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# College and Career Readiness in Boston: Understanding and Tracking Competencies and Indicators

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## Introduction

The following is a review of research on college and career readiness indicators. Research on college and career readiness indicators is a vast field, examining a variety of indicators that relate to several different kinds of outcomes, including high school completion, college enrollment, college persistence, and obtaining gainful employment after school. These goals vary greatly, but start from a similar place: students' experiences during their high school years.

The indicators we have compiled here are intended to offer guideposts for educators and community program managers to consider in designing and measuring the success of their programs. This review was conducted and compiled by several researchers at American Institutes for Research (AIR) for partners at the Boston Opportunity Agenda.

The review of research was conducted by searching online databases for evidence of indicators that predict college and career readiness. The following databases were searched for peer-reviewed articles: Academic Search Premier, ERIC, JSTOR, PsycINFO, and SAGE Journals, along with the collection of AIR's own published information. Key words used in the search included College Readiness, Career Readiness, College Indicators, Career Indicators, and a range of Employability Skills (with Employability and Skill listed as secondary and tertiary search terms). The search terms were chosen by identifying key skills from different frameworks that were developed with the input of employers, educators, and researchers, such as the Employability Skills Portfolio (Stemmer, 1992). Our inclusion of studies in this review focuses on work published in the last 15 years, though a small number of foundational studies in each area are cited as well.

In addition to reviewing the published literature, AIR's team conducted eight semistructured interviews with nine individuals with a diverse array of expertise in areas of college and career readiness, including foundation staff, university-based researchers, and experts from nonprofit and government agencies. These interviews revealed not only experts' views on important indicators of college and career readiness, but also their experiences in measuring emerging and challenging constructs.

## Findings

Broadly speaking, our review was concerned with research that presented early indicators of later success after high school, generally defined as preparation either for college or the world of professional work. The indicators we found are presented in three categories:

- Academic indicators
- Soft skills, or employability skills
- Social and life experience indicators

Collectively, these indicators show a wide variety of ways that high schools, school districts, and community agencies might consider monitoring—and ultimately supporting—their students for greater likelihood of success after high school. These various indicators describe a set of cognitive abilities, noncognitive skills, experiences, and dispositions that might predict students’ ability to thrive in a number of different circumstances in postsecondary life, though research literature generally focuses on these indicators being predictive of success in two realms: college readiness and career readiness.

- *College readiness* differs from college eligibility; in addition to satisfying high school graduation requirements, college-ready students are able to succeed in a credit-bearing course at a postsecondary institution and, therefore, do not require any remediation (Conley, 2005, 2007a, 2010).
- *Career readiness* pertains to the knowledge, skills, and learning strategies necessary to begin studies in a career pathway, or the basic expectations regarding workplace behavior and specific knowledge necessary to begin an entry-level position (Conley, 2011b).

### Academic Indicators

Academic indicators are those that (a) center on a student’s formal schooling experience, and (b) are generally predictive of academic success (e.g., high school completion or college persistence). Unlike personal characteristics, academic indicators are often captured and measured in more accessible ways, particularly within high schools. Students’ grades, grade point average (GPA), or participation in early college experiences (e.g., dual enrollment) can be tracked and quantified, often with readily accessible data. A summary of academic indicators is presented in Table 1.

**Table 1. Overview of Academic Indicators**

Indicator	Description	Outcome		Research
		Postsecondary Enrollment or Persistence	Career and Workplace	
<b>High School Indicators</b>				
High School Curriculum Intensity	1. Defined as sufficient exposure to core subjects, AP courses, and no remedial courses	x		Roderick, Nagaoka, & Coca (2009)



		Outcome		
Indicator	Description	Postsecondary Enrollment or Persistence	Career and Workplace	Research
High School GPA/grades	<p>2. A student who maintains a C average or lower in high school is less likely than a student who maintains above a C average (generally 3.0) to persist in college. Findings from one study, which is not nationally representative, suggest that students who have an A average are seven times more likely to complete college in 4 years compared with students with a C average (Reason, 2009).</p> <p>3. Students who maintain a GPA of C or lower were found to be less likely to persist in college when compared with students who maintains a GPA above a C (especially in the first year of college), and the likelihood of a student persisting decreased as his or her GPA declined.</p> <p>4. According to a recent study, GPA is a better predictor of college success than standardized test scores. It is an even more powerful predictor if students enter college within a year of finishing high school. In Alaska, this holds true for both urban and rural student populations.</p>	x		<p>Cabrera, Miner, &amp; Milem (2013)</p> <p>Wolniak &amp; Engberg (2010)</p> <p>Geiser &amp; Santelices (2007)</p> <p>Hodara &amp; Lewis (2017)</p>
Dual Enrollment	<p>1. Dual-enrollment courses allow students to enroll in college-level courses (often for college credit) while still in high school. Sometimes dual-enrollment programs reflect a particular career pathway (e.g., health, technology). Students who participate in dual-enrollment programs focused on career-type courses and located on a college campus are more likely to persist in college than similar students (attending college) who do not. One possible reason for this finding is that participating in a dual-enrollment program exposes high-school</p>	x		<p>D’Amico, Morgan, Robertson, &amp; Rivers (2010)</p> <p>Hughes, Karp, Fermin, &amp; Bailey (2005)</p> <p>Pierson, Hodara, &amp; Luke (2017)</p> <p>Davis et. al (2017)</p> <p>Berger &amp; Milem (1999)</p>

		Outcome		
Indicator	Description	Postsecondary Enrollment or Persistence	Career and Workplace	Research
	<p>upperclassmen to the skills required to be successful at the college level. In addition, students in early college high school programs (a specific type of dual-enrollment program) who participate in college courses on a college campus are more likely to be academically successful.</p> <p>2. Oregon's rate of participation in dual enrollment is high. Recently, studies showed that dual enrollment that took place at the college itself is a better indicator of future college success than dual credit, which consists of college classes taken on the high school campus.</p> <p>3. In Minnesota, dual enrollment is associated with higher rates of college enrollment. For students who face more difficulties, such as free or reduced lunch, the association is less clear.</p>			
Advanced Placement Results	<p>1. A student who scores below a 3 on an AP exam is less likely to persist in college than a student who scores a 3 or higher. One interpretation of this finding is that possessing a solid foundation in content—as evidenced by success on AP exams—is a critical component for success in college. <i>Note: It is suggested that AP performance may reflect habits of mind that contribute to college success and that students who access AP courses through nontraditional means may not possess these same characteristics and may be receiving supports that allow them to be successful on AP exams, but not necessarily acquire the skills related to persistence.</i></p>	x		<p>ACT (2009)  Conley (2007)  Roderick, Nagaoka, Coca, &amp; Moeller (2008)</p>
SAT Scores	<p>1. Students who perform poorly on college entrance exams are less likely to persist in college than</p>	x		Ryan (2004)

		Outcome		
Indicator	Description	Postsecondary Enrollment or Persistence	Career and Workplace	Research
	students who receive the highest scores on college entrance exams. Students with the highest SAT scores were found to be six times more likely to graduate from college in 4 years than students with the lowest scores. <i>Note: The exact cutoff or threshold for high versus low SAT scores was not provided.</i>			
End-of-Course Exams	1. A student who scores below the proficiency level on an end-of-course exam in high school may be at risk of not persisting in college.	x		Conley (2007)
Participation in Remedial Courses	1. Participation in remedial courses in college is an indicator of risk that a student may not persist in college.	x		Stewart, Lim, & Kim (2015)
Articulated Academic and Career Goals	1. A student who has few or poor academic and career goals may have less probability of completing college. This includes choice of major and alignment with student goals. 2. The data necessary to inform this indicator need to be clearly defined. The research is based on a survey of students. There may be data on the college application that could be used to capture this information (e.g., a student selects a major or applies as undecided).	x		Kahn & Nauta (2001) Titus (2004) Adelman (2006) St. John, Hu, Simmons, Carter, & Weber (2004) Pascarella & Terenzini (1980)
<b>Career and Vocational Technical Education (CVTE) Indicators</b>				
Completing Work-based learning Experience With Satisfactory Rating	1. Students have the chance to learn and practice their skills in the context of work.		x	Darche & Stern (2013) Hanushek, Schwerdt, Woessman, & Zhang (2016)
Presence of Career Guidance Programs	1. Students have access to career guidance, especially assistance with planning.		x	Kuijpers, Meijers, & Gundy (2011)



Academic indicators are often discussed in terms of preparation for college. However, there also are ways to gauge students' preparation for work in CVTE experiences. For example, the completion of different kinds of apprenticed work experiences correlates with higher employment (see Darche & Stern, 2013). These can be experiences where students not only learn the technical skills of a profession, but also gain some of the soft skills referenced in the following section.

### ***Measuring Academic Indicators***

Massachusetts school systems have a strong record of tracking academic indicators. For example, state systems currently include the Early Warning Indicator System (EWIS) tool and related systems, which allow schools and districts to identify students who have missed a number of school days that put them at risk or those students who are not accumulating a sufficient number of credits to put them on track to graduate (e.g., students must earn at least five credits in Grade 9). Several systems track completion of the MassCore (the Massachusetts high school program of studies), and encourage students to complete or exceed these requirements. Recent reports from Achieve (2016) also indicate that Massachusetts has information on cohort graduation rates, college attendance and persistence, AP course performance, and preparedness for careers in the military by performance on the U.S. Armed Forces enlistment examination.

This same report from Achieve, as well as interview data, showed other areas where school systems in Massachusetts should consider tracking additional information that is not commonly tracked, such as the following:

- Other advanced courses that students have taken, such as dual-enrollment and early college experiences
- District-level tracking of completion of various precollege experiences that have shown to predict college persistence, such as taking the PSAT, completing the Free Application for Federal Student Aid (FAFSA), and college visits. Interview participants noted that guidance counselors can be utilized, when student-counselor ratios are reasonable, to ensure that students complete these experiences and can assist with tracking them through school-created tools or software tools such as Naviance
- Quarterly examinations of course failures, absences, and other warning signs, beyond the annual screening using tools such as EWIS
- Measures of students' sense of connection to high school, established through programs such as advisories and mentoring, which can predict long-term college and career success (see Villavicencio, Klevan, & Kang, 2015; Faircloth & Hamm, 2004)

### **Soft Skills**

The second category of indicators is the broadest and the one with the largest array of names. As Savitz-Romer and her colleagues (2015) point out, terms for this group include soft, employability, noncognitive, metacognitive, and 21st century skills, among other terms. Interview participants agreed that “*coming up with a common language in the field is a real need.*” For the purposes of this review, we have selected the term *soft skills*, as it was used by

some of the more recent studies reviewed here and because it most clearly implies that these skills are applicable to several contexts, not just particular subjects or settings.

By and large, these soft skills are not related to innate intellectual capacity, but rather represent a largely nonspecific and nonacademic set of traits that nonetheless can be valuable skills for success in a variety of areas, including both academic and professional work. Soft skills also are relevant to this review as they are in demand, but difficult to cultivate and measure in many traditional settings. They “are ones that employers increasingly contend are vital to success in the work world, but are in short supply” (Savitz-Romer, Rowan-Kenyon, & Fancsali, 2015, p. 19).

Soft skills represent an area that is both in practical demand, but also in early stages of development in terms of monitoring and interventions. Two recent studies suggest priorities for educators in this broad area that generally encourage development of soft skills that can support success in several contexts. Nagaoka, Farrington, Ehrlich, and Heath (2015) suggest that three key factors for youth success are *agency* (taking an active role in development), *integrated identity* (internal consistency across contexts), and *competencies* (abilities to perform complex tasks such as critical thinking and collaboration). More recently, Gates and colleagues (2016) proposed three skills that contribute most toward positive development at the intersection of workforce success, violence prevention, and sexual and reproductive health. Similar to the Nagaoka et al. study, these were *self-control* (similar to agency, this represented discipline and avoiding risk behaviors), *positive self-concept* (self-efficacy and confidence in different domains of life), and *higher-order thinking skills* (problem-solving skills related to diverse, complex tasks). Both studies suggested that these skills are foundational, and are most likely to contribute to varying kinds of social success and workplace advancement.

We have used these two recent studies to organize the many soft skills presented in this review. The soft skills—those that can correlate with either college readiness, career readiness, or both—are listed in Tables 2, 3, and 4. These indicators fall into three categories, inspired by the Gates and Nagaoka studies:

- **Agency:** Soft skills related to self-discipline and self-control as well as one’s ability to reflect on progress and persist in completing a task;
- **Identity:** Soft skills related to one’s sense of self and confidence; and
- **Competency:** Soft skills related to critical thinking, problem solving, and transferring knowledge to other settings or problems.

**Table 2. Overview of Soft Skills: Agency**

Skill	Description	Outcome		Research
		Postsecondary Attendance or Persistence	Career and Workplace	
Self-Regulation	2. Self-regulation, defined as the ability to focus and exercise inhibitory control, is a predictor of academic achievement. 3. Interventions to improve self-regulation can significantly	x	x	Duckworth & Seligman (2005) Dignath, Buettner, & Langfeldt (2008)

		Outcome		
Skill	Description	Postsecondary Attendance or Persistence	Career and Workplace	Research
	improve academic performance, especially in mathematics.			
Conscientiousness	1. Conscientiousness is an aspect of personality, highly related to “grit,” (perseverance in the pursuit of long-term goals). Each has been shown to be at least as predictive of academic performance as IQ. Duckworth’s work operates on an emerging idea that indicators such as these, related to personality, are malleable.	x	x	Almlund, Duckworth, Heckman, & Kautz (2011)  Duckworth, Peterson, Matthews, & Kelly (2007)

Skill	Description	Outcome		Research
		Postsecondary Attendance or Persistence	Career and Workplace	
Self-Monitoring	<ol style="list-style-type: none"> <li>1. Self-monitoring skills, related to self-assessment skills, are built through practice in goal setting and tracking progress.</li> <li>2. Self-monitoring is seen in conjunction with motivation and engagement, goal orientation and self-direction, self-confidence, metacognition and self-efficacy, and persistence. It is regarded as a key component of college readiness and an aspect of agency.</li> </ol>	x	x	Conley & French (2014)
Grit	<ol style="list-style-type: none"> <li>1. Grit is an aspect of personality, highly related to conscientiousness. It is defined as perseverance and passion for long-term goals. Each has been shown to be at least as predictive of academic performance as IQ.</li> </ol>	x	x	Duckworth et al. (2007) Hanford (2012)
Perseverance	<ol style="list-style-type: none"> <li>1. Particularly, this refers to the perseverance in the pursuit of long-term goals. Similar to “grit” and conscientiousness, it has been shown to be at least as predictive of academic performance as IQ.</li> </ol>	x	x	Gaertner & McClarty (2015) Radcliffe & Boss (2013)
Mindsets	<ol style="list-style-type: none"> <li>1. Positive mindsets about learning and social belonging in academic environments are predictive of academic performance.</li> <li>2. Interventions aimed at improving academic mindsets result in improved academic performance. Such interventions can reverse the commonly held misconception that intelligence is fixed and does not grow with effort.</li> <li>3. Stereotype threat is a predictor of poor academic performance. Interventions to reduce this effect are correlated with an improvement in academic performance.</li> </ol>	x	x	Blackwell, Tzesniewski, & Dweck (2007) Walton & Cohen (2011) Dweck, Walton, & Cohen (2014) Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski (2009)



The first set of characteristics are related to personal agency, or a sense in people that they can exert influence on the events that shape their lives (see Bandura, 2001). These include concepts such as regulating desires and monitoring feelings or progress on a task. Related are the ability to push oneself to complete a difficult task. These concepts are captured by the currently popular terms “grit” and “perseverance,” most notably inspired by the work of former classroom teacher Angela Duckworth. These indicators, generally described as having the persistence and passion to pursue long-term goals in the face of difficulty, can predict a variety of outcomes. Students demonstrating these indicators are more likely to complete difficult, long-term objectives, including graduation.

**Table 3. Overview of Soft Skills: Identity**

Skill	Description	Outcome		Research
		Postsecondary Attendance or Persistence	Career and Workplace	
Motivation	<ol style="list-style-type: none"> <li>1. Student motivation for learning is predictive of academic achievement.</li> <li>2. Students who are motivated by mastery of content demonstrate better academic behaviors (e.g., study skills) and overall academic performance.</li> <li>3. Student valuations of a subject and expectations for success are strong predictors of their academic performance in that subject.</li> <li>4. Student motivation for learning generally declines over time and is most vulnerable during school transition years, especially during the transition to middle school.</li> <li>5. Interventions to improve student motivation are effective and can result in better academic performance.</li> <li>6. Individuals’ motivations within work often represent <i>values</i> that are expressed through attitudes and could be learned <i>skills</i>, not soft skills.</li> </ol>	x	x	Wigfield & Eccles (2000) Cury, Elliot, Da Fonseca, & Moller (2006) Conley & French (2014) Gaertner & McClarty (2015) Hafner, Joseph, & McCormick (2010) Hafner & McCormick (2013) Lazowski (2015) Mattern, Allen, & Camara (2016) Worth (2003) Eccles, Midgley, & Adler (1984) Dweck (1986) Elliot, McGregor, & Gable (1999)
Self-Efficacy	<ol style="list-style-type: none"> <li>1. Self-efficacy is seen in conjunction with motivation and engagement, goal orientation and self-direction, self-confidence, metacognition and self-monitoring, and persistence. Specifically, it refers to belief in one’s own ability to complete</li> </ol>	x	x	Conley & French (2014) Jiang (2016) Strayhorn (2015)

	tasks and/or goals. It is regarded as a key component of college readiness.			Slade, Eatmon, Staley, & Dixon (2015)
Self-Confidence	1. Self-confidence is seen in conjunction with motivation and engagement, goal orientation and self-direction, self-monitoring, metacognition and self-efficacy, and persistence. It is regarded as a key component of college readiness.	x	x	Conley & French (2014)
Exercises Leadership	1. Related term includes Student Leaders.		x	Bates & Phelan (2002) Rosenberg, Heimler, & Morote (2012) Casner-Lotto & Barrington (2006) Collet, Hine, & du Plessis (2015)
Demonstrates Integrity (Ethics, Integrity)	1. Related terms include Ethics and Integrity.		x	Bates & Phelan (2002) Taylor (2005) Ju, Zhang, & Pacha (2012) Rosenberg et al. (2012)
Takes Responsibility for Professional Growth	1. Related terms include Career Development, Professional Growth, Selects Mentor, and Responds to Feedback.		x	Bates & Phelan (2002) Zinser (2003) Collet et al. (2015)
Self-Advocacy	1. This refers to the process of exercising, defending, and promoting one's rights—most often refers to people with disabilities speaking and acting on behalf of themselves. 2. The term "self-advocacy" in the research shows up largely in reference to students with disabilities, though that does not mean that students without disabilities could not benefit from improving this skill. The research presented self-advocacy as correlated with		x	Green (2013) Green (2014) Olney & Salomone (1992)

	students with disabilities' success in finding and maintaining employment, and not necessarily in an academic setting, though there is certainly a connection between self-advocacy and college readiness.			
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The second set of personal factors are related to identity and self-concept. Together, they describe a sense of confidence in abilities and self-efficacy to overcome obstacles of different kinds. Such a sense of self-concept might allow a student to utilize similar strengths in a variety of settings, maintaining a consistent sense of self throughout.

**Table 4. Overview of Soft Skills: Competency**

		Outcome		
Skill	Description	Postsecondary Attendance or Persistence	Career and Workplace	Research
Critical Thinking	<ol style="list-style-type: none"> <li>1. It is possible to explicitly train individual critical-thinking strategies.</li> <li>2. Critical thinking is an essential process in the <i>transfer of knowledge</i>, whereby students use knowledge of skills learned in one subject and apply it to solve problems or advance understanding in another.</li> </ol>	x	x	Klauer & Phye (2008) Lombardi, Kowitt, & Staples (2015) Verrell & McCabe (2015) Soulé & Warrick (2015) Buskist (2016) Duvall & Pasque (2013) Halpern (1998)
Problem Solving	<ol style="list-style-type: none"> <li>1. Problem-solving skills are often best learned within subject-specific contexts (e.g., English language arts and mathematics) and are somewhat restricted in their applicability across subjects.</li> <li>2. Problem-solving skills are a predictor of academic performance.</li> </ol>	x	x	Mayer & Wittrock (2006) Greiff et al. (2013) Duvall & Pasque (2013) Perkins & Salomon (1989)

		Outcome		
Skill	Description	Postsecondary Attendance or Persistence	Career and Workplace	Research
Creativity	1. It is possible to teach and improve creativity. Although under the category of critical thinking and related in the research, creativity refers to the unique ways and the liberty taken in which students may critically think in order to solve a problem or complete a task or assignment.	x	x	Scott, Leritz, & Mumford (2004) Soulé & Warrick (2015)
Applied Academic Skills	1. Applied academic skills include basic communication skills (e.g., reading, writing, speaking, listening), applying scientific and social studies concepts, and performing mathematical processes in work-related situations.		x	Zinser (2003)
Conveys Information in Writing	1. Related terms include Written Communication, Communication Skills, and Writing.		x	Bates & Phelan (2002) Zinser (2003) Miller & Luse (2004) Deeley (2014) Pollack & Godwin (1983)
Technology Use	1. Related terms include Technology Skills and Computer Literacy.		x	Bates & Phelan (2002) Miller & Luse (2004) Taylor (2005) Rosenberg, Heimler, & Morote (2012)
Systems Thinking	1. Systems thinking is “the ability to understand (and sometimes to predict) interactions and relationship in complex, dynamic systems: the kinds of systems educators are surrounded by and embedded in” (Senge et al., 2000, p. 239).		x	Rosenberg et al. (2012) Yurtseven & Buchanan (2016) Betts (1992)

The final group of personal indicators relates to students' critical-thinking skills, including the ability to transfer cognitive problem-solving skills to various kinds of academic and career situations (Kuncel & Hezlett, 2010). Several sources describe these traits as malleable, trainable characteristics (e.g., Savitz-Romer & Bouffard, 2012). Students demonstrating these indicators will, for example, be able to transfer knowledge to new settings and use knowledge in solving novel problems.

## **Measuring Soft Skills**

Although these personal characteristics are likely to be of great interest to educators, teaching and measuring these characteristics are challenging for educational and community institutions. Measures are often specific, proprietary instruments, the use of which may impose costs on users and also may require training for valid use. Instruments meant to measure soft skills also may be limited in scope to discrete concepts or not designed to measure growth over time.

In terms of workplace application, pertinent employability skills for career readiness and success are measured largely through surveys to employers, educators, students, or employees themselves.

Academically, there has not been a convergence to date of evidence or expert opinion on a single type of assessment getting at several kinds of soft skills, making this type of information difficult to obtain (Archambault et al., 1993; Lockwood, 2007). Teacher assessments aimed at identifying students with these traits are one possible avenue. For example, assessments can be measures of academic knowledge as well as tools to assess underlying student traits (e.g., motivation, communication, or organization skills), which are found to be significant contributors to students' success in advanced courses. However, such tools are often time consuming or require an investment in training of teachers to ensure valid measurement.

Interviews with experts in this area have revealed several findings relevant to school systems and community partners trying to measure and influence so-called soft skills. First, measurement of these skills can be challenging. One participant noted, "*There are not a lot of good assessments out there, so the field certainly has a lot of need to fill in the gap in terms of how do we measure these kinds of social-emotional outcomes for students.*" Interview participants noted several formal instruments that have been used to measure soft skills as well as several other ways that they or programs they had studied were trying both to assess and support the development of soft skills in students.

Interview participants described their experience with several formal, research-based instruments meant to measure soft, noncognitive skills. These have included the 5Essentials Survey, Duckworth's Grit Scale, the Becoming Effective Learners Survey from the University of Chicago, and the Student Self-Awareness Inventory. These formal survey tools have been validated and used in several contexts. Their use in schools, however, may incur costs for schools and districts and require consultation with external instrument designers and data analysts.

Interview participants also described several ways that they had measured soft skills using alternate means perhaps more readily accessible to schools and school districts. These included:

- *School and District Surveys*: Several districts already administer annual surveys of students. One interview participant described work on a recent project examining items on the New York City annual NYC School Survey. These included student self-reports of

their growth in various self-skills areas. In a more detailed examination of soft skills by a school district, Snipes and Tran (2016) used three reliable survey scales on an annual student survey of students in Clark County, Nevada. These three scales consist of 14 items that collectively measure growth mindset, performance avoidance (or not taking on new responsibility or completing work for fear of failure, lack of willingness to take on challenges), and academic behaviors.

- *Student Self-Reflections*: Interview participants noted that having students periodically reflect on their own growth in soft skills, including reflecting on their learning, areas of strength and weakness, and obstacles to greater success in various courses, can be powerful learning experiences for students and contribute to growth in executive functioning and ability to self-monitor.
- *Student Assessments*: Interview participants noted that various kinds of in-school assessments can be used to measure soft skills in students. For example, one interview participant characterized course grades as multidimensional measures of students' abilities, behaviors, and soft skills. Grades can reflect not only students' academic knowledge, but also their ability to exercise soft skills, such as organize their time and persist on difficult tasks. Similarly, another interviewee noted that various forms of competency-based curriculum assessments can be used to assess soft skills (McClarty & Gaertner, 2015). These might include presentations, oral defenses, and the demonstration of other specific work-related skills, allowing students to practice soft skills in context, which interviewees also stressed was important.
- *Work-Based Learning*: Access to and completion of career development education programs (beyond those that are Perkins or Chapter 74-funded programs) can greatly assist in the development of soft skills, and may offer the opportunity for assessing participating students' ability to demonstrate various soft skills. For example, students might complete an apprenticeship or internship, or earn an industry-recognized credential, and, as part of doing so, have to demonstrate problem-solving abilities and a sense of agency in the face of challenges.
- *College and Career Readiness Database*: Some states, such as Hawaii, report percentages of students attending college in reports, and are building a college and career readiness database with GPAs, higher level courses, and SAT results, with the intention to add postsecondary results (Herman et. al., 2017). Creating this kind of database is one way schools and districts can measure and monitor progress in terms of college and/or career readiness.

Interview participants noted implications for data gathering in relation to these suggestions. At the district and state levels, understanding students' progress in soft skills may require tracking alternate kinds of information, an area where states have made varying levels of progress. For example, current surveys may need to be updated and results tracked over time. System-level data may need to include what number or percentage of students completed—or had access to—various kinds of high-level courses, such as Advanced Placement (AP) or International Baccalaureate (IB) programs, which might offer opportunities to learn and demonstrate critical-thinking and higher-order thinking skills. In addition, state systems may need to understand

which students are asked to complete complex, competency-based assessment tasks, such as defenses or portfolios, and consider tracking common thresholds on those assessments.

## **Contextual and Social Indicators**

Finally, we present indicators of future college and career success that are related to factors in students' lives that are outside of their academic experiences in school. These factors include attributes of their secondary institution, extracurricular participation, and their lives outside of school.

**Table 5. Contextual and Social Experiences Indicators**

		Outcome		
Indicator	Description	Postsecondary Attendance or Persistence	Career and Workplace	Research
<b>High School Indicators</b>				
Working While Attending School	1. A student who works more than 20 hours a week during school is at greater risk of not persisting in college.	x		Roksa & Velez (2010) DeAngelo, Franke, Hurtado, Pryor, & Tran (2011)
Support	1. The absence of a home or community environment that is supportive of college and career completion increases the likelihood that a student will not persist in college. Research suggests that family support and encouragement of college-going students is related to persistence. 2. As an indicator this may be difficult to measure.	x		Reason (2009) Bean (1980) Bean & Metzner (1985) Bean & Vesper (1990) Cabrera, Nora, & Castaneda (1993)
Single-Parent Student	1. A student who attends school while also being a single, full-time parent is at greater risk of not persisting in college. One study showed that, in some instances, this link between single parenthood and college persistence may be mitigated by institutional supports available at postsecondary institutions.	x		Raley & Kuo (2011)
High School Extracurricular Participation	1. Participation in at least 2 years of extracurricular activities is associated with greater success in school and work, as well as involvement in civic duty.	x	x	Gardner, Roth, & Brooks-Dunn (2008)
School Socioeconomic Status (SES)	1. Students who attend high-SES composition high schools are more likely to enroll in 4-year colleges.	x		Palardy (2013)
High School Resources	1. Institutions that have lower levels of funding for administration and curriculum development, libraries, and instructional technologies have lower rates of persistence, especially those resources	x		Engberg & Wolniak (2010) Kim & Nunez (2013) Klugman (2012)



		Outcome		
Indicator	Description	Postsecondary Attendance or Persistence	Career and Workplace	Research
	related to academic support (e.g., academic administration, curriculum development, libraries, instructional technology).			Roderick Coca, & Nagaoka (2011)
Participation in First-Year Seminars or Summer Bridge Programs	1. Participation in curricular interventions, such as first-year seminars and summer bridge programs, have been associated with increased intent to re-enroll and 5- to 6-year graduation.	x		Keup & Barefoot (2005) Pike, Hansen, & Childress (2014)
<b>College Indicators</b>				
First-Generation College Student	1. A student who is the first in his/her family to enroll in a postsecondary institution is at greater risk of not persisting in college.	x		Schademan & Thompson (2016)
Availability of and Access to Financial Assistance	1. The availability of financial support for students may impact college persistence. 2. Rural students have lower expectations for postsecondary education due to financial worries.	x		Boatman & Long (2016) Molefe, Proger, & Burke (2017)
Student-Faculty Interactions	1. Students who have more student-to-faculty formal and informal periods of contact have a reduced likelihood of withdrawing. 2. This indicator must be defined and tested. One possible indicator could be class size, hypothesizing that this would increase student and faculty interaction. Another indicator to be tested could be nonclassroom-based learning opportunities led by faculty, such as seminars and special projects.	x		Lillis (2011)

### **Measuring Contextual Factors**

Contextual and social factors may be measured in several ways and may involve an integration of existing systems rather than the addition of new measures, as may be the case with other indicators. For example, guidance counselors and other school teams may need to collaborate in new ways to track family factors or personal factors that may indicate risk, or may require more

deliberate tracking of extracurricular participation among students. Participation in bridge programs—similar to dual-enrollment experiences—may need to be tracked in new ways and participation encouraged as it may not have been previously.

At the district or system level, the contextual indicators displayed in Table 5 may be particularly important to consider when determining how to allocate resources and supports for high school students across schools, where community partnerships may be needed, or how to counsel and support students as they enter postsecondary education. Beyond just examining broad, demographic factors, these social and contextual indicators may provide a way to take a closer look at particular students with unique risk factors and allocate resources accordingly.

## **Conclusions and Caveats**

Interview participants stressed that just as important as the need to measure students' soft skills, academic readiness, and contextual indicators is the need to establish systems to track students' progress over time as well as any interventions put in place to support those students and any progress they might make over time. Although interview participants stressed that college and career readiness indicators should be considered as important milestones for all students, the ability to acquire certain skills and characteristics will differ by familial, social, environmental, peer, community, and economic influences (Phillips, Brooks-Gunn, Duncan, Kelbanov, & Crane, 1998). Students may need additional or varying levels of support in reaching various milestones based on personal circumstances, and tracking mechanisms—and systems of intervention—are important tools to support the preparation of all students to pursue their own postsecondary paths.

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