Comparing Alternatives in the Prediction of College Success

Doris Zahner
Council for Aid to Education

Lisa M. Ramsaran
New York University

Jeffrey T. Steedle
Council for Aid to Education

Please send correspondence to:
Doris Zahner
Council for Aid to Education
215 Lexington Ave., 21st Floor
New York, NY 10016
212.204.8407
dzahner@cae.org

Copyright © 2014 Council for Aid to Education

Abstract

This study investigates the prediction of college success as defined by a student's college GPA. We predict college GPA mid-way through and at the end of their college careers using high school GPA (HSGPA), college entrance exam scores (SAT/ACT) and an open-ended, performance-based assessment of critical thinking and writing skills (CLA). 3,137 college sophomores and 1,330 college seniors participated in this study. We found, using simple and multiple regression analyses, that HSGPA was the best single predictor of college GPA, but for sophomores, correlations increased when using HSGPA and SAT scores and HSGPA and CLA. For seniors, the best two predictors were HSGPA and CLA, indicating that the CLA may measure something different than the traditional predictors of college success.

Comparing Alternatives in the Prediction of College Success

What is college readiness and how can we measure it? Measuring college readiness is important because in order for students to be successful in college, they must be prepared for college. Yet most college professors do not believe that entering freshmen are ready for college-level work (ACT, 2009). A greater emphasis and more attention has been given to college preparedness and ultimately, college success because employers now, more than ever, expect college graduates to possess writing, critical thinking, and problem solving skills (Hart Research Associates, 2006) in response to the changing demands of available jobs (Autor, Levy, & Murname, 2003). In tandem with employer demands, the educational community has begun to emphasize so-called "21st century" skills in addition to knowledge in specific content domains (Arum & Roksa, 2011; Porter, McMaken, Hwang, & Yang, 2011; Silva, 2008; Wagner, 2008) in hopes of fostering the development of critical thinking, problem solving, communication, collaboration, creativity and innovation skills (Porter, et al., 2011). Indeed, nearly 80% of Association of American Colleges and Universities member institutions have a list of general learning outcomes intended for all students regardless of their academic programs (Hart Research Associates, 2009).

Educators and researchers have long engaged in discourse on how to best define and effectively measure college success (McPherson & Schapiro, 2008). Possibilities include tests of proficiency in the use of higher-order thinking skills (Jerald, 2009; Silva, 2008) and reported learning outcomes such as grade point average (GPA) and graduation (ACT, 2009; Atkinson & Geiser, 2009; Silva, 2008; Zwick & Sklar, 2005). In this study, we evaluated multiple indicators of college readiness as predictors of postsecondary success as measured by college GPA. Specifically, we examined the prediction of college GPA mid-way through and at the end of

participants' college careers using well established predictors of first-year college GPA: high school GPA (HSGPA) (Atkinson & Geiser, 2009) and college entrance exam scores (ACT, 2009; Kobrin, Patterson, Shaw, Mattern, & Barbuti, 2008). The research reported here adds to our knowledge of what it means to be college ready by examining the utility of an open-ended, performance-based assessment of critical thinking and writing skills as an additional predictor. This type of assessment may improve the accuracy of the prediction of college GPA since HSGPA and college entrance exams may not capture these higher-order skills.

Perspective

There are several well established predictors of college GPA, most notably HSGPA (Atkinson & Geiser, 2009) and SAT or ACT scores (ACT, 2009; Kobrin, et al., 2008; Rothstein, 2004). HSGPA is recognized as the best single predictor of first-year college GPA, accounting for approximately 30% of the variance in first-year college GPA (Atkinson, 2001; Kobrin, et al., 2008). The utility of HSGPA as a predictor of first-year college GPA persists despite differences in grading standards across high schools (Zwick & Himelfarb, 2011). One likely explanation is that HSGPA is based on repeated sampling of performance over time and across many different academic settings. Another possible explanation is that both HSGPA and college GPA are based on similar kinds of academic evaluations (e.g., quizzes, term papers, labs, class participation, exams), so prior performance on these types of tasks will be predictive of later performance on the same task types (Geiser & Santelices, 2007). To address concerns about differences in grading standards across high schools, college admissions offices commonly consider standardized admissions test scores (SAT or ACT) in addition to HSGPA as indicators of college readiness (and therefore predictors of college success). In combination, HSGPA and scores from such tests account for 37.2% of the variance in first-year college GPA (Kobrin, et al., 2008).

In prediction studies, first-year college GPA is frequently used as the criterion measure of college success. However, college GPA from later years must also be examined. For example, the SAT, which has been established as a good predictor of first-year college GPA, is less effective in predicting senior-year college GPA (Atkinson & Geiser, 2009). Indeed, research indicates that the best predictors of senior-year GPA are HSGPA in combination with the SAT Writing subject test, which accounted for approximately 30% of the variance in senior-year college GPA (Atkinson & Geiser, 2009). These findings catalyzed the development of the new SAT, which consists of writing, critical reading, and mathematics sections. Despite the addition of the writing section, the new SAT has not been found to be statistically superior in predicting college success (Atkinson & Geiser, 2009; Geiser & Santelices, 2007).

So what might an alternative predictor of college GPA be? Performance-based assessments, such as the Collegiate Learning Assessment (CLA), are assessments of higher-order thinking and writing skills (Klein, Benjamin, Shavelson, & Bolus, 2007); skills that are necessary for college and 21st century workplace success (Silva, 2008). The CLA has been shown to be effective in predicting first-year college success, accounting for 17% of the variance in first-year college GPA (Arum, Roksa, & Velez, 2008). In an effort to improve the prediction of college success, this study examines the relative efficacy of various combinations of HSGPA, SAT, and CLA as predictors of college GPA.

Method

The data used in this paper come from a five-year longitudinal study funded by the Lumina Foundation to examine gains in critical thinking and writing skills during college.

Participants

Participants for this study were recruited as entering freshmen in the fall semester of 2005 from fifty colleges and universities, each of which enrolled approximately 300 students to take the CLA and answer a short demographic survey. Subsequent testing occurred towards the end of the spring semester of 2007, as the participants were completing their sophomore year, and again near the end of the spring 2009 semester, as the participants were completing their senior year. The sampled institutions consisted of small liberal arts colleges as well as large research institutions, both public and private from the four regions of the United States. A number of historically black and Hispanic-serving institutions were part of this sample. The participants were demographically diverse with 18% Black and 8% Hispanic. 37% of the participants were males and 21% of the participants reported that English was not the primary language spoken at home. They represented all of the fields of study available at their schools.

A total of 9,167 freshmen completed testing in fall 2005. Of these students, 3,137 (34%) tested again during spring 2007, and 1,330 (13%) completed all three phases. Attrition was due mostly to institutions, rather than individual students, dropping out of the study, although some schools may have dropped out of the study due to difficulty recruiting participants. On average, an institution that participated in all three phases of the study lost about one-third of its participants.

Materials and Administration

The CLA consists of two task types: Performance Tasks and Analytic Writing Tasks. Each participant took one Performance Task and one Analytic Writing Task which consisted of a *Make-an Argument* section and a *Critique-an-Argument* section. The prompts within each task type were randomly assigned and participants were never given the same prompt in subsequent

testing sessions. A total of six Performance Tasks and eight Analytic Writing tasks (4 *Make-an-Argument*, 4 *Critique-an-Argument*) were used.

In the Performance Task, participants were asked to draft a document such as a letter or a memo to address a real-world problem. They were given a "document library" containing a mix of trustworthy and unreliable information pertaining to the problem. Participants had a total of 90 minutes to analyze and evaluate the information in the documents, synthesize and organize the information, draw conclusions, and craft a written response.

The Analytic Writing Task consisted of two sections. First, participants were allotted 45 minutes for the *Make-an-Argument* section in which they were required to take a position in response to an argumentative statement and create a persuasive argument in support of that position. Following this, participants had 30 minutes for the *Critique-an-Argument* section, which required them to identify and describe logical flaws in the assumptions and claims of a given argument. Tasks were timed separately and administered by computer under proctored conditions at each school during a multi-week testing window. Participants completed the Performance Task before they were administered the Analytic Writing Task.

Scoring

Performance Task responses were scored by trained human scorers, and Analytic Writing Task responses were scored using an automated scoring engine (Elliot, 2011; Klein, 2008). The automated scoring engines were developed using a broad sample of responses scored by multiple human-scorers trained in the use of the established rubrics for the CLA. All responses were assigned raw total scores that holistically reflected critical thinking and writing skills. Raw scores were placed on a common scale to adjust for differences in task difficulty. This was achieved by converting the raw scores for a particular task to a score distribution with the same

mean and standard deviation as the SAT total scores of the population of freshmen who took that task. The seniors' raw scores for that task were converted to scale scores using the same formulas used with freshmen so that any differences in answer quality between classes would not be obscured by the scaling process.

A participant's CLA total scale score was the weighted sum of his or her Performance Task (weighted at .50), Make-an-Argument (weighted at .25), and Critique-an-Argument (weighted at .25) scale scores. Participants' CLA total scores were used in the analyses for this study.

Analysis

A series of simple and multiple regression analyses were conducted using participants' HSGPA, SAT/ACT, and freshman CLA scores as predictors of college GPA at the end of their sophomore and senior years. Participants' HSGPAs were converted to a 4.0 scale, and ACT scores were converted to the SAT scale using an established conversion table (ACT, 2008). Only schools with at least 25 participants were used in the analyses.

Although the correlation between self-reported and actual HSGPA is only .74 (Shaw & Mattern, 2009), many studies use self-reported HSGPA in the prediction of college success. This study used participants' actual HSGPA and SAT/ACT scores as reported by university registrar offices. The enhanced accuracy of these data may cause results to differ from previous prediction studies. Additionally, the results of our study may differ from previous research because, unlike previous studies in which there was a single analysis using student data from many schools, the regression analyses were first conducted within schools and then results were aggregated across schools. As a result, lower validity coefficients might be expected because the range of scores tends to be more restricted within schools. The analyses were conducted within schools in order

to accommodate for the difference in grading standards between schools. Furthermore, admissions officers may be interested in the efficacy of these predictors for a specific school rather than across many schools.

Results

Predicting Sophomore GPA

Table 1 presents the simple and multiple correlations between participants' end of sophomore-year college GPA and all possible combinations of HSGPA, SAT, and CLA. The average correlations are reported in the last row. All three predictors are individually and collectively positively correlated with end of sophomore-year GPA. The efficacy of the individual predictors varied dramatically across schools, ranging from .03 to .68 for HSGPA, .02 to .65 for SAT, and .03 to .56 for CLA.

The predictive validity of the combinations of predictors also differed between schools. For example, all three predictors were much more strongly correlated with sophomore-year GPA at school 13 (.706) than school 14 (.222). This difference is potentially a reflection of institutions' admissions policies (e.g., restriction of range on predictors).

When looking across all schools, at the end of students' sophomore year in college, it appears that HSGPA is the single best predictor of college GPA, accounting for approximately 24% of the variance. When SAT is added to the prediction, the variance explained increases to 31%, whereas the combination of HSGPA and CLA accounts for 29% of the variance. Thus, at the end of sophomore year, HSGPA and SAT are slightly better at predicting of college GPA than HSGPA and CLA.

Table 1
Correlations between end of sophomore-year GPA and HSGPA, SAT, and CLA

School	N	HSGPA	SAT	CLA	HSGPA & SAT	HSGPA & CLA	SAT & CLA	HSGPA, SAT, & CLA
1	126	0.53	0.36	0.30	0.54	0.54	0.39	0.55
2	140	0.39	0.44	0.31	0.48	0.43	0.45	0.49
3	74	0.56	0.34	0.34	0.60	0.59	0.39	0.61
4	82	0.46	0.46	0.31	0.56	0.48	0.47	0.56
5	70	0.56	0.38	0.35	0.61	0.60	0.43	0.63
6	157	0.44	0.38	0.31	0.50	0.48	0.42	0.51
8	162	0.24	0.36	0.25	0.39	0.33	0.37	0.40
10	51	0.56	0.46	0.29	0.63	0.57	0.49	0.64
11	66	0.44	0.46	0.40	0.54	0.52	0.52	0.57
12	138	0.62	0.38	0.43	0.64	0.67	0.49	0.67
13	145	0.54	0.65	0.40	0.71	0.58	0.65	0.71
14	140	0.35	0.22	0.03	0.37	0.35	0.22	0.37
15	117	0.63	0.59	0.48	0.71	0.68	0.65	0.74
16	92	0.03	0.02	0.23	0.04	0.24	0.24	0.24
17	76	0.49	0.26	0.32	0.51	0.52	0.34	0.52
18	40	0.58	0.41	0.56	0.62	0.70	0.59	0.71
19	84	0.46	0.38	0.33	0.53	0.52	0.44	0.56
21	201	0.30	0.31	0.30	0.37	0.41	0.37	0.43
23	48	0.60	0.32	0.27	0.60	0.60	0.36	0.60
24	116	0.66	0.43	0.52	0.66	0.69	0.56	0.69
25	37	0.49	0.62	0.48	0.67	0.59	0.65	0.68
26	65	0.52	0.58	0.44	0.63	0.58	0.61	0.65
27	64	0.68	0.44	0.42	0.71	0.71	0.51	0.72
28	66	0.56	0.43	0.43	0.65	0.63	0.57	0.70
29	142	0.41	0.53	0.27	0.58	0.45	0.53	0.58
Mean		0.49	0.42	0.36	0.56	0.54	0.48	0.58

Predicting Senior GPA

Table 2 shows the simple and multiple correlations between participants' end of senior-year college GPA and combinations of HSGPA, SAT, and CLA. As with the analyses of sophomore GPA, all three predictors were also found to be positively correlated with end of senior-year GPA. Correlations ranged from .15 to .86 for HSGPA, .22 to .58 for SAT, and .03 to .57 for CLA.

Table 2
Correlations between end of senior-year GPA and HSGPA, SAT, and CLA.

School	N	HSGPA	SAT	CLA	HSGPA & SAT	HSGPA & CLA	SAT & CLA	HSGPA, SAT, & CLA
1	114	0.51	0.32	0.20	0.52	0.53	0.32	0.53
2	60	0.28	0.35	0.42	0.37	0.46	0.45	0.46
3	65	0.46	0.35	0.42	0.52	0.56	0.45	0.56
4	48	0.26	0.33	0.34	0.36	0.38	0.37	0.38
5	73	0.50	0.42	0.14	0.59	0.59	0.42	0.59
6	70	0.45	0.30	0.40	0.47	0.51	0.43	0.51
7	70	0.20	0.41	0.42	0.42	0.52	0.52	0.52
8	56	0.20	0.27	0.26	0.30	0.35	0.32	0.35
9	60	0.18	0.32	0.30	0.35	0.40	0.37	0.40
10	50	0.49	0.51	0.34	0.62	0.63	0.55	0.63
11	49	0.55	0.42	0.49	0.59	0.63	0.55	0.63
12	99	0.66	0.45	0.44	0.68	0.71	0.54	0.71
13	83	0.65	0.45	0.38	0.67	0.68	0.47	0.68
14	97	0.26	0.22	0.03	0.29	0.30	0.22	0.30
15	109	0.59	0.58	0.49	0.68	0.71	0.65	0.71
17	57	0.46	0.22	0.20	0.49	0.49	0.25	0.49
18	29	0.82	0.25	0.57	0.82	0.88	0.61	0.88
20	67	0.59	0.47	0.42	0.62	0.63	0.51	0.63
21	110	0.15	0.22	0.29	0.24	0.34	0.31	0.34
22	29	0.56	0.57	0.12	0.62	0.62	0.57	0.62
23	53	0.75	0.42	0.44	0.75	0.75	0.51	0.75
26	50	0.39	0.57	0.45	0.58	0.62	0.61	0.62
27	45	0.51	0.53	0.33	0.63	0.63	0.53	0.63
29	87	0.49	0.51	0.31	0.58	0.59	0.51	0.59
Mean		0.46	0.39	0.34	0.53	0.56	0.46	0.56

Once again, large differences were observed in the predictive validity of HSGPA, SAT, and CLA across the schools. For example, HSGPA was most strongly correlated with senior-year college GPA for many schools in this sample, but for some schools (e.g., school 7), the SAT and CLA had much stronger correlations.

When looking across all schools, at the end of students' senior year in college, HSGPA is still the single best predictor of college GPA, accounting for approximately 20.8% of the variance. HSGPA and SAT together account for 28.3% of the variance, and CLA and HSGPA

accounts for 31.5%. As with sophomore GPA, the difference is small, but HSGPA and CLA are better predictors of senior-year GPA than HSGPA alone or HSGPA and SAT.

Table 3 shows the average and weighted average (based on sample size) amount of variance in senior-year GPA that is accounted for by HSGPA, SAT, and CLA. As expected when measurements are separated in time, the validity of each individual predictor drops slightly between the end of sophomore and senior years. However, there is an increase in the amount of variance accounted for by the model using HSGPA and CLA. The weighted average variance accounted for by the model using HSGPA and CLA increased from 26.8% at the end of sophomore year to 30.1% at the end of senior year. The amount of variance accounted for in predicting college GPA for all other single predictors and combinations of predictors dropped during this time.

Table 3
Mean percent variance of senior-year college GPA accounted for by HSGPA, SAT, and CLA

Year	Mean	HSGPA	SAT	CLA	HSGPA & SAT	HSGPA & CLA	SAT & CLA	HSGPA, SAT, & CLA
Sophomore	Mean	23.7	17.6	12.7	31.2	29.5	22.8	33.5
	Weighted Mean	21.4	16.8	11.4	28.7	26.8	21.4	30.6
Senior	Mean	20.8	15.4	11.6	28.3	31.5	21.1	31.5
	Weighted Mean	20.0	15.1	11.0	27.0	30.1	20.0	30.1
Difference Senior – Sophomore	Mean	-2.9	-2.1	-1.0	-2.9	2.0	-1.7	-2.1
	Weighted Mean	-1.5	-1.8	-0.3	-1.7	3.3	-1.5	-0.4

Results also show that the weighted average variance of senior-year GPA increased from 27% to 30.1% when CLA was added to the model containing HSGPA and SAT. However, when SAT was added to the model including HSGPA and CLA, the variance accounted for stayed exactly the same. This means that there is some variance in CLA scores that is not accounted for by

HSGPA and SAT, and it suggests that the CLA is accounting for some feature of students' academic preparedness for college not captured by HSGPA and SAT in the prediction of senior cumulative GPA.

Discussion and Conclusion

This research examined the relative utility of various predictors of college success as measured by students' sophomore and senior-year college GPAs. The variables used in this prediction study included HSGPA, SAT, and CLA scores. As expected, HSGPA was found to be the best single predictor of college success (Atkinson & Geiser, 2009), accounting for 21.4% of the variance in sophomore-year GPA and 20.0% of the variance in senior-year GPA.

It is unclear why HSGPA is the best predictor of college GPA. Some argue that the prediction of college GPA from HSGPA is due to "method covariance," since student performance in high school and college is assessed in a large number of courses taken over a period of several years and are based on similar kinds of academic evaluations (e.g. quizzes, term papers, labs, exams) (Geiser & Santelices, 2007). It could also be due to latent traits such as motivation or ambition, where highly motivated or ambitious students will do well and students with low motivation and ambition will perform poorly regardless of the setting.

Despite its predictive efficacy, HSGPA should not be used in isolation when predicting college GPA because standardized tests such as the SAT, ACT, and CLA improve the prediction significantly. Results from this study revealed that the best prediction of college GPA was obtained using the combination of HSGPA and a standardized test, which corroborates previous predictive validity research (ACT, 2009; Kobrin, et al., 2008; Rothstein, 2004). While most previous research utilized end of freshman-year college GPA as the measure of college success, this research examined the prediction of GPAs of sophomores and graduating seniors. The most

notable finding from this study is that the CLA and HSGPA together provided the best prediction of senior-year GPA. Moreover, the amount of variance accounted for by this model increased between sophomore and senior years. This could be due in part to using students' cumulative GPA in the analysis. Previous research has shown that variance for cumulative GPA declines over time whereas it increases sharply for non-cumulative GPA (Geiser & Santelices, 2007). An analysis of our own data yielded similar findings. For sophomores, the standard deviation of cumulative GPA was .53. By senior year, the standard deviation for cumulative GPA decreased to .46. As a result, the increase in the proportion of total variance accounted for by the model may be partially due to this decrease of variance between sophomore and senior college GPA since there is less total variance in senior-year college GPA. However, the amount of variance for all single predictors and other combinations of predictors dropped during this period, which is contrary to results from previous research showing that the predictive validity of a model containing HSGPA and standardized test scores improved after freshman year (Geiser & Santelices, 2007).

We hypothesize that HSGPA and college entrance exams like the SAT assess knowledge of domain-specific content such as algebra and literature. They are not assessments specifically aimed at measuring critical thinking and writing skills, which is what the CLA strives to do. Therefore, the CLA and SAT appear to capture different aspects of students' abilities. These higher-order skills are the types of 21st century skills that are necessary for college and the next generation of employees (Autor, et al., 2003). Institutions which have curricula aimed specifically at improving these higher-order skills may be effective although further research is necessary to confirm this.

It should be noted that despite the overall trend of HSGPA and CLA being predictive of college GPA, at the individual school level, different combinations of predictors, including indicators of college readiness not used in this study, may be more effective in predicting college GPA. Thus, it is recommended that schools conduct analyses to identify the effective predictors of college GPA within their institution. Future studies could seek to examine differences in the predictive validity of the CLA based upon varying demographics (e.g., sex, race/ethnicity) and increasing sample sizes.

The results from this study underscore the apparent value of open-ended performance assessments as indicators or college readiness and therefore as predictors of college success. In light of the demand for 21st century skills and the focus on college success, HSGPA and traditional college entrance exams should not be the only variables. In the prediction of college success, there is clearly room for another measure. Indeed, a strong case can be made for open-ended performance assessments that measure the higher-order skills and knowledge that are important in determining college and career success.

References

ACT. (2008). ACT-SAT concordance. Retrieved July 21, 2011, from http://www.act.org/aap/concordance/

ACT. (2009). National overview: Measuring college and career readiness - the class of 2009. Iowa City, IA: ACT.

Arum, R., & Roksa, J. (2011). *Academically adrift: Limited learning on college campuses*. Chicago, IL: University of Chicago Press.

Arum, R., Roksa, J., & Velez, M. (2008). *Learning to reason and communicate in college: Initial report of findings from the CLA longitudinal study*. Brooklyn, NY: Social Science Research Council.

Atkinson, R. (2001). Standardized tests and access to American universities. *The 2001 Robert H. Atwell Distinguished Lecture.American Council on Education, Washington, D.C.*

Atkinson, R., & Geiser, S. (Eds.). (2009). *Reflections on a century of college admissions test*. Berkeley, CA: University of California, Berkeley.

Autor, D. H., Levy, F., & Murname, R. J. (2003). The skill content of recent technological change: An empirical exploration. *Quarterly Journal of Economics, 118*(4), 1279-1333.

Elliot, S. (2011). *Computer-assisted scoring for performance tasks for the CLA and CWRA.* New York: Council for Aid to Education.

Geiser, S., & Santelices, M. V. (2007). *Validity of high-school grades in predicting student success beyond the freshman year: High-school record vs standardized tests as indicators of four-year college outcomes*. Berkeley, CA: Center for Studies in Higher Education, University of California, Berkeley.

Hart Research Associates. (2006). *How should colleges prepare students to succeed in today's global economy? - based on surveys among employers and recent college graduates*. Washington, DC: Hart Research Associates.

Hart Research Associates. (2009). *Learning and assessment: Trends in undergraduate education - a survey among members of the association of American colleges and universities*. Washington, DC: Hart Research Associates.

Jerald, C. D. (2009). *Defining a 21st century education*. Alexandria, VA: The Center for Public Education.

Klein, S. (2008). Characteristics of hand and machine-assigned scores to college students' answers to open-ended tasks. In D. Nolan & T. Speed (Eds.), *Probability and statistics: Essays in honor of david a. Freedman* (Vol. 2, pp. 76-89). Beachwood, OH: Institute of Mathematical Statistics.

Klein, S., Benjamin, R., Shavelson, R., & Bolus, R. (2007). The Collegiate Learning Assessment: Facts and fantasies. *Evaluation Review, 31*(5), 415-439.

Kobrin, J. L., Patterson, B. F., Shaw, E. J., Mattern, K. D., & Barbuti, S. M. (2008). *Validity of the SAT for predicting first-year college grade point average*. New York: The College Board.

McPherson, M. S., & Schapiro, M. O. (Eds.). (2008). *College success: What it means and how to make it happen*. New York: The College Board.

Porter, A., McMaken, J., Hwang, J., & Yang, R. (2011). Common core standards: The new US intended curriculum. *Educational Researcher, 40*(3), 103-116.

Rothstein, J. (2004). College performance predictions and the SAT. *Journal of Econometrics, 121*(1-2), 297-317.

Shaw, E. J., & Mattern, K. D. (2009). *Examining the accuracy of self-reported high school grade point average* (No. 2009-5). New York: The College Board.

Silva, E. (2008). *Measuring skills for the 21st century*. Washington, DC: Education Sector.

Wagner, T. (2008). *The global achievement gap: Why even our best schools don't teach the new survival skills our children need--and what we can do about it*. New York, NY: Basic Books.

Zwick, R., & Himelfarb, I. (2011). The effect of high school socioeconomic status on the predictive validity of SAT scores and high school grade-point average. *Journal of Educaitonal Measurement, 48*(2), 101-121.

Zwick, R., & Sklar, J. (2005). Predicting college grades and degree completion using high school grades and SAT scores:The role of student ethnicity and first language. *American Educational Research Journal, 42*(3), 439-464.