

Setting Targets for Grades 3-12 Linked to the ACT's College Readiness Benchmarks

BY LARRY GAVIN

The Evanston RoundTable, in its editorial pages, has urged School Districts 65 and 202 to set goals that students be on track to college and career readiness in grades 3-8 at District 65, and that they be college and career ready when they graduate from Evanston Township High School. The RoundTable has also urged that progress toward meeting such goals be measured using targets linked to the college readiness benchmarks of the ACT. Illinois students take the ACT as part of the Prairie State Achievement Exam in eleventh grade. This article summarizes some of the research that supports using targets linked to the college readiness benchmarks of the ACT.

In June 2010, the Illinois State Board of Education (ISBE) adopted the Common Core State Standards as Illinois learning standards for grades K-12. The goal of these new standards is to prepare students to be successful in college and the workforce in a competitive global economy. They set out what students should know when they graduate from high school and what they should know to be on track to college and career readiness at each step along the way, including in the elementary and middle school grades.

Illinois has not yet adopted a new assessment system to measure student performance under the new standards. It is one of 26 states that have joined a Partnership for the Assessment of Readiness for College and Careers (PARCC) to develop a K-12 assessment system aligned to the common core standards in English-language arts and mathematics. The new assessments will not be ready until the 2014-15 school year, three years from now.

In the interim, ISBE will continue to administer the Illinois Standard Achievement Test, using benchmarks to “meet standards” that are grossly

misaligned with the level of proficiency needed to be on track to college readiness.¹

On Oct. 18, 2010, the District 65 School Board decided that it will consistently measure and monitor the percent of students who are on track for college readiness. Keith Terry, the School Board president at the time, said, “There’s been a shift nationally in education to college readiness, and I think you’ve seen that shift starting to happen at District 65.”

The Board decided that District 65 will measure the percent of students on track to college readiness using ISAT scale scores aligned to the 60th Illinois percentile in reading and the 68th Illinois percentile in math. At that meeting Board members Katie Bailey and Tracy Quattrocci also said the District should measure not only whether students were on track to college readiness at eighth grade, but at earlier grade levels starting with third grade.

Section A of this article cites support for using the ACT’s college readiness benchmarks to set targets for grades 3-12. Section B summarizes some of the research that assesses the effectiveness of ACT scores in measuring cognitive skills and predicting college success and that consider the practical import of obtaining relatively high ACT scores.

A. Support for Using the ACT Benchmarks for College Readiness for High School and Backmapping Them to Grades 3-8

1. ACT Linked to Common Core State Standards

The Common Core State Standards define what a student should know to be college and career ready at the end of high school and what students should know in earlier grade levels to be on track to college readiness. The ACT

says the Common Core State Standards Initiative drew on its longitudinal research in preparing the standards, and that ACT’s College Readiness Standards and ACT Course Standards match well with the Common Core State Standards. See ACT Reports, *The Alignment of Common Core and ACT’s College and Career Readiness System* (2010), and *A First Look at the Common Core and College and Career Readiness Standards* (2010).

In its Race to the Top Application filed with the U. S. Dept. of Education in June 2010, ISBE endorsed the use of the college readiness benchmarks

Footnote

¹In *From High School to the Future: The Pathway to 20* (2008), researchers with the Consortium on Chicago School Research at the University of Chicago, found that Chicago eighth-graders who just meet standards in math have less than a 5% chance of meeting ACT benchmarks for college readiness in eleventh grade. Another study, *Something’s Wrong with Illinois Test Results* (2009), conducted by Paul Zavitkovsky of the Urban Education Leadership Program at the University of Illinois-Chicago, found that Illinois eighth-graders met standards in reading on the 2006 ISATs if they were at the 22nd Illinois percentile (better than 22% of Illinois students who took the test). In 2010, this figure dropped to the 16th percentile. Yet, they need to be at the 60th Illinois percentile (better than 60% of the Illinois students who took the same test) to be on track for ACT college readiness in reading. See additional research discussed in *Taking a Fresh Look at Achievement Data For School Districts 65 and 202*, Evanston RoundTable, June 2, 2010, and *New Data Show Benchmarks for 8th-Graders to ‘Meet Standards’ on ISATs Coincide With 20th National Percentile on NAEP*, Evanston RoundTable, Jan. 5, 2011.

identified by the ACT, which is given to eleventh-graders as part of the Prairie State Achievement Exam.

ISBE said ACT's college readiness benchmarks match well with the new Common Core State Standards for College and Career Readiness in multiple subject areas, and that the State would use the benchmarks as a "primary outcome indicator" to determine whether the State is preparing more students for college and careers. ISBE also said it would use the EXPLORE test, a test in the ACT family of tests that is given to eighth-graders, as a "primary outcome indicator" to measure whether middle schools are effectively addressing the middle to high school transition.

The ACT's benchmarks are recognized as a measure of college readiness. They are used by the United States Department of Education, and the ISBE (in its interactive website), as well as by many research organizations in reporting the percent of students who are college ready.²

2. The ACT's College Readiness Benchmarks

The ACT identified college readiness benchmarks for English composition, reading, math and science in its research report, *Using ACT Assessment Scores to Set Benchmarks for College Readiness* (ACT 2005), by Jeff Allen and Jim Scoring. In identifying the benchmarks, the ACT matched and analyzed a sample of students' ACT scores in the four subjects with their first-year college grades in related subjects. In its report, ACT says the benchmarks are set at scores at which a student has a 50% chance of obtaining a course grade of B or higher in a related college-level course in the first year of college.

The ACT says it chose a B as an indicator of success, rather than a C for three reasons: First, under actual grading practices, it is common for more than 50% of college students to earn grades of A or B. Second, due in part to "grade inflation," grades below C are fairly uncommon in most courses. The third reason relates to policy implications of course placement and remedial courses.

While the benchmarks are set at

a score at which a student has a 50% chance of obtaining a B or higher, the ACT says a student with that score also has a 75% chance of obtaining a C or higher in a related college-level course in the first year of college.

The ACT identified college readiness benchmarks of 18 for English composition, 21 for reading, 22 for math, and 24 for science. The average, or composite score, is 21.25.³

The College Board, owners of the SAT (formerly known as the Scholastic Aptitude Test), recently took a similar approach in setting college readiness benchmarks using an SAT composite score (the sum of the scores on the SAT critical reading, math, and writing tests). See, *The Development of a Multidimensional College Readiness Index* (2010), by Andrew Wiley.⁴

In its report, the College Board defines college readiness as having a 65% chance of obtaining a B- (a 2.67) grade point average or higher in the first year of college, and also satisfying two other criteria. All three of the criteria must be satisfied for a student to be deemed college ready. The College Board says it used a 65% probability level because it is "widely used in research" as an appropriate standard of success.

The SAT benchmark composite score that indicates a 65% chance of obtaining a B- or higher is 1556. That score, according to a concordance scale, compares to an ACT composite score of 22 or 23, which is slightly higher than the ACT composite benchmark score of 21.25 for college readiness. While there is a difference between the benchmarks, targets aligned with either of those benchmarks would set much higher expectations for students than the ISAT "meet standards" benchmark.

3. Backmapping to Grades 3-8

Some States that are addressing college readiness have taken the ACT college readiness scores for eleventh- and twelfth-graders and have back-mapped them to grades 3-8. In doing so, they have set targets for grades 3-8 that are linked to being on track to meet the ACT college readiness benchmarks upon graduation from high school. For example, the National Center for

Educational Achievement, a department of ACT, has worked with the boards of education in Arkansas and Texas to set targets for grades 3-7 to be on track to college readiness. EXPLORE's benchmarks are used for eighth grade.

Last year, the New York State Education Department changed the cut scores on its tests given to third- to eighth-graders to align them with college-ready performance. In explaining its decision, Meryll H. Tisch, Chancellor of the N.Y. Education Department, said:

"We are doing a great disservice when we say that a child is proficient when that child is not. Nowhere is this more true than among our students who are most in need. There, the failure to drill down and develop accurate assessments creates a burden that falls disproportionately on English Language

Footnotes

²Academic and business studies say that being prepared for college and being prepared for a career if one does not intend to go to college require the same set of cognitive skills in today's world. See e.g. *The Forgotten Middle, Ensuring that All Students are on Target for College and Career Readiness before High School* (2008); *Master Plan for Higher Education in the Midwest: A Roadmap to the Future of the Nation's Heartland* (2011), James J. Duderstadt, The Chicago Council on Global Affairs.

³Some educators say that the ACT's benchmark for English is set too low, while the one for science too high, and have raised questions about the sample used in identifying the benchmarks. The Chicago Public School System has set a goal that students obtain a composite score of 20 on the ACT, which is less than the composite average of 21.25. As discussed *infra*, the Chicago Public School System selected 20 as the target because students would have a chance of being admitted into many Illinois state universities with that score. Montgomery County, Maryland, however, has set a goal that students obtain a composite score of 24 on the ACT.

⁴The SAT should not be confused with the Stanford Achievement Test, Tenth Edition, often referred to as the SAT-10. The SAT-10 is a totally different test and is now owned by Pearson.

Learners, students with disabilities, African American and Hispanic young people and students in economically disadvantaged districts – who turn out to be much further behind than anyone recognized. The Regents and I believe these results can be a powerful tool for change. They clearly identify where we need to do more and provide real accountability to bring about the focused attention needed to implement the necessary reforms to help all of our children catch up and succeed.”

While the ISBE has not realigned the ISAT’s cut scores with college readiness, it has encouraged Illinois school districts to administer the EXPLORE test to eighth-graders, and it has endorsed using EXPLORE’s benchmark scores.

In addition, Paul Zavitkovsky of the Urban Education Leadership Program at the University of Illinois-Chicago has identified ISAT scale scores that indicate when students are likely to be on-track for college readiness at grades 3-8 (i.e. have a 50-50 or better likelihood of meeting or exceeding college-readiness benchmarks in eleventh grade).

Mr. Zavitkovsky’s estimates are based on five years’ of statewide and district-level comparisons between eighth-grade ISAT and eleventh-grade ACT scores, three years of comparisons between fifth and eleventh grade scores and five years of comparisons from grades three through eight. In all cases, he says he found that students statewide typically needed to be at or above the 60th Illinois percentile in reading and at or above the 66th Illinois percentile in math, to be on track to ACT college readiness in 11th grade.

In his report, *Something’s Wrong With Illinois Test Results* (2009), Mr. Zavitkovsky says, “The specific ISAT scores that predict ACT college readiness vary from district to district, depending on the demographics of the student population and the academic expectations of high schools students attend.” He adds, though, “Despite these differences, it is still possible to make general predictions about ACT college readiness. ... Across grades and subject areas, there appears to be a consistent relationship between particular sets of

ISAT scores and the ACT scores that students need to achieve to reach college readiness at the end of grade 11.”

At the *RoundTable*’s request, Mr. Zavitkovsky identified the 2010 ISAT scale scores aligned to these Illinois percentile ranks for grades 3-8.⁵ The scores, which fall between the ISAT cut scores to “meet standards” and “exceed standards,” are listed in the table below.

ISAT Cut Scores to Be On Track To ACT College Readiness		
Grade	Reading	Math
3rd	219	230
4th	227	242
5th	238	254
6th	247	267
7th	251	276
8th	256	284

Mr. Zavitkovsky says, “It’s clear that many factors beyond ACT scores contribute to college success, and we need to find responsible ways to measure them all. But academic capacity is a pretty indispensable part of the mix. It’s hard to conceive of a credible way to assess how well an elementary school or district is preparing students for college and career readiness without including measures that correlate well with the ACT or SAT.”⁶

Mr. Zavitkovsky argues that elementary schools and districts need a constellation of data points to meaningfully assess what is happening at different points on the achievement spectrum, and that these constellations should be broken down and tracked over time by gender, ethnicity and family income status.

For each sub-group, he suggests that five basic metrics provide a pretty representative picture of how schools and districts are doing across the full range of student achievement: “a) the percent of students scoring at/above cut scores he has identified for college readiness; b) the percent of students scoring at/above the state average; c) the percent of students scoring in the lowest quartile compared with all students tested statewide; d) the percentile rank of the average scale score compared

with all students tested statewide; and e) the percent who meet and who exceed state standards. Of these, the percentile rank of average scale score is the best single number for assessing overall achievement because it takes account of all student scores, not just those that are on one side or the other of a particular benchmark.”

B. The Effectiveness of ACT Scores in Measuring Cognitive Skills and Predicting College Success

David T. Conley, a researcher who has written extensively on college readiness, says four things are required for a student to be college ready: 1) key cognitive and metacognitive capabilities, which he says are at the heart of college readiness; 2) academic knowledge and skills in each subject area; 3) academic behaviors, such as time management skills, strategic study skills, persistence, the ability to work in study groups, etc.; and 4) contextual skills and awareness, or “college knowledge,” which includes the ability to interact with professors and peers, and the knowledge necessary to

Footnotes

⁵Zavitkovsky, Paul (2010), *Charts Showing Connection Between ISAT Scale Scores, Illinois Percentiles and ACT College Readiness*. <http://evanstonroundtable.com/ftp/P.Zavitkovsky.2010.ISAT.chart.pdf>

⁶By way of comparison, researchers with the Consortium on Chicago School Research at the University of Chicago found that an eighth-grader in the Chicago Public Schools needed an ISAT scale score in the low 260s in reading and an ISAT scale score in the low 290s in math to be on track for college readiness. See, *From High School to the Future: The Pathway to 20* (2008). These scale scores identified for the Chicago Public School System as a whole are higher than the statewide estimates identified by Mr. Zavitkovsky who has found such differences to be a common characteristic of lower achieving high school districts throughout the state. He has also found that, within the Chicago system, students entering lower-achieving high schools typically require higher scores to be on-track for ACT college readiness than students who enter higher achieving CPS high schools.

be eligible for admission, to gain admission, and obtain financial aid. See e.g., *Rethinking College Readiness*, (2009), by David T. Conley.

Dr. Conley says a student's cognitive capacities have consistently been identified as being "centrally important to college success." (p. 2). In a similar vein, in a 2007 report, *The Role of Nonacademic Factors in College Readiness and Success*, the ACT says cognitive ability and academic knowledge and skills, "surpass all other factors in their influence on student performance and persistence in college." In terms of influence, the ACT says academic factors comprise 68%, academic discipline 21%, and other nonacademic factors 11%.

This section summarizes some reports and research that consider: 1) the reliability of the ACT in measuring cognitive skills and academic knowledge; 2) the effectiveness of the ACT in predicting college success; 3) the practical importance of the ACT; and 4) issues of cultural or racial bias.

1. The ACT Test and Its Reliability

The ACT is designed to measure cognitive skills and academic knowledge, a factor that is centrally important to college success.

ACT says its tests "include questions from a large domain of skills and from areas of knowledge that have been judged important for success in college and beyond." It adds, "The ACT academic tests focus on thinking skills: the ability to select, manipulate, and manage core skills, strategies, and processes in order to solve specific problems in specific contexts. Consequently, the ACT tests contain a large proportion of analytical, problem-solving exercises."

In a book published by the National Association for College Admission Testing, *Foundations of Standardized Admission Testing* (2009), author Richard J. Noeth, says, "The ACT is based on the belief that preparation for postsecondary skills is best assessed by measuring the academic skills students will need to perform college-level work. The ACT is designed to determine how skillfully students solve problems, grasp

implied meanings, draw inferences, evaluate ideas, and make judgments in subject-matter areas important to college success." (p. 25).

The ACT "measure[s] performance across a prescribed set of cognitive factors related to postsecondary success at one point in time," Dr. Noeth says, adding that it has "been proven to be reliable and valid" for "accomplishing this important task." He says it "accurately measure[s] a finite set of academic proficiencies critical to college success (e.g., reading, mathematics, writing and science-related skills)." (p. 19).

Dr. Noeth says high stakes tests should have reliability coefficients in the .80-.90 range. He reports that the reliability coefficients for the ACT's tests are as follows: English .91; reading- .85; math .91; science .80; and its composite score .96. He says, "few tests of any type will have much higher reliabilities." (p. 28).

He cautions, though, that the ACT is "not intended to measure the complete range of cognitive and non-cognitive factors associated with a student's potential to academically perform and successfully persist in college." In addition, he says it would be unreasonable to expect that a single test would suffice as the sole indicator of a student's level or post-secondary preparedness. (p. 19).

The ACT acknowledges this, and adds that no test measures everything necessary for students to know to be successful in college or in the workplace.

While the ACT does not measure all cognitive and non-cognitive factors related to college success, it does measure a set cognitive capabilities and academic knowledge and skills that are regarded as critical to college success. A K-12 school system's responsibility is to educate its students so they possess these skills when they graduate from high school. Using targets linked to the ACT's college readiness benchmarks for grades 3-12 can provide a data point that sheds light on whether a K-12 school system is doing its part to meet that goal at all grade levels.

2. Predictive Validity of the ACT

The effectiveness of the ACT (and the SAT) in predicting college success has been debated by many educators and researchers in the context of whether it should be used in the college admission process, and if so, the weight it should be given. See e.g., *Reflections on a Century of College Admission Tests*, (2009) by Richard C. Atkinson and Saul Geiser.

Using ACT scores in deciding whether to admit students (and possibly deny them access to certain colleges because of low scores) presents a very different issue than using them to set achievement targets for third- through twelfth-graders. Using them to set achievement targets for third- through twelfth-grades provides a measure of whether a school system is playing its part in educating students so they possess the necessary cognitive ability and academic knowledge and skills to have a high likelihood of succeeding in college and the workplace.

Strength of the Validity Coefficient

Many researchers have analyzed whether the ACT predicts success in college. One common way is to measure the strength of the linear statistical relationship between ACT scores and first-year college grade point average, referred to as a "correlation coefficient." A coefficient of 0 indicates no relationship, a 1 indicates a perfect relationship.

While "reliability" coefficients should be in the .80-.90 range for high stakes admission tests, Dr. Noeth says, expectations for satisfactory predictive "validity" coefficients tend to be lower – typically in the .30 to .50+ range. He says, correlations of .10, .30 and .50 or higher typically demonstrate "small, medium and large predictor-criterion relationships, respectively." (p. 41).

He adds there are multiple reasons for lower predictive validity coefficient expectations, including, that non-cognitive factors potentially impact a student's academic success in college. These may include perseverance, class attendance rates, study habits, time devoted to study, ability to participate in study groups, social support, and financial support and aid.

For the ACT, the predictive validity coefficient for large-scale studies is about .4, says Dr. Rebecca Zwick in *College Admission Testing*, (2007) NACAC. (p. 14). Dr. Zwick, notes, though, that estimates of predictive validity coefficients may be substantially understated due to “range restriction” (e.g. restricting the range of students in the sample) and due to differences in course difficulty or teacher grading patterns. (p. 19). She cites one study where adjustments to take range restriction and course selection into account increased the predictive validity coefficient of a test from .36 to .57, or by 58%. (p. 19). See also Appendix, Section A.

In a more recent study, *Individual Differences in Course Choice Result in Underestimation of the Validity of College Admissions Systems* (2009), by Christopher M. Berry and Paul R. Sackett, the authors conclude that a validity coefficient of .424 for the SAT in predicting cumulative first-year college GPA, would increase to .672, or by 58%, when corrected for range restriction and differences in course selection.

The ACT’s predictive validity coefficient of .4 falls between the medium and large range; if it were adjusted to correct for range restriction and differences in course selection, it would likely be higher.⁷

Odds of Success

The predicative usefulness of a test is often expressed in terms of odds of success or by estimating its impact on ‘real-life’ decision making and predictions. See e.g., *High Stakes Testing in Higher Education and Employment* (2008), Paul Sackett, Matthew J. Borneman and Brian S. Connelly, and *Psychometrics, an introduction* (2009), Furr and Bacharach.

The college readiness benchmarks identified by the ACT are expressed in terms of the odds of success – a 50% chance of scoring a B or better in the first year of college. This recognizes that for the group of students who obtain the benchmark score of 21 in reading on the ACT, 50% are predicted to score a B or higher in a related first-year college course, and 50% lower. Different

college outcomes can be expected for a variety of reasons, including perseverance, study habits, social support, and financial aid and support.

While there are many factors that may impact college success, ACT studies nonetheless show there is a strong correlation between higher ACT scores and higher grades in the first year of college:

- A 2002 report illustrates that as ACT composite scores increase, the probability of obtaining higher first-year college grade point averages (2.0 or higher, 2.5 or higher, 3.0 or higher, 3.25 or higher, 3.5 or higher and 3.75 or higher) increases.
- A 2005 report illustrates that as ACT scores increase in English, reading, math and science, the probability of obtaining a C or higher or a B or higher in those courses increases.

Another ACT study examined the relationship between college readiness and first-year college success at two-year and four-year colleges. The study found that students who met ACT’s college readiness benchmarks are more likely: a) to enroll in college; b) to achieve a B or higher grade in first-year college courses; c) to earn a first-year college grade point average of 3.0 or higher; and d) to persist to the second year at the same institution.

In addition, the study found that students who met ACT’s English benchmark were less likely to take remedial English; and those who met the math benchmark were less likely to take remedial mathematics.

A 2010 study by the Illinois Education Research Council found that the higher the level of college readiness (measured using a combination of ACT scores and high school grade point averages) the greater the likelihood a student would enroll in a four-year college and obtain a bachelor’s degree.

The Appendix, Sections B and C, provide additional details, charts and tables relating to these studies.

These studies show that as ACT scores increase, the odds of succeeding in college, measured by course grades

and other measures, also increase. The studies also show a statistical relationship between meeting the ACT’s benchmarks for college readiness and scoring a B in college and achieving other indicators of success. Of course, students who do not meet ACT’s benchmarks can and do succeed, but the odds of their doing so is less.

3. The Practical Side

There is a practical aspect to setting targets linked to ACT college readiness. Most colleges and universities use standardized tests, such as the ACT, in combination with high school grades or class rank in making admission decisions. Higher ACT scores improve a student’s chances of being admitted to a four-year college and to a selective or very selective college or university.

A 2006 CCSR Report, *From High School to the Future*, by Melissa Roderick, Jenny Nagaoka, and Elaine Allensworth, examined the extent to which students’ qualifications shape their college access and success. The report found, “Low ACT scores, are however, a significant barrier to students attending four-year colleges.” (p. 43). They found, “College goes with ACT scores of 24 have about a 70 percent chance of attending a four-year college. ... Among students enrolled in four-year colleges, those with ACT scores of 24 have about a 30 percent chance of attending a selective or very selective college.” (p. 44).

The report concludes, “increasing qualifications is the single most important strategy to improve college-participation rates, access to the most selective colleges, and college graduation rates of low-income, minority, and first-generation college students.” (p. 90).

Footnote

⁷Dr. Noeth says the validity coefficient is often interpreted by squaring it to provide the proportion or percent of the variability in the criterion (e.g., the first-year college grade) that is explained by the predictor (e.g. a college admission test score). Different views on the use of squared correlations are discussed in the Appendix, Section A.

A 2008 CCSR report, *From High School to the Future: The Pathway to 20*, by John Q. Easton, Stephen Ponisciak and Stuart Luppescu, also recognized that higher ACT scores improve a student’s chances of getting into a four-year college. The report explains that the Chicago Public School System adopted a goal that more high school students have a composite score of 20 on the ACT because students with that score – and good grades – will have a chance of being accepted into many Illinois state universities.

They say, “For example, at Southern Illinois University at Edwardsville, Northern Illinois University, and the University of Illinois at Chicago a composite score of 20 ranks at about the 25th percentile for the college class of 2005. The average freshman at these colleges had somewhat higher ACT scores, but still a 20 would give a CPS graduate some moderate chance of gaining admission to these institutions. CPS students with a 20 on the ACT would also have access to many of the historically black colleges and universities, such as Fisk University, where the average ACT score for entering students was 20.” (p. 4).

In addition, the 2010 study by the Illinois Education Research Council found that the higher the level of college readiness, the higher the likelihood a student would enroll in a four-year college, and in a competitive, or highly competitive college. See table in Appendix, Section C.

ACT scores have practical consequences. High ACT scores improve a student’s chances of getting into a four-year college and into selective colleges.

4. Test Bias

Questions have been raised about whether the ACT is culturally or racially biased and whether it underestimates the success of African American students in college. Many studies and reports have examined the ACT for test bias and have found none. Rather, many studies have

found that the ACT overestimates the success of African American students as a group.

A 2008 CCSR report, *From High School to the Future: ACT Preparation – Too Much, Too Late*, by Elaine Alensworth, Macarena Correa, and Steve Ponisciak, concluded, “A number of studies have looked at whether college entrance exam scores (the ACT or the SAT) under-predict the college performance of racial/ethnic minority students to determine whether the test is biased against them. These studies consistently find no evidence of under-prediction,” and “In fact, college entrance exams seem to over-predict performance of minority students.” (pp. 25 and 80).⁸

Numerous other studies and reports have reached the same conclusion. See e.g., *College Admission Testing*, (2007) Rebecca Zwick, National Association for College Admission Testing, p. 21, (“The overprediction of college achievement for Black and Hispanic students has also been found in research on the ACT ... Educational researchers have long been aware of the overprediction phenomenon.”); *The Effects of Using ACT Composite Score and High School Average on College Admission Decisions for Racial/Ethnic Groups* (2002), Julie Noble, ACT Research Report Series (“Thus, total-group predictions based on either high school average or ACT Composite score were found to overestimate the first-year performance of African American and Hispanic students, relative to that of Caucasian American students.”); *High-Stakes Testing in Higher Education and Employment*, p. 223, (the “consistent finding is overprediction (the predicted GPA is higher than the actual obtained GPA), rather than underprediction, for Black and Hispanic students; ...”).

Because the ACT is given to Illinois students as part of the PSAT, the ISBE has examined the ACT for gender, cultural or racial bias on a regular basis. ISBE’s *Technical Manual* for the 2010 Prairie State Achievement Exam,

concludes, “The reviewers concluded that no gender, cultural, or racial bias was evident in the test items and that the item content was consistent with Illinois Learning Standards.” (pp. 43-45).

C. Conclusion

Under the Common Core State Standards, a school district's responsibility is to prepare students for college and career readiness by the end of high school and to be on track for that ultimate goal each step along the way, beginning at the earliest grades. ISBE is working with a group of other states on a new assessment system which will measure whether school districts are doing their part, but it will not be ready for another three years.

In the interim, research supports using targets linked to the ACT’s college readiness benchmarks for grades 3-12. This would raise the expectations at both school districts, and provide a transition to the new assessments scheduled to be ready for the 2014-15 school year.

Footnote

⁸The CCSR report goes on to say what while the ACT does not under-predict students’ success in college based on race/ethnicity, it still might be biased as an indicator of high school learning if the ACT tests skills needed for college are learned at home to a greater degree than at school. The report explains this possibility, “For example, the ACT tests students’ familiarity with standard English and ability to understand complex, technical vocabulary. These skills – which are needed in college – may be learned to a larger degree in students’ homes than at school. If they are not emphasized in high school classes, the score will not be a good representation of classroom learning.” (p. 25).

APPENDIX

This Appendix provides additional research, charts and data tables regarding the ACT's effectiveness in predicting success in college.

A. Squaring the Predictive Coefficient

As reported in the foregoing article, the ACT's predictive validity coefficient for large scale studies is .4; if it were adjusted to correct for range restriction and individual differences in course selection, it would be higher. Several studies have found that correcting for these factors with respect to other tests increases the coefficient by 58%.

Richard J. Noeth (2009) says the validity coefficient is often interpreted by squaring it to provide the proportion or percent of the variability in the criterion (e.g., the first-year college grade) that is explained by the predictor (e.g. a college admission test score). As an example, if the predictive validity coefficient is .4 for a college admission test score and a first-year college grade, then the percent or proportion of the "variability" of the first year grade explained by the test score would be 16% (the .4 predicative validity coefficient squared to equal 16%). If a hypothetical validity coefficient that is 58% higher than .4 is used to correct for range restriction and individual differences in course selection, the predictive validity coefficient squared would be 40%.

Under this approach, researchers would say that somewhere between about 16% and 40% of the first-year college grade is explained by the admission test score, and 60% to 84% is explained by other factors, which might include perseverance, study habits, social support and financial support.

Some educators, including Drs. Atkinson and Geiser, question the utility of standardized tests in the college admission process, saying they explain only a low proportion of a first-year college grade.

Squaring the validity coefficient has been questioned by some researchers because it can lead to results that do not fit real world experiences, and some say

it understates the predictive validity of a test. In *Psychometrics: an introduction* (2008), R. Michael Furr and Verne R. Bacharach say, "The 'squared correlation' or 'variance explained' interpretation of validity coefficients is a common but potentially misleading approach." They cite several articles to illustrate their point. (pp. 221-23).

In one article, *A Variance Explanation Paradox: When a Little is a Lot* (1985), Robert P. Abelson used squared validity coefficients to examine the relationship between batting skill and getting a hit. He found that batting skill expressed as a batting average explained the variance in getting a hit in an individual at-bat by only one-third of 1%. Thus, squaring the coefficients indicates that 99% of getting a hit is unrelated to batting skill. Dr. Abelson said, the variance explained "is pitifully small, whereas 'everyone knows' that the variable in question has substantial explanatory power." He postulates that the paradox might be explained by the fact that a batting average (the predictor variable) is the accumulation of many individual at-bats over a season, which he says could have a statistical effect.

In a subsequent article, *The Interpretation of r Versus r^2 or Why Percent of Variance Accounted for Is a Poor Measure of Size and Effect* (1990), Foy D'Andrade and Jon Dart suggest that an alternative explanation suggested by Abelson's paradox is that squaring validity coefficients does not produce a good measure for the predictive power of a variable. They argue that it is inappropriate to square validity coefficients to measure the predictive power of a variable, and instead say that the validity coefficient, not squared, is a better measure of predictive power.

Drs. Furr and Bacharach do not resolve the Abelson paradox or the argument that squaring correlations is a poor measure of predictive power, but say, "Perhaps most critically, a 'variance explained' approach tends to cast association in a way that tends to minimize their size and importance." (p. 223). They say that another way "of interpreting a correlation is by estimating its

impact on 'real-life' decision making and predictions."

Similarly Paul Sackett, Matthew J. Borneman and Brian S. Connelly say, "there has been a long history of expressing the value of a test in a metric more interpretable than percentage of variance accounted for." *High Stakes Testing in Higher Education and Employment* (2008). They say one common metric is to convert correlations to "odds of success."

B. Odds of Success in College 1. Odds of Obtaining First-Year College Grades

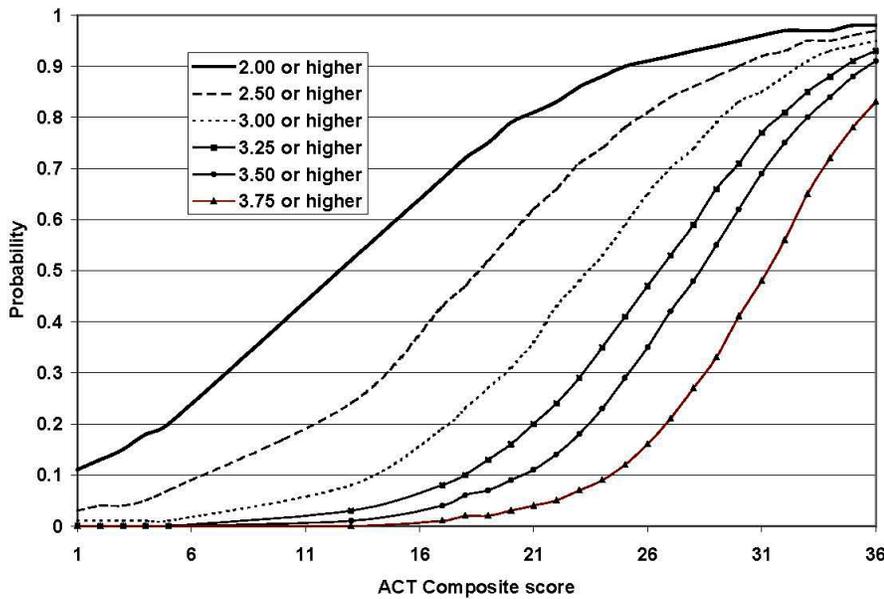
The college readiness benchmarks identified by the ACT are expressed in terms of odds of success – a 50% chance of scoring a B or better in the first year of college. This recognizes that for the group of students who obtain the benchmark score of 21 in reading on the ACT, 50% are predicted to score a B or higher in a related first-year college course, and 50% lower. Different college outcomes can be expected for a variety of reasons, such as perseverance, study habits, social support and financial support.

While there are many factors that may impact college success, ACT studies nonetheless show there is a strong correlation between higher ACT scores and higher grades in the first year of college. In a 2002 report, *Predicting Different Levels of Academic Success in College Using High School GPA and ACT Composite Score* (2002), Julie Noble and Richard Sawyer concluded that ACT composite scores were effective in predicting first-year grade point averages at all grade levels. The report contains a chart showing that as ACT composite scores increase, the probability of obtaining higher first-year college grade point averages increases. (p.11). The chart is reprinted at page 8.

In the 2005 ACT Report that set the college readiness benchmarks, Jeff Allen and Jim Sconing found a correlation between higher ACT scores and the probabilities of obtaining higher grades in the first-year of college. Charts con-

Charts Showing ACT Scores and Probability of Success

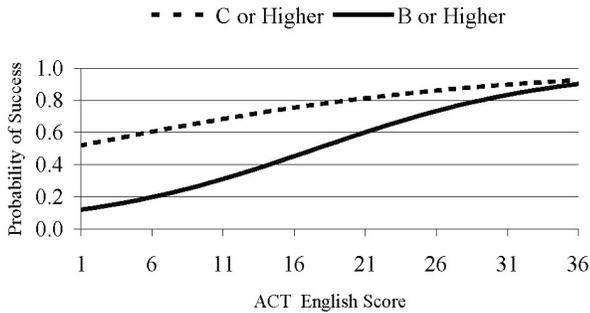
RE 1. Median Probabilities of 2.00, 2.50, 3.00, 3.25, 3.50, and 3.75 or Higher First-Year GPA, Based on ACT Composite Score



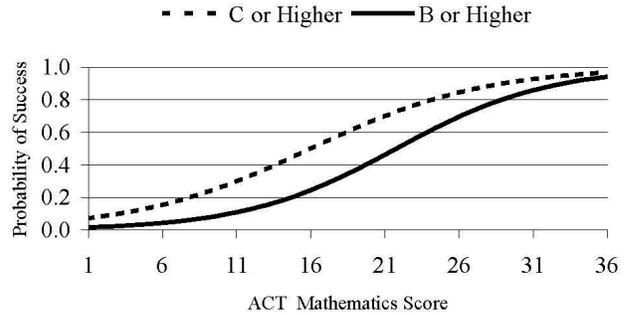
The chart at left shows the odds that students with an ACT composite score shown at the bottom of the chart will obtain a first-year college grade point average of 2.0 or higher, 2.5 or higher, 3.0 or higher, 3.5 or higher or 3.75 or higher. The chart is reprinted from the report, *Predicting Different Levels of Academic Success in College Using High School GPA and ACT Composite Score* (2002).

The charts below show odds that students with an ACT score in English, math, reading and science shown at the bottom of the charts will obtain a first-year college grade of C or better or B or better in a related subject. The charts are reprinted from the report, *Using ACT Assessment Scores to Set Benchmarks for College Readiness* (2005).

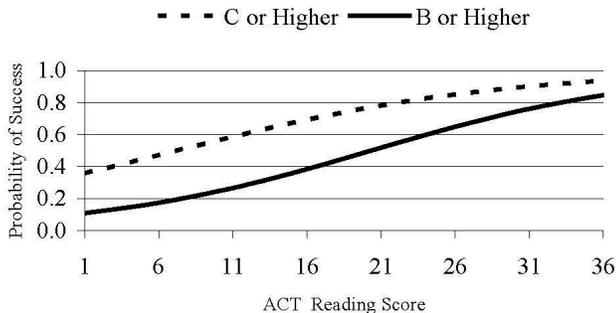
ACT English Score and Probability of Success in English Composition



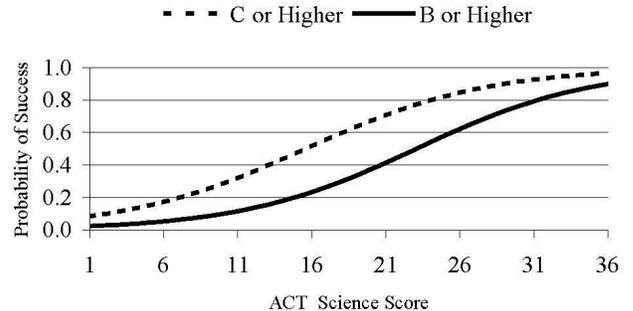
ACT Mathematics Score and Probability of Success in College Algebra



ACT Reading Score and Probability of Success in Social Science



ACT Science Score and Probability of Success in Biology



tained in the report illustrate that as ACT scores increase in English, reading, math and science, the probability of obtaining a C or higher or a B or higher in those courses increases. (pp. 17-19). The charts are reprinted at page 8.

2. Odds of Achieving Other Measures of Success

Another ACT study examined the relationship between college readiness and first-year college success at two-year and four-year colleges. The ACT says in its *Technical Manual* that the study found that students who met ACT's benchmarks are more likely: a) to enroll in college (by 14% to 19%); b) to achieve a B or higher grade in first-year college courses (by 14% to 33%); c) to earn a first-year college grade point average of 3.0 or higher (by 21% to 28%); and d) to persist to the second year at the same institution (by 11% to 14%).

In addition, the study found that students who met ACT's English benchmark were less likely to take remedial English (2% to 5%, vs. 38 to 74%); and those who met the math benchmark were less likely to take remedial mathematics (1% vs. 27% to 59%). (pp. 127-29).

3. Odds of Enrolling in College and Obtaining a Bachelor's Degree

The Illinois Education Research Council (IERC) recently completed a six-year study that tracked the Illinois high school graduating class of 2002, comprising 113,135 students. See, *A Longitudinal Study of the Illinois High School Class of 2002: A Six-Year Analysis of Postsecondary Enrollment and Completion* (2010) by David J. Smalley, Eric J Lichtenberger and Kathleen Sullivan Brown. The study found: "College readiness ... was the strongest indicator of nearly all of the outcome measures we used in the study."

IERC developed a College Readiness Index when it began the study in 2005. The study used a combination of ACT scores and high school grade point averages to classify students into five categories of college readiness: not/least ready;

minimally ready; somewhat ready; more ready; and most ready. A matrix is included in its report.

Students who had an ACT composite score below 20 were classified as "somewhat ready" if they had a high school GPA of 3.0 or higher. Of the students who scored below a 20 on the ACT, about 16% were "somewhat ready" and none were regarded as "more" or "most ready."

Students with an ACT composite score between 20 and 22 were regarded as "somewhat ready" if they had a high school GPA of 2.5, and were regarded as "more ready" if they had a high school GPA of 3.0 or above. Students who had a composite ACT score over 23 were generally in the "more ready" or "most ready" categories, depending on ACT score and high school GPA.

The study found that the higher the level of college readiness, the greater the likelihood a student would enroll in a four-year college and obtain a bachelor's degree. The table below shows: a) the number of students in the Illinois high school class of 2002 who were in each category of college readiness; b) the percentage of students in each category who enrolled in a two-year or four-year college immediately after graduating high school; and c) the percentage of students in each category who either earned an "outcome" at a 2-year college (defined as earning a certificate, an associate's degree or a transfer to a four-year college), or who obtained a bachelor's degree in six years. In the "outcome" column students who transferred from a 2-year college and who earned a bachelor's degree are double counted as having earned an outcome from a 2-year college and obtaining a bachelor's degree.

(The percentages in the "outcome"

Many Students Enter College Unprepared

In 2007, the Illinois Legislature passed The College and Career Readiness Pilot Act. In enacting the law, the legislature found, "[T]here is a direct and significant link between students being academically prepared for college and success in post-secondary education. Many students enter college unprepared for the academic rigors of college and require noncredit remedial courses to attain skills and knowledge needed for regular, credit course work."

A report issued by the Office of Community College Research and Leadership concludes, "Increasingly, students entering college lack the requisite competencies in math, reading and writing to enroll in college-level coursework, requiring that they enroll in remediation programs." It says that in 2006-07, nearly half of all undergraduate students in the U.S. were enrolled in community colleges; and 58% of students attending community colleges take at least one remedial course compared to 31% attending non-selective four-year institutions, 2% attending selective four-year institutions, and less than 1% attending highly selective institutions.

columns have been calculated using data reported in IERC's report.)

The study also found that the higher the level of college readiness, the higher the likelihood a student would enroll in a very competitive, or highly competitive four-year college. For example, 47% of those who were "most ready" were admitted to very or most competitive colleges, compared to 19% of those who were "more ready," 9% of those who were "somewhat ready," 2% of those who were "minimally ready," and 1% of those who were "not/least ready."

The accompanying table and the data mentioned above do not include data for students who delayed enrollment into

two-year or four-year colleges. The study found that 17 % of the 2002 graduating class delayed enrollment, but does not provide data reflecting whether they enrolled in a two- year or four-year college or whether they obtained either an "outcome" from a two-year college or a bachelor's degree.

% of Illinois Students Enrolling in and Graduating From 2-and 4-Year Colleges By Level of College Readiness

College Readiness	N	Enrollment		Outcome	
		2-Year	4-Year	2-year	Bachelor's
Most	22,336	10%	74%	8%	66%
More	19,742	24	55	17	46
Somewhat	19,598	32	36	19	28
Minimally	12,518	35	20	16	14
Not/Least	38,941	29	11	10	7

BIBLIOGRAPHY

- Abelson, Robert P. (1985), *A Variance Explanation Paradox: When a Little is a Lot*, Psychological Bulletin, Vol. 97, No. 1, 129-133. <http://pcbfaculty.ou.edu/classfiles/MGT%206973%20Seminar%20in%20Research%20Methods/MGT%206973%20Res%20Methods%20Spr%202007/Week%203/Abelson%201985%20PB%20A%20variance%20explanation%20paradox.pdf>
- Allen, Jeff and Jim Sconing (2005), *Using ACT Assessment Scores to Set Benchmarks for College Readiness*, ACT Research Report Series 2005-3. http://www.act.org/research/reports/pdf/ACT_RR2005-3.pdf
- ACT (2007), *The Role of Nonacademic Factors in College Readiness and Success*. http://www.act.org/research/policymakers/pdf/nonacademic_factors.pdf
- ACT (2008), *The Forgotten Middle, Ensuring that All Students are on Target for College and Career Readiness before High School*. <http://www.act.org/research/policymakers/pdf/ForgottenMiddle.pdf>
- ACT Technical Manual*. http://www.act.org/aap/pdf/ACT_Technical_Manual.pdf
- ACT (2010), *A First Look at the Common Core and College and Career Readiness*. <http://www.act.org/research/policymakers/reports/firstlook.html>
- ACT (2010), *The Alignment of Common Core and ACT's College and Career Readiness System*. <http://www.act.org/commoncore/pdf/CommonCoreAlignment.pdf>
- Atkinson, Richard C., and Saul Geiser (2009), *Reflections on a Century of College Admission Tests*, Educational Researcher, Vol. 38, No. 9, pp. 665-676. <http://cshe.berkeley.edu/publications/docs/ROPS-AtkinsonGeiser-Tests-04-15-09.pdf>
- Berry, Christopher, and Paul R. Sackett (2009), *Individual Differences in Course Choice Result in Underestimation of the Validity of College Admission Systems*, Psychological Science, Vol. 20 – Number 7. http://people.tamu.edu/~w-arthur/2009/2009_Berry-_Individual%20differences%20in%20course%20choice.pdf
- Wiley, Andrew, Jeffrey Wyatt and Wayne J. Camara (2010), *The Development of a Multidimensional College Readiness Index*, College Board Research Report 2010-3. http://professionals.collegeboard.com/profdownload/pdf/10b_2084_DevelopmentMultiDimenRR_WEB_100618.pdf
- David T. Conley (2009), *Rethinking College Readiness, Office of Community College Research and Leadership*, spring 2009. <http://occr.illinois.edu/Newsletter/2009/spring/9>
- Consortium on Chicago School Research (CCSR) (2006), *From High School to the Future, A first look at Chicago Public School graduates' college enrollment, college preparation, and graduation from four-year colleges*, Melissa Roderick, Jenny Nagaoka, and Elaine M. Allensworth. <http://ccsr.uchicago.edu/publications/Postsecondary.pdf>, and update: http://ccsr.uchicago.edu/downloads/4732hs_report_addendum-13.pdf
- CCSR (2008), *From High School to the Future: ACT Preparation – Too Much, Too Late*, Consortium on Chicago School Research. <http://ccsr.uchicago.edu/publications/ACTReport08.pdf>
- CCSR (2008), *From High School to the Future: The Pathway to 20*, John Q. Easton, Stephen Ponisciak, and Stuart Luppescu. <http://ccsr.uchicago.edu/publications/Pathway%20to%2020%20Report-final.pdf>
- D'Andrade, Roy and Jon Dart (1990), *The Interpretation of r Versus r² or Why Percent of Variance Accounted for Is a Poor Measure of Size and Effect*, Journal of Quantitative Anthropology 2:47-59, 1990. [http://www.quantitativeanthropology.org/index.php?journal=QA&page=article&op=viewFile&path\[\]=28&path\[\]=44](http://www.quantitativeanthropology.org/index.php?journal=QA&page=article&op=viewFile&path[]=28&path[]=44)
- Duderstadt, James, J., Master Plan for Higher Education in the Midwest: *A Roadmap to the Future of the Nation's Heartland* (2011), The Chicago Council on Global Affairs.
- Furr, Michael R. and Verne R. Bacharach (2008), *Psychometrics, an Introduction*, published by Sage Publications, Inc.
- Illinois Education Research Council (2010), *A Longitudinal Study of the Illinois High School Class of 2002: A Six-Year Analysis of Postsecondary Enrollment and Completion*, David J. Smalley, Eric J. Lichtenberger, and Kathleen Sullivan Brown,. <http://ierc.siue.edu/documents/2010-3%20Six%20Years%20After%20Graduation.pdf>
- Noble, Julie and Richard Sawyer (2002), *Predicting Different Levels of Academic Success in College Using High School GPA and ACT Composite Score*, ACT Research Report 2002-4. http://www.act.org/research/reports/pdf/ACT_RR2002-4.pdf
- Noble, Julie (2003), *The Effects of Using ACT Composite Score and High School Average on College Admission Decisions for Racial/Ethnic Groups*, ACT Research Report Series 2003-1. http://www.act.org/research/reports/pdf/ACT_RR2003-1.pdf
- Noeth, Richard J. (2009), *Foundations of Standardized Admission Testing*, published by National Association for College Admission Counseling
- Sackett, Paul R., Matthew J. Borneman, and Brian Connelly (2008), *High-Stakes Testing in Higher Education and Employment*, American Psychologist, May-June 2008. http://academics.eckerd.edu/instructor/hardym/PS337-001_08/high_stakes_testing.pdf
- Zavitkovsky, Paul (2008), *Something's Wrong With Illinois Test Results*, Urban School Leadership Program University of Illinois-Chicago. <http://evanstonroundtable.com/ftp/Zavitkovsky%20Report.pdf>
- Zavitkovsky, Paul (2010), *Charts Showing Connection Between ISAT Scale Scores, Illinois Percentiles and ACT College Readiness*. <http://evanstonroundtable.com/ftp/P.Zavitkovsky.2010.ISAT.chart.pdf>
- Zwick, Rebecca (2007), *College Admission Testing*, commissioned by the National Association for College Admission Counseling. <http://www.ramakrishnan.com/Articles/Education/Standardized-Testing.pdf>