



Impact of Cognitive, Psychosocial, and Career Factors on Educational and Workplace Success

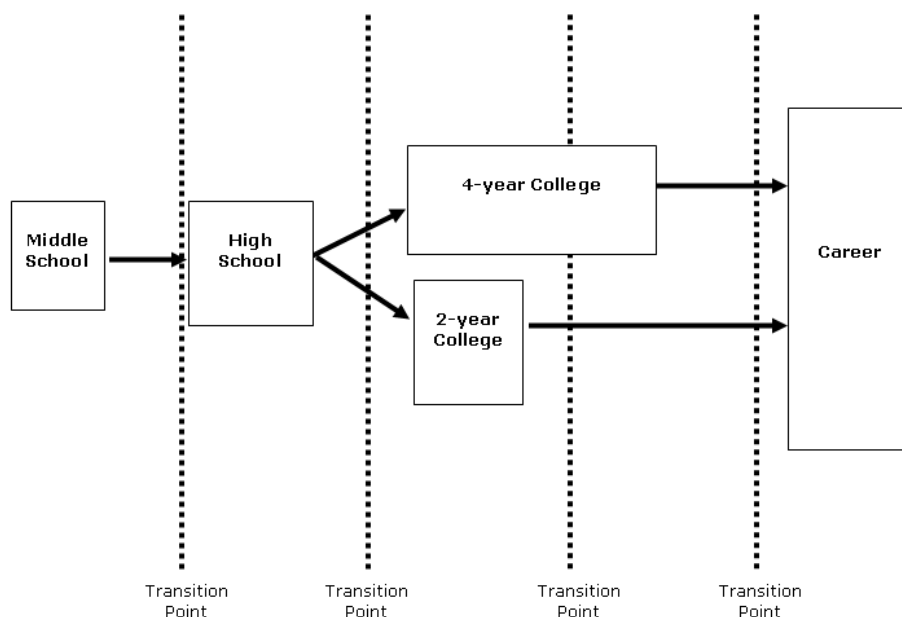
Postsecondary and work success is central to the economic and social well-being of our country. Fundamentally, college success is measured by persistence to degree attainment. Analogously, work success refers to effective performance of a job's required tasks. To succeed in college, one must be ready for college. A student who is ready for college is prepared to enter a credit-bearing college course with a high likelihood of obtaining a grade of C or better in the course. Similarly, a student who is ready for workforce training is prepared to learn from training program materials and complete training and/or certification requirements.

Of course, college and work success require more than task mastery. For example, the low retention and degree attainment rates we observe at U.S. postsecondary institutions affirm the importance of persistence and commitment. Likewise, general work attitudes and conduct, such as diligence on the job, persistence to task completion, cooperation, teamwork, and rule compliance, are frequently noted as critical behaviors expected by employers.

How we educate and train our youth to be successful postsecondary students and workers is one of the most critical questions of our time. We cannot compete globally without a high percentage of our citizens succeeding in college and in the workplace. What are the key factors of college and work readiness?

Figure 1 depicts some of the critical transition points across grades 6 through 16 and work.

Figure 1: Critical Transition Points across Grades 6–16 and Work



The key underlying constructs associated with readiness and success are: *cognitive development*, as measured by academic learning and achievement; *psychosocial development*, as measured by motivation, and self-regulatory and social engagement constructs; and *career development*, as reflected in an ability to engage in exploration and crystallization and make effective choices. We believe that these three constructs are essential to readiness and success as they reflect subject-matter mastery, general work attitude, and effective career-decisionmaking, respectively.

This tripartite distinction is common in the psychological research literature. Industrial-Organizational (I/O) psychologists have examined how cognitive, psychosocial, and career-interest fit factors incrementally predict work and work-training success:

- Most I/O psychologists believe that cognitive abilities provide most of the explanation for understanding work-task or performance and training outcomes (Schmidt & Hunter, 1998).
- They also believe that psychosocial factors influence work-task and organizational-citizenship behaviors in different ways, whereas the degree of career-interest fit influences work commitment and satisfaction.
- In the psychosocial research literature, Ackerman and Heggstad (1997) addressed the degree to which intellectual ability, psychosocial factors, and career interests overlap.

Scholars may disagree about the extent of overlap among the three factors. The important point, though, is that they have been shown to be conceptually and empirically distinct.

The traits associated with each construct vary by developmental milestone and criterion:

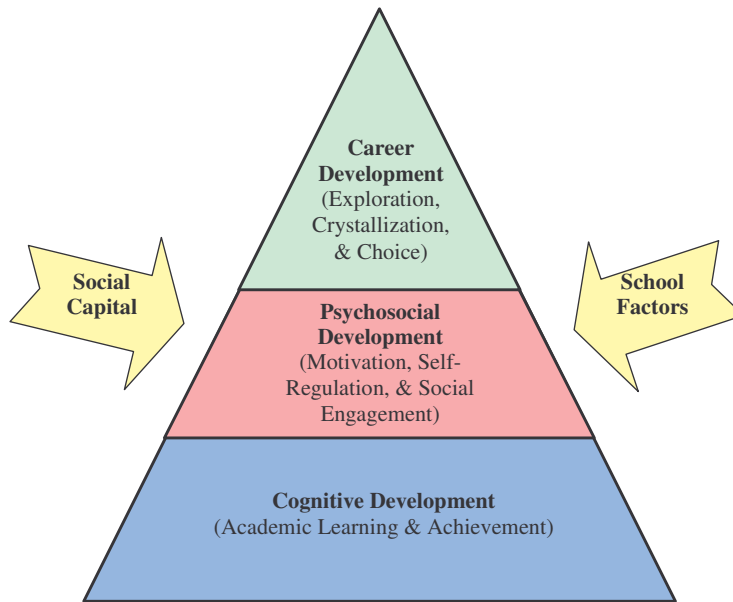
- In the cognitive domain, we know that there is a linear progression to reaching the ACT College Readiness Benchmarks in core subject matter. Numerous studies highlight the progression to college success when students take a rigorous core curriculum (cf. ACT, 2006).
- In the psychosocial domain, the relevant indicators vary with age. Conduct and homework compliance are important for understanding academic performance and mastery as students transition to high school. Motivational factors, such as academic discipline and commitment to college, are important for predicting college success.
- As with psychosocial factors, the relevant career factors vary with age. We know that career-interest exploration is critical in middle school, whereas interest-crystallization is critical during the transition from high school to college. Furthermore, we know that the greater the congruence between a person's college major and career on the one hand, and their measured values and interests on the other, the more likely that person is to persist in college and achieve work success and satisfaction (cf. Neumann, Olitsky, & Robbins, 2007).

We believe that the cognitive skills acquired through academic learning and achievement are foundational and required for success throughout one's school and work career. Some general attitudes and behaviors can help. Likewise, thoughtful postsecondary and work-based choices that match a person's career interests and values help contribute to sustained effort and satisfaction.

We highlight this model in the ACT Pyramid for Success (Figure 2). The pyramid exists within two influential contexts: social capital and school factors. Social capital is defined as the resources gained from relationships with individuals (such as parents or significant role models) or institutions (such as clubs, religious groups, or after-school programs) (Eatwell, Milgate, & Newman, 1990). These relationships help students to develop norms and values and to create and take advantage of opportunities (Wimberly, 2000). Without exposure to positive role models and to ideas about what it means to be successful in school and work, students are at a significant disadvantage in forming and executing plans.

School factors here refer to rigorous curricula, high expectations for college readiness, and contacts with colleges and businesses (McDonough, 1997). Together, the two contexts represent the availability of outside resources that promote learning, set appropriate expectations for success, and provide informal and formal exposure to postsecondary and work settings. Wimberly (2002) found that disadvantaged students exposed to formal and informal role models aspired to and achieved higher career and college goals, suggesting that the top section of the pyramid is especially relevant to students at risk.

Figure 2: ACT Pyramid for Success



Personality and Career Development

The prevailing taxonomy of personality- and behavior-based attributes in the psychological literature is called the Big 5 Theory, derived from a combination of empirical and experimental biopsychology research. The theory is based on five underlying constructs that are constant across culture and time. The Big 5 traits consistently emerge from research regardless of the test battery used or the age or culture of the subjects. Table 1 lists the Big 5 constructs along with their definitions, and shows multiple indicators for each underlying trait. These indicators are observable and are amenable to change.

Table 1: Salient Personality Constructs, by Developmental Milestone

Big 5 Construct	Middle & High School	College	Work
Conscientiousness Ability to conduct task- and goal-directed behavior, including following norms and rules, planning, organizing, and prioritizing tasks	Academic discipline ^a Thinking before acting ^b Commitment to school ^a Orderly conduct ^b	Academic discipline ^a General determination ^a Commitment to college ^a Study skills Goal striving ^{a,b}	Discipline ^a Carefulness ^a Order ^a Striving ^{a,b} Attitude toward work ^{a,b,c} Safety ^{a,b}
Extraversion An energetic approach to the social and material world and includes traits such as sociability, activity, assertiveness, and positive emotionality	Optimism ^b	Social connection ^c Social activity ^c Relating w/ School Personnel ^c	Sociability ^c Influence ^c
Emotional Stability Ability to problem solve and manage stress without seeing the world as threatening	Anger management ^b Orderly conduct ^b Optimism ^b	Emotional control ^b Academic self-confidence ^b	Stability ^b Optimism ^b Attitude toward work ^{a,b,c} Safety ^{a,b}
Agreeableness Pro-social and communal orientation toward others including trust and modesty		Communication skills ^c	Goodwill ^c Cooperation ^c Attitude toward work ^{a,b, c}
Openness The breadth, depth, originality and complexity of an individual's mental and experiential life			Creativity Savvy

^a Taps a broad Motivation Construct; ^b Taps a broad Self-Regulation construct; ^c Taps a broad Social Engagement construct

Interestingly, personality attributes have little relationship with measures of cognitive achievement, and their effects are mostly independent of one another. Hence, they can be combined with measures of cognitive achievement when predicting college and work outcomes, resulting in improved prediction. This point is highlighted in Table 2, which reports the correlations among general mental ability and emotional stability and conscientiousness. We see the same small associations with more specific cognitive measures of reading and mathematics ability. Although these constructs are independent, a large body of research in educational psychology clearly demonstrates a connection between motivation and academic performance. However, little research has examined their causal linkage or their mutual association with the underlying trait of conscientiousness.

Table 2: Relative Importance of Cognitive and Psychosocial Tests on Training and Work Outcomes

	Training Outcomes	Work Performance
General Mental Ability	.54*	.62**
Math	.48*	.52**
Reading	.44*	.35**
Conscientiousness	.17***	.22***
Emotional Stability	.10***	.11***

* Brown, Le, & Schmidt (2006). **Salgado et al. (2003). *** From Schmidt et al. (2007) using indirect range restriction.

An alternative model to the Big 5 was developed by ACT researchers (cf. Robbins et al., 2004; Le et al., 2005), who identified three broad psychosocial factors associated with some combination of academic performance and persistence. Using both meta-analytic and scale development and validation strategies, they found that specific psychosocial and behavioral attributes in what they labeled the *motivational*, *self-regulation*, and *social engagement* constructs were most predictive of postsecondary success. Several of the scales developed to measure these three constructs are included in Table 1: conscientiousness (e.g., academic discipline, general determination), self-regulation (e.g., emotional control, academic self-confidence, and orderly conduct), and social engagement or extraversion (e.g., social connection, social activity, and sociability).

We view vocational interests and career development as separate from personality or psychosocial development, though Ackerman and Heggstad (1997) suggest that there is some overlap in constructs. John Holland (1959), who was vice president of research at ACT in the 1960s, created a hexagonal model of career interests and argued that the degree to which an individual's interest profile "fit" their environment (i.e., career or field of study) influenced the person's level of satisfaction and productivity at work or school. This notion of "person-by-environment fit" was also detailed extensively by Dawes and his colleagues (1984) in *A Psychological Theory of Work Adjustment*, which argues that a combination of ability and personality are required for work satisfaction from both the individual's and the employer's perspective.

Within a career-development context, we assume that younger students will explore their career interests and values throughout their school career so that they will crystallize by 12th grade. The goal, then, is to maximize person-by-environment fit by encouraging students to choose college majors and occupational paths that are commensurate with their interests and academic strengths.

Our ability to track the academic and career development of students into college and work

ACT assesses academic achievement across English, Mathematics, Reading, and Science. As part of the ACT Educational Planning and Assessment System

(EPAS[®]), we also collect career interest and other noncognitive information relating to college aspirations and goals, volunteer and extracurricular activities, and coursetaking patterns from grade 8 through grade 12.

In any given year, we link over 100,000 individual student 8th-10th-12th grade assessments. We also are able to link these files to college outcome data compiled with the assistance of state and postsecondary institution partners. These data allow us to examine the cognitive and career-interest development of students as they transition from middle school to high school and into college. These data have allowed us to test or answer specific questions about high school and college readiness and college success.

At the same time, ACT has built a series of self-report measures of psychosocial factors that are associated with high school, college, and work success. As part of our research, we have tested and tracked thousands of students and workers as they move through their postsecondary training and into the workforce.

Organization and overview

With these data, we are able to address several key issues, including:

1. the role of academic achievement and college readiness benchmarks on college success,
2. the interrelation of academic achievement and psychosocial development and their effects on educational success, and
3. the interrelation of academic achievement and career interest development and their effects on college success and work outcomes.

We provide several important recommendations based on what we know about the interrelation of cognitive, psychosocial, and career factors within the context of social-capital and school effects. More specifically, we address:

1. how high school and college readiness requires a multifaceted approach,
2. the need to identify academic achievement and career aspiration gaps at the state level to facilitate the education and work pipeline, and
3. the importance of improving students' academic achievement, effective psychosocial factors, and career planning by emphasizing both classroom- and guidance-based strategies.

The role of academic achievement and College Readiness Benchmarks on college success

It is fair to say that college readiness begins in middle school (cf. Wimberly & Noeth, 2004). We know, for example, that if 8th-grade academic achievement standards are not met it is unlikely that a student will achieve college readiness benchmarks by 12th grade (cf. Sawyer, 2007). What is shocking about this finding is that, regardless of the quality and quantity of college-prep courses students take in high school, they are unlikely to overcome deficits without significant remediation by 8th grade.

Put another way, although there are additional antecedents to college and workplace success (including psychosocial- and career-development, social-capital, and school effects), academic readiness is critical. ACT has developed College Readiness Benchmarks, which are scores on the ACT[®] test associated with a 50% chance of obtaining a B or better grade in specific college coursework. The Benchmarks are: 18 in English, 22 in Mathematics, 21 in Reading, and 24 in Science. Students who attain these benchmarks have a high probability of success in entry-level college courses.

Extensive research demonstrates the relationship between college readiness and college success. For example:

- Students who meet the ACT College Readiness Benchmarks are more likely to enroll in college. This finding is consistent across gender, racial/ethnic, and family income groups.
- For students who take both PLAN[®] and the ACT, those who meet the PLAN benchmarks are more likely to enroll in college.
- Students who take upper-level high school courses in mathematics, science, and/or social studies are more likely to enroll in college regardless of demographic status.
- Students who meet or exceed the PLAN and/or ACT College Readiness Benchmarks are less likely to need remediation in college, regardless of demographic status.
- Across first-year college courses, students who meet the ACT Benchmarks are more likely to succeed. This finding is consistent across gender, racial/ethnic, and family income groups.
- Students who meet the ACT Benchmarks are more likely to persist to their second year in the same college and twice as likely to show progress to a degree over three years.

What we know about the interrelation of academic achievement and psychosocial development, and their effects on education outcomes

ACT has conducted extensive research (Robbins, Allen, Casillas, Peterson, & Le, 2006) on unraveling the differential effects of motivation, social engagement, and self-regulation measures from traditional predictors of college outcomes. Tracking 14,464 students from 48 postsecondary institutions over several years, we were able to address the relative role of demographic status factors, high school grades, standardized achievement, and psychosocial constructs (measured by the Student Readiness Inventory [SRI]; Le, Casillas, Robbins, & Langley, 2005) on college success, taking into account institutional differences.

Some of the key findings of our first-year college outcome research—on both retention and grade point average (GPA)—are summarized in Tables 3 through 5. Standardized achievement and high school GPA both contribute to college academic performance (i.e., college GPA) and persistence (i.e., retention) outcomes. In turn, we see that academic discipline, a measure of motivation to comply with school-based tasks, is also predictive of both college GPA and retention.

Table 3: Cumulative Percentage of Explained Variance (R and R^2) and Overall Odds Ratios Associated with Adding Blocks of Predictor Variables for Four-year Institutions

Block of predictor variables	College GPA				Retention			
	Fall term		First year		Fall to Spring		First year	
	R	R^2	R	R^2	OR^a	R^{2b}	OR^a	R^{2b}
Institutional variation	.30	.09	.32	.10	1.78	.05	1.76	.07
Demographic	.36	.13	.39	.15	1.80	.05	1.79	.07
Prior academic achievement	.55	.30	.60	.36	2.03	.08	2.02	.11
SRI scales	.58	.34	.63	.39	2.25	.11	2.16	.13

Note: ^aOdds ratio of the entire model formed by combining all the predictors in the model weighted by their respective logistic regression coefficients. ^b R^2 based on Nagelkerke's (1991) estimate.

Table 4: Adjusted Mean Change in GPA Associated With One Standard Deviation Increase in Predictors for Four-year Institutions

Predictor	Fall term	First year
Achievement test score	0.274	0.263
High school GPA	0.243	0.246
Academic discipline	0.208	0.182

Table 5: Adjusted Odds Ratios for Retention Associated With One Standard Deviation Increase in Predictors for Four-year Institutions

Predictor	Fall to spring	First year
Achievement test score	1.31	1.28
High school GPA	1.22	1.25
SRI scales		
Academic discipline	1.13	1.14
Commitment to college	1.25	1.19
Social connection	1.20	1.13
Social activity	0.89	0.89

The middle school–to–high school transition

We have also extended this research toward examining the transition from middle school to high school. Little if any longitudinal research is available on the interrelation of psychosocial and cognitive development between middle school and high school. However from a cross-sectional perspective, we have examined the relationship between middle school academic performance, standardized achievement, individual differences in psychosocial factors and behavior, and perceptions of school quality, including teacher-student relationships and parental involvement.

Table 6 is a correlation matrix revealing the relationships among a range of psychosocial and behavioral variables. Here we see strong, significant relations between psychosocial factors and absenteeism (median $r = -.30$) and homework behaviors (median $r = -.30$). Table 7 is a correlation matrix for these same psychosocial variables with grades and standardized achievement test scores. Here we observe strong, significant relations between student psychosocial factors and grades (median $r = .31$) and EXPLORE[®] composite scores (median $r = .17$).

Table 6: Associations between Psychosocial Scales and Behavioral Data

Scales	Behavioral Data				
	Daily time spent on homework	Times without homework	Media time	Absenteeism	Times student changed schools
Academic Discipline	.26	-.60	-.24	-.46	-.17
Anger Management	.19	-.35	-.25	-.31	-.17
Commitment	.18	-.28	-.13	-.30	-.08
Family Attitude toward Education	.16	-.21	-.12	-.26	-.09
Family Involvement	.20	-.29	-.14	-.22	-.13
Optimism	.14	-.31	-.13	-.26	-.14
Orderly Conduct	.21	-.37	-.24	-.42	-.21
Relationships with School Personnel	.17	-.28	-.16	-.21	-.10
School Climate—Safety	.13	-.21	-.15	-.31	-.12
Thinking before Acting	.21	-.36	-.23	-.29	-.14

Note. $N = 3,116$. Correlations $\geq |.05|$ are significant ($p \leq .01$).

Table 7: Associations between Psychosocial Scales and Academic Achievement

Scales	Achievement					
	Grades	EXPLORE				
		English ^a	Mathematics ^a	Reading ^a	Science ^a	Composite ^a
Academic Discipline	.53	.25	.22	.22	.25	.27
Anger Management	.35	.19	.15	.16	.21	.20
Commitment	.32	.20	.19	.19	.19	.22
Family Attitude toward Education	.27	.20	.18	.20	.19	.22
Family Involvement	.27	.11	.06	.11	.11	.11
Optimism	.30	.11	.10	.10	.12	.12
Orderly Conduct	.41	.24	.18	.21	.25	.25
Relationships with School Personnel	.29	.14	.09	.11	.14	.14
School Climate—Safety	.20	.09	.06	.06	.09	.08
Thinking before Acting	.32	.14	.10	.12	.16	.15

Note. $N = 3,116$. ^a $N = 2,485$. Correlations $\geq |.05|$ are significant ($p \leq .01$).

We also built models that predict retention in high school (using failed classes as a proxy) and academic success (using predicted attainment of College Readiness Benchmarks based on EXPLORE scores). For example, the model featured in Table 8 accounted for 37% of the variance in EXPLORE scores.

Table 8: Variance Accounted for, by Predictor

Predictors	R ²
Grades only	.35
Psychosocial Scales only	.19
Grades and Psychosocial Scales	.37

Note. $N = 2,488$.

Although cognitive and psychosocial factors play different roles depending on the outcomes of interest (e.g., when predicting class failure, psychosocial factors play a larger role; when predicting EXPLORE scores, previous academic achievement plays a larger role), both the literature and the research presented here provide robust evidence that the combination of cognitive and psychosocial information provides the most predictive power for identifying students at risk for academic difficulty and dropping out. Psychosocial factors also help target key areas for student intervention to raise grades and, eventually, scores on standardized achievement tests.

Finally, we find:

- When predicting school failure, adding psychosocial measures increases the accuracy of identifying at-risk students from 35% (using EXPLORE or standardized achievement scores) to 53%.

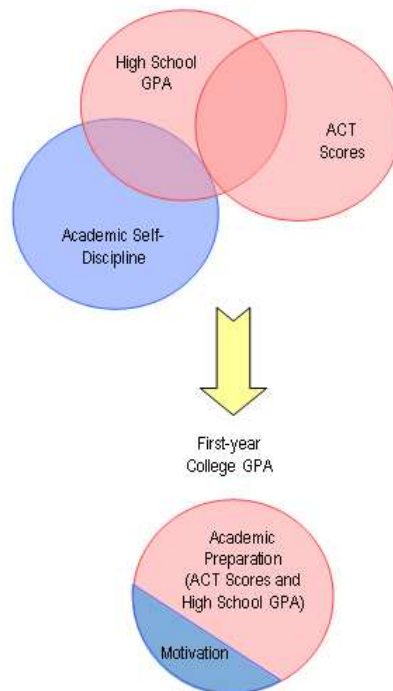
- When predicting attainment of College Readiness Benchmarks, the inclusion of psychosocial measures increases accuracy from 62% (using past grades) to 71%.

A note on the effects of standardized achievement, GPA, and psychosocial factors on educational outcomes

Measures that tap into student motivation are just one facet of psychosocial development, but they are consistently predictive of educational outcomes. In other words, motivation is often the most salient psychosocial factor when it comes to educational outcomes. A key question then, is the relationship among motivation, standardized achievement, and high school GPA, and their relative effects on first-year college GPA (as a measure of initial college success).

As we see from the research described above, motivation is strongly related to high school GPA but not to standardized achievement. Further, motivation has a small but unique role in predicting first-year college GPA once you include the academic preparation variables (ACT and high school GPA). In other words, GPA and psychosocial factors are related to sustained effort and performance, and standardized achievement is related to academic mastery and learning. We highlight these points in Figure 3.

Figure 3: Interrelationship of Motivation, High School GPA, and ACT Scores, and their Effects on First-year College GPA



The relationship between academic achievement and career-interest development from middle school through high school, and their relation to college and work outcomes

8th through 12th grade

A series of studies examined stability and change in career interests and cognitive development over time (Tracey, Robbins, & Hofsess, 2005; Tracey & Robbins, 2005). The studies found the development of academic achievement and career interests to be independent processes. They observed steady improvements in academic achievement across the 8th-10th-12th grades. The studies also showed that measured interests (using a career interest inventory) crystallized over the same time period, though students' expressed interest (i.e., what they say they want to do) shifted away from science-related fields by 12th grade. These findings have several policy implications, including:

- Career planning must begin early, and students must be helped to stay focused.
- Even though measured interests in science-related fields are stable, too many students end up not choosing these fields.
- Too many students with interests in academically demanding fields in science, technology, engineering, and mathematics are not reaching College Readiness Benchmarks.

High school to college

Tracey & Robbins (2006) also examined the relative effects of standardized achievement and career-fit on college outcomes. Using data on over 80,000 students from 87 postsecondary institutions, they found career-interest fit to be positively correlated with college GPA, regardless of institutional and standardized achievement differences. They also found that career-interest fit was predictive of retention and graduation status. These findings affirm the validity and importance of effective career planning and decision making within the education process.

In another study, Allen & Robbins (in press) examined the degree to which college-major persistence is associated with academic success and career-fit. As expected, they found that the fit between students' interests and their major, as measured by ACT's UNIACT (ACT, 1995), is a strong predictor of which students will change majors by their third year of college. They also found that first-year college GPA was independently predictive: pre-enrollment factors such as ACT score and high school GPA were less important once first-year GPA was entered into the model.

Work success

A strong indicator of career success and economic well-being is long-term change in salary. Economists have studied predictors of salary attainment focusing on factors such as educational level, ability, and occupational choice (Ehrenberg, 2004; Mincer, 1974). To our knowledge, no one has studied the operation of academic achievement and career-interest fit within salary forecast

models. To put ACT's recommendations to the test, we investigated whether the academic preparation and career-interest fit of first-year college students predicted their long-term earnings (ACT, in press-a). We observed positive relationships between both career-interest fit and ACT score and later salary. Specifically, we found that:

- Higher ACT scores correlate with higher long-term earnings. For each 5-point increase in ACT Composite score, average salary increases by as much as 5 percent.
- The degree to which students' measured career interests (using ACT's UNIACT) fit their career choice is directly related to their long-term earnings. For each comparable increase in career-interest fit, average salary increased by as much as 7 percent.
- These positive relationships were found for both males and females, regardless of college major or ultimate educational attainment.

The findings of this study are remarkable given the length of time between measuring academic achievement and career interest on the one hand, and long-term salary attainment on the other. The positive relationships among ACT score, career-interest fit, and earnings for both men and women speak to the importance of academic achievement and early career planning for obtaining quality jobs that drive our national economy. Although we previously knew that ACT score and career-interest fit were critical to college success (Tracey & Robbins, 2006), we now also know that these two indicators are also critical to career success.

Recommendations

High School and College Readiness Requires a Multifaceted Approach

Academic achievement and high school performance are important underlying factors of college and work readiness. These two constructs capture how hard people work or perform and their degree of mastery of academic material. As such, these remain the critical high stakes factors used in admission decisions.

At the same time, students' progress (and failure) must be met head on, and within the context of psychosocial and career development. Motivational and career and educational planning factors are essential to promoting learning and academic achievement, and to ensuring that students and their families prepare for the challenging and rewarding journey from middle school through high school to college and work. While psychosocial and career development factors are not suited for high-stakes decisions because they are easily coached and are not as reliable or predictive as standardized achievement and high school GPA (cf. Lievens & Sackett, 2007), they are key to developmentally based interventions.

As can be seen, the foundations of our Pyramid for Success remain academic achievement and learning. To promote high school and college readiness, we must:

- be prepared to diagnose and remediate more middle-schoolers who do not demonstrate adequate academic mastery of core subject areas, especially reading and mathematics;
- support our school leaders as they continue to encourage students to take upper level coursework, especially in mathematics and science;
- review and evaluate the rigor and content of high school courses in mathematics, reading, and science;
- establish high expectations for all students, monitor their college and/or workforce readiness through high school, and encourage all students to take the ACT in their junior year; and
- Continue to evaluate and align the curriculum with state, college, and workplace readiness standards.

To create the proper context for learning, we must:

- understand how psychosocial and career development can facilitate or impede student success beginning in middle school,
- engage students and their families in a long-term commitment to high school completion and postsecondary success,
- intervene to motivate students as they struggle with homework compliance, attendance, and remedial work, and
- create social capital through role modeling, college and work visits, and anything else that highlights or promotes strong work attitudes and their positive payoff.

Finally, parents, educators, and counselors can influence the educational and career aspirations of students positively by following a few basic principles:

- Treat career development as an ongoing process in which students continue to change and develop during the high school and postsecondary years. Research suggests that systematic career education makes a difference.
- Begin talking to students about their academic and career interests during elementary and middle school.
- Help students to think about the connections between academic coursework, college, and their future career.
- Help students establish goals for acquiring information about colleges and careers.
- Promote students' college and career planning in school.
- Engage parents and other significant persons in the lives of students.

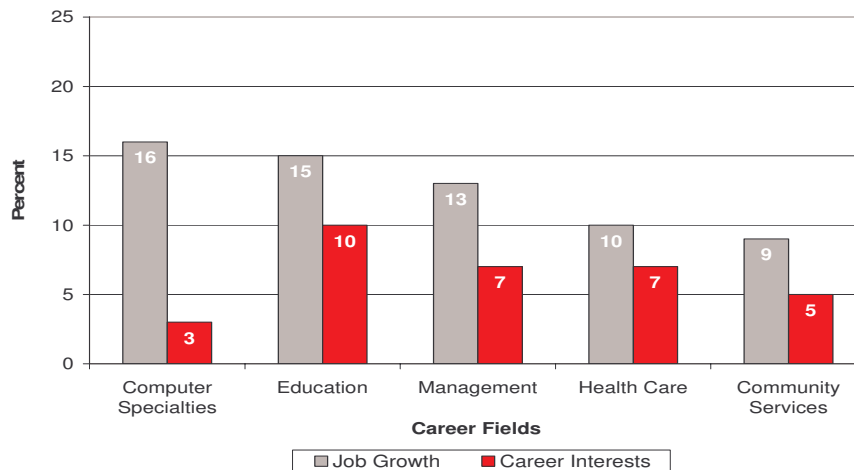
Integrating Academic Achievement and Career Factors to Promote the Education-to-Work Pipeline

ACT is proud of its historic commitment to promoting academic achievement within the context of career and educational planning. We do this by providing both college-readiness and career-interest information throughout our EPAS program and as a part of DISCOVER[®], our web-based career guidance program. We are working with over 30 states to better understand the gaps between college-readiness benchmarks and career or occupational goals, and between high-demand and priority occupations in an individual state and the

number of students expressing career interest in them. This strategy helps both students and states to focus on their education-to-work pipeline, identify any gaps between student learning, and college and work-skill expectations, and learning where career aspirations and economic opportunity coincide.

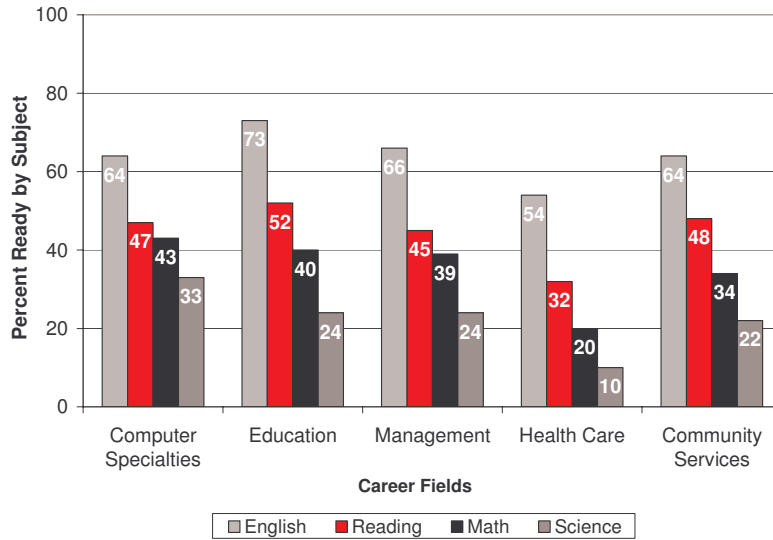
We present a specific example of such a pipeline analysis using data from the state of Illinois. Figure 4 illustrates the connection between students' career interests and the anticipated number of high-growth jobs in the state. Significant gaps between expected jobs and student interests are apparent for careers in computer specialties (computer programmers, database administrators, etc.), management (convention planners, hotel/restaurant managers, etc.), community services (social workers, school counselors, etc.), and education (secondary teachers, administrators, etc.), with more jobs expected than students interested in these fields. Illinois faces potential labor shortfalls in fields where skilled individuals are most needed.

Figure 4: Projected Annual Job Growth and Illinois High School Students' Interests in High Growth Illinois Career Fields



Although the gap between student interest in health care jobs (nurses, occupational therapists, etc.) and job availability is narrower, many of these students are not ready to meet or exceed one or more of ACT's College Readiness Benchmarks, as shown in Figure 5. Students who are both interested in health care and ready for college are more likely to master the coursework required for this high-growth career field.

Figure 5: ACT College Readiness Benchmark Performance of Illinois High School Students Interested in High Growth Illinois Career Fields by Subject



In Illinois, more than one-half of students are prepared for first-year college coursework in English for all five high-growth career fields. Fewer students interested in these high-growth fields are prepared to succeed in college-level social science courses, with students pursuing health care careers being the least prepared and students pursuing education careers being the most prepared. Fewer than one-half of students wishing to enter computer specialty fields are ready for college-level mathematics courses, while one-third are ready for college-level science courses. Fewer than one-quarter of students pursuing careers in education, health care, community services, and management are ready for college-level science.

Overall, the pattern of readiness for college coursework is similar across the five high-growth career fields: student preparation is strongest for English, and much weaker for the social sciences, mathematics, and science. These lower levels of preparation among graduating high school students are alarming given the high demand for science- and math-intensive careers such as nursing, pharmacy, and teaching.

Promote Social Capital and School Factors through School Guidance and Parental Involvement, and by Using the Classroom to Encourage Responsible Behavior

We know that skills and credentials acquired through postsecondary education and training are essential for successfully competing in the U.S. labor market. Regardless of their socioeconomic status, students understand this and express strong interest in advanced training. Yet there remain huge discrepancies in high school and postsecondary completion rates across racial/ethnic groups and socioeconomic status. We believe these discrepancies are due in part to a lack of social capital and school-based practices.

To demonstrate how schools can provide effective assessment feedback and instruction within the context of rich social capital, we identified schools that incorporated these practices (cf. ACT, in press-b) and studied students who had

scored below 8th-grade EXPLORE benchmark achievement levels. We observed that students whose schools systematically followed the course and study recommendations included with their EXPLORE results increased their achievement gains at significantly higher rates than would otherwise have been expected. This was true for both genders and all racial/ethnic groups. More importantly, this growth was most pronounced between the 8th and 10th grades—the early years of high school when students who perform well establish themselves on the path to college and workforce-training readiness.

As we have observed in our research on high school readiness and in our policy research (ACT, in press-b; Wimberly, 2002), several significant factors promote effective academic achievement and learning, the development of effective academic and work behaviors, and sound career and educational planning.

These factors underlie the promotion of readiness in situations like the following:

- Educational expectations and postsecondary participation are higher among students who talk with their teachers and counselors and have positive feelings toward them.
- Schools that promote rigorous course expectations and insist on college preparatory coursework witness higher overall academic achievement levels regardless of students' socioeconomic status.
- Districts implement programs that integrate cognitive, career, and psychosocial assessment feedback within the context of positive relationships and high expectations for success.
- Schools make available activities that engage students with adults both in school and in the workplace and promote positive awareness and understanding of the factors associated with education and work success.
- Community, business, and postsecondary partners help middle and high school students understand and engage in activities and behaviors that are associated with lifelong learning and readiness.

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