

## October 2008 Research Brief:

### What does it take to prepare students academically for college?

The research is clear on the connection between high school coursework and success in college. The more academically advanced and rigorous a student's coursework is in high school, the more likely she will enroll in and complete college. In a 1996 study, the College Board found that the more science classes, math classes, foreign language classes and AP classes a student takes in high school, the greater the probability of four-year college attendance.<sup>1</sup> Ten years later, U.S. Department of Education researcher Clifford Adelman found that the "academic intensity" of a student's high school curriculum (i.e., the number and type of challenging courses taken, such as Calculus, Trigonometry, AP classes, etc.) is a key indicator of bachelor's degree completion.

Adelman paid particular attention to math courses and found that students who take Calculus in high school are twice as likely to attain a bachelor's degree as students who only made it to Algebra II in high school (see Figure 1). Adelman also points out that minority and low-income students are less likely to attend schools that offer the most rigorous classes. For example, Adelman finds that "students from the lowest socioeconomic status (SES) quintile attend high schools that are much less likely to offer any math above Algebra II than students in the upper SES quintiles."<sup>2</sup> However, when low-income and minority students do take more rigorous courses, their chances of completing a bachelor's degree increase significantly (see Figure 2).

Adelman establishes the importance of taking the "right classes," but in many schools it is important to look beyond course titles and examine what's actually happening inside of the classroom, in terms of course content, student-teacher interactions and expectations for students. In 2005, ACT and the Education Trust conducted research to determine the common attributes of high school courses that successfully prepare students for college. The ACT and Education Trust researchers found that in truly rigorous college prep classes, the course content was aligned with college expectations and exceeded state and district standards; teachers were passionate about their subject; students and teachers engaged in constant questioning; students were expected to think and act like scholars; and students were expected to do significant amounts of reading, writing, analyzing and interpreting.

However, many "college prep" high school classes are "college prep" in name only and do not align with college expectations. Consequently, these supposedly "college prep" classes fail to prepare students for college. According to a 2006 National Center for Educational Accountability (NCEA) report, "troubling evidence has accumulated that as student enrollment in advanced courses has expanded, increasing percentages of

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<sup>1</sup> King, J. (1996). *Improving the odds: Factors that increase four-year college attendance among high school seniors*. NY, NY: College Board.

<sup>2</sup> Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. Washington, DC: U.S. Department of Education.

students who are receiving credit for those courses are not learning the content implied by the course titles.”<sup>3</sup> In their study, *Rigor at Risk*, ACT found taking a recommended core curriculum consisting of four years of English and three years each of math, science and social studies, did not guarantee that students would be prepared for college coursework. According to this report, “only one quarter of ACT-tested 2006 high school graduates who took a core curriculum were prepared to take credit-bearing entry-level college courses in all four subject areas with a reasonable chance of succeeding in those courses.”<sup>4</sup> The authors of *Rigor at Risk* conclude that these findings indicate a lack of rigor in many high school courses and a mismatch between expectations at the secondary and postsecondary levels.

According to ACT’s *Rigor at Risk*, “one reason that improving college readiness is such a challenge for high schools is because many eighth-graders enter high school without having learned the skills needed to perform well.”<sup>5</sup> Research shows that middle schools must prepare students for rigorous 9<sup>th</sup> grade classes because “students who complete college-preparatory courses in 9<sup>th</sup> grade begin a clear trajectory that continues throughout high school.”<sup>6</sup> Not surprisingly then, 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grades are critical years in students’ academic lives. In order to make sure students are set up for success in 9<sup>th</sup> grade and are college-ready by the end of high school, students must master key foundational knowledge (for example, Algebra) in middle school.

While much of the research on college readiness focuses on courses and curriculum, some researchers take a broader approach when defining the skills and knowledge necessary to be “college ready.” David Conley of the Educational Policy Improvement Center outlines four domains of college readiness in his paper *Toward a More Comprehensive Conception of College Readiness*. Conley defines these four domains as: 1) key content knowledge (e.g., writing, research, algebraic concepts, key foundational concepts from core subjects); 2) key cognitive strategies (e.g., analysis, reasoning, interpretation, problem solving, intellectual openness); 3) academic behaviors (e.g., self-monitoring, study skills, time management); and 4) contextual skills and awareness or “college knowledge” (e.g., knowledge about college admissions requirements, costs of college and financial aid, college culture and expectations of professors and level of challenge of college courses). Conley argues that this expanded framework of college readiness will provide more accurate information to students about their college readiness and could help to assess whether college preparatory programs are developing all the skills, knowledge and behaviors that students will need to succeed in college.

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<sup>3</sup> Dougherty, C., Mellor, L. & Jian, S. (2006) *Orange juice or orange drink: Ensuring that “Advanced Courses” live up to their labels*. Austin, TX: National Center for Educational Accountability.

<sup>4</sup> ACT. (2007). *Rigor at risk: Reaffirming quality in the high school curriculum*. Iowa City, IA: ACT

<sup>5</sup> ACT. (2007). *Rigor at risk: Reaffirming quality in the high school curriculum*. Iowa City, IA: ACT

<sup>6</sup> Finkelstein, N & Fong, A. (2008) *Course-taking patterns and preparation for postsecondary education in California’s public university systems among minority youth*. San Francisco: CA: WestEd.

## Implications for College Access Programs – Questions to Ask:

### **Are our students taking the “right classes”?**

- Are all our students taking, at a minimum, Algebra in 8<sup>th</sup> grade and Geometry, Trigonometry, Pre-Calculus and Calculus in high school? Are our students taking four years of English classes? Are our students taking Biology, Chemistry and Physics lab classes?
- In 7-12<sup>th</sup> grades, are our students taking three to four years of the same foreign language? Are our students succeeding in these classes (i.e., getting A’s or B’s and doing well on end-of-course exams)?
- Are our students taking three or more AP classes? Are our students taking the AP exams for all AP courses in which they’re enrolled? Are our students receiving a “3” or higher on their AP exams?

### **Are the classes rigorous enough?**

- Are the Algebra classes our students are taking in middle school rigorous enough and covering all the content we would expect to see in an Algebra I class? If not, do we provide tutoring or extra academic assistance to ensure students are prepared for an accelerated math course sequence in high school?
- In high school, do the college prep classes build upon one another in a coherent and sequential way?
- Does the course content of college prep classes exceed state and district standards? Are key topics explored in-depth?
- Are students expected to think and behave like mathematicians in their math classes, scientists in their science classes, etc.?
- Are students required to do a significant amount of analysis, problem-solving, reading and writing in all classes?

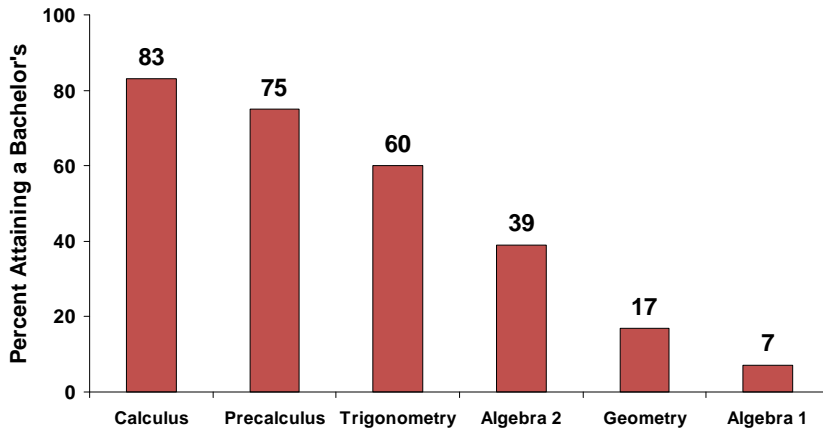
### **Do our support strategies for students encompass all aspects of “college readiness”?**

- How do we support our students in learning the academic content they will need to be ready for college?
- How do we support our students’ development of their problem-solving abilities, their analytical abilities, their ability to interpret and critique?
- How do we support our students’ development of study skills, time management, and ability to assess their own knowledge, skills, strengths and weaknesses?
- How do we build our students’ knowledge and awareness of the benefits of college, college admission requirements, financial aid, the expectations, values and norms of college?

## Charts & Graphs:

Figure 1

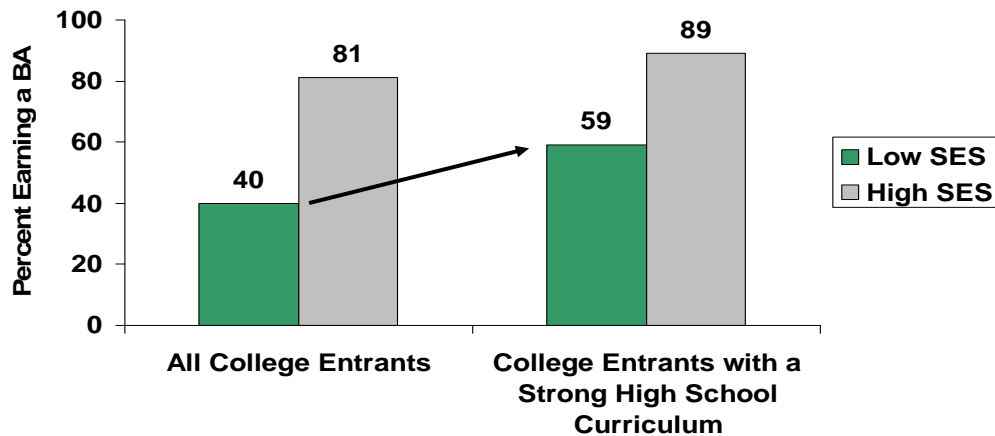
### The Highest Level of Math Reached in High School is a Strong Predictor of BA Attainment



Source: Clifford Adelman, U.S. Department of Education, The Toolbox Revisited, 2006.

Figure 2

### A Rigorous High School Curriculum\* Greatly Increases Bachelor's Degree Completion, Especially for Low-SES Students



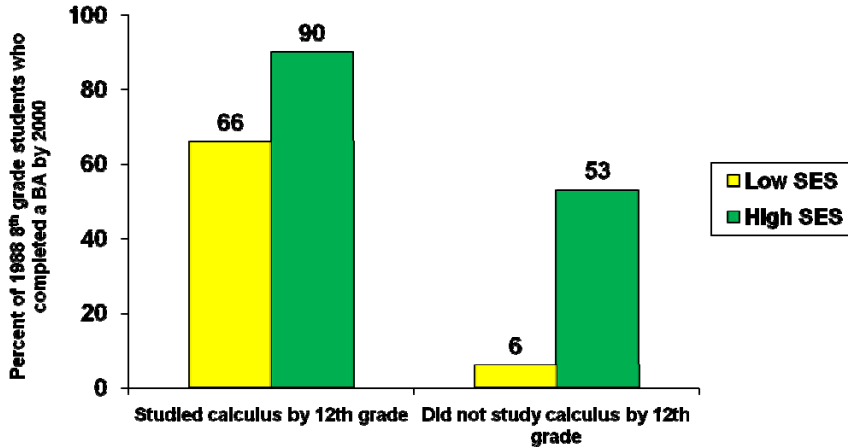
\*Rigorous Curriculum is defined as the top 40 percent of high school curriculum and the highest high school mathematics above Algebra 2.

Note: These numbers reflect outcomes for high school graduates who enter four-year institutions with no delay.

Source: Clifford Adelman, U.S. Department of Education, The Toolbox Revisited, 2006.

Figure 3

### Having the Opportunity to Study High-Level Math in High School Greatly Increases Chances of BA Completion, Particularly for Low Income Students

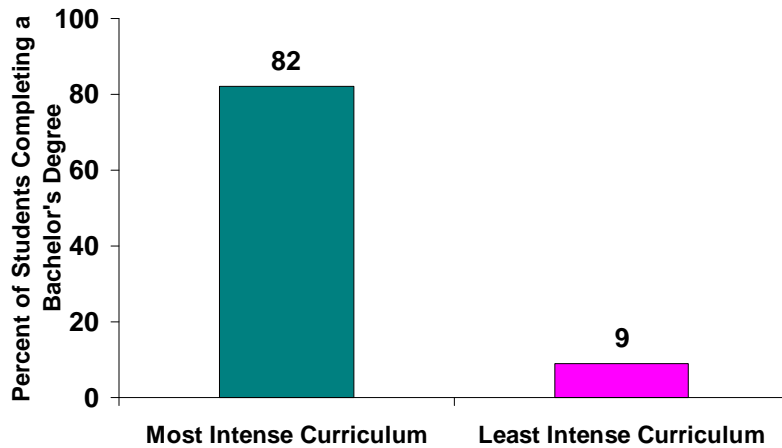


Source: NCES, The Condition of Education, 2003, Table 22-2

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Figure 4

### High School Curriculum Intensity is a Strong Predictor of Bachelor's Degree Completion



Curriculum quartiles are composites of English, math, science, foreign language, social studies, computer science, Advanced Placement, the highest level of math, remedial math and remedial English classes taken during high school.

Source: Clifford Adelman, U.S. Department of Education, The Toolbox Revisited, 2006.

## References:

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