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RESEARCH BRIEF

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Washington State Graduates: Course-Taking Patterns in Science

As the nature of the nation's economy and industrial base changes, the skills necessary to enter and to be successful in the workforce have also changed. Research from the Trends in International Mathematics and Science study shows United States students lagging behind much of the world in math and science skills (Grandjour, 2008).

With the growing concern around preparing students to compete in a global economy, 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, with an additional 10 states considering increasing graduation requirements to better prepare students for college and career. (Achieve, 2004; 2009).

Washington State's minimum graduation requirement of 19 credits is among the lowest in the nation, as are requirements for specific content areas (Education Commission of the States, 2006). Currently, 33 states require three or more science credits to graduate from high school, while Washington State requires only two, including one credit of laboratory science. However, specific subject area requirements vary by district. For science, only 46 districts exceed the state's two credit minimum requirement (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 2008, students were required to take two science credits, one of them lab, to graduate from high school. This requirement would increase to three science credits, two of them labs, with the implementation of Core 24 (see Table 1).

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

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

*Including at least one year of laboratory science (HEC Board requirements will increase to two years of laboratory science beginning with students entering college in the summer of 2010)
**Including at least two years of laboratory science
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. In some subject areas, such as science, the proposed Core 24 requirements exceed HEC Board requirements.

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 science, 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.

The results show differences in the percentage of students meeting the minimum science graduation credit requirements, HEC Board minimum admissions requirements, and the proposed Core 24 default college and career ready requirements (see Figure 1). Results show 94.1% met current graduation requirements, 87.6% met 2008 HEC Board requirements for science, and 54.6% of students met Core 24 requirements for science. (The 2008 HEC Board requirements specified only one credit of lab; those requirements will change to two lab credits in 2010.)

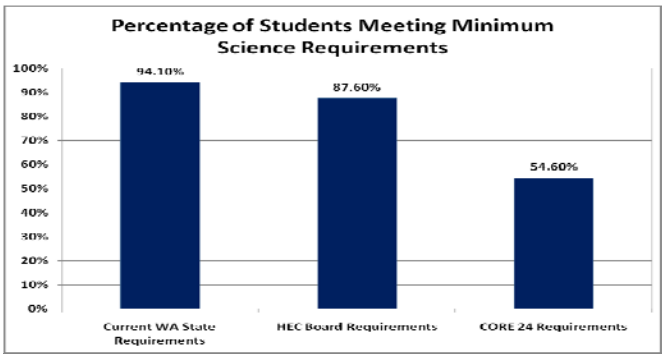

Figure 1. Percentage of Students Meeting Minimum Science Requirements

It is noteworthy that 5.9% of students did not meet current minimum Washington State science graduation requirements. These students failed to take one credit of a designated laboratory science. State law does not permit lab science classes to be waived. The remaining 6.5% of students who did not meet HEC Board requirements took cross credited classes in Career and Technical Education, such as agriculture and horticulture. While these courses met minimum graduation requirements, they did not always align with the HEC Board criteria.

Further analyses show many students took laboratory sciences. In total, 78.4% of students took at least two laboratory sciences (see Figure 2). This finding suggests that many students did not meet Core 24 requirements in science because they took fewer than three credits—not because they did not take two lab sciences.

An analysis of schedules shows that the majority of students took science in the freshmen and sophomore year, with fewer taking science in their junior and senior years. For example, only 47.9% of students took science in their senior year. Typically, students took physical science or integrated science their freshman year and biology in the second year. Among students who pursued additional science, juniors tended to take chemistry and seniors tended to take physics.

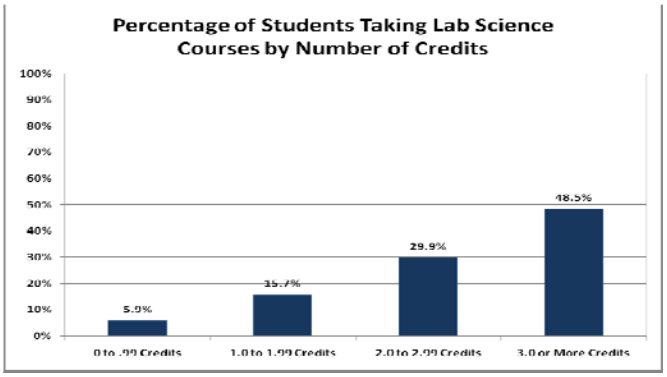

Figure 2. Percentage of Students Taking Lab Science Credits

Course level was also important. Students who completed two credits of science, including one laboratory credit (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 less than two credits but one laboratory credit (level 2) or fewer than one laboratory credit (see Figure 3).

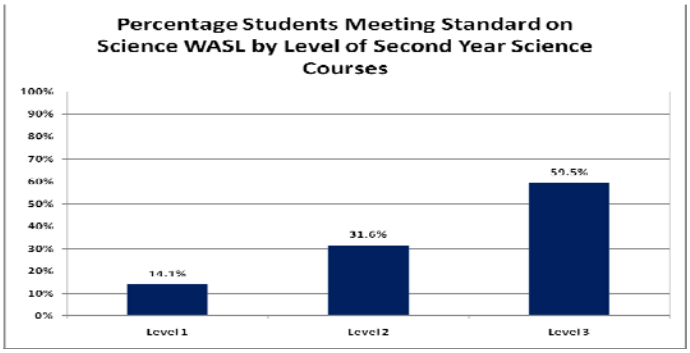

Figure 3. Percentage of Students Meeting Standard on Science WASL by Level of Second Year Science Courses

References:

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

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