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On Track:

Redefining Readiness in Education and the Workplace

MATTHEW N. GAERTNER
Center for College & Career Success
Pearson

DAVID T. CONLEY
EdImagine
University of Oregon

PAUL G. STOLTZ
PEAK Learning, Inc.

Illustration by Ben Wiseman

About the Authors

MATTHEW N. GAERTNER is a senior research scientist in the Center for College & Career Success at Pearson. His methodological interests include multilevel models, categorical data analysis, and Item Response Theory. Substantively, his research focuses on the effects of educational policies and reforms on disadvantaged students' access, persistence, and achievement. Dr. Gaertner's work has been published in Harvard Law Review, Harvard Educational Review, Educational Evaluation and Policy Analysis, Research in Higher Education, and Educational Measurement: Issues and Practice. He was awarded a Spencer Foundation Dissertation Fellowship and an Association for Institutional Research Dissertation Grant. Dr. Gaertner also received the 2013 and 2011 Charles F. Elton Best Paper Awards from the Association for Institutional Research. He holds a BA from Georgetown University and a Ph.D. in Research and Evaluation Methodology from the University of Colorado Boulder.

Email: *matt.gaertner@gmail.com*

DAVID T. CONLEY is the founder and president of EdImagine Strategy Group. He is also a professor of educational policy and leadership, as well as founder and director of the Center for Educational Policy Research (CEPR), at the University of Oregon. In addition, he is the founder, chief executive officer, and chief strategy officer of the Educational Policy Improvement Center (EPIC) in Eugene and Portland, Oregon. Dr. Conley conducts research on a range of topics related to college readiness and other key policy issues. Dr. Conley's latest publication Getting Ready for College, Careers and the Common Core: What Every Educator Needs to Know was recently published by Jossey Bass, and more information on the text can be found at www.collegecareerready.com.

Email: *david_conley@edimagine.com*

PAUL G. STOLTZ founded the global research and consulting firm, PEAK Learning, Inc., in 1987. He is the founding director of The Global Resilience Institute, The Global GRIT Institute, as well as author of five international bestselling books on the integration and application of grit and resilience. In his newest book, GRIT — The New Science of What it Takes to Persevere, Flourish, Succeed, he pioneers the first construct for growing both the quantity and quality of one's GRIT. Dr. Stoltz is visiting faculty at MIT, has been a member of Stanford University's Distinguished Leaders Lecture Series, and has guest lectured at Cornell, Carnegie Mellon, and the Harvard Business School. Dr. Stoltz received his bachelor's degree from the University of California and his business and social sciences interdisciplinary master's and Ph.D. from the University of Minnesota.

Email: *paul@peaklearning.com*

Summary

Popular conceptions of college and career readiness are broadening beyond strictly academic competencies like literacy and numeracy. New thinking on the many dimensions of preparedness has produced volumes of research and scores of new products. In fact, educators and employers may find it difficult to separate signal from noise and focus on the readiness paradigms that suit their needs. In this paper, we attempt to clarify the readiness landscape. We introduce three readiness paradigms—the college readiness index for middle school students, the Conley Readiness Index, and GRIT—and review their goals, theoretical foundations, and empirical support. This paper dedicates particular focus to strands of convergence and divergence between these three approaches. A few core tenets underpin each of the three readiness paradigms: (1) scholars, educational practitioners, and employers must develop an expanded definition of readiness and success, (2) useful readiness paradigms should empower the learner, and (3) rigorous measurement still matters. The paper concludes with a short set of recommendations focused on how new approaches to college and career readiness can be used to support smarter and earlier interventions and open college and career pathways to all learners.

> **New approaches to college and career readiness can be used to support smarter and earlier interventions and open college and career pathways to all learners**

Introduction and Background

Over the past decade, educators, employers, and policymakers have gradually shifted their focus from status to readiness—more specifically, from the static set of knowledge and skills students possess, to their trajectory toward meaningful future outcomes. Put simply, school systems and the labor market are beginning to care a bit less about what students know at a fixed point in time, and a bit more about how they are able to continue to learn and to apply knowledge in novel and non-routine ways in real-world settings.

This trend has enhanced our assessment of students' talents and future prospects in two ways. First, modern assessment systems no longer simply describe students' statuses relative to one another; they must now provide actionable information about the likelihood of future success (e.g., chances of passing an entry-level, credit-bearing college course).[1] Second, our appraisals of readiness have broadened beyond the over-assessed domains of reading and mathematics to include student success skills such as perseverance, resilience, and ownership of learning.[2] This brave new world of readiness blends mindset (how students approach learning) and skill set (how they learn) in entirely novel ways.[3]

New thinking on the multiple dimensions of readiness has brought welcome attention to non-academic essentials such as grit, and has generated a wide range of diagnostic instruments and interventions.[4]

In fact, readiness tools and strategies have become so abundant that school systems, higher education institutions, and employers may find it difficult to determine which metrics provide the biggest upside, and which will be less useful. This paper will begin to cut through that noise.

We will describe and contrast three readiness paradigms that not only assess strengths and weaknesses at multiple stages in learners' lives, but also generate targeted interventions and supports to help learners progress toward significant future goals.

1. Wayne Camara, "Defining and measuring college and career readiness: A validation framework," *Educational Measurement: Issues and Practice* 32, no. 4 (2013): 16-28.
2. David Conley, *Redefining College Readiness* (Eugene, OR: Educational Policy Improvement Center, 2007).
3. Paul Stoltz, "LEADERSHIP GRIT™: What new research reveals," *Leader to Leader* 2015, no. 78 (2015): 49-55.
4. See Angela Duckworth and Patrick Quinn, "Development and Validation of the Short Grit Scale," *Journal of Personality Assessment* 91, no. 2 (2009): 166-174.

The first paradigm we discuss is a system of college-readiness indicators for middle school students, designed to provide early, multidimensional diagnoses of students' preparedness for postsecondary study.[5] The second paradigm is the Conley Readiness Index, developed to assess entering college students' strengths in four key components of postsecondary success, and pinpoint specific areas in need of improvement.[6] The third is GRIT™, which aims to help students, faculty, staff, businesses, leaders, and employees assess their capacity to leverage personal strengths (for example, robustness and resilience), grow and optimize their skill set and ultimately thrive on adversity, in order to measurably improve personal and collective outcomes.[7] These paradigms were developed independently, and as such, each maintains a distinct focus and is calibrated for different stages of learners' lives. Still, the three paradigms share common attributes. Most importantly, given the current need for predictive assessments, all three paradigms derive from programs of empirical research linking academic competencies and student success skills to later-life outcomes.

Purpose and Structure

In this paper we describe the conceptual foundations of each approach, and we devote particular attention to strands of convergence and divergence between the three. Highlighting key differences and similarities across these paradigms supports the central aim of this paper: to distill the shared principles and unique features of leading approaches to measuring, communicating, and ultimately boosting college and career readiness and success. While each approach's inputs and uses are flexible, for the sake of clarity we will also compartmentalize them.

We stress the utility of the middle school college-readiness index for K-12 settings (readiness to enter college), the Conley Readiness Index for higher education (readiness to complete college), and GRIT for employment (readiness to succeed in the workplace).

5 For technical details on the college readiness index for middle school students, see Matthew Gaertner and Katie McClarty, "Performance, Perseverance, and the Full Picture of College Readiness," *Educational Measurement: Issues and Practice* 34, no. 2 (2015): 20-33.

6 For validation research on key cognitive strategies summarized in the Conley Readiness Index, see Allison Lombardi, David Conley, Mary Seburn, and Andrew Downs, "College and Career Readiness Assessment: Validation of the Key Cognitive Strategies Framework," *Assessment for Effective Intervention* 38 no. 3 (2012): 163-171.

7 For technical detail on GRIT™ assessments, see Jerilee Grandy, *Psychometric Properties and Analysis of the AQ PROFILE® Online Version 8.1* (San Luis Obispo, CA: PEAK Learning, Inc., 2009).

The rest of this paper is structured as follows. The next three sections will describe the philosophy and development of (1) the college-readiness index for middle school students, (2) the Conley Readiness Index, and (3) the GRIT framework, respectively. In each section we outline the practical problems these approaches address, the populations they target, and the key attributes and competencies they measure. The subsequent section will hone in on strands of convergence (how these paradigms are similar) and divergence (how they differ).

Our intent in this section is to illustrate that while some key qualities drive academic, personal, and professional growth across ages and stages, "readiness" is dynamic—its definition depends on the learner's setting and circumstances.

The final section makes sense of these commonalities and differences—we offer recommendations for schools, school systems, and employers working to incorporate multidimensional measures of readiness in order to facilitate academic, professional, and personal success.

Part 1: The College-Readiness Index for Middle School Students

The roots of the college-readiness index can be traced to high school grades (GPAs) and admissions test scores. In practice, these measures are the operational state-of-the-art in college-readiness assessment. They are the most widely used and widely researched indicators of postsecondary readiness in the U.S., and many universities use these metrics alone to gauge each applicant's preparedness for college (more specifically, their chances of success in their first year of coursework). Cumulative high school GPA and admissions test scores provide fine summaries of academic achievement at the end of high school, but these measures suffer from major inadequacies. First, they are delivered to students and parents in 11th grade, at the earliest. A student who is off track at this point will have little time to correct course. Second, these metrics focus almost exclusively on academic achievement, to the exclusion of contextual, environmental, and affective traits like motivation and behavior. Non-academic qualities deserve further exploration. First, they may move the needle on college readiness, independent of academic accomplishments.[8] More importantly, information on motivation- and behavior-related issues may provide more "actionable intelligence" than test scores alone. Depending upon how the concepts are operationalized, motivation and behavior measures may suggest straightforward (though not easy) steps students can take to get back on track.

8 Existing research suggests changes in non-academic personal qualities may indeed affect students' future outcomes. See, for example, David Yeager and Gregory Walton, "Social-psychological Interventions in Education: They're Not Magic," *Review of Educational Research* no. 81 (2011): 267–301.

The college-readiness index was created to address these gaps in research and practice—to provide students, parents, and teachers earlier, more actionable readiness diagnoses across a diversity of academic and non-academic domains.

Choosing early indicators required a thorough review of the student success research literature. Because "middle school college readiness" is a relatively new concept, we relied primarily on findings from research on student success in higher education and dropout prevention in the K-12 space. Although the outcomes of interest in this work (graduating from college, avoiding dropout in high school) are not the same as college readiness, our literature review revealed quite a few factors that could at least be empirically tested as candidate predictors of college readiness.

Middle School Indicators

Six middle-school factors comprise the college readiness index: academic achievement, motivation, behavior, social engagement, family circumstances, and school characteristics. Each is described briefly below.

Academic Achievement. It should be self-evident that academic achievement at Point A correlates with academic achievement at Point B.[9] But the construct of achievement in this case is not limited to course grades and test scores. Grade skipping, course rigor, and grade retention (that is, being held back) also predict future academic success.[10]

Motivation. This construct includes measures of commitment, motivation, and effort. Specific examples (shown in prior research to influence later-life success) include locus of control, persistence, and self-efficacy.[11]

Behavior. A variety of behavior issues can affect college preparedness, most notably absences, tardies, suspensions, and discipline referrals (that is, being sent to the office). These conventional measures are popular because they are widely understood and easy to track, but self-management and

9 Empirical research consistently supports this axiom. See Michal Kurlaender, Sean Reardon, and Jacob Jackson, *Middle School Predictors of High School Achievement in Three California School Districts* (Santa Barbara, CA: California Dropout Research Project, 2008) and Mark Long, Patrice Iatarola, and Dylan Conger, "Explaining Gaps in Readiness for College-level Math: the Role of High School Courses," *Education Finance and Policy 4*, no. 1 (2009): 1-33.

10 For example, for grade-skipping see Katie McClarty, "Life in the Fast Lane: Effects of Early Grade Acceleration on High School and College Outcomes," *Gifted Child Quarterly* 59, no. 1 (2015): 3-13, for course rigor see Clifford Adelman, *Answers in the Toolbox: Academic Intensity, Attendance Patterns, and Bachelor's Degree Attainment* (Washington, DC: U.S. Department of Education, 1999) and for retention see Melissa Roderick and Jenny Nagaoka, "Retention under Chicago's High-stakes Testing Program: Helpful, Harmful, or Harmless?" *Educational Evaluation and Policy Analysis* 27, no. 4 (2005): 309–340.

11 Research on the measurement and importance of non-academic skills like persistence, internal locus of control, and self-efficacy is extensive, though these constructs tend to change names from one academic generation to the next. For recent work on persistence, or "grit," see Duckworth et al., "Development and Validation of the Short Grit Scale"; for locus of control, see Maureen Findley and Harris Cooper, "Locus of Control and Academic Achievement: A Literature Review," *Journal of Personality and Social Psychology* 42 no. 2 (1983): 419-427; finally, excellent coverage of self-efficacy among many other critical non-academic qualities can be found in National Research Council, *Education for life and work: Developing Transferable Knowledge and Skills in the 21st Century* (Washington, DC: The National Academies Press, 2012).

temperament also influence performance, and should therefore be considered in any holistic college-readiness index.[12]

Social Engagement. This construct tracks involvement and leadership in school and extracurricular clubs and activities.[13] In addition, positive relationships with teachers and peers has been shown to increase students' sense of connectedness with school and, ultimately, academic success.[14]

Achievement, motivation, behavior, and social engagement are competencies that students can change, provided they have appropriate guidance and support. This is not true of all the elements of this college-readiness index. Below we discuss family circumstances and school characteristics—contextual and environmental constructs over which students wield little to no influence. Nevertheless, family circumstances and school characteristics impact students' prospects for success, so they are included in this readiness paradigm.[15]

Family Circumstances. Students from disadvantaged backgrounds (for example, where neither parent attended college) will face unique challenges preparing for postsecondary study. However, research suggests high academic expectations and reduced mobility (that is, staying in the same school for multiple years) can mitigate these risks. Unfortunately, the inverse is also true: low expectations and high mobility can compound risks.[16]

School Characteristics. This construct incorporates multiple measures of school context and climate, including not only demographics (such as the school-wide poverty rate) but also school safety measures and the availability of clubs and activities. Safe environments and the provision of learning opportunities (such as foreign language clubs, computer clubs, and debate teams) can help build a college-going culture.[17]

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12 For additional resources and research on the impacts of self-management and temperament, see Steven Robbins, Jeff Allen, Alex Casillas, Christina Peterson, and Huy Le, "Unraveling the Differential Effects of Motivational and Skills, Social, and Self-management Measures From Traditional Predictors of College Outcomes," *Journal of Educational Psychology* 98 (2006): 598-616 and Wayne Camara, "Broadening Predictors of College Success," in *Choosing Students: Higher Education Admissions Tools for the 21st Century*, ed. Wayne Camara and Ernest Kimmel (Mahwah, NJ: Lawrence Erlbaum Associates, 2005).

13 See Herbert Marsh and Sabina Kleitman, "Extracurricular School Activities: The Good, the Bad, and the Nonlinear," *Harvard Educational Review* 72, no. 4 (2002): 464-511 for an examination of the impacts of extracurricular activities.

14 Gregory Montalvo, Eric Mansfield, and Raymond Miller, "Liking or Disliking the Teacher: Student Motivation, Engagement and Achievement," *Evaluation and Research in Education* 20, no. 3 (2008): 144-158.

15 There are practical and statistical reasons for including factors like family circumstances and school characteristics. From a practical perspective, teachers may view any attempt to gauge college readiness without accounting for students' home lives and school environments as disingenuous. From a statistical perspective, eliminating these elements from a college-readiness model (if they do exert influence on later-life success) will lead to omitted variable bias; remaining coefficients in the model may be artificially small or large because influential predictors are absent.

16 For evidence on the effects of mobility, see Russell Rumberger, "The Causes and Consequences of Student Mobility," *The Journal of Negro Education* 72, no. 1 (2003): 6-21.

17 For further analysis of the effects of learning opportunities in high school, see Adam Gamoran, "The Stratification of High School Learning Opportunities," *Sociology of Education* 60, no. 3 (1987): 135-155.

Predicting College Readiness

The six factors above are summarized via principal components analysis to yield one score on each factor for each middle school student. Those six scores are then used to predict college readiness at the end of high school, via ordinary least squares regression. In this model, "college readiness" is summarized as the average of two standardized measures—admissions test scores and cumulative high school GPA.[18] There were two reasons for choosing these rather conventional college-readiness targets. First, both the SAT and ACT have empirical, publicly available college-readiness benchmarks.[19] These benchmarks can be applied to the college-readiness index to determine which middle school students are on track, and which are not.[20] Second, admissions test scores and cumulative GPA are collected in high school. It was important that college-readiness predictions (Point A) and outcomes (Point B) both be contained in the K-12 space. Projecting college outcomes (for example, graduation) using middle school data would be a tough sell for many educators; given such distant outcomes, an intervention in middle school may seem premature. Projecting high school outcomes avoids that problem, while still leaving sufficient time (at least three years between middle school and the end of high school) to take corrective action with struggling students.

Of course, estimating relationships between middle school indicators and high school outcomes requires data. The college-readiness index relies on the National Education Longitudinal Study (NELS), a 12-year study from the U.S. Department of Education that begins with eighth graders.[21] NELS tracks a variety of academic, affective, and environmental measures from middle school through high school and postsecondary endeavors, making these data uniquely appropriate for testing the associations between middle school factors and later-life success. Our analysis shows those associations are surprisingly strong and surprisingly well distributed across academic and non-academic domains. We will first discuss the overall strength of middle school predictors.

The six middle school indicators outlined above explain 69% of the variance in college readiness at the end of high school. To put this predictive power in context, the College Board markets the SAT primarily as a reliable predictor of first-year performance in college; the SAT explains about 23% of the variance in first-year college grades.[22] Another, more intuitive way to gauge predictive power is

18 Admissions test scores refer to ACT composite, which includes mathematics, English, reading, and science subtests; and SAT combined, which includes mathematics and critical reading subtests.

19 The ACT benchmarks are English = 18, mathematics = 22, reading = 22, and science = 23, averaging to 21.25 for the ACT composite cut. See ACT, *The Condition of College & Career Readiness: 2013* (Iowa City, IA: ACT, 2013). The SAT benchmarks are mathematics = 500 and critical reading = 500, for a sum of 1000 for the SAT combined cut. See Jeffrey Wyatt, Jennifer Kobrin, Andrew Wiley, Wayne Camara, and Nina Proestler, *SAT Benchmarks: Development of a College Readiness Benchmark and its Relationship to Secondary and Postsecondary School Performance. College Board Research Report 2011-5.* (New York, NY: The College Board, 2011).

20 For technical details on how ACT and SAT benchmarks are applied to determine on-track status, see Gaertner et al., "Performance, Perseverance, and the Full Picture of College Readiness."

21 National Center for Education Statistics, *National Education Longitudinal Survey of 1988*. (Washington, DC: U.S. Department of Education, 2000).

22 Jennifer Kobrin, Brian Patterson, Emily Shaw, Krista Mattern, and Sandra Barbuti, *Validity of the SAT for Predicting First-Year College Grade Point Average. Research Report 2008-5*. (New York: College Board, 2008).

with classification accuracy. That is, if we were to predict which middle schoolers would go on to reach the college-readiness benchmarks on the SAT and ACT and which would not, how often would these predictions prove correct? Classification accuracy with the college-readiness index for middle school students is 88%.[23]

The final test of predictive power involved comparing the college readiness index to SAT and ACT in terms of forecasting college outcomes such as course grades and graduation. The motive for this analysis was simple: the primary use of the SAT and ACT is to gauge college readiness, and if we could deliver those diagnoses with a similar degree of accuracy three years in advance, parents and educators would have more time to help struggling students catch up. Middle school indicators' forecasts of college grades and graduation are as accurate as ACT's, and slightly more accurate than SAT's.[24]

While the college readiness index boasts strong explanatory power, accurate predictions are not the same as actionable information. If, for example, middle school predictions were driven entirely by standardized test scores, the college-readiness index would add little value to existing large-scale assessment systems. Our analysis of NELS data, however, suggests non-academic factors contribute substantially to postsecondary readiness. Unsurprisingly, we found academic achievement in middle school to be the most important predictor of college readiness, accounting for 25% of explainable variance. But motivation and behavior were close behind, at 22% and 20%, respectively. Family circumstances came in fourth at 18%, and school characteristics and social engagement were significantly less influential (10% and 5%, respectively). In sum, academic achievement in middle school is an important predictor of college readiness in high school—and that point should not be undersold—but independent of achievement, non-academic factors like motivation and behavior also play an important role. Combined (22% + 20% = 42%), motivation and behavior are considerably more influential than achievement alone.

Making Meaning of Readiness Data

What do these findings mean for middle school educators? Very little if readiness diagnoses are not communicated in a simple and straightforward fashion. To aid interpretation, college-readiness index results are reported not on a single quantitative scale, but rather as a series of classifications. Overall, and in each of the six readiness domains, every middle school student falls into one of four categories: well prepared, prepared, partially prepared, or inadequately prepared. Each category has a conceptual definition and an empirical definition linked to the likelihood of reaching the SAT and ACT college-readiness benchmarks in high school. The higher the readiness category, the higher the likelihood of future academic success.[25]

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23 Variance explained (R2) is generally preferred over classification accuracy as a measure of predictive power, since classification accuracy is influenced by incidence rates. That is, if 99% of the population goes on to reach college readiness in high school, we could label every middle school student "on track" and we would be correct 99% of the time.

24 A full list of college outcomes as predicted by ACT, SAT, and the college readiness index for middle school students is available in Gaertner et al., "Performance, Perseverance, and the Full Picture of College Readiness."

25 For example, the conceptual definition of the well prepared category is "Students in this category are well prepared for future studies and are

Using these classifications, educators, school leaders, and school district administrators can make informed decisions about how to best allocate resources to improve students' college readiness. For example, a district leader may learn that certain schools are struggling in the area of behavior—specifically with systematic absenteeism. In such cases, programs such as family workshops focused on attendance and school-wide policies that reward students for improved attendance have proven effective.[26] Other schools may face challenges in the area of motivation, in which case "growth mindset" training (that is, being taught that intelligence is not fixed and that hard work leads to learning) may help increase students' classroom motivation and academic achievement.[27]

An educator, on the other hand, may learn that some of his students are grappling with non-academic issues that are keeping them off track to postsecondary readiness. In this case, a couple examples—real students from the NELS data—may be instructive. First let us consider Megan Franco. Megan's academic achievement is solid (she's in the prepared category on that factor), but her behavior (inadequately prepared) needs attention. Specifically, Megan has had multiple discipline referrals, absences, and suspensions. If she could cut her absences in half and avoid discipline referrals and suspensions altogether, she would be on track to college readiness, even without any change on any other indicator.

Next let us consider Michael O'Keefe. Like Megan, Michael is not on track to college readiness. He could get back on track by focusing on his studies outside of school. Michael reported spending less than an hour per week on homework. If he could spend one hour each week on each of four subjects (mathematics, English, science, and social studies), Michael would also be on track to college readiness—again without any change in his relative position on any other indicator.

Put simply, behavior matters. Motivation matters. Schools systems that wish to boost their college-readiness rates would be wise to measure these competencies, intervene when the data suggest it, and monitor student progress to test the efficacy of their interventions.

on a trajectory toward being college ready. Continued performance at this level/rate will result in students being well prepared for college upon high school completion." Empirically speaking, 95% of the eighth graders in the well prepared category will go on to reach the SAT and ACT college-readiness benchmarks in high school.

26 Joyce Epstein and Steven Sheldon, "Present and Accounted for: Improving Student Attendance Through Family and Community Involvement," *The Journal of Educational Research* 95, no. 5 (2002): 308-318.

27 Lisa Blackwell, Kali Trzesniewski, and Carol Dweck, "Implicit Theories of Intelligence Predict Achievement Across Adolescent Transition: A Longitudinal Study and an Intervention," *Child Development* 78, no. 1 (2007): 246-263.

That is the ideal theory of action for the middle school college-readiness index, which is undergirded by a simple educational philosophy: diagnostic information is most useful when it is diverse, early, accurate, and actionable. Many of these core tenets emerge in the next two paradigms we discuss in this paper, but as we noted earlier, different readiness programs target different populations at different life stages. Across these paradigms, distinctions are as common and as important as similarities. In the next section, we turn our attention to higher education, and the Conley Readiness Index.

Part 2: The Conley Readiness Index

Entering college students face multiple challenges simultaneously. They are adapting to new surroundings and new expectations. They are also coming to grips with the gaps between their perceived competence and the reality of their performance in a postsecondary environment. Gaps often arise from either a lack of good readiness information or because the "readiness" information students do have is so narrow that it provides no insight into critical but under-assessed areas.

College students need to understand not only how ready they are to succeed in college, but also which areas need improvement and which resources they can access to improve their readiness in identified areas.

The traditional approach to admitting students to college has not focused on readiness as a first-order measure. Instead, it has relied on three sources of information on academic performance as proxies for the entire universe of factors that constitute readiness. Those three are high school course titles, grades in those courses, and scores on admissions tests. While these have proven to have some utility predicting freshman-year grades and have therefore been used as measures of eligibility to enter college, they are quite limited in terms of what they tell students about the ways in which they are ready for all they will encounter as they enter postsecondary education.[28] These measures are heavily influenced by the context of the high school and its course of study and by the student's familiarity with and preparation for admissions tests, so they offer distinct advantages to some groups of students while potentially underestimating the likelihood of success of other less advantaged students.

28 See William B. Armstrong and Heidi M. Carty, "Reconsidering the SAT-I for College Admissions: Analysis of Alternate Predictors of College Success" (presentation, Annual Meeting of the American Educational Research Association, Chicago, IL, April 2003) and University of California Office of the President, *Relative Contribution of High School Grades, SAT I and SAT II Scores in Predicting Success at UC: Preliminary Findings.* (Oakland, CA: University of California Office of the President, 2001).

Furthermore, many students who take a challenging course of study in high school, earn good grades, and score well on an admissions test will nevertheless struggle in college due to factors not accounted for by these measures.

For students with lower test scores and course grades who still choose to pursue college-level studies, the challenge is even greater—these learners need much more comprehensive information on the specific areas where they need to add new knowledge and skills, not generic measures of overall performance on a narrow set of indicators that largely compare their performance to that of their peers.

The first step in addressing this problem is to identify the full complement of factors that affect readiness to succeed. The number of factors can be overwhelming without a conceptual model by which to organize them. Such a model was developed in 2007 and refined over the ensuing eight years to form a comprehensive definition of college and career readiness.[29] This model was based on and derived from research conducted on the content of entry-level college courses, the perceptions of instructors of those courses on what it takes for students to succeed in them, studies of high schools that have been effective at getting more students ready for college than would be predicted by their demographics, and additional foundational empirical work on college success factors.[30] The model is based on a content validity approach. That is, it determines what it actually takes to succeed in entry-level college courses as the basis for specifying the most important success factors. It consists of factors that are actionable and are directly associated with success in entry-level college courses. This means it does not include some traditional predictive factors such as parents' level of education or income because these factors are not actionable. However, the model is designed to inform predictive and causal study designs and serve as a framework for the development of instruments that describe readiness at the student and institutional levels and generate recommendations at both levels.

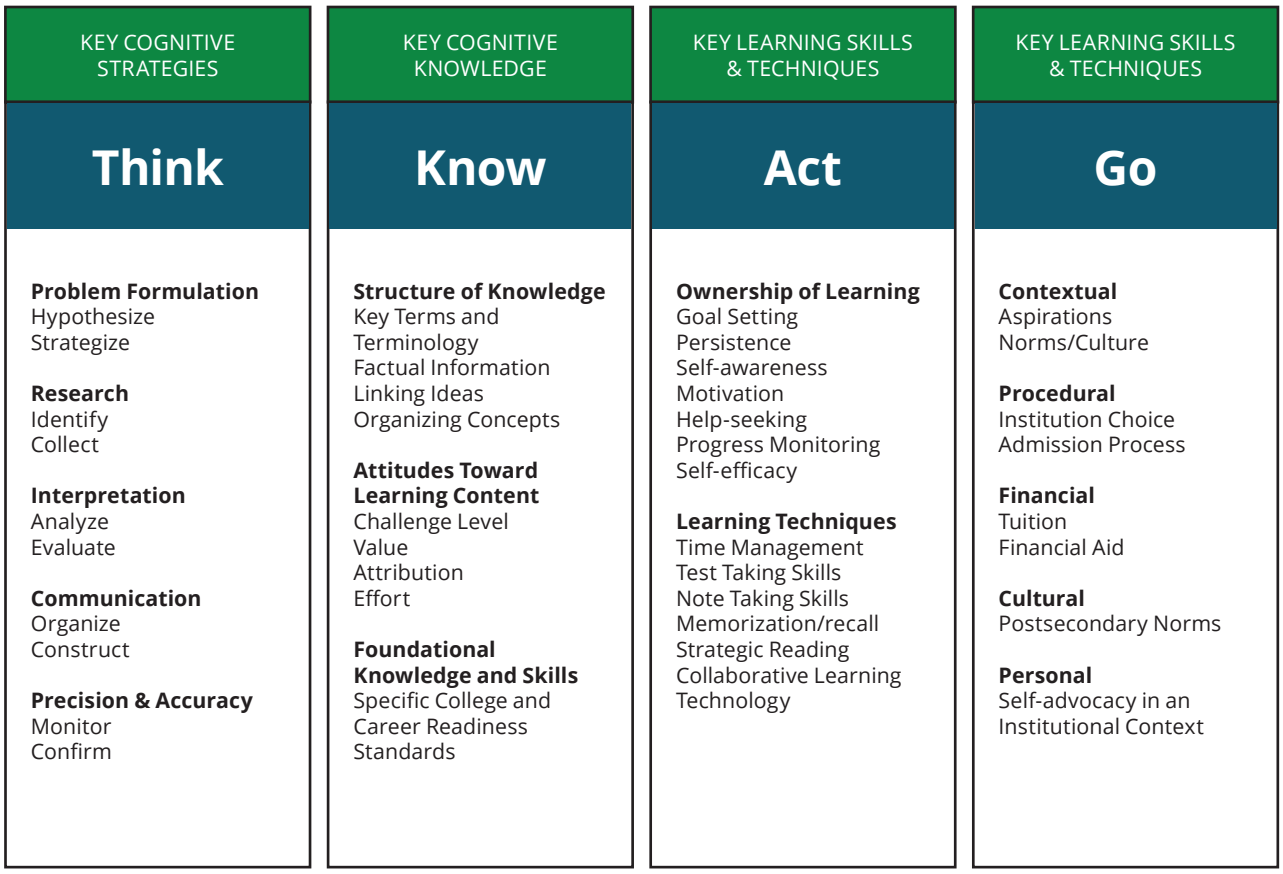
The model's research base consists of studies at the secondary and postsecondary levels, which makes it one of the few approaches to readiness that spans both of these levels of schooling. The model consists of 42 components organized into four "keys": Key Cognitive Strategies, Key Content

29 David T. Conley, *Redefining College Readiness*. (Eugene, OR: Educational Policy Improvement Center, 2007); David T. Conley, Getting Ready for College, Careers, and the Common Core: What Every Educator Needs to Know. (San Francisco, CA: Jossey-Bass, 2014).

30 For further background on this readiness model, consult David T. Conley, *Understanding University Success*. (Eugene, OR: Center for Educational Policy Research, University of Oregon, 2003); David T. Conley, *College Knowledge: What it Really Takes for Students to Succeed and What We Can Do to Get Them Ready*. (San Francisco, CA: Jossey-Bass, 2005); David T. Conley, *Getting Ready for College, Careers, and the Common Core: What Every Educator Needs to Know.* (San Francisco, CA: Jossey-Bass, 2014); David T. Conley, K. Aspengren, Odile Stout, and Darya Veach, *College Board Advanced Placement Best Practices Course Study Report.* (Eugene, OR: Educational Policy Improvement Center, 2006); David T. Conley, Charis L. McGaughy, Jody Kirtner, Adrienne van der Valk, and Mary Theresa Martinez-Wenzl, "College Readiness Practices at 38 High Schools and the Development of the College-ready School Diagnostic Tool" (presentation, Annual Meeting of the American Educational Research Association, Denver, CO, April 2010); and David T. Conley, Kathryn V. Drummond, Alicia DeGonzalez, Jennifer Rooseboom, and Odile Stout, *Reaching the Goal: The Applicability and Importance of the Common Core State Standards to College and Career Readiness.* (Eugene, OR: Educational Policy Improvement Center, 2011).

Knowledge, Key Learning Skills and Techniques, and Key Transition Knowledge and Skills. These are the Four Keys to College and Career Readiness. The dimensions, aspects, and components of the model appear in Figure 1.

Figure 1. The Four Keys to College and Career Readiness



Key cognitive strategies refer to the thinking skills students employ to comprehend, integrate, and apply their content knowledge to solve complex problems and complete meaningful tasks. The aspects of key content knowledge encompass three areas: students' understanding of the structure of knowledge beyond simply remembering simple facts and basic declarative knowledge[31]; their general attitude toward learning, and the degree to which they attribute academic success to effort[32] ; and the specific

31 Grant Wiggins and Jay McTighe, *Understanding by Design*. (Alexandria, VA: Association for Supervision and Curriculum Development, 1998); James W. Pellegrino and Margaret Hilton, *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century.* (Washington, DC: National Academy Press, 2012); M. Suzanne Donovan, John D. Bransford, and James W. Pellegrino, *How People Learn: Bridging Research and Practice.* (Washington, DC: National Academy Press, 1999); Gregory Schraw and Daniel Robinson, *Assessment of Higher Order Thinking Skills.* (Charlotte, NC: Information Age Publishers, 2011); Patrick Kyllonen, Richard Roberts, and Lazar Stankov, *Extending Intelligence: Enhancement and New Constructs.* (New York: Lawrence Erlbaum Associates, 2008).

32 For further information on mindset research, see Carol S. Dweck, *Mindset: The New Psychology of Success*. (New York: Ballantine Books, 2006), Carol S. Dweck, Gregory M. Walton, and Geoffrey L. Cohen, *Academic Tenacity: Mindsets and Skills that Promote Long-term Learning*. (Seattle, WA: Gates Foundation, 2011), and Camille A. Farrington, *Academic Mindsets as a Critical Component of Deeper Learning.* (Chicago, IL: University of Chicago Consortium on Chicago School Research, 2013).

content knowledge aligned with college and career readiness that students are expected to master[33]. Key learning skills and techniques consist of a constellation of attitudes and mindsets associated with students being engaged and taking ownership of learning.[34] These begin with student motivation, which leads to goal-setting behaviors that in turn enhance self-efficacy as students take control of achieving their goals.[35] Students then build metacognitive skills, reflecting on their performance relative to their goals. Metacognitive skills and ownership-of-learning behaviors reinforce and strengthen student persistence, perseverance, tenacity, and grit.[36] Motivation subsequently increases, bringing the cycle full circle. The second aspect of key learning skills and techniques consists of the specific techniques successful learners employ, such as time management, study skills, collaboration, using technology, and help-seeking.[37]

Finally, the fourth key—transition knowledge and skills—identifies what is necessary for students to transition successfully from secondary school to any of a range of postsecondary settings.[38] These encompass being clear on the purposes and benefits of postsecondary education and its norms and culture, making the right choice of a postsecondary program and understanding how to apply, knowing how to navigate financial aid options, being able to relate to faculty and peers who may be more diverse than in high school, and understanding how to advocate for one's self and how to access resources available for self-help on a college campus or in a training program.

Once the model was developed and validated, the next step was to create instrumentation to ascertain readiness at the individual student level and overall school level. The resulting instrument—CampusReady—was initially intended to give educators a profile of readiness at the campus level to inform changes that might help students enroll and succeed in college. CampusReady is administered

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33 David T. Conley, Kathryn V. Drummond, Alicia DeGonzalez, Jennifer Rooseboom, and Odile Stout, *Reaching the Goal: The Applicability and Importance of the Common Core State Standards to College and Career Readiness*. (Eugene, OR: Educational Policy Improvement Center, 2011).

34 David T. Conley, "Transition Readiness: Making the Shift From High School to College in a Social Media World," in *Postsecondary Play: The Role of Games and Social Media in Higher Education,* ed. William Tierney, Zoe Corwin, Tracy Fullerton and Gisele Ragusa. (Baltimore, MD: John Hopkins Press, 2014); David T. Conley and Elizabeth French, "Ownership of Learning and Self-efficacy as Key Components of College Readiness," *American Behavioral Scientist* 58, no. 8 (2014): 1018-1034; Jennifer Fredricks, Phyllis Blumenfield, and Alison Paris, "School Engagement: Potential of the Concept, State of the Evidence," *Review of Educational Research* 74, no. 1 (2004): 59-109; George D. Kuh, "What We're Learning About Student Engagement from NSSE: Benchmarks for Effective Educational Practices," *Change* 35, no. 2 (2003): 24-32.

35 Christopher Wolters, "Advancing Achievement Goal Theory: Using Goal Structures and Goal Orientations to Predict Students' Motivation, Cognition, and Achievement," *Journal of Educational Psychology* 96 (2004): 236-250; Barbara Greene and Raymond B. Miller, "Influences on Achievement: Goals, Perceived Ability, and Cognitive Engagement," *Contemporary Educational Psychology* 21 (1996): 181-192; Dale Schunk and Frank Pajares, 2002, "The Development of Academic Self-efficacy," in *Development of Achievement Motivation. A Volume in the Educational Psychology Series*, ed. Allan Wigfield and Jacquelynne Eccles. (San Diego, CA: Academic Press, 2002); Frank Pajares, "Self-efficacy Beliefs in Academic Settings," *Review of Educational Research* 66, no. 4 (1996): 543-578.

36 Carolyn MacCann, Angela Lee Duckworth, and Richard D. Roberts, "Empirical Identification of the Major Facets of Conscientiousness," *Learning and Individual Differences* 19, no. 4 (2009): 451-458; Angela Duckworth and Christopher Peterson, "Grit: Perseverance and Passion for Long-term goals." *Journal of Personality and Social Psychology* 92, no. 6 (2007): 1087-1101.

37 Steven B. Robbins, Huy Le, Daniel Davis, Kristy Lauver, Ronelle Langley, and Aaron Carlstrom, "Do Psychosocial and Study Skill Factors Predict College Outcomes? A Meta-analysis," *Psychological Bulletin* 130, no. 2 (2004): 261-288; Maribeth Gettinger and J. K. Seibert, "Contributions of Study Skills to Academic Competence," *School Psychology Review* 31, no. 3 (2002): 350-365; John Hattie, *Visible Learning: A Synthesis of Over 800 Meta-analyses Relating to Achievement*. (New York: Taylor & Francis, 2009).

38 Ernest T. Pascarella and Patrick T. Terenzini, *How College Affects Students: Findings and Insights From Twenty Years of Research*. (San Francisco, CA: Jossey-Bass, 1991); George Kuh, Jillian Kinzie, Jennifer Buckley, Brian Bridges, and John Hayek, *Piecing Together the Student Success Puzzle: Research, Propositions, and Recommendations, ASHE Higher Education Report*. (Hoboken, NJ: Wiley Periodicals, 2006).

online to students, teachers, counselors, and administrators in secondary schools, grades 6-12. It takes students approximately 35 minutes to complete.

The research suggests CampusReady is particularly useful for identifying students who may have poor grades but are highly motivated to succeed in college.

CampusReady was used exclusively for three years as a school-level measure in order to refine items and develop and validate scale scores. Then, individual student reports were added. These were designed to provide students with information on the next steps they needed to take to improve their readiness. Current development work on CampusReady is focused on connecting student results with other indicators of student performance such as grades, course-taking patterns, and attendance. Doing so allows triangulation among multiple sources, which enables greater confidence and precision when interpreting results from CampusReady. Early evidence demonstrates that CampusReady correlates as strongly with performance on admissions tests as student grades and predicts which students will attend college as well as student grades.

Research suggests CampusReady is particularly useful for identifying students who may have poor grades but are highly motivated to succeed in college. Many high school students fit this profile, but the description is even more apt for college students, who have all made a choice to continue their education and who frequently have a financial stake in being successful. Based on this general observation, the decision was made to develop a postsecondary version of CampusReady—the Conley Readiness Index. This version followed the structure of the Four Keys while adapting the specific items to the developmental level and vocabulary of college students and rewording questions as appropriate, based on college students' circumstances.

The Conley Readiness Index (CRI) was piloted initially at two colleges in Illinois and Texas, in courses designed specifically to help entering students succeed in college. Results were positive—students indicated completing the CRI was the most important activity in the course, and instructors stated that the CRI provided insight beyond students' written work and oral presentations. The pilot was expanded to six schools including two-year and four-year campuses. Approximately 6,000 students completed the CRI during the first two phases.

Results indicated student responses could be grouped into three broad categories for the purpose of providing general feedback. About a third of students rated themselves above average on all four or three of the four keys. Another third rated themselves below average on all four or three of the four keys. The remaining third rated themselves above average on two keys and below average on two keys, in varying combinations.

Thus, students receive general feedback depending on their profile. Students rating themselves above the average on three or four keys are congratulated on their perceived level of readiness and encouraged to self-evaluate in a number of areas where all students tend to have problems. They are also encouraged to continue to build in areas of strength, because strengths can be used to overcome weaknesses in many cases. For example, students with clear goal focus and strong persistence, or grit—combined with good time management—can better compensate for academic weaknesses, provided those weaknesses are not profound.

Students rating themselves below average on three or four keys are first encouraged to review their strengths and determine which of those strengths might help them overcome areas of perceived weakness. They are also encouraged to seek help and to use campus resources to remedy deficiencies that could derail their progress. Finally, they are encouraged to build strong personal relationships with advisors, instructors, and peers and to discuss the results of the CRI with those allies in order to receive support and learn new success strategies. For students with mixed profiles, the advice is a mixture of what is provided for the other two groups, with an emphasis on building an improvement plan that systematically capitalizes on strengths while targeting weaknesses.

This type of feedback based on a profile appears to be particularly useful to students who may be at risk of dropping out or who aren't sure whether they belong in college in the first place. However, this is only the first step of development for the CRI. As more students complete the instrument, the relationship between CRI scores and performance measures such as course-taking and course-completion patterns, course grades, and admissions and placement test scores will be explored in more depth. Results from these studies will reveal relationships between perceptions of readiness and academic performance, which in turn will enable more precise and detailed recommendations to students.

The final step in developing the CRI profile is to link the recommendations to specific resources either on campus or online. For example, students most in need of immediate assistance may be referred to a website where they can make an appointment with an academic advisor to review CRI results, to a financial aid information site if they need to build knowledge in this area, to the campus writing center, to an online time-management program to help them prioritize tasks, or to other resources based on the areas of their profiles that will yield the greatest probability of increasing their success in college.

The overall goal of the CRI is to improve student success in postsecondary education by (1) making students more aware of what it takes to succeed in college and training programs and (2) providing them with the specific steps they need to take to enhance their readiness. Better information about college-relevant strengths and weaknesses can help students seek out appropriate supports and help postsecondary educators intervene purposefully. Put simply, students who target and develop key success skills will be more likely to graduate college ready for a career pathway and lifelong learning. But success in these areas is not preordained simply by doing well in college. Building capacity to thrive in the face of adversity is a lifelong endeavor, and it is a major focus of our next readiness paradigm: GRIT.

Part 3: GRIT

The roots of the GRIT construct date back to a research question posited at University of California, Santa Barbara in 1979: "How do we know who will fail, versus fail and prevail, in any given context?"[39] The initial exploratory psychological study sparked a 35-year effort to excavate down to and ultimately decode "the bedrock of human endeavor." The research quickly expanded beyond psychology to a diverse array of sciences, including neurology, neurochemistry, psychoneuroimmunology, biopsychology, epigenetics, and evolutionary epidemiology.[40] Methodical cataloging of the major human-endeavor-related revelations from each scientific discipline eventually yielded larger discoveries, detailed below.[41]

Discovery #1. Research supports the notion that adversity is at the epicenter of the human journey and experience, as well as one's capacity to flourish and optimize potential, regardless of background or disadvantage. In 1991, it was hypothesized that perhaps, much like IQ, each person has an "AQ"—Adversity Quotient—which could be measured and improved. AQ® is defined as "one's capacity to handle, or how one responds to adversity." The scientific basis of AQ strongly suggests a person's AQ is hardwired in their youth, and remains consistent throughout one's life, unless purposely and directly rewired through specific protocols.[42]

Ongoing AQ research ultimately led to the construction, validation, and implementation of the AQ Profile® (AQP). The AQP has evolved over time, from Version 1.0 to the present iteration, Version 9.2, which research suggests is highly predictive of performance, resilience, productivity, optimism, quality of life, health, capacity, and innovation. To date, more than one million individuals in 63 countries have assessed their AQs.[43] This validity evidence built a strong case for developing, testing, and implementing instruments and interventions designed to measurably improve one's AQ.

Discovery #2. AQ—a person's pattern of response to adversity—can be both validly measured and permanently improved. Over the past 30 years, and through an ongoing series of tests across organizations and settings, several AQ-enhancing tools have been developed, tested, and implemented. Today, AQ-enhancing tools can be employed independently, in groups, online, with private study aids, or live. Even

39 Initial, exploratory study conducted by Paul G. Stoltz in 1979, as part of the Advanced Organizational Studies class at University of California, Santa Barbara.

40 A more detailed explanation of the various scientific building blocks and discoveries can be found in Paul G. Stoltz, Adversity Quotient, *Turning Obstacles into Opportunities* (New York: Wiley, 1997).

41 PEAK Learning, Inc. was formed in 1987 as an independent research and consulting firm, comprising professionals from five continents, exploring and expanding the initial research on the bedrock of human endeavor, and the human interface with adversity. www.peaklearning.com

42 Deeper substantiation and detail into the methodology involving the measurement and improvement of one's AQ can be found in Stoltz, *Adversity Quotient, Turning Obstacles into Opportunities* and Paul G. Stoltz, *Adversity Quotient at Work* (Morrow, 1999, 2000) and at www.peaklearning.com.

43 Several of the studies referenced are proprietary and therefore not publicly available, but readers interested in further details are encouraged to contact the authors, who can provide additional data upon request.

online, self-paced tools enable statistically significant AQ gains.[44] In live AQ development sessions, most groups improve 11-23% on AQ on average. Groups tracked for more than 10 years have shown no significant post-treatment declines in AQ.[45]

Discovery #3. AQ is only partially predictive of one's ability to fail and prevail, to persist through adversity in pursuit of goals. This finding suggested AQ offers a valuable but incomplete picture of readiness. Enter GRIT. To investigate this concept empirically, individuals (from companies, institutions, and organizations) were surveyed in one of three forms: (1) email "pulse" surveys to qualified samples within larger lists; (2) verbal surveys of large groups with technology-enable response systems; and (3) written-response surveys of large groups.

Between 96 and 99 percent (depending on the item) of more than 250,000 respondents said that, when it comes to accomplishing their goals or "getting stuff done," things were becoming more difficult, more frustrating, more complex, and more confusing. Respondents reported it was taking longer than expected to complete their most important goals. And the percentage of tasks they were able to complete, on time, to their satisfaction, was continuing to drop.[46] These findings suggest that while strengthening one's ability to respond more optimally to all forms of adversity is clearly both essential and impactful, GRIT—one's capacity to dig deep, to do whatever it takes, and especially to sacrifice, suffer, stumble, and struggle in pursuit of worthy goals, is in many cases more vital.

Beyond the implementation of AQ and GRIT at educational institutions (e.g., Harvard, INSEAD, Stanford, Cornell, Carnegie Mellon, and Arizona State University) ongoing research with employers has further solidified the importance of GRIT when it comes to one's career readiness and success. In 2007, the research extended to include Reed Global, a specialized recruiting firm with the largest online job site in Europe. Reed Global conducted a large-scale employer survey, and results suggested that while their job postings emphasized job skills and qualifications, non-cognitive factors (termed "Mindset") trumped skill set, in both perceived importance and predicting success.[47]

Discovery #4. GRIT has emerged as the most important dimension of Mindset. To wit, in a global survey of 21,548 employers across all industry sectors, participants were asked, "If you were hiring someone today, who would you pick: A) The person with the perfect skills and qualifications, but fairly weak on GRIT, or B) The person with exceptional GRIT but missing some other elements?" Just under 99 percent

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44 Paul G. Stoltz, "Resilient Health: The Adversity Quotient (AQ) Factor, an Exploratory Study," PEAK Learning, Inc., 2012, http://www.peaklearning.com/about_aq_studies.php

45 In an independent proprietary study, involving 789 participants with one of the world's largest telecom firms, AQ improvement through a self-paced, online AQ program averaged 17 percent, depending on the group, and varied, based largely on the time one spent engaged in the program/tools. Stoltz, "Resilient Health: The Adversity Quotient (AQ) Factor, an Exploratory Study."

46 Participants—ranging from unemployed to CEOs, ages 15-85, across six continents —were asked if they see the world becoming more complex or simpler, easier or tougher, more or less demanding, faster or slower, more predictable or more uncertain, etc. The statistics cited are based on a 20-year composite, with minor variance over the years and locations. For more information go to http://www.peaklearning.com/aq-researchers_grp.php and www.gritinstitute.com.

47 More information on Mindset-related research can be found at http://www.peaklearning.com/about_3G-mindset.php.

chose the gritty, imperfect candidate over the not-so-gritty but otherwise perfect candidate.[48]

Discovery #5. When it comes to GRIT, quality trumps quantity. An ongoing survey of educators, students, employers, and leaders worldwide underscores this point. When asked, "When it comes to the kind of person you want to become, and the kind of contribution you seek to make, what matters more, the quality or quantity of your GRIT?" 100 percent of respondents choose quality.[49]

Discovery #6. GRIT can be gauged and grown, measured and improved. Extensive work within the corporate world, beginning in 1987, reveals all facets of GRIT can be measurably improved. Through a deliberate combination of awareness, assessment, and the implementation of GRIT Gainer tools, most people improve 8-21 percent in their composite or dimension-specific GRIT scores.[50]

Discovery #7. GRIT Predicts. The GRIT Gauge™ is an instrument developed to assess GRIT holistically, across all validated dimensions and established, qualitative elements.[51] Research reveals GRIT—quantified either as a composite or as distinct dimensions—is predictive of:[52]

- Goal magnitude
- Difficulty of academic major or track
- Goal completion rate
- Employment status (unemployed, partially, or fully and gainfully employed)
- Job tier
- Income
- Health and energy
- Station in life (one's likelihood of bettering his or her circumstances)[53]

The Dimensions and Components of GRIT

Over the past decade, efforts to define, assess, and strengthen GRIT have led to several breakthroughs, which have substantial implications for career readiness. First, quality of GRIT can be broken down along two continua, or dimensions: Dumb—Smart and Bad—Good. Dumb and Smart GRIT are

48 This research continues with every live group PEAK works with, and every leader who enrolls in any PEAK-related assessment or program.

49 In collaboration between PEAK and Pearson, research is ongoing with all live groups of employers worldwide. Response levels have held constant globally.

50 Data is based on the majority of corporate groups that complete a pre-and post-GRIT program assessment. Educational efforts include a series of pilot studies, currently underway, with a variety of educational institutions, in collaboration with Pearson.

51 The GRIT Gauge™ is a proprietary assessment, validated through independent analysis at the Educational Testing Service, Cornell University, and Boston College.

52 Paul G. Stoltz, "GRIT Gauge and Duckworth Scale: An Exploratory, Comparative Analysis," 2015, http://www.gritinstitute.com/grit-research-2/

53 Based on proprietary studies conducted by PEAK Learning, Inc., in conjunction with senior psychometricians at the Educational Testing Service. Respondents include those assembled through Mechanical Turk, corporate field studies, and academic programs at MIT, High Tech High, and other locations.

synonymous with Ineffective and Effective GRIT, respectfully. Dumb GRIT is defined as repeatedly, even relentlessly pursuing goals in ineffective ways, while Smart GRIT is defined as pursuing the best goals in the most effective ways. Given the clear, uninterrupted, decades-long trend of "doing more with less" at work, an essential element of career readiness is a worker's capacity to pursue the right goals in the most effective and efficient ways.

An essential element of career readiness is a worker's capacity to pursue the right goals in the most effective and efficient ways.

Bad versus Good GRIT refers to the impact of one's efforts on himself and those around him. Bad GRIT occurs when one's efforts have a detrimental effect (intentionally or not), and Good GRIT represents the inverse—that is, beneficial effects. Even the best-intentioned individuals typically demonstrate moments of Bad GRIT. The highly-dedicated student who stresses out at exam time, in a way that makes life unbearable for others, is demonstrating potentially strong, but certainly Bad GRIT. Conversely, the fitness-minded student who rather than going it alone, takes her worn-down classmate for a jog to blow off some steam before an exam might be demonstrating Good GRIT.[54]

Initial research at West Point and in the corporate world suggests that quality of GRIT is also predictive of leadership effectiveness. Specifically, there is some evidence that even basic grit correlates significantly with trust, quality leader-member exchange, and strong identification with an organization.[55] This research direction suggests followers appear to trust, respect, and stay loyal to leaders who demonstrate not just the Strongest, but the Smartest and "Goodest" GRIT.

Mindset-related research to date also suggests that Good GRIT may serve as the foundation of moral fortitude—one's capacity to stay true to his highest principles and values, especially when faced with difficult challenges. One implication may be that as ethics gains share in our definition of corporate responsibility, readying one's self with a deeper understanding and practice of Good GRIT may provide a meaningful advantage. Further research exploring the connection between GRIT and moral perseverance, or fortitude, is warranted.

Four Essential Elements of GRIT

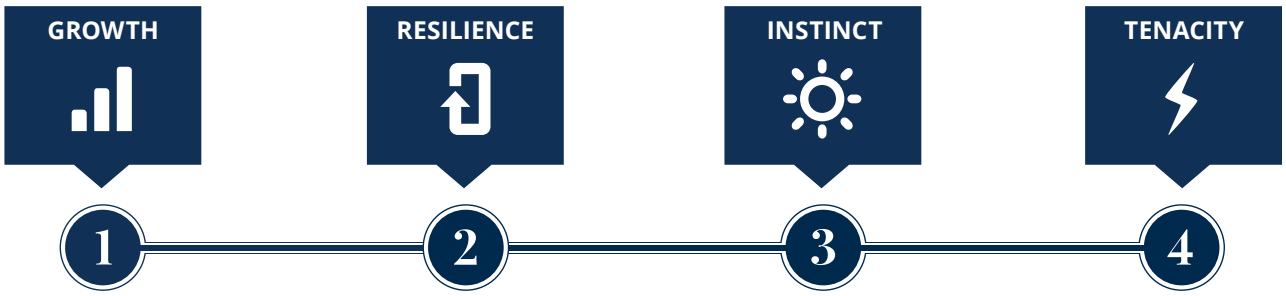
Psychometric analysis suggests GRIT is actually composed of four main elements: Growth, Resilience, Instinct, and Tenacity.[56] Each element is detailed below.

54 Studies indicate that, overall, each of the qualitative GRIT dimensions enhances the overall predictive validity of the GRIT Gauge.

55 Unpublished study conducted by Sean R. Martin, Ph.D., Boston College, in collaboration with West Point Military Academy, 2014.

56 The current version of the four dimensions of GRIT has emerged from a series of independent studies, with statistical analysis performed at

Growth. Research on growth mindset has established that people focused on effort and learning are more likely to strive and succeed than those with fixed mindsets based on static labels like "talented," "smart," or "exceptional." Within the GRIT construct, Growth is presented as not just a concept, but an actionable mindset. Growth is more completely defined as one's propensity to seek fresh ideas, perspectives, and input to accelerate and/or enhance progress toward goals.



Few people would disagree with the importance or potential value of adopting a growth mindset, but the faster, more demanding, and more stressful tasks become, the more difficult it is to lift one's head out of the weeds long enough to get the kind of input, perspectives, and ideas that improvement requires. When asked why they chose not to demonstrate Growth-related behaviors, even though they felt it was important, survey respondents typically indicate a lack of time or being too focused or immersed.[57]

Resilience. The most commonly accepted meaning of Resilience is one's capacity to "bounce back" from adversity. However, AQ- and GRIT-related research indicates Resilience encompasses much more. For the GRIT construct, Resilience is defined as one's capacity to respond constructively to, and ideally make positive use of adversity. This definition highlights the difference between (1) those who avoid, survive, cope with, handle, and even overcome adversity, and (2) those who harness it, using adversity to fuel otherwise unachievable gains. Not surprisingly, Resilience is highly predictive of attrition, performance, and promotion at work. It's hard to overstate the importance of Resilience in preparing for a career.[58]

Instinct. Effectiveness at school and in one's career is based largely on Instinct, or propensity to seek out the best possible goals and pursue them in the most effective and efficient ways. Unlike the classic primal instincts for food or shelter, GRIT-related instinct is grown, not born. People are capable of improving their GRIT-related Instinct, to go after the right things in the best ways.[59] Employer data and basic intuition suggest that one's potential for a productive, engaging, and

ETS, Cornell, and/or Boston College. The four dimensions are described in details in Paul G. Stoltz, *GRIT: The New Science of What it Takes to Persevere, Flourish, Succeed* (San Luis Obispo, ClimbStrong Press, Inc., 2015).

57 The most recent group surveyed with this question was the Launch program at MIT's Martin Center for Entrepreneurial Studies, in July, 2015.

58 Some of the basic data from PEAK's proprietary studies related to the factors AQ and resilience tend to predict can be found at http://www.peaklearning.com/about_aq_studies.php

59 Burt de Perera, T., and Guilford, T., "Found: The Missing Part Of Brain's 'Internal Compass,'" *IFL Science*, January 5, 2015, http://www.iflscience.com/brain/found-missing-part-brain-s-internal-compass

rewarding career is greatly affected by where and how energy and effort are invested. Instinct, therefore, tends to differentiate those who do and do not complete long-term goals despite daunting obstacles.

Tenacity. Long considered synonymous with basic grit, Tenacity is one's propensity to relentlessly persist long after others pursuing similar goals have quit. Decades of social-psychological research has validated this construct as a strong predictor of academic and workplace achievement. As workplaces trend toward greater frustration, confusion, complexity, and struggle, Tenacity has become highly valued by employers as an essential element of career readiness.

Robustness: The Missing Element

Even those with reasonably strong Growth, Resilience, Instinct, and Tenacity, who demonstrate Good, Smart, and Strong GRIT may fall short of their goals. Put simply, there is a vital element missing from the overall human endeavor equation. The term Robustness comes from the world of materials science, and is formally defined as "the capacity of a material to maintain its ideal state despite the unexpected perturbations that assault it."[60] If a structure is designed for a typhoon but experiences an earthquake, its robustness is what determines how well it holds up.

The same can be said of human beings. Personal Robustness is, quite simply, how well one holds up over time. Do the adversities and challenges of life tend to weaken and deplete, or galvanize and strengthen? Robustness marks the difference between short-term and lifelong GRIT. Some begin with reasonably strong GRIT, but it wears down over time. Others refine, strengthen, and more strategically channel both the quality and quantity of their GRIT over time.

While the GRIT construct, assessment, and GRIT Gainer tools continue to be revisited and refined, employer research through the GRIT Institute clearly confirms that job candidates who demonstrate Strong, Good, Smart GRIT across all four dimensions (Growth, Resilience, Instinct, and Tenacity)—while also remaining Robust—have the potential to grow into highly successful employees, leaders, and citizens.

Convergence and Divergence in Three Readiness Paradigms

Each of the three paradigms above rests on some shared principles, but each is also distinct in its purpose and reach. This section will review some of those differences and similarities, and we will start with the latter—strands of convergence.

60 "Robustness Analysis: Robustness Algorithms for Multiple Criteria Optimization." Koç University College of Administrative Sciences and Economics, 2005. http://www.cs.put.poznan.pl/ewgmcda/pdf/ForSayin.pdf and "Robust Definition." Definition of Robust. N.p., n.d. Web. 16 Aug. 2013. <http://www.linfo.org/robust.html>.

Convergence

Three ideas undergird each approach to addressing and improving college and workforce readiness. The first is the most obvious—scholars, educational practitioners, and employers must develop an expanded definition of readiness and success. Second, productive readiness approaches should empower the learner. Finally, measurement still matters. We will discuss each common strand in turn.

Expanding the Readiness Construct. This plea has become so common it's cliché, but many state-of-the-art large-scale assessment systems—including the Common Core testing consortia—still devote overwhelming focus to the "three R's." Academic accomplishments and general aptitude are clearly instrumental to learners' life chances, but focusing on narrow content domains, to the exclusion of the success skills we introduce in this paper, leaves a lot of unexplained variance on the table. Put another way, ignoring non-academic strengths and weaknesses will produce quite a few false-positives and false-negatives—learners who are told they will succeed but do not, and learners who are denied opportunities even though they have a better shot at success than their raw academic credentials suggest. Theoretical, technological, and psychometric innovations detailed in this paper have created a space for meaningful advancement in the measurement and development of non-academic success skills. It's time for these advances to leave the lab and the private sector and impact formal educational policy and practice.

Put simply, non-academic skills can be quantified and those measures must be validated if they're going to take hold in educational and workplace settings.

Empowering the Learner. Modern assessment, for understandable reasons of economy and parsimony, has become an elaborate exercise in categorizing and labeling. We are not opposed to classification—each readiness paradigm above employs some heuristic for grouping learners or workers according to predefined rules. But we do not see inherent value in simply telling learners, their instructors, or their employers where they sit in the distribution of their peers. Serious and disciplined educators and employers use assessment for nuanced diagnosis and constructive support, not punishment and blame. As such, each of the three approaches covered in this paper focuses not just on where individuals are now, but also how they can capitalize on their strengths to address their weaknesses and stay on a path toward postsecondary, career, and personal success. Ownership of learning and improvement is implied in each paradigm (and made explicit in the Conley Readiness Index), and it is only possible when assessment systems are built to identify the solution rather than expose the problem. This is a key distinction between present-day assessment norms and the "brave new world" of readiness for which we argue. The former is

summative, distant, and too often context-irrelevant and punitive, while the latter is diagnostic, personalized, and empowering.

Measurement Matters. Our shared focus on under-assessed personal qualities should not be mistaken for a retreat from rigorous empiricism. It is still true that you cannot manage what you cannot measure. Put simply, non-academic skills can be quantified and those measures must be validated if they're going to take hold in educational and workplace settings. Each readiness paradigm we detail here operates according to this philosophy. The college readiness index for middle school students summarizes observed data via principal components analysis and then statistically links those factor scores to meaningful later-life outcomes (i.e., admissions tests and cumulative GPA). The Conley Readiness Index and GRIT instruments have been tested, revisited, and refined by way of pilot implementations involving thousands of respondents. In addition, each readiness system's validation process has been described in peer-reviewed publications and commissioned reports. Measurement matters—and assiduous validation procedures matter—because as researchers, it is insufficient to ask practitioners, parents, and employers to trust us. Users of the college readiness index, the Conley Readiness Index, and GRIT need to know that these assessment systems are not only psychometrically reliable, but also predictive of important future outcomes. Without robust validity evidence, users would be right to refrain from making meaningful changes based on these systems' diagnoses.

Divergence

There are two important areas in which these readiness paradigms are either dissimilar or in disagreement. First, each approach accounts for a distinct set of attributes, presenting a simple question: What should count when we gauge readiness? Second, each approach is in a different stage of implementation, which raises an important point: Readiness instruments must be deployed in the field, not remain in the lab, if they're to (1) meaningfully impact schools, students, and the workplace and (2) effect broader change in currently limited conceptions of college and career readiness. We discuss each divergence in the paragraphs below.

What Counts for Readiness? The Conley Readiness Index measures student success skills and academic content knowledge but avoids unchangeable socioeconomic characteristics like parents' education. The GRIT instruments avoid circumstance measures and academic criteria altogether in favor of deeper focus on behavioral qualities or traits like robustness and tenacity. The college readiness index for middle school students accounts for them all—socioeconomic variables, academic accomplishments, and non-academic factors like motivation—but may sacrifice some depth in favor of breadth. Which approach has it right? There is no simple single answer. Social science research consistently shows that socioeconomic factors, academic achievement, and non-academic personal qualities all exert some independent influence on life chances. But socioeconomic factors usually cannot be changed and academic achievement (at least reading and math) is already over-assessed. What's most important is that users of these or any other readiness paradigms fully understand what is included and excluded in

each approach, along with the potential consequences of those theoretical and methodological choices. We will elaborate on appropriate interpretation and use in the final section.

Translating Research into Practice. Each approach detailed here is in a different stage of implementation and practical application. The Conley Readiness Index is operational for many postsecondary students with plans to extend the instruments and interventions to new institutions. The GRIT program has been implemented in organizations across the globe. By contrast, the college readiness index for middle school students is being piloted in only a few K-12 settings. While each paradigm's architects intend to implement their approaches broadly, these differences in reach illustrate an important point: To materially and positively shift students' and workers' trajectories, readiness approaches must find their way to schools and industries, not just academic journals and technical reports. Putting research into practice always presents an awkward catch-22; for instruments to be tested and validated they must be deployed in real-world settings, but real-world users usually need extensive validity evidence before they're willing to use such instruments for decision-making purposes. Still, these are solvable implementation problems. Many large-scale assessment programs establish validity evidence prior to operational testing, and continue to collect validity evidence under high-stakes settings to further refine their assessments and performance standards.[61]

Summary and Recommendations

Definitions and assessments of college and career readiness are changing. While the pace of change may be frustratingly slow for those of us interested in disrupting timeworn notions of academic eligibility and baseline competence, the positive trends are clear. Research on non-academic skills has exploded so rapidly over the past decade that researchers are racing to not only name these traits (e.g., 21st Century skills, social-emotional strength, grit), but also raise flags of caution against the misuse of these measures for punitive purposes.[62] The glut of new thought has generated a range of readiness products and paradigms that educators and employers must navigate. In this paper we promised to cut through some of that noise. In service of that goal, we offer three recommendations and a parting thought to summarize our hopes for college and career readiness policy and practice.

Recommendation 1: Understand what readiness assessments measure, and what they do not. As we have reiterated throughout, conventional assessments of academic achievement do not explicitly measure

61 Texas, for example, conducted multiple validity studies prior to the operational implementation of its K-12 testing program, the State of Texas Assessments of Academic Readiness (STAAR). For detail on predictive and concurrent validity evidence that can be collected prior to high-stakes test deployment, see the STAAR Standard Setting

Technical Report: http://tea.texas.gov/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=25769804117&libID=25769804117

62 See Angela Duckworth and David Yeager, "Measurement Matters: Assessing Personal Qualities Other Than Cognitive Ability for Educational Purposes," *Educational Researcher* 44, no. 4 (2015): 237-251.

anything other than academic achievement. Comprehensive readiness paradigms like the college readiness index for middle school students, the Conley Readiness Index, and GRIT go further. Statistically speaking, incorporating more predictive measures yields more accurate predictions of meaningful later-life goals. Conceptually speaking, diverse data can yield more actionable diagnoses of learners' and employees' strengths and weaknesses. But is all that data necessary? Should we measure and report on, for example, socioeconomic disadvantages that students can't improve or academic deficiencies they already know about? The answer depends on the intended use of the readiness instrument. If the only intent is to provide new actionable information, non-academic success skills may suffice. If the intent is to paint a comprehensive and unbiased picture of readiness, aptitudes and economics matter, even if they can't be changed. These factors may, in fact, be leveraged to make interventions maximally effective.

Recommendation 2: Use research to intervene and support, not label and blame. It should be evident in the three parts above that these readiness approaches were designed with a common underlying purpose—helping learners and workers maximize their potential and live fully in their time. Achieving that goal requires solid diagnostic instruments validated with empirical data. Achieving that goal does not require attributing cause and imposing sanctions for low performance. No matter how comprehensive or innovative, readiness paradigms that seek to add new layers of "accountability" will generate substantial controversy before experiencing a swift and absolute demise. There is simply no reason that progress should require punishment.

Readiness paradigms and those who use them should consider the learner or employee's goals, circumstances, and attributes, and develop a plan to maximize an individual's likelihood of success

Recommendation 3: Assessment should open doors, not close them. It should also be evident in the three parts above that we stand firmly in opposition to assessments that tell students and workers what they can't do. GRIT, the Conley Readiness Index, and the college readiness index for middle school students are all founded on a straightforward philosophy—there's more to readiness than popular conceptions permit, and many under-assessed qualities respond particularly well to intervention. Therefore, readiness paradigms should never produce output suggesting, for example, "college isn't in the cards for this student." Rather, readiness paradigms and those who use them should consider the learner or employee's goals, circumstances, and attributes, and develop a plan to maximize an individual's likelihood of success—in the language of GRIT, using students' varied strengths to mitigate their weaknesses. Educational and career pathways should be a matter of choice and endeavor, not prophecy.

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