College Readiness vs College Admissions: Will we resolve the chasm between K-12 and Higher Education?

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College Readiness

Students are college ready when they have the **knowledge, skills and behaviors** to successfully complete a 4-year college course of study without remediation

College readiness requires multiple components and should be assessed through multiple measures:

1. **Academic knowledge and skills evidenced by successful completion of a rigorous high school core curriculum**

2. **Success in college-level courses taken in high school that require in-depth subject-area knowledge, higher-order thinking skills, and strong study and research skills**

3. **Advanced academic skills, such as reasoning, problem solving, analysis, and writing abilities**

4. **College planning skills demonstrated by an understanding of college and career options and the college admissions and financing process, as well as other non-cognitive attributes associated with persistence, flexible, and maturity in learning**

College Success

- Research has clearly shown that 3 factors account for **academic** success:
  - High School grades
  - The rigor of High School courses
    - The number of courses (4 vs 3 yrs math)
    - The highest level completed (Calc vs Alg II)
    - The rigor of the courses (honors, AP vs standard)
  - Performance on Cognitive Ability Tests (Admissions Tests)
  - Studies by Cliff Adelman, EdTrust, NCES and other groups have been widely cited and accepted by policymakers.
  - But…no one has developed a comprehensive set of metrics that report on these 3 metrics for students and schools

College Readiness Assessments

CB Middle School Assessment – 8th grade

- Critical Reading, Math and Writing
- Will be comparability to PSAT/NMSQT and useful for placement into honors and AP; informing students early on if they are on the right path to college readiness

PSAT/NMSQT – 10th and 11th grades

- Used in conjunction with AP Potential – it identifies students who have a good probability of success in specific AP (and other rigorous) courses.

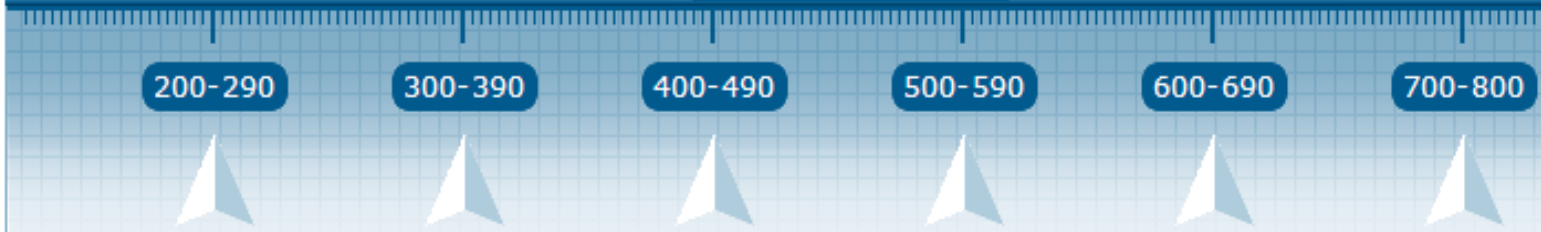
SAT – 11th and 12th grades

- Valid for admissions and placement decisions
- All three tests will include a student skills insight with

SAT® Skills Insight™

OVERVIEW | CRITICAL READING | MATHEMATICS | WRITING

Print



Choose Your Starting Point

As with any plan, before you decide where you're going, you need to know where you are right now. So to use SAT Skills Insight, start with your prior scores on the PSAT/NMSQT®, the SAT, or any practice test you have taken. Then choose the score band for each section of the SAT that reflects your score on that section. For example, if you got a 420 on the critical reading section of the SAT, your starting point on the Skills Insight would be the 400–490 score band for critical reading. (If you haven't taken the PSAT/NSMQT, the SAT, or any practice tests, you may want to start at the lowest score band and work your way up until you find a score band that contains skills that you find unfamiliar or challenging.)

SAT® Skills Insight™

1. Number and Operations

Academic Skills

A typical student in this score band can do the following:

- **SKILL 1**: Solve problems using ideas from basic set theory and basic number theory
- **SKILL 2**: Recognize and apply ratio, proportion, or percent in solving problems
- **SKILL 3**: Use properties of real number operations, ordering, and the zero-product property
- **SKILL 4**: Solve problems involving counting techniques

Suggestions for Improvement

To prepare for the next score band, try the following:

- Determine values or properties of numbers in a sequence when given a description of the sequence
- Create and use ratios, fractions, or percents in solving problems
- Solve more-complex counting problems (e.g., permutations, combinations, and inclusion/exclusion)

Skill Examples

The example questions below demonstrate the Academic Skills found in this score band. Without looking at the answers, try out the questions to see how comfortable you feel with the skills they test.

SKILL 1—EXAMPLE

Solve problems using ideas from basic set theory and basic number theory

X = set of positive integer factors of 6.
Y = set of positive integer factors of 9.
Z = set of positive integer factors of 15.

X, Y, and Z represent three sets of numbers, as defined above. What is the set of numbers that belong to set Z but to neither set X nor set Y ?

(A) {1, 3}
(B) {1, 5}
(C) {5, 15}
(D) {2, 3, 5}
(E) {1, 3, 5, 15}

Answer: C

Tests and Grades

- The College Board has SAT, PSAT and soon Middle School Test Scores
- We are developing Benchmarks of College Success tied to FGPA and probability of graduation from 4-yr colleges.
- We also have self reported GPA and schools, districts and states have actual grades

And the College Board also have courses students have taken

- The number of courses in a content area (4 vs 3 yrs math)
- The highest level completed (Calc vs Alg II)
- The rigor of the courses (honors, AP vs standard)
- The courses taken by grade (Alg I in 9th grade…Pre calc in 12th grade)

Academic Rigor – The purpose!

- Compute a measure of academic rigor that predicts college success using the number and type of courses taken in academic subjects and the rigor of those courses.
- Validate this metric with data from the SAT validity study (110 colleges) and National Student Clearinghouse (92% of colleges)
- Demonstrate the incremental validity of this new metric of academic rigor when added to SAT scores and HSGPA.
- Establish a College Readiness metric (SAT+HSGPA+Academic Rigor). Provide scores to students, schools and states and monitor trends over time
- Beginning in Late 2009 we can provide school, state and national data on College Readiness and supplement CB Srs report devoted only to national SAT scores.
- We believe that multiple measures are better than a single test score in discussion college readiness!

Academic Rigor Prototype @ your school

Scale	% at school	% in state	% in US		Completed College Core PLUS	Completed College Core	AP / DE Level Score	Honors Level Score
8	6	5	7		Y		3-4	3-4
7	9	8	9		Y		2-3	2-3
6	25	26	22		Y		0-2	0-2
5	22	20	18			Y	3-4	3-4
4	12	12	7			Y	1-3	2-3
3	16	9	5			Y	0-2	0-2
2	10	13	12				NA	2-4
1	0	7	8				NA	0-2
Mean	4.6	4.3	4.4					

Computing the Academic Rigor Index

Similar to setting SAT benchmarks we will:

1. Conduct regressions to identify the best combination of predictors for different scaling options (FGPA, persistence)
2. Compute the % of students meeting different benchmarks (x ethnicity, SES, language) to estimate impact
3. Use a policy capturing approach (or standard setting) with external educational experts to determine final levels.

Academic Rigor – Prototype Scoring

	Core Plus	Core
ELA	4+	4+
Science	3+ (Physics, Chem, Bio, Eq.)	3+ (2 of Physics, Chem, Bio, Eq.)
Math	4+ (Pre-Calc)	4+ (Alg II)
Social Science/ History	4+	3+
For. Lang.	3+ (same lang)	2 + (same lang)

AP/DE score	4	3	2	1
Sci-Math	2+	1+		
Other	2+			
Total AP	4+	3+	2+	1-2
Total AP+DE	4+	3+	3+	2+

Honors (includes AP-DE)	4	3	2	1
Sci-Math	4+	3+	1+	
Other	4+			
Total AP, DE, Honors	8+	6+	4+	2+

Academic Success is NOT college success

- Need other measures that extend beyond grades, courses and achievement
- Study Skills, Engagement, Self efficacy, meta-cognition….

Predictors of College Success

College Skills	Content Knowledge Achievement	Non-Cognitive	Personal Qualities/ Experiences/ Characteristics	School Performance/ Context	Guidance
Verbal Reasoning	Math	Motivation	Letters	Grades	Career Interests
Math Reasoning	Language Arts	Follow-through	Essay	GPA	Study Skills
Writing	Science	Communication	Community Service	Weighted GPA	Interest in Major
Metacognition	Social Studies/ Humanities	Conscientiousness	Extra-curricular	Rank	Self Efficacy
Creativity	Foreign Language	Leadership	Work Experience	Courses Completed	Aspirations/
Practical Knowledge	Language Proficiency	Other Personality	Literacy in Second Lang	Academic Rigor	Realistic Self-concept
Spatial Relations			Teacher Ratings	AP/Honors Courses	
Intellectual Curiosity			Gender	School Size	
			Ethnicity	School Quality	
			Residence		
			Age		
			Family Education/ Income		
			Ability to Pay		
			Ability to Benefit		

College Board Schools Have Not Developed

Non Cognitive Measures in College Admissions: Background

- Choosing students: Higher education admissions tools for the 21st century (Camara & Kimmel, 2005)
- Purpose:
  - Identify additional predictors of college success
  - Expand the definition of what constitutes successful performance in college beyond freshman GPA
- Collaboration with Research Team at Michigan State University (Schmitt & Oswald)
  - Review university mission statements and department objectives
  - Interview with university staff responsible for student life at Michigan State University
  - Review of the education literature on student outcomes
- Our systematic search resulted in 12 dimensions of student performance…

12 Dimensions of Student Performance

Broadening the Performance Domain in the Prediction of Academic Success (Schmitt, Oswald, & Gillespie, 2004)

1. Knowledge, learning, mastery of general principles
2. Continuous learning, intellectual interest and curiosity
3. Artistic and cultural appreciation
4. Multicultural appreciation
5. Leadership
6. Interpersonal skills
7. Social responsibility, citizenship and involvement
8. Physical and psychological health
9. Career orientation
10. Adaptability and life skills
11. Perseverance
12. Ethics and integrity

Two “Noncognitive” Measures

- **Situational judgment inventory**
  - A situation is presented along with several alternative courses of action.
  - The respondent is asked to indicate what she/he would be most likely and least likely to do.

- **Biodata**
  - Short, multiple choice reports of past experience/background and interests/preferences.

Sample SJI Item for Leadership

You are assigned to a group to work on a particular project. When you sit down together as a group, no one says anything.

a)-1 Look at them until someone eventually says something

b)Start the conversation yourself by introducing yourself

c)+1 Get to know everyone first and see what they are thinking about the project to make sure the project's goals are clear to everyone

d)Try to start working on the project by asking everyone's opinion about the nature of the project

e)You would take the leadership role by assigning people to do things or ask questions to get things rolling

Sample Biodata Items for Leadership

1. **The number of high school clubs and organized activities (such as band, sports, newspapers, etc.) in which I took a leadership role was:**
   a) 4 or more
   b) 3
   c) 2
   d) 1
   e) I did not take a leadership role

2. **How often do you talk your friends into doing what you want to do during the evening?**
   a) most of the time
   b) sometimes (about half the time)
   c) occasionally (about as often as others in my group
   d) seldom or infrequently
   e) never

Study 1:
Psychometric adequacy & scale refinement

- 644 MSU freshmen completed one of the two parallel forms of the biodata and SJI instruments at the beginning of the academic year.
- Identical empirical-keying procedures were conducted on both instruments at the item level (double-cross validated using randomly split samples).
- Results indicated significant incremental validity for some of the scales above and beyond the validity of SAT/ACT scores and existing measures of personality in predicting college GPA.
- The biodata and SJI demonstrated the greatest incremental validity when absenteeism, students' self ratings, and peer-ratings of performance were examined (.19, .22, and .14, respectively).

Study 1: Standardized Differences

Compared with White group…

Non-cognitive Dimension	Black	Hispanic	Asian
Knowledge	-0.08	-0.20	-0.25
Learning	0.01	0 .63*	-0.19
Artistic	-0.19	0 .73*	0.15
Multicultural	-0.11	0 .63*	0.02
Leadership	-0.18	0.08	-0.30
Interpersonal	-0.18	0.33	-0.38*
SJI composite	-0.05	-0.14	-0.21
Citizenship	0.05	0.23	-0.14
Health	-0.31*	0.06	-0.67*
Career	0 .34*	0 .56*	0.14
Adaptability	0.03	0.09	-0.41*
Perseverance	0.13	0 .55*	-0.18
Ethics	0.17	-0.06	-0.13

- Positive values indicate that minorities perform **better** than White students.
- The *d* values for biodata and SJI measures across ethnic and gender subgroups were consistently smaller than those found on cognitive predictors.
- * p <.05

Follow-up to Study 1: Time to Graduate

- Obtained graduation records for the initial sample
  - Specifically, copies of the graduation records released by the school from spring 2004 through the summer of 2006 (4 to 6 years from matriculation) were obtained
- Examined the incremental validity of biodata and SJI over standardized test scores in the prediction of time to graduate

Predicting Time to Graduate

Variable	Standardized Regression Weight/ R_{Δ}^2
SAT/ACT scores	.048
R_{Δ}^2	.001
Knowledge	-.025
Continuous Learning	-.128
Artistic Appreciation	-.148*
Multicultural Appreciation	-.018
Leadership	.167*
Interpersonal Skills	.053
Citizenship	-.045
Health	-.053
Career Orientation	-.085
Adaptability	.000
Perseverance	.150*
Ethics	.087
SJI	.050
R_{Δ}^2	**.090***

Note

- Numbers in the table are standardized regression coefficients.
- * Indicates statistical significance $p < .05$.
- N = 424.
- Biodata and SJI add significant incremental validity to the prediction of time to graduate above standardized test scores.

Study 2: Refine Scales & Replicate Study 1
Participating Institutions & Sample Size

HBCU	***N***
Winston-Salem (public)	229
Spelman College (private)	254

Big Ten (public)	***N***
University of Iowa	335
Michigan State University	546
Ohio State University	304
University of Michigan	297
Indiana University	170

Other Institutions	***N***
University of Chicago (private)	168
Cal State – Fullerton (public)	223
Virginia Tech (public)	237

Predicting FYGPA: Total Sample across 10 Institutions (*N* = 2443)

Variable	Mean	SD	Validity	Regression Wt.
HS-GPA	3.51	.42	.61	.70*
SAT/ACT	.61	.91	.64	.38*
			***R* (Adjusted *R*)**	**.70 (.70)**
Biodata				
Knowledge	3.15	.48	.29	.08*
Learning	3.08	.61	.13	-.00
Artistic	2.91	.83	.22	.02
Diversity	2.98	.66	.13	.03
Leadership	3.07	.81	.14	-.02
Responsibility	3.35	.76	.19	.02
Health	3.26	.51	.16	.10*
Citizenship	3.31	.65	-.17	-.15*
Adaptability	3.38	.44	.11	-.02
Perseverance	3.73	.49	.09	.08*
Ethics	3.86	.55	.18	-.01
SJI Composite	.67	.33	.27	.23
Constant				-.28*
			***R* (Adjusted *R*)**	**.72 (.72)**
			Change in *R*	**.02***

Predicting Class Absenteeism: Total Sample across 10 Institutions (*N* = 899)

Variable	Mean	SD	Validity	Regression Wt.
HS-GPA	3.64	.35	-.04	.34*
SAT/ACT	.98	.81	.17*	.36*
			***R* (Adjusted *R*)**	**.22* (.22)**
Biodata				
Knowledge	3.23	.46	-.15*	-.14
Learning	3.16	.61	-.06*	-.04
Artistic	3.09	.85	-.03	-.03
Diversity	3.05	.69	-.03	.03
Leadership	3.11	.80	-.05	.05
Responsibility	3.42	.74	-.08*	-.02
Health	3.27	.48	-.18*	-.34*
Citizenship	3.22	.69	-.06*	.11*
Adaptability	3.42	.44	-.09*	.08
Perseverance	3.74	.46	-.17*	-.14
Ethics	3.92	.51	-.19*	-.18*
SJI Composite	.73	.29	-.17*	.41*
Constant				5.17*
			***R* (Adjusted *R*)**	**.36* (.34)**
			Change in *R*	**.14***

Representative Subgroup Differences in Standardized Units

Compared with White group

	SAT/ACT	HS-GPA	SJI	Persevere	Career	Learn	Responsible
Hispanic	-.83	-.61	-.18	-.01	.08	-.05	.00
Asian	.38	.12	-.03	-.12	-.03	-.18	.07
African-American	-1.15	-.81	-.23	.20	.52	-.11	-.14

Compared with Male group

	SAT/ACT	HS-GPA	SJI	Persevere	Career	Learn	Responsible
Females	-.42	.02	.36	.22	.17	-.20	.26

< .20 = small effect
.20-.50 = moderate effect
> .50 = large effect

Percent of Students Selected: Two Composites and Three Selection Strategies

	Top 85%		Top 50%		Top 15%	
Group	**AB**	**AB+**	**AB**	**AB+**	**AB**	**AB+**
Hispanic	4.4 →	4.6 (+.2)	4.1 →	4.9 (+.8)	3.9 →	5.5 (+1.6)
Asian	7.6 →	7.7 (+.1)	9.9 →	9.5 (-.4)	17.5 →	12.9 (-4.6)
African-American	17.9 →	19.8 (+1.9)	9.6 →	13.6 (+4.0)	1.3 →	7.2 (+5.9)
White	70.2 →	67.9 (-2.3)	76.4 →	71.9 (-4.5)	77.2 →	74.4 (-2.8)

AB = equally weighted composite of HSGPA and SAT/ACT.

AB+ = equally weighted composite of HSGPA, SAT/ACT, Biodata, and SJI.

Follow-up to Study 2: Cumulative GPA and Graduation

- In the process of obtaining GPA data for all four years and whether or not the students graduated in the usual four year time frame.
  - 8 of the 10 institutions have/will provide data
- After cleaning and preparing the data, results should be available this Fall/Winter (2008)
  - Stay Tuned!

Study 3: Participating Institutions (k=15): Applicants

- University of Washington
- Michigan State University
- Lafayette College
- Earlham College
- Ohio State University
- Purdue University
- Spelman College
- Johnson and Wales University
- Meredith College
- University of Southern California
- Furman University
- University of North Carolina, Chapel Hill
- Kenyon College
- Gonzaga University*
- University of Puget Sound*

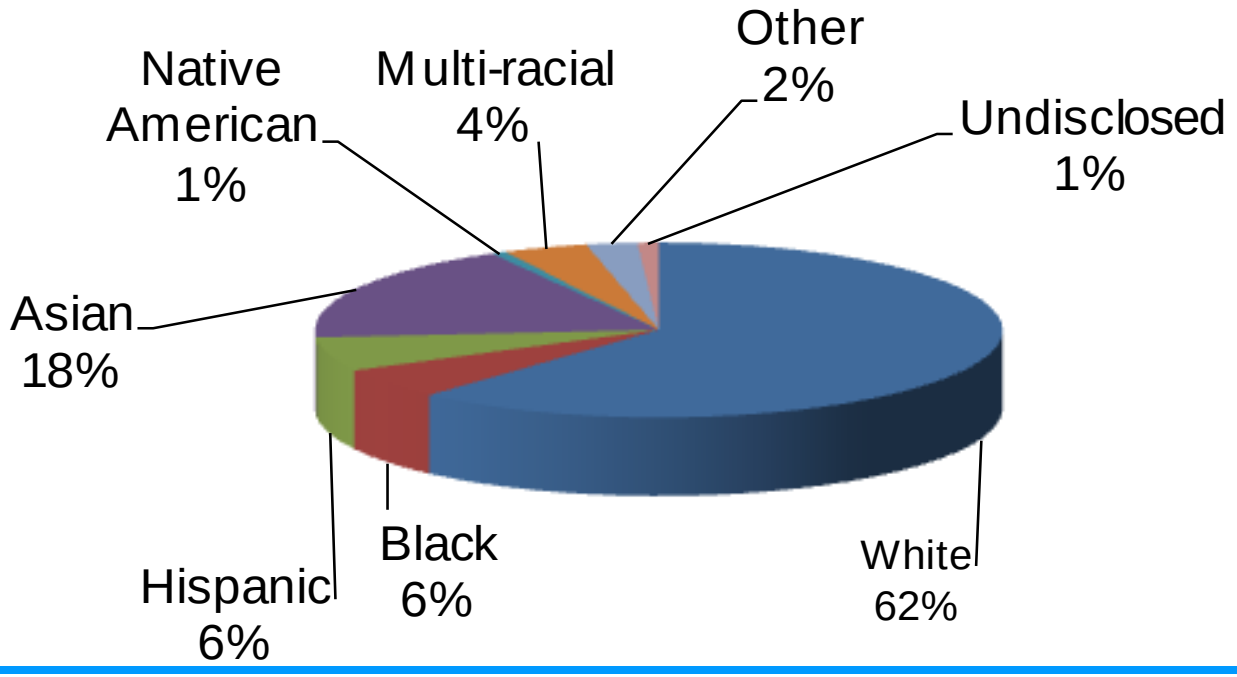
* Sample size to small to run within-institution analyses

Study 3: Data Collection

- September 2007 – May 2008
  - Applicants completed 2 non-cognitive measures
    - $N_{(SJI)}$ = 4,164
    - $N_{(biodata\ dimensions)}$ ranging from 5,744 to 7,645
- Fall 2008
  - Determine which applicants are enrolled in participating institutions
- Spring 2009
  - Collect outcome data

Study 3: Demographic Information

- Overall, 7,884 students participated in our study. 60.3% of participants were female. The average age was 17.39 years old.
- Racial/ethnic breakdown below:



Study 3: Results – Mean differences

Dimension	Average score for 13 universities 2007-2008	Average score all 10 universities 2004
Knowledge (.73)	3.51 (.48)	3.15 (.47)
Continuous Learning (.83)	3.53 (.61)	3.09 (.61)
Artistic Appreciation (.86)	3.31 (.80)	2.91 (.82)
Multicultural Appreciation (.83)	3.40 (.67)	2.98 (.66)
Leadership (.88)	3.39 (.79)	3.07 (.81)
Social Responsibility (.80)	3.73 (.72)	3.32 (.76)
Health (.74)	3.32 (.54)	3.25 (.51)
Career Orientation (.78)	3.49 (.62)	3.32 (.65)
Adaptability (.72)	3.51 (.45)	3.38(.45)
Perseverance (.78)	3.94 (.47)	3.73 (.49)
Ethics (.66)	4.11 (.43)	3.86 (.54)
Jobs Scale (.91)	2.63 (1.07)	2.76 (.84)
Awards Scale (.77)	2.39 (.75)	2.42 (.70)
LEAD (.49)	.41(.15)	.33 (.17)

Note. Reliability (coefficient alpha) for each scale is presented in parentheses next to the scale labels. Standard deviations are in parentheses next to the means.

Limitations & Future Research

- Public relations and acceptance of these measures by consumers (i.e., admissions officers, parents, students). Need to collect reactions to new admissions measures along a variety of dimensions (e.g., fairness, face validity).
- Fakability in high-stakes situation especially relevant for biodata, less so for SJI. However, note that essays can be coached and edited, and self-reported activities can also be inflated.
- Reluctance to experiment in Higher Ed admissions context despite efficacy and value. Need a consortium of institutions to move from a research effort to application.

Next Steps

- Replicate previous analyses with data from Study 3
- Benefits of Study 3:
  - The sample size will be much larger, therefore, increasing the power to detect significant effects
  - Additionally, sampling error will be reduced
  - Finally, the data represents a multi-institutional sample increasing the generalizability of results
- For more information, go to

www.iopsych.msu.edu/cbstudy/