



Washington State Graduates: Course-Taking Patterns in Mathematics

Research shows high school course-taking patterns affect students' achievement in high school and beyond. This is particularly evident in math. Students who take advanced math courses are more likely to enroll in college and earn degrees, despite race or socioeconomic status (Adelman, 2006).

In response to this research, education leaders and policy makers have begun to recommend raising graduation requirements. From 2004 to 2008, the number of states requiring all students to take a college and work preparatory curriculum for graduation grew from zero to 20 (Achieve, 2004, 2009).

Washington State's minimum graduation requirement of 19 credits (20 credits in 2013) is among the lowest in the nation, as are requirements for specific content areas (Education Commission of the States, 2006). The 2009 minimum state requirement for math is two credits (t credits in 2013). However, district requirements may exceed the minimum. For math, in 2007-2008, 148 districts required two credits, 96 required three credits, and 2 required four credits (SBE database, 2008).

The Washington State Board of Education (SBE) is revising high school graduation requirements to better prepare students for career, postsecondary education, and citizenship. The proposed Core 24 graduation requirements framework, approved in July 2008 with implementation contingent on funding, is more rigorous than current Washington State graduation requirements and, in some content areas, more rigorous than minimum college admission standards set by the Washington Higher Education Coordinating (HEC) Board (see Table 1). In a separate action, the SBE revised math requirements in July 2008 from two to three credits, and prescribed the content of those credits for the graduating class of 2013.

Prior to proposing new requirements, the SBE commissioned a transcript study. Researchers from The

BERC Group examined course-taking patterns for 14,875 students who graduated in 2008 from 100 schools in 100 districts across Washington. This research brief, with an emphasis on mathematics, is one in a series of research briefs. More information about the study can be obtained at http://www.sbe.wa.gov/documents/SBETranscriptStudy2008_FINAL.pdf

This study was conducted to provide a baseline of information that would inform the SBE's graduation requirements initiative. The proposed Core 24 requirements were not in place for the class of 2008, and students were not trying to meet these requirements.

Table 1.
Comparison of Washington State High School Math Graduation Requirements with Four-year Public College Admission Requirements

Subject	2008 WA State Requirements	2013 WA State Requirements	2008 HEC Board Requirements	Core 24 Default Requirements
Math	2	3**	3*	3**

*Algebra I, II, and geometry or Integrated Mathematics I, II, III

**Algebra I, II, and geometry (or Integrated Mathematics I, II, III) Students can elect a third math credit, other than the advanced math equivalent.

Note. The Core 24 default college and career ready requirements align with the Higher Education Coordinating Board minimum college admissions requirements. Some students may choose an alternative Core 24 pathway.

Figure 1 compares the percentages of students meeting 2008 math graduation credit requirements, HEC Board minimum admissions requirements, and the proposed Core 24 default college and career ready requirements. While all students met the state's current minimum

requirements, only 65.5% met HEC Board requirements and the default Core 24 requirements. Of the 34.5% who did not meet HEC Board requirements, 11.5% took fewer than three credits of math, and 23% took three or more credits of math, but did not meet the criteria for advanced math.

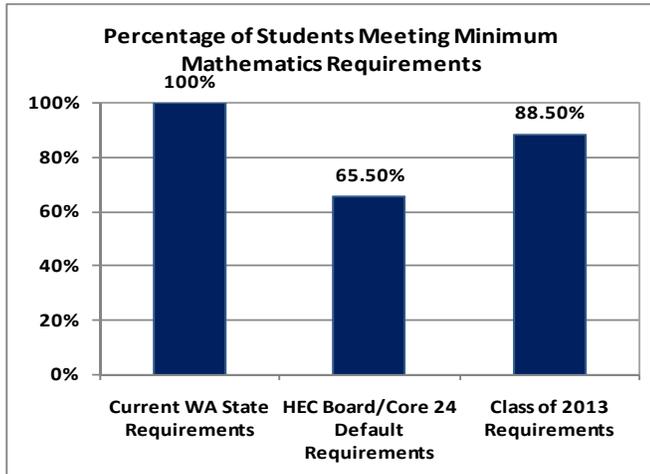


Figure 1. Percentage of Students Meeting Minimum Mathematics Requirements

Table 2 details examples of students' course taking patterns who met and who did not meet HEC Board Requirements.

Table 2.
Sample Schedules

Sample Schedules	Met HEC Board Requirements	Did Not Meet HEC Board Requirements
Freshmen Sophomore Junior Senior	Algebra Geometry Algebra 2 ---	Pre-Algebra Algebra --- Segmented Math
Freshmen Sophomore Junior Senior	Geometry Algebra 2 Trigonometry Calculus	Algebra 1A Algebra 1B Geometry PAS Math

Note: Students entering college in 2012 will need to complete a math-based quantitative course in the senior year. The proposed default Core 24 college and career ready requirements align with the HEC Board minimum admissions standards.

Further analysis reveals 26.1% of students earned math credits prior to entering 9th grade. This helped students meet the advanced math criterion, even if they ultimately took only two credits. Course level is also important. Students who completed Algebra 2 or above (level 3) by the second year of high school were significantly ($p < .001$) more likely to meet standard on the WASL than students who completed Geometry (level 2) or Algebra or below (level 1) (see Figure 2).

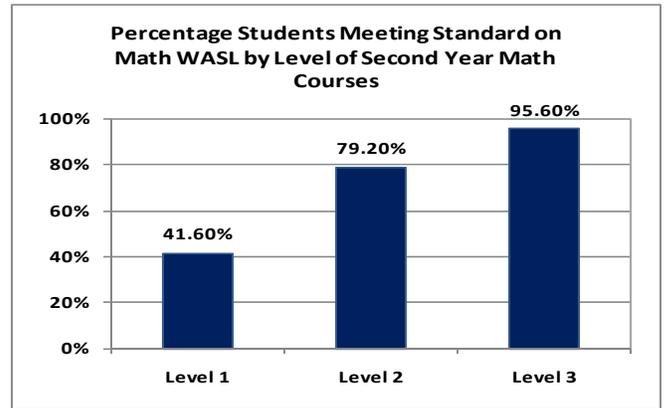


Figure 2. Percentage of Students Meeting Standard on Math WASL by Level of Second Year Mathematics Courses

During the senior year, 68.7% of students took math. This result is likely higher than previous years, because students graduating in 2008 who did not pass the math WASL were required to take math credits as seniors. An analysis of seniors' math courses showed 55.3% took a higher-level math that met college admission requirements, while 13.4% took math to meet basic requirements, such as Segmented Math and the Promoting Academic Success (PAS) Math Program.

An analysis was conducted to determine if the number of math credits required by a district affected the percentage of students meeting the minimum HEC Board Requirements. Results showed no relationship between the number of math credits required for graduation and students' eligibility for a Washington four-year college. While the number of credits taken by students was greater in districts with higher credit requirements, the extra credits often represented repeated or lower level courses or Algebra 1 taken for two credits over two years. The SBE's new math rule (WAC 180-51-066) addresses this issue.

References:

Achieve Inc. (2004). *The expectations gap: A 50-state review of high school graduation requirements*. Washington, DC: Achieve, Inc.

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