

Student Completion of Four Years of Coursework in Mathematics and Science in Central Texas



This issue of *Implications* was developed by Dr. Ed Fuller, E³ Alliance

Introduction

Over the past 15 years, Texas is among many states that have increased both the number of mathematics and science courses required for graduation and the rigor of such courses. The Texas State Board of Education mandated that the Recommended High School Graduation Plan be the default plan beginning for the class of 2012. While the option to opt out of this plan is available, students are strongly encouraged to complete the courses required under the plan—including four years of mathematics and science.

Completing additional math courses has a profound positive impact on students (Adelman, 2006; Rose & Betts, 2001). For example, Rose and Betts (2001) found that taking advanced mathematics courses beyond Algebra I and Geometry increased the probability of completing college and improved earnings even after controlling for family income, race/ethnicity, and other factors associated with such outcomes. Specifically, students completing an advanced math course were more than 2.5 times more likely to graduate from college and had earnings that were over 17% greater than students completing only Algebra I and Geometry

Purpose

The purpose of this issue of *Implications* is to estimate the number of Central Texas (CT) public high school students completing four years of mathematics and four years of science courses by graduation.

Data and Methodology

This study relies on an ad hoc data analysis by the Texas Education Agency, including those students enrolled in the 12th grade in Texas public schools in the 2007-08 school year who were consistently enrolled within the same district for the schools years starting with the 2004-05 school year and ending with the 2007-08 school year. Thus, the analysis was based on those students enrolled for four consecutive school years.

The manner in which the data was constructed limits the analysis in a number of ways. First, students not consecutively enrolled in all four years were excluded from the analysis. This resulted in about 12% of the total CT 12th grade students being excluded from the analysis. Second, TEA does not currently track middle school course

enrollment data. Thus, data from another TEA data set and The College Board's *College Bound Seniors* report were used to estimate the number of students completing high school mathematics and science classes in middle school. A description of these problems and how the analysis was adjusted to account for them is in the full report on the E³ Alliance website.

Findings in Mathematics

As shown in Table 1, only about one-third of CT seniors had completed four years of mathematics in high school according to the TEA data. After adjusting for middle school coursework, the percentage increased to almost 50%. Another nearly 30% of students completed three years of mathematics coursework, while only 22% completed less than three years. With almost 80% of students completing three or more years of mathematics, CT districts are well-positioned to quickly graduate a large majority of the students who meet the mathematics component of the 4x4 requirement.

Table 1: Number and Percentage of Students Taking Selected Number of Years of Mathematics Coursework

Data Source	Number of Years of Mathematics Courses Taken				Total
		0-2	3	4	
TEA Data File	#	3,862	7,378	5,646	16,886
	%	22.90%	43.70%	33.40%	100%
Adjusted for Middle School	#	3,755	4,914	8,211	16,886
	%	22.20%	29.10%	48.60%	100%
Difference: Adjusted - TEA	#	-107	-2,464	2,565	0
	%	0.7	-14.6	15.2	0

Findings in Science

As shown in Table 2, only 25% of students completed four years of science according to the TEA and that percentage increased to only about 38% after adjusting for middle school coursework completed. Thus, even after adjusting the data, only slightly more than one-third of students are completing four years of science coursework. The adjusted data suggest that almost 40% of students complete three years of science coursework while about 24% completed less than three years.

Table 2: Number and Percentage of Students Taking Selected Number of Years of Science Coursework

Data Source	Number of Years of Science Courses Taken				
		0-2	3	4	Total
TEA Data File	#	3,969	8,748	4,169	16,886
	%	23.50%	51.80%	24.70%	100%
Adjusted for Middle School	#	3,969	6,581	6,337	16,887
	%	23.50%	39.00%	37.50%	100%
Difference: Adjusted - TEA	#	0	-2,167	2,168	0
	%	0	-12.8	12.8	0

Region Education Service Center Comparison

In mathematics, Region XIII had the 6th greatest percentage of students completing at least four years of mathematics coursework (at 48.6%) of twenty regions across the state. This was almost seven percentage points lower than the percentage of the El Paso region and just slightly above the state average of 48.0%

In science, Region XII had the third greatest percentage of students completing at least four years of science coursework with 37.5%. This was just two percentage points lower than the San Antonio region and slightly more than three percentage points greater than the state average.

District Comparison

This analysis examines the 19 largest districts in Central Texas. In mathematics, three districts had at least 60% of students completing four or more years of coursework: Eanes ISD, Wimberley ISD, and Round Rock ISD. On the other hand, five districts had less than 35% of students completing four or more years of mathematics coursework.

In science, two districts had at least 50% of students completing four or more years of coursework: Round Rock ISD and Eanes ISD. Five districts had less than 25% of students completing four or more years of science coursework. In fact, a majority of students in one district completed two or fewer years of science coursework.

Conclusions

Of the 20 education region service centers, Region XIII has one of the greatest percentages of students completing four years of mathematics and four years of science coursework. Therefore, Central Texas is fairly well-positioned to move students into completing four or more years of mathematics coursework by high school graduation to meet state policy.

Central Texas is less well-positioned to move students into completing four years of science. Indeed, a far lower percentage of students were completing the science component of the 4x4 requirement when compared to the percentage of students in math.

There is wide variation across Central Texas districts in both the percentage of students completing four years of mathematics and of science. In general, more affluent districts have a greater percentage of students already meeting the 4x4 requirements in mathematics and science than less affluent districts.

Policy Implications

Central Texas policymakers should closely examine the policies and practices that encourage students to complete four years of rigorous math and science courses and quickly adopt such policies and practices.

Districts should closely examine whether students are entering high school ready to tackle rigorous math and science courses and adjust instruction and implement interventions to ensure students all students enter high school ready to be successful.

Districts need to develop and implement rigorous Career and Technology Education (CTE) courses that will count towards meeting the 4x4 requirements in mathematics and science.

Districts with low percentages of students completing four years of math and science coursework need to develop a strong teacher recruitment, retention, and professional development plan for mathematics and science teachers.

Teacher preparation programs in Central Texas need to rapidly increase the production of secondary mathematics and science teachers to meet the increasing demand for such teachers.

References

- Adelman, C. (2006, February). *The Toolbox Revisited: Paths to Degree Completion from High School through College*. Washington, DC: U.S. Department of Education.
- Rose, H. & Betts, J. (2001). *Math matters : The links between high school curriculum, college graduation, and earnings*. San Francisco, CA: Public Policy Institute of California.



Guided by an objective data map and a clear community vision, we propose to better align the system components and practices of our regional education system and allocate our investments and services more efficiently to dramatically and sustainably increase educational outcomes within a decade. By doing so, we can increase our global competitiveness and the economic vitality and overall quality of life in our region.

<http://www.e3alliance.org/>