CAE

# Leveling the Playing Field From College To Career

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Roger Benjamin
President of the Council for Aid to Education

# Preface

There is much to discuss, and debate, about the sources and effects of inequality on economic growth and social mobility, and the relationship between education and economic growth. However, an undergraduate degree from a highly selective and elite college gives students a strong advantage in gaining employment in jobs that promise greater lifetime earnings. The widely held assumption is that the prestige of the college is a useful proxy for the quality of the graduates of that institution. Irrespective of the relationship between education and economic growth, post-secondary education is imperative to the enhancement of human capital and a rich source of talent for employers. If there are significant bottlenecks, or structural impediments, that block equal opportunity for students of high ability that do not go to elite colleges, we should identify the problem and attempt to reduce or eliminate it.

In the United States, achieving equal opportunity in post-secondary education is typically described in terms of enrolling more underrepresented groups in selective colleges. The belief is that if this step is accomplished, it will have a fundamental impact on the problem of inequality at the national level. However, what if there are not enough places for students in selective colleges to accomplish this goal? What if selective colleges do not have enough capacity to make a significant impact on the problem of serving students from underrepresented groups with demonstrated high abilities? The rest of this paper will address these questions.

# Introduction

The post-secondary education sector is beset by a number of severe headwinds. Cost issues now elicit comparisons with the healthcare sector's cost problem. Access deficits continue to rise, and retention and graduation rates are unacceptable. Questions about the quality of education are increasing as well. Moreover, the rise of online and competency-based undergraduate programs, emerging across the for-profit, non-profit, and public sectors, constitutes a disruptive force that threatens the business model of the traditional brick-and-mortar, post-secondary education sector.

However, it is important to remember that higher education was formed to achieve two principal objectives: 1) to provide education for students, encouraging them to achieve their highest intellectual potential, and 2) to encourage faculty to teach and produce scholarship and research to their highest level of ability. A principal role, introduced by Thomas Jefferson, is for higher education to be the major source of social mobility for all citizens. This ideal was institutionalized as the Morrill Land Grant Act of 1862. It is this principle that I focus on here. Today the college that students attend largely determines their economic and social chances in life. The question is whether the level of prestige granted to a select group of institutions unduly restricts the ability of all students to benefit equally from the educational attainments they demonstrate. Do all graduating college seniors secure jobs commensurate with their skills? If the answer is no, can we identify innovations that assist in leveling the playing field for all citizens?

# Equal Opportunity Not Equal Results

> ...if Smith and Jones have the same native talent and Smith is born of wealthy, educated parents of a socially favored ethnicity and Jones is born of poor, uneducated parents of a socially disfavored ethnicity, then if they develop the same ambition to become scientists or Wall Street lawyers, they will have the same prospects of become scientists or Wall Street lawyers if equal fair opportunity prevails. (Rawls, 2001, "A Theory of Justice," section 13)

This statement captures how the concept of equal opportunity is used here.

Since the premise I am beginning with is that there is not a level playing field for all graduating college seniors, a basic question is: Why have we not attempted to create and implement innovations to deal with the problem until now? Here is a good answer:

> Goldman Sachs doesn't intrinsically care about Harvard. They care about finding the best person for the job. Elite brand degrees have just traditionally been the best proxy metrics for that because precise metrics weren't heretofore available. (Ferreira, 2013, "Disruptive Innovation vs. Harvard")

We now have precise metrics that can be used to offset the power of the proxy of elite brand institutions. The rest of this paper suggests how we can benefit from using them. I will use the Collegiate Learning Assessment (CLA), in particular the recent next generation of this protocol, CLA+, for my illustrative argument because I am most familiar with this assessment.[2]

## The Context for the Problem

If the absence of equal opportunity is the problem, can higher education be altered to create a more level playing field for all graduating college seniors? And, what is the premise behind this question? My argument is that, as in most countries, a set of selective colleges can be described as a positional good that determines the life chances of most students. The concept of positional good (Hirsch, 1976) describes goods that fall under the category of "zero sum," which means there are upper limits to their consumption. Only a finite number of people can attend a chamber music concert before it ceases to be one. The same thing is true about many other goods in life, including top positions in the private and public sector. The places at highly selective colleges are limited; again by definition, a selective college would cease to be one if it grew beyond perceived enrollment limits. (This itself is a contentious point for some.) Here I will attempt to provide empirical evidence that selective colleges do not enroll the vast majority of high-ability students (this term defined below). If this hypothesis is borne out, we have a mal distribution of our human capital at the societal level and an unequal playing field in the college-to-career space.

Second, are significant innovations in major social institutions, such as higher education, possible? The institution of higher education itself is rightly thought to be one of the major social institutions in American society, highly institutionalized and thus not easily transformed by outside disruptive forces. However, it is important to remember that humans create institutions and not the other way around (Harsanyi, 1969). Since the education system is the only venue we have to preserve and enhance human capital, it is prudent to audit it from time to time to judge whether it is in need of redesign. This is particularly true for U.S. post-secondary institutions because they have greater importance in today's Knowledge Economy, where national economies that strive to stay at the forefront of the new product-innovation cycle and the ideas that generate the highest economic value added are the winners.

Finally, does educational technology provide new ways to innovate in post-secondary education? The reason this question is important is because education technology now provides a cornucopia of potential innovations for higher-education institutions.

There are now technology-based solutions, including open-education resources, flipping classrooms, and adaptive and personalized instruction. Advances in education-assessment tools, the reason for the innovation suggested here, has been stimulated by recent investments of over $360 million by the U.S. Department of Education in twenty-first-century tests, in support of the Common Core movement in K-12 education. As a byproduct, new ways to use educational technology have led to novel assessments—such as interactive games—that give promise of being widely implemented.

Significant innovation, in support of institutional redesign of important segments of higher-education institutions, is possible. We appear to be at a moment when we can think practically about re-engineering key processes to make the higher-education sector more efficient and more effective.

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[1] See also Fishkin (2014) for a new treatment of the implications of equal opportunity.
[2] The other two national assessments are Proficiency Profile (Educational Testing Service) and The Collegiate Assessment of Academic Progress (ACT). These three critical-thinking tests were found to be reliable and valid in a test validity study sponsored by the Department of Education, Fund for the Improvement of Postsecondary Education. See Klein et al. (2009) cf Steedle, et. al. (2010).

# The Case for a Market Failure

Today, going to college is the principal means to success in the United States. However, all post-secondary education institutions are not equal; a few are viewed as selective colleges. These colleges, with the Ivy Leagues at the apex, are examples of positional goods. Only a small percentage of college students enter and graduate from these colleges. Many leading companies recruit only from this group of colleges. The most selective colleges and universities have strong barriers to entry. Students who win enrollment to these colleges tend to have the advantage of significant financial and social support from early childhood through high school.

Parents, with the appropriate financial means, are willing to financially support their children in gaining the skills needed for admission to Yale because that gives their children entry into the select circle of society's "winners," economically and socially. They have the resources to compete for top public and private leadership positions which, by definition, are finite, in short supply, and possess a zero-sum quality. There, typically, is only one CEO of a company, one dean and one president, respectively, of a university, and so on. Of course, selective colleges have scholarships and affirmative action policies that permit them to enroll minority students, but the resources devoted to these policies are not enough to have a significant impact on creating a truly diverse student body.

The gap between the per-student endowment of Yale versus a public university, such as the City University of New York, is so large that it is difficult not to conclude that education at Yale is a very different student experience, which gives graduates huge life-long advantages in their individual human capital assets. No one should want to harm Yale's ability to deliver an education of the highest quality. However, as the support for public higher education wanes across the United States, we must be prepared for even greater economic and social inequality, less social mobility, less diversity, and, in all likelihood, less economic growth. Why? Because the selective colleges may not supply a sufficient critical mass of educated citizens to maintain the U.S. human capital comparative advantage globally. Surely we should examine what might be done about this issue.

The rich diversity of American post-secondary education is correctly cited as a unique strength. However, just as we made significant changes in admissions requirements for college applicants in the aftermath of World War II by creating admissions tests, such as the SAT and ACT, to complement the high school GPA, we now face the need to create a test to complement the graduating college senior's GPA. We should do so to reset the opportunity structure held in place by the positional-good world of post-secondary education. However, we should not attack selective colleges but design a way to widen the opportunity structure for students in less-selective colleges. Why should we do this now?

The positional-good system of selective colleges may have made sense in an earlier age of American development. But with a population of over 320 million (to be 400 million in three or four decades), the bulk of whom live well outside the geographic reach of most of the selective colleges, we need to dramatically expand the opportunity system created by post-secondary education. This is especially true for underrepresented high-ability students because they appear to attend less-selective colleges in overwhelming numbers. What follows is an attempt to justify this problem statement and suggest a way to attack it.

# The Problem to Solve

Hoxby and Avery (2012) demonstrate that as many as 10 to 15 times the number of African American and Hispanic students, as previously thought, have SAT or ACT scores that meet the admissions requirements of the most prestigious colleges in the United States. However, these students are often advised not to apply to selective schools and attend high schools not visited by college recruiters from elite institutions. If we did not have the SAT and ACT in place, admissions officers would only have students' high school GPAs to rely upon for admissions decisions. There likely would be even fewer students from underrepresented groups admitted to the most selective colleges because the SAT and ACT provides important additional information to students' high school GPAs (Kobrin et al., 2008).

[3] The per student endowment at Yale University is $1,750,000 while the per student endowment at the City University of New York ranges from a few hundred dollars at Medgar Evers College to $9,000 at Baruch College. Voluntary Support of Education, VSE Data Miner, cae.org.

College to work presents a more severe market failure because there are no tests to accompany students' college cumulative GPAs that could control for the grade inflation and variability of grades across colleges. Such a test could assist in leveling the playing field for students from less-selective colleges without damaging the prospects from selective colleges.

## Students

Grade inflation has resulted in the national mean college cumulative senior GPA rising to 3.3 (on a four point scale) (Rojstaczer and Healy, 2012). This means that most graduating seniors do not have an objective way of distinguishing their skills from other students when they apply for jobs; they are all above average. Students who attend the top 150 selective institutions are likely to get a pass because many employers will choose students based on institutional prestige. However, what about the others, the 90-plus percent of graduating seniors who attend less selective institutions? Moreover, what about the most disadvantaged students? There are a large number of low income students who graduate from these colleges and universities that have the critical-thinking skills and abilities that employers cherish.

## Colleges

Less-selective colleges produce many college graduates who achieve distinction in their careers. However, they face a branding problem. Since these colleges do not have reliable tools that make the case for their stronger graduating seniors, employers may never discover their students. Less-selective colleges, in particular, should consider recommending that their graduating seniors take CLA+. This should increase the number of their graduates at the peak of the value-added economic product cycle. If this turns out to be the case, less-selective colleges will change employers' preconceived notions about their graduates and the colleges that produce them.

In sum, the market failure between graduating college seniors in less-selective colleges seeking employment and employers is blocking hundreds of thousands of students from attaining employment appropriate for the high-ability skills they have attained. Too many students do not get to interview for jobs that they have the skills for because employers are unaware of them. This is bad for the students in question, their institutions, and employers. At the macro level, it means too much of our human capital is mal distributed. And it also is a major block to opportunity for high-ability students from disadvantaged backgrounds who attain skill levels equivalent to their selective college counterparts.

## Employers

Employers spend much time and money interviewing potential applicants for jobs. Some employers give applicants assessments on the skills and abilities they require in their employees. However, in the age of grade inflation, how do hiring managers decide who to interview in the first place? If, in addition to résumés and college transcripts, hiring managers have the results of a valid and reliable critical-thinking test, their pool of potential applicants would be enlarged. The employment process would be more effective and efficient, and employers would be better equipped to tap the social, economic, and ethnic diversity of students reflected in all of our colleges and universities.

Increasingly, employers have been forced to ask applicants to send their SAT/ACT scores or Graduate Management Admission Test (GMAT) scores along with their résumé because the high level of grade inflation means the transcripts of graduating seniors do not supply sufficient information about the job candidates' skills. This is unacceptable. The GMAT, a solid critical-thinking test, is targeted for a small population of students applying for business-school programs. The SAT is not an acceptable measure for the skill levels college seniors have achieved, for two reasons. First, reliance on a test that applicants took before they entered college means no credit is given to the effect of the college experience. This not only unacceptable, it is not credible. We know from analysis of the CLA database that the overall mean student-learning growth, for college students from freshmen to seniors, is .73 (a .44 standard deviation). This finding is based on analysis of all students taking the CLA in over 1200 test administrations over the past eight years. This is a significant effect. College does matter

to student-learning growth, and it matters a lot (See Benjamin, 2014). We should not assume that college does not matter. Moreover, we should **not** ignore the strong probability that many of these same students and their Hispanic and non-Hispanic white counterparts who attend less-selective colleges exhibit above average growth in their critical-thinking skills as a result of their college experience, **even if** they do not attend highly-selective colleges.

## The Challenge

If employers had the results of a reliable and valid pre-screening assessment of graduating college seniors, that might provide suitable information to enlarge the pool of potential applicants. If less-selective colleges produce many college graduates that achieve high levels of the skills employers cherish and can overcome the problem of employers not knowing how to find these students, these institutions will change the perception of employers about their graduates and the colleges that produce them.

The hypothesis, then, is that less-selective colleges graduate a large number of high-ability students (as defined by appropriate standardized assessments), as many or more students than the selective colleges that serve as the proxy for excellence as noted by Ferreira on page two.

## Validating the Market Failure Thesis

There is at least one data set that may be useful for this purpose, the data set of the Collegiate Learning Assessment (CLA and CLA+). There are two other reliable assessments in the graduating senior space, the ETS's Proficiency Profile and ACT's Collegiate Assessment of Academic Progress (CAAP), that are also potentially appropriate for this purpose. What is CLA+? Is it reliable and valid?

CLA+ measures critical-thinking skills, regarded as the top priority by employers (Hart Associates, 2013), including:

- analysis and problem solving
- writing mechanics
- writing effectiveness
- scientific and quantitative reasoning
- critical reading and evaluation
- critique an argument

These cognitive skills are independent from academic disciplines and are teachable. They are thought to be particularly important skills in today's Knowledge Economy where one can Google for facts and, hence, the question becomes whether the student can access, structure, and use information, not just whether he or she can remember the content; these skills are highly prized by faculty and college leaders who, like their K-12 counterparts, are moving toward "deeper" learning in both K-12 and higher education (Benjamin, 2014). [4]

CLA, and the updated CLA+, has been used in over 700 colleges and universities in the United States, many testing on an annual basis since 2004-05. It has been used internationally in approximately 125 colleges in 12 different countries.

[4] For evidence of reliability and validity see the following sources. Klein and R. Benjamin. The CLA+ at cae.org. See also the 90 studies of reliability and validity listed and analyzed in R. Benjamin et al. (2013), The Case for Critical Thinking Skills and Performance Assessment at cae.org. For important new validity evidence see R. Arum and J. Roksa, forthcoming 2014, which shows that graduating seniors who do well on CLA+ are in better financial situations and are much more likely to be employed than those students who do poorly on CLA+.

Figure 1 Distribution of Senior CLA Scores

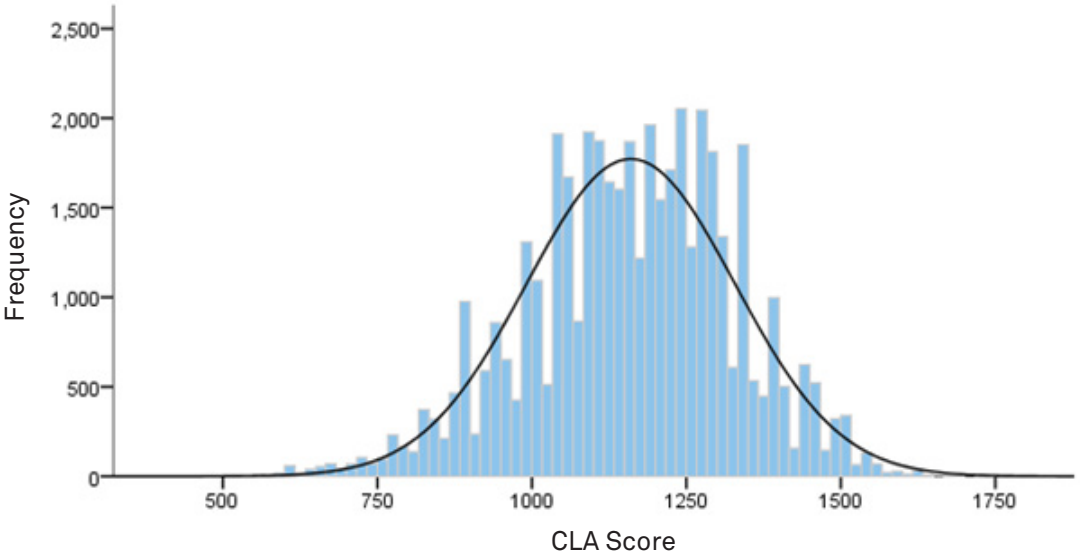



*Figure 1 indicates that 68% of the students fall within 1 standard deviation of the mean score 1159. The question is how many of the students scoring in the top 10%, 25%, and 50% are in selective versus less-selective colleges (see Appendix C).*

Table 1
Proportion of Selective vs. Less-selective Institutions

| | Colleges & Universities | | Student Enrollment | |
|---|---|---|---|---|
| | 1980 | 2012 | 1980 | 2012 |
| Selective | 143 (5%) | 143 (5%) | 762,248 (12%) | 940,771 (9%) |
| Less Selective | 3,014 (95%) | 3,014 (95%) | 5,584,841 (88%) | 9,823,718 (91%) |
| ALL | 3,157 (100%) | 3,157 (100%) | 6,347,089 (100%) | 10,764,489 (100%) |

Table 1 was constructed to set the context for our test of whether a market failure exists. Over the past 30-plus years, the number of students in the 143 selective colleges has grown by 171,000. Over that same time period, the number of students attending less-selective colleges has grown by over 4,200,000. The largest growth in four-year college attendance is in the less-selective colleges.

The list of selective colleges is based on the Barron's selectivity college index (See appendix B and C), the same index used by Hoxby and Avery (2012). Of course, any division of colleges and universities into selective and less-selective categories can be challenged. For example, today Indiana University, the University of California, San Diego, and private liberal arts colleges, such as Earlham College and Kalamazoo College, would appear to warrant the label selective. The Barron's selectivity index reflects judgments based on past performances which may not capture recent trends. Based on the analyses here, the list of selective colleges itself should be widened.

Table 2
Projected National CLA Performance

| A *Actual* CLA Performance | Exiting Seniors at CLA Institutions | | |
|---|---|---|---|
| | Selective Institutions | Less-selective Institutions | ALL |
| Above 1400* | 395 (24%) | 2,631 (6%) | 3,026 (7%) |
| Above 1300 | 841 (52%) | 8,001 (18%) | 8,842 (20%) |
| Above 1200 | 1,284 (79%) | 17,956 (41%) | 19,240 (43%) |
| ALL | 1,627 (100%) | 43,352 (100%) | 44,979 (100%) |

**These scale points are based on the CLA scale, which like the "old" and upcoming SAT, ranges from 400 to 1600.*

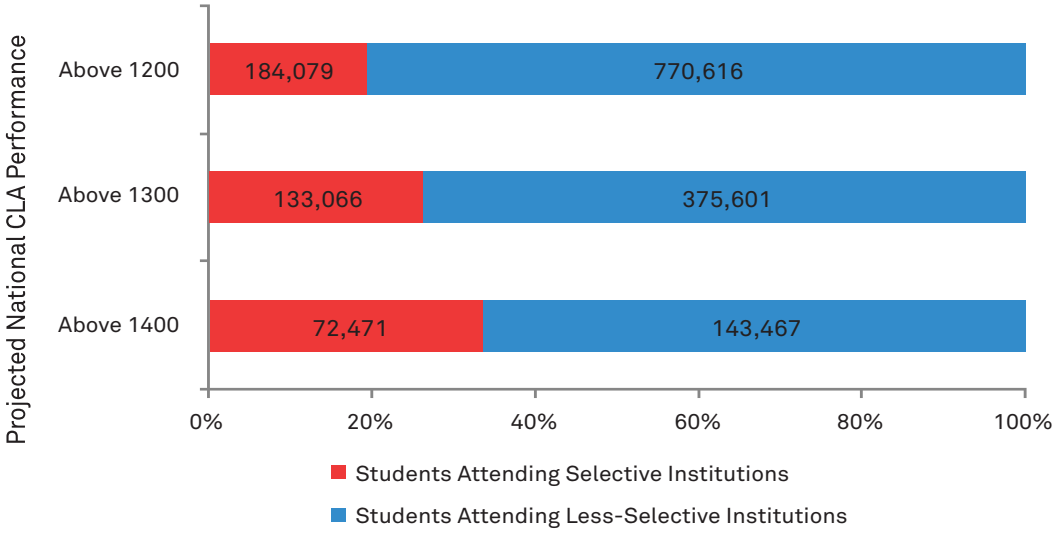
| B<br>*Projected National*<br>CLA Performance | Bachelor's Degree Recipients Nationally (2011-12) and Projected CLA Performance | | |
|---|---|---|---|
| | Selective Institutions | Less-selective Institutions | ALL |
| Above 1400 | 53,307 (24%) | 95,295 (6%) | 148,602 (8%) |
| Above 1300 | 113,497 (52%) | 289,796 (18%) | 403,293 (23%) |
| Above 1200 | 173,282 (79%) | 650,365 (41%) | 823,648 (46%) |
| ALL | 219,572 (100%) | 1,570,207 (100%) | 1,789,779 (100%) |

**Note that the total national percentages differ somewhat from the percentages of students at all CLA institutions scoring at given levels, due to a slight underrepresentation of slective colleges taking the CLA.*

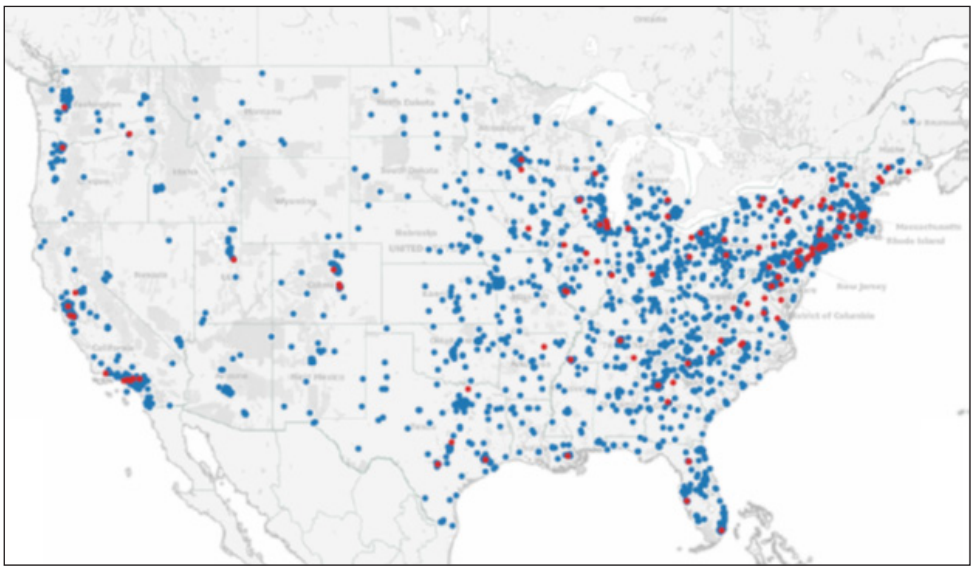
Using the percentages of students above 1400, above 1300, and above 1200, Table 2 shows that selective colleges produce a higher percentage (24%) of students above 1400 than the less-selective colleges (6%). However, there are almost twice as many high-ability students graduating from less-selective colleges above the 1400 level. The proportion of high-ability students in the less-selective colleges grows for students testing above 1300 and 1200 (see graph). The less-selective colleges have large percentages of low-income (Pell grant) and moderate-income students from diverse backgrounds.

Graph 1 captures this finding. A significant market failure exists in the college-to-career space.

Graph 1
Projected National CLA Performance




Geographic Distribution of Selective and Less-selective Colleges



The map shows that the selective colleges are isolated from most students in the United States. The 143 selective colleges, largely in the northeast, form a positional-good gatekeeper system that overly determines the life chances of all students across the country. We know most students attend college within commuting distance. The location of the selective colleges means there is a disconnect with large and growing ethnic/racial and income groups throughout the United States.

Table 3
Distribution of Student Race and Ethnicity, by Institutional Selectivity, 1980 and 2012

| | Students | | 1980 | | 2012 | |
|---|---|---|---|---|---|---|
| | ALL 1980 | ALL 2012 | Selective Institutions | Less Selective Institutions | Selective Institutions | Less Selective Institutions |
| Non-Hispanic White | 81% | 56% | 86% | 81% | 58% | 56% |
| Hispanic | 5% | 13% | 3% | 5% | 9% | 13% |
| Black or African American | 9% | 13% | 5% | 10% | 5% | 13% |
| Asian or Pacific Islander | 2% | 6% | 4% | 2% | 13% | 5% |
| Other | 3% | 13% | 3% | 3% | 15% | 12% |

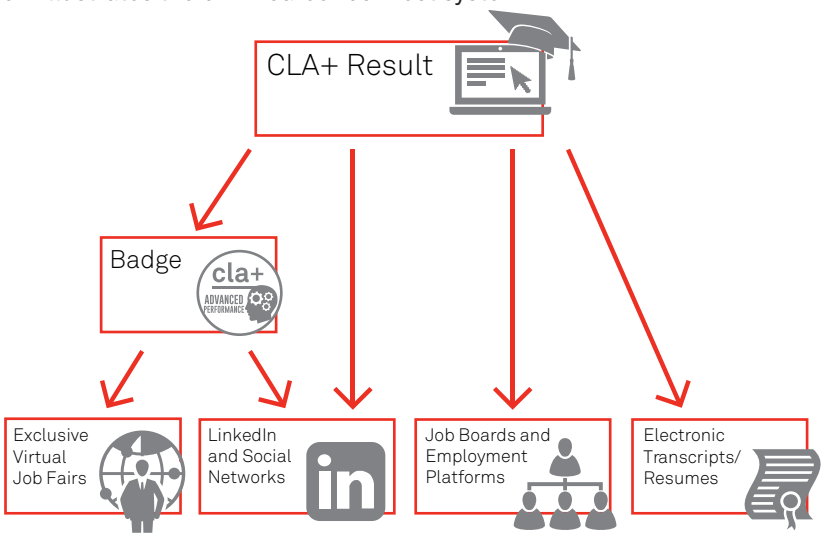
Table 3 provides further evidence of the market-failure challenge. First, there has been a significant change in distribution of race and ethnicity by institutional selectivity from 1980 to 2012. The selective colleges are more diverse. The main point, however, is that the increasingly small proportion of total college enrollment made up by selective colleges reinforces the market-failure thesis. The major growth of enrollment is in the less-selective college group.

# Possible Solution

The goal is to develop tools that allow for the demonstration of skills that are important for both employers and students and to make that information accessible to students and employers. CAE has developed one process, labeled "CLA+ as a Work Readiness Pre-Screening Tool in the College-to-Career Space" (see Appendix A). It is being piloted to see if it can reduce the market failure.

Each student receives a score report that indicates the level of mastery for skills measured by CLA+. Qualifying students (those with proficient- or advanced-mastery levels) may claim a certified badge through a secure vault hosted by Pro Exam. Students will be able to store their score reports with online transcript service providers and place their CLA+ scores on employment boards. Qualifying students (those with top scores) were invited to a virtual career fair, hosted by Brazen Careerist, in May 2014 to meet with selected employers. Employers who attended the virtual career fair did so knowing that the students they met possess the mastery level critical-thinking skills they regard as requisites for an interview. Moreover, they knew that they met many students who have the diverse backgrounds they are seeking in order to diversify their workforce. Both employers and students saved time and money through the virtual career fair meeting.

Figure 2 illustrates the CLA+ Career Connect system.



The steps outlined above are possible for graduating seniors who take CLA+ and elect to add the additional information to their transcript, secure a certified badge, if eligible, and send their results to respected jobs boards accessed by employers. If students qualify, they can also attend a virtual career fair all of which will improve the odds of high-ability students in less-selective colleges to obtain a good job and start a promising career.

## Benefits of a More Level Playing Field

When groups do not believe the playing field is level, they become discouraged and drop out. If enough students and enough colleges and enough employers embrace the innovation outlined here, then the market failure will be reduced. Most economists agree that an open, transparent market brings greater benefits to buyers and sellers. Ways to reduce the "noise" between college and career should thus be encouraged. This would result in a better distribution of human capital and a more level playing field.

## Conclusion

Olson's collective action model (1965) suggests that new innovations are needed to help create a more level playing field. We cannot expect stakeholders at the selective colleges to deal with the problem alone. New innovations are needed to reset the rules of the game students, employers, and colleges operate within. There is a strong case for use of an appropriate standardized assessment to provide graduating college seniors and employers additional information about their critical-thinking skills. Such an assessment could be used as a sourcing tool by employers which would be of assistance to them and the students they identify assisted by the measurement tool.

The "tunnel effect," formulated by economists A. Hirschman and M. Rothschild, suggests why a more level playing field for careers encourages members of all ethnic/racial groups to compete/work hard. Imagine you are in the left-hand line of two lanes of traffic held up in the Lincoln Tunnel. Frustration builds. Finally, cars in the right-hand lane begin to move. What are your emotions then? Hirschman posits that you are excited and now positive about the possibility that your lane of traffic is next to move. You see light at the end of the tunnel. However, what are your reactions when your lane does not move forward? You realize that while cars in lane 2 moved forward, your lane is stuck. You are stuck. That is when feelings of anger or despair set in.

The United States is only one example of the market failure. Based on countries that I have lived in, many countries probably exhibit significant disconnects between their higher-education systems and employment. Because many countries may face similar market failures between college and career, as outlined in this case study of the U. S., research programs should be formed to refute or corroborate the points I have made and create new evidence-based findings on the topic across nations.

Most importantly, the principle of equal opportunity is widely shared in liberal democracies (Hartz, 1955). "Equality has always been the most radical and potent idea in American history (Wood, 2014, p. 38). If it is problematic in the senior-to-career space for many students to find jobs appropriate to their skills, then that is a serious problem that we need to fix. Today, we have metrics to measure the quality of the skills that colleges and employers indicate they prize highly.

We also have education technology-based tools to more quickly inform employers and students about the cognitive skills required for jobs and the skills that students have that appear to meet those requirements.

The market failure problem between graduating college seniors and employers should be very high on the policy agenda to solve by both private and public stakeholders involved. It is a matter of significant national interest to more efficiently allocate the nation's human capital, the only resource any nation has, and to improve equal opportunity, which is key to improving economic and social equality.

# Appendix A

## The Case for CLA+ Career Connect as a Work Readiness Pre-Screening Tool in the College-to-Career Space

### Types of Tests for Employers

A large amount of time and energy has been spent designing assessments employers can use to make hiring decisions. Therefore, most of the attention devoted to assessments for work readiness is focused on the human resources department. Although assessment protocols for human resource departments may be tailored to meet a specific employer's needs, the assessment categories may be divided as follows:

- Aptitude tests—predictive of job success in specific fields, focus on abilities, such as spatial visualization, verbal conceptualization, and math aptitude. These tests are expensive, time consuming, and must be updated frequently to remain aligned with changing job requirements.
- Personality tests—"...instruments for the measurement of emotional, motivational, interpersonal and attitudinal characteristics as distinguished from abilities..." (Anastasi & Urbina, 1997). For example, characteristics such as one's openness to experience, extroversion, agreeableness, conscientiousness, emotional stability, well-being, and/or happines s are measured.
- Academic discipline tests—tests of content knowledge for particular fields and domains of knowledge. For example, these tests help answer questions like: Does an applicant for a position in accounting have the requisite content knowledge to do the job?
- Cognitive abilities tests—assess critical-thinking or cognitive skills (see below) but these tests are also extended to soft skills, such as persistence, collaboration, entrepreneurship, creativity, collaboration, and moral or ethical reasoning (Kraiger et. al., 1993).

The most prominent example of a work readiness assessment is ACT's WorkKeys (2014), which comprises a combination of these types of tests. This test, crafted to predict job success in thousands of occupations, most of which are in the sub-baccalaureate market, requires applicants to demonstrate familiarity with the skills needed for success in the occupation, but the test also predicts the ability of applicants to succeed.

### The Criteria for the Evaluation of Tests

No matter what combination of test items make up an assessment protocol, reliability and validity, along with time and cost, are always the basic criteria used to evaluate the test. Validity concerns the extent to which the test measures the knowledge, skills, and abilities it is designed to measure. Reliability refers to the degree of consistency of students' scores across a test's questions, the consistency of scores across different assessors, and whether the tests are given to students under the same conditions and over the same time period and, thus, meet the essential criterion of fairness (Klein, 2002). The measurement science community views these two criteria as necessary for an effective assessment.

Time and cost are also crucial. Assessments that require more than two hours are restricted to high-stakes tests, such as the SAT, MCAT (medical school), and LSAT (law school). Tests that cost more than $75 to $100 are products for niche markets; for example, certification tests for specialized professional fields such as piloting an airplane.

The types of tests listed above vary on the criteria noted. Aptitude tests are costly and time-consuming to administer. Academic discipline tests, geared towards specific fields, are possible to administer, but it is not easy to compare potential applicants across diverse fields. Personality tests are used widely but are not considered highly reliable by the measurement science community (Stabile, 2002).

Cognitive abilities tests are not only considered a significant requisite for employment success, they are the only tests with sufficiently high levels of reliability and validity (as defined by measurement scientists) that permit wide comparisons across all graduating college seniors,

and are also efficient in testing time and cost. Cognitive abilities can also be defined as critical-thinking skills, which are regarded as the top priority by employers (Hart Associates, 2013) and include:

- Analysis and Problem Solving
- Writing Mechanics
- Writing Effectiveness
- Scientific and Quantitative Reasoning
- Critical Reading and Evaluation
- Critique an Argument

Faculty surveys also place these cognitive abilities at the top of requirements for graduating college seniors (Hart Associates, 2013). Moreover, most colleges feature these skills in their mission statements or general education goals.

Three assessment organizations, ETS, ACT, and CAE, cooperated in a test validity study of the two multiple-choice tests that assess these critical-thinking skills developed by ETS and ACT, respectively, and the performance-based assessment developed by CAE. All were judged reliable and valid by the measurement scientists at these three education assessment organizations. However, this does not mean, necessarily, that all of the assessments measure the same criteria (Steedle, et al., 2012).

Many have suggested that measures of soft skills, such as entrepreneurship, collaboration, creativity, and moral or ethical reasoning, should be added to the above list of prioritized cognitive skills. These additional measures have not yet received the endorsement of the measurement science community in regards to reliability and validity (see Hersh, et al., 2012). Therefore, adding the soft cognitive skills to the above listed cognitive skills must wait for the research and development process to prove their reliability and validity. Therefore, development and implementation of combinations of the above types of tests for use by human resources departments to make hiring decisions will remain a long-term, perhaps ongoing, set of issues to solve for.

**The Case for A Pre-Screening Assessment**

Given the numerous combinations of work-readiness assessments and the difficulties involved in designing assessment protocols that meet the minimum conditions required by the four criteria of reliability, validity, time, and cost, it is understandable that a healthy debate is underway to clarify which strategy, or strategies, make the most sense for developing assessments that meet the needs of human resource departments. However, the implication of the market failure argument presented here suggests the emphasis on assessments for human resource departments is not the most urgent problem to focus on.

Employers indicate there is a significant skills gap in the United States. There are an estimated 10 to 20 million vacant jobs in the US (Economic Modeling Specialists International, 2014). The number of places for students in selective colleges remains static at under one million (see Baron's selectivity index). Employers need methods to distinguish the large number of students from less-selective colleges that display the requisite skills to succeed in the professional world. A significant increase in hiring high-ability students from less-selective colleges for competitive jobs would increase the motivation for additional students in these colleges to work harder to succeed.

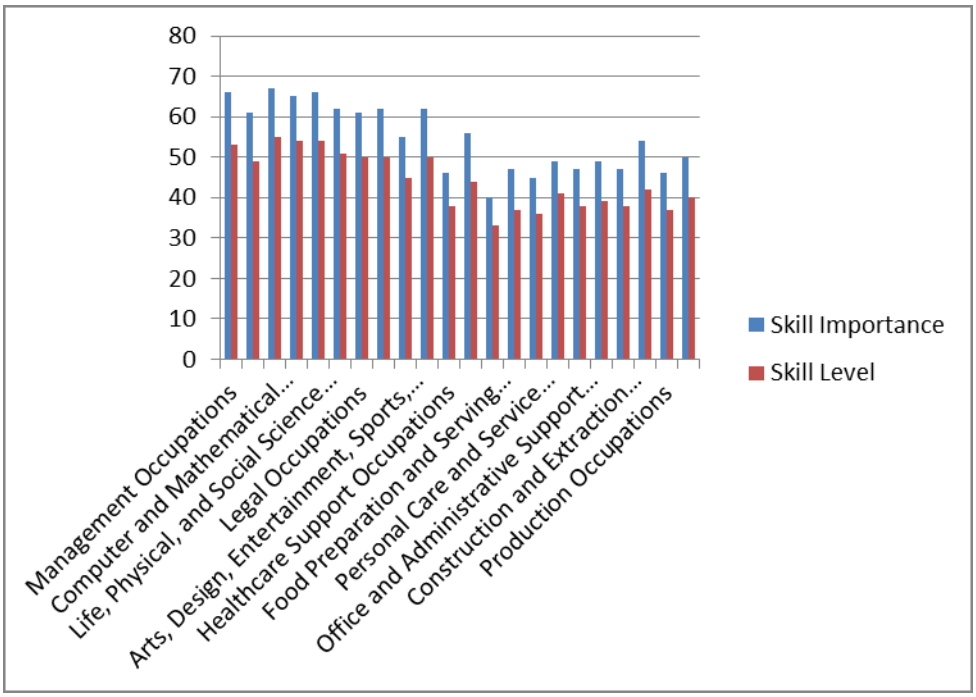
**Meeting the Occam's Razor Test**

CLA+ Career Connect is built upon the foundation of the Collegiate Learning Assessment (CLA+), an assessment subjected to more than a decade of critical scrutiny by members of the measurement science community (See Benjamin et al., 2013). The result is a test that is viewed as reliable and valid. The time (90 minutes) and cost (less than $50) required to take CLA+ are reasonable. The Career Connect system, based on education technology innovations, brings employers and eligible students together efficiently at little or no cost to either party. CLA+ Career Connect therefore meets the Occam's razor requirement that metrics should deal with the most significant problem and not be multiplied unnecessarily to deal with it .

The case to use a widely accepted critical-thinking test such as CLA+ as an additional tool to

prescreen potential applicants to determine who employers should consider interviewing is compelling. The critical-thinking skills measured by CLA+ capture a large percentage of skills desired by employers in a large number of fields that require a bachelor's degree, as defined in the Bureau of Labor Statistics OBON database. CAE proposes using CLA+, then, as a pre-screening tool to reduce the "noise" between the employer and the applicants, particularly the graduating college seniors starting their job searches.

TABLE 1




# Appendix B

**Data Sources:**
National college data were obtained from the National Center for Education Statistics, IPEDS website (http://nces.ed.gov/ipeds/datacenter//), and represent institutional enrollment, bachelor's degrees awarded, and race/ethnicity data for all four-year degree-granting institutions in the database for the years 1980 and 2012. Note that enrollment data are not available for all institutions; these data were reported for 1,826 institutions in 1980 and 2,806 institutions in 2012.

CLA performance data are from all U.S. four-year institutions that tested seniors in spring 2011, 2012, and 2013.

Selective institutions consist of those identified by Heller (2004). Note that three of the institutions in Heller's list—all part of Rutgers University—are considered a single institution by NCES, so the count of selective universities is smaller here (N=143 vs. N=146). Heller's list is based on information provided by Barron's selectivity college index ("Barron's Profiles of American Colleges," 2004).

# Appendix C

**Selective Colleges and Universities:**
Amherst College, MA
Austin College, TX
Babson College, MA
Barnard College, NY
Bates College, ME
Beloit College, WI
Boston College, MA
Boston University, MA
Bowdoin College, ME
Brandeis University, MA
Brigham Young University-Provo, UT
Brown University, RI
Bryn Mawr College, PA
Bucknell University, PA
California Institute of Technology, CA
Carleton College, MN
Carnegie Mellon University, PA
Case Western Reserve University, OH
Claremont McKenna College, CA
Colby College, ME
Colgate University, NY
College of the Atlantic, ME
College of the Holy Cross, MA
College of William and Mary, VA
Colorado College, CO
Colorado School of Mines, CO
Columbia University in the City of New York, NY
Connecticut College, CT
Cooper Union for the Advancement of Science and Art, NY
Cornell University, NY
Dartmouth College, NH
Davidson College, NC
Drew University, NJ
Duke University, NC
Emory University, GA
Franklin and Marshall College, PA
Furman University, SC
George Washington University, DC
Georgetown University, DC
Georgia Institute of Technology-Main Campus, GA
Gettysburg College, PA
Grinnell College, IA
Grove City College, PA
Hamilton College, NY
Hampshire College, MA
Harvard University, MA
Harvey Mudd College, CA
Haverford College, PA
Illinois Institute of Technology, IL
Illinois Wesleyan University, IL
Jewish Theological Seminary of America, NY
Johns Hopkins University, MD
Kenyon College, OH
Kettering University, MI
Knox College, IL
Lafayette College, PA
Lawrence University, WI
Lehigh University, PA
Loyola University Maryland, MD
Lyon College, AR
Macalester College, MN
Massachusetts Institute of Technology, MA
Miami University-Oxford, OH
Middlebury College, VT
Mount Holyoke College, MA
New College of Florida, FL
New York University, NY
Northwestern University, IL
Oberlin College, OH
Pennsylvania State University-Main Campus, PA
Pepperdine University, CA
Pitzer College, CA
Pomona College, CA
Princeton University, NJ
Providence College, RI
Reed College, OR
Rhodes College, TN
Rice University, TX
Rose-Hulman Institute of Technology, IN
Rutgers University-New Brunswick, NJ
Saint Louis University-Main Campus, MO
Santa Clara University, CA
Sarah Lawrence College, NY
Scripps College, CA
Sewanee-The University of the South, TN
Skidmore College, NY
Smith College, MA
Southwestern University, TX
St Mary's College of Maryland, MD
St Olaf College, MN
Stanford University, CA
Stevens Institute of Technology, NJ
SUNY at Binghamton, NY
SUNY College at Geneseo, NY
SUNY College of Environmental Science and Forestry, NY
Swarthmore College, PA
Syracuse University, NY
The College of New Jersey, NJ
Trinity College, CT
Trinity University, TX
Tufts University, MA
Tulane University of Louisiana, LA
Union College, NY
United States Air Force Academy, CO
United States Coast Guard Academy, CT
United States Merchant Marine Academy, NY
United States Military Academy, NY
United States Naval Academy, MD
University of California-Berkeley, CA
University of California-Davis, CA
University of California-Los Angeles, CA
University of California-Santa Barbara, CA
University of Chicago, IL
University of Florida, FL
University of Georgia, GA
University of Illinois at Urbana-Champaign, IL
University of Mary Washington, VA
University of Miami, FL
University of Michigan-Ann Arbor, MI
University of North Carolina at Chapel Hill, NC
University of Notre Dame, IN
University of Pennsylvania, PA
University of Puget Sound, WA

University of Richmond, VA
University of Rochester, NY
University of Southern California, CA
University of Virginia-Main Campus, VA
University of Wisconsin-Madison, WI
Ursinus College, PA
Vanderbilt University, TN
Vassar College, NY
Villanova University, PA
Wake Forest University, NC
Washington and Lee University, VA
Washington University in St Louis, MO
Webb Institute, NY
Wellesley College, MA
Wesleyan College, GA
Wheaton College, IL
Whitman College, WA
Williams College, MA
Worcester Polytechnic Institute, MA
Yale University, CT

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