want to focus on this question: Which suburban Front Range school districts have been doing the best job of growing students' reading and math achievement results, regardless of those students' starting point?

In Colorado, people typically try to answer this question by comparing districts' "Median Growth Percentiles" (MGP).   Unfortunately, this approach has some serious shortcomings.

A student's growth percentile is a relative, rather than an absolute measure of performance. To simplify a bit, a growth percentile is calculated by subtracting a student's previous year TCAP or CMAS scale score from the current year's score, and then dividing the result by the starting score to standardize the increase in scale score (actually, the process uses quantile regression, but I'm not going to try to explain that here). These standardized score gains are then divided into statewide growth percentiles that range from 0 to 99 for every student who started with the same score the previous year.

For this reason, growth percentiles aren't affected by a student's socioeconomic circumstances; for example, a student from a poor family and one from an affluent one could still have the same growth percentile, even though their starting scale scores were quite different. For this reason, student growth percentiles provide a much better measure of school value added than the absolute scale score.

The Median (i.e., the 50th) Growth Percentile is simply the midpoint growth percentile in any group of students.

In theory, the year-to-year increase in the TCAP or CMAS score that is associated with the Median Growth Percentile should correspond to the year-to-year increase in the minimum cut score required to meet the

minimum acceptable achievement standard (for TCAP this was "Proficient"; for CMAS it is "Met Expectations"). This is why you often hear people claim that a Median Growth Percentile of 50 equals "a year's worth of learning."

However, when you look at the data, this often hasn't been the case, and the grade-to-grade increase in TCAP scale score associated with the 50th growth percentile was often less than the increase in the proficiency cut score. This is the answer to the often-posed question (or riddle), "why isn't our percentage of proficient students increasing if our Median Growth Percentile is above 50?"

The twelve suburban Front Range districts we'll use in our comparison serve almost 400,000 students, or 45% of all public K-12 students in Colorado, and spend over four billion tax dollars every year.

The following tables show the average TCAP Median Growth Percentiles for reading and math for 2012, 2013, and 2014 (we won't have CMAS growth percentiles until we have another year of test data). We average MGPs over three years to reduce the amount of noise caused by year-to-year changes in the students who make up a grade, as well as teacher turnover. In the table, "FRL" stands for the percent of students in each district who are eligible for free and reduced lunch in 2015.

Reading MGPs 2012-2014									
	FRL Pct	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	Average
Academy	14%	53	52	49	52	56	54	54	53
Boulder	22%	59	56	53	50	52	44	44	51
Cherry Creek	30%	55	55	47	54	51	54	56	53
Cheyenne Mtn	14%	55	48	58	48	54	53	52	53
Colo Springs	59%	47	47	46	51	50	48	51	48
Douglas	12%	55	53	56	46	48	51	51	52
Falcon	35%	48	47	48	51	50	48	47	49
Jefferson	31%	53	52	60	47	49	45	48	51
Lewis Palmer	12%	60	53	49	42	51	52	56	52
Littleton	18%	54	54	53	52	53	53	49	53
Poudre	31%	56	55	49	49	51	49	46	51
St. Vrain	32%	47	50	52	57	58	49	49	52
Average		53	52	52	50	52	50	50	51

Math MGPs 2012-2014									
	FRL Pct	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	Average
Academy	14%	54	52	49	56	49	55	53	52
Boulder	22%	59	61	49	55	53	56	55	55
Cherry Creek	30%	52	54	52	55	48	56	55	53
Cheyenne Mtn	14%	53	52	58	56	56	71	66	59
Colo Springs	59%	49	46	40	47	49	47	49	47
Douglas	12%	54	51	56	48	47	47	48	50
Falcon	35%	46	45	39	45	52	44	39	44
Jefferson	31%	53	53	60	57	51	54	55	55
Lewis Palmer	12%	53	52	50	47	56	56	58	53
Littleton	18%	50	55	58	58	55	56	52	55
Poudre	31%	56	56	53	56	47	44	50	52
St. Vrain	32%	49	48	52	62	59	48	46	52
Average		52	52	51	53	52	53	52	52

As you can see, the Median Growth Percentiles are quite tightly grouped, which makes it hard to draw strong performance distinctions between these twelve districts. Moreover, given the frequently heard claim that anything above the 50th percentile represents a commendable MGP, some people might even say these districts are generally doing a great job.

But before agreeing with them, we need to recognize that MGP doesn't answer a critical question: How do these districts' reading and math growth compare to districts outside Colorado? After all, our children are competing with kids from those districts for coveted places in colleges, military services, and with employers, and we need to know where our districts stand.

To address this question, we've taken a different approach to measure student achievement growth, using "Effect Sizes" (ES) instead of Median Growth Percentiles. This metric expresses the absolute grade-to-grade increase in the average TCAP or CMAS scale score as a multiple of the standard deviation of those scale scores, rather than as a growth percentile. But just like MGP, Effect Size reflects district value added, and not student demographics.

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However, unlike MGP, Effect Size has the great virtue of enabling the comparison of grade-to-grade achievement growth across districts, states, and nations, regardless of the assessment instruments that they use.

The following table shows grade-to-grade reading achievement growth in our 12 districts expressed as Effect Sizes (again, averaged over three years), with larger numbers indicating higher growth. Note that these Effect Sizes are based on the same underlying 2012 - 2014 data as the previously discussed Median Growth Percentiles. We've also included Denver as a point of district comparison.

The table also shows national Effect Size benchmarks for grade-to-grade achievement growth in reading. These are average Effect Sizes from multiple assessment instruments (7 for reading, and 6 for math) that are used in districts across the United States (see: "*Empirical Benchmarks for Interpreting Effect Sizes in Research*" by Hill et al).

To be sure, these comparisons are noisy, due to potential inconsistencies between what is taught and what is tested in different grades across districts. For this reason, we've also included average Effect Sizes, both for individual districts and for each grade, so that these can be compared to the national benchmarks.

Reading Effect Sizes 2012-2014								
	FRL Pct	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	Average
Academy	14%	0.40	0.56	0.29	0.27	0.20	0.11	0.59	*0.35*
Boulder	22%	0.35	0.43	0.27	0.20	0.16	-0.01	0.39	*0.26*
Cherry Creek	30%	0.37	0.44	0.22	0.20	0.13	0.15	0.49	*0.29*
Cheyenne Mtn	14%	0.25	0.54	0.40	0.13	0.25	0.10	0.56	*0.32*
Colo Springs	59%	0.41	0.36	0.23	0.20	0.17	0.14	0.46	*0.28*
Douglas	12%	0.46	0.51	0.35	0.16	0.16	0.15	0.49	*0.32*
Falcon	35%	0.36	0.38	0.29	0.24	0.15	0.09	0.39	*0.27*
Jefferson	31%	0.39	0.44	0.38	0.12	0.16	0.08	0.46	*0.29*
Lewis Palmer	12%	0.53	0.56	0.32	0.14	0.22	0.08	0.58	*0.35*
Littleton	18%	0.39	0.51	0.31	0.23	0.17	0.14	0.45	*0.32*
Poudre	31%	0.37	0.43	0.23	0.21	0.16	0.05	0.42	*0.27*
St. Vrain	32%	0.23	0.38	0.27	0.26	0.19	0.08	0.43	*0.26*
12 District Average		*0.38*	*0.46*	*0.30*	*0.19*	*0.18*	*0.10*	*0.48*	*0.30*
Denver	*69%*	*0.38*	*0.34*	*0.28*	*0.23*	*0.16*	*0.21*	*0.45*	*0.29*
National Benchmark		*0.36*	*0.40*	*0.32*	*0.23*	*0.26*	*0.24*	*0.19*	*0.29*

As you can see, there are some significant differences in these 12 districts' reading growth, suggesting opportunities for learning and transfer of best practice across districts. The other good news is that the overall average for the 12 suburban Front Range districts is essentially equal to the national benchmark.

However, this begs the question, if these districts' reading achievement growth rates from grade 3 to grade 10 on average match the national benchmark, why do only about half our non-free and reduced eligible students meet the ACT college and career benchmark in grade 11?

On the one hand, it could be that the districts' average achievement growth rate needs to increase, to meet college and career readiness standards that are growing more rigorous.

But on the other hand, the root cause could lie in districts' differing approach to teaching students to read between kindergarten and third grade. As you can see in the following table, which shows CMAS grade 3 English Language Arts results from 2015, there are significant differences between our 12 districts, which are not all driven by their differing percentages of students eligible for free and reduced lunch:

2015 CMAS Grade 3 English Language Arts	Percent Met or Exceeded Expectations	Percent Free & Reduced Lunch
Academy	50.1%	14%
Boulder	70.1%	22%
Cherry Creek	47.9%	30%
Cheyenne Mtn	47.7%	14%
Colo Springs	34.1%	59%
Denver	31.2%	69%
Douglas	45.6%	12%
Falcon	43.7%	35%
Jefferson	43.6%	31%
Lewis Palmer	61.6%	12%
Littleton	53.7%	18%
Poudre	48.3%	31%
St. Vrain	41.3%	32%

Unfortunately, the results for math achievement growth raise greater concerns:

	FRL Pct	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	Average
Math Effect Sizes 2012-2014									
Academy	14%	0.35	0.37	0.24	0.44	0.18	0.11	0.23	0.27
Boulder	22%	0.37	0.41	0.17	0.41	0.19	0.05	0.19	0.26
Cherry Creek	30%	0.28	0.32	0.22	0.34	0.14	0.07	0.22	0.23
Cheyenne Mtn	14%	0.23	0.35	0.34	0.33	0.24	0.24	0.32	0.29
Colo Springs	59%	0.34	0.32	0.15	0.30	0.22	-0.02	0.20	0.22
Douglas	12%	0.37	0.34	0.32	0.30	0.15	0.04	0.22	0.25
Falcon	35%	0.31	0.30	0.16	0.33	0.21	-0.12	0.01	0.17
Jefferson	31%	0.40	0.37	0.34	0.35	0.18	0.07	0.25	0.28
Lewis Palmer	12%	0.31	0.35	0.27	0.35	0.23	0.09	0.27	0.27
Littleton	18%	0.31	0.39	0.32	0.38	0.22	0.11	0.20	0.27
Poudre	31%	0.35	0.37	0.22	0.36	0.12	-0.06	0.24	0.23
St. Vrain	32%	0.32	0.33	0.27	0.41	0.21	-0.02	0.18	0.24
12 District Average		0.33	0.35	0.25	0.36	0.19	0.05	0.21	0.25
Denver	69%	0.41	0.38	0.31	0.31	0.20	-0.08	0.30	0.26
National Benchmark		0.52	0.56	0.41	0.30	0.32	0.22	0.25	0.37

As you can see, the district averages for math have less dispersion than those for reading, suggesting fewer opportunities to improve growth results by identifying and transferring district level best practices.

More importantly, the average math growth performance for all of our 12 affluent suburban Front Range districts lags significantly behind the national benchmark. This has two clear implications.

First, it is almost certainly the case that district averages hide even larger growth performance differences between schools, some of which are growing their students faster than the district average, and perhaps even faster than the national benchmark. To the extent that this is true, district leaders must do a better job of identifying and transferring the best practices that these schools are using.

Second, the relatively tight grouping of districts' math effect sizes suggests that their leaders should also spend more time looking outside Colorado for new approaches to improving math results (e.g., last year, the C.D. Howe Institute, which is Canada's leading think tank, published a major report on "*What To Do About Canada's Declining Math Scores*.")

In sum, using Effect Sizes as a metric to compare student achievement growth across districts helps to make clear some critical issues that Median Growth Percentiles tend to obscure. But that is only half the battle. The even greater challenge is to successfully address these issues, and substantially increase the percentage of students in our 12 affluent suburban Front Range districts who graduate from high school college and career ready.

Tom Coyne is a member of Jeffco's District Accountability Committee, co-founded www.k12accountability.org, and has worked on corporate performance improvement issues for more than 30 years.

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