

Learning Accelerator Research Paper

The ACT Holistic Framework® of Education and Workplace Success

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2019

Burrus, J., Way, J., Bobek, B., Stoeffler, K., & O'Connor, R., (2020). The ACT holistic framework of education and workplace success. In M.E. Oliveri & C. Wendler (Eds.), *Higher Education Admission Practices: An International Perspective*. Cambridge University Press. Cambridge, UK.

This is a draft of "The ACT Holistic Framework® of Education and Workplace Success," and the copy of record is with Cambridge University Press.



The ACT Holistic Framework[®] of Education and Workplace Success
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In their quest to admit students most likely to succeed, colleges and universities have traditionally weighed grade point averages (GPA) and standardized test scores heavily in admissions decisions. The *2016 National Association for College Admission Counseling Admissions Trends Survey* (cited in Clinedinst & Koranteng, 2017) found that colleges rate grades, strength of curriculum, and admissions test scores as the most important admissions decision factors, in that order. That postsecondary institutions value these factors makes intuitive sense. The popular maxim that “the best predictor of future performance is past performance” reflects the notion that an effective predictor of college performance should be some indicator of how a student has performed in high school; and, the most common indicators of high-school performance are GPA and admissions test scores such as the ACT[®] and SAT[®].

This practice is clearly not unfounded. People with greater academic knowledge and skills perform better and persist longer in college. For example, one meta-analysis found that academic knowledge reflected by high school GPA and ACT/SAT scores were associated with both college GPA and retention (Robbins et al., 2004). These skills translate to workforce success, as well. Academic skills as indexed by college GPA predicts job performance (Roth, BeVier, Switzer, & Schippman, 1996), and those who have strong literacy and numeracy skills are more likely to have higher wages than those with weaker literacy and numeracy skills (Organisation for Economic Co-operation and Development [OECD], 2013).

There is increasing awareness, however, that several additional factors help individuals succeed in higher education and the workforce. Numerous surveys suggest that employers increasingly value skills considered to be nonacademic and, often, they value them even more than academic skills. This is true both within the United States (e.g., Hart Research Associates, 2010) and internationally (e.g., Cullinane & Montacute, 2017). For example, a survey asking employers in Great Britain about attributes they wanted to see in young people entering the workforce found that life skills such as communication and motivation were considered more important than cognitive skills such as verbal and numeracy skills (Cullinane & Montacute, 2017).

This awareness is reflected in the current movement toward what is known as holistic college admissions. That is, a growing number of colleges and universities in North America are attempting to incorporate nonacademic, or noncognitive, variables into their admissions process (Kalsbeek, Sandlin, & Sedlacek, 2013). One admissions officer recently described their institution’s admissions policy in the following way:

We’re far more interested in who you are and what you can bring to our campus community than how you happened to score on a high-pressure, high-stakes standardized test. We look at your high school achievements, your extracurricular activities, your work and life experiences, community service activities, artistic and creative talents, and more. All the unique, personal traits that make you ... you.” (Grove, 2018)

In short, colleges and universities are now looking beyond standardized test scores and GPA in selecting the next generations of students for success.

This trend is also occurring in international admissions. For example, the Chinese Ministry of Education published new guidelines in 2014 that were designed to encourage institutions to adopt a more holistic approach towards admissions in higher education; these guidelines included a number of provisions that reinforce the relevance of nonacademic components. One provision in particular provides institutions with greater latitude when

considering admissions criteria that go beyond the primary academic admissions exam: the Gaokao (e.g., awards and honors, athletics, teacher recommendations; Gu & Magaziner, 2018).

Importantly, research evidence supports the belief that these additional factors predict success both in higher education and the workforce. But what constitutes success? There is a long tradition in workforce research to expand the definition of success beyond traditionally measured outcomes such as supervisor ratings of job performance (Campbell, 1990). Other factors are deemed as important outcomes, such as task-specific behaviors, non-task-specific behaviors, oral communication, effort, personal discipline, teamwork, and supervisory or leadership and managerial skills. Importantly, nonacademic skills tend to predict less cognitive determined outcomes such as teamwork (Mount, Barrick, & Stewart, 1998). In these ways, the definition of success at colleges and universities can be expanded accordingly. The most obvious criteria include timely degree attainment, retention, and absenteeism, all of which are well predicted by nonacademic skills (Allen & Robbins, 2010; Robbins et al., 2004; Schmitt et al., 2009).

For both traditional and nontraditional indicators of success, nonacademic factors are among the most powerful predictors. Factors such as conscientiousness (Poropat, 2009) and interest-major congruence (Nye, Su, Rounds, & Drasgow, 2012) predict college GPA. The story is similar for performance in the workplace: Conscientiousness, agreeableness, emotional stability, and interest-job congruence predict outcomes such as task performance, organizational citizenship, and persistence on the job (Nye et al., 2012; Sackett & Walmsley, 2014).

Because the preponderance of evidence suggests that success depends on more than simply academic knowledge and skills, we propose that colleges and universities consider expanding the set of characteristics they value in prospective students. Oliveri and Markle (2017) provide a detailed review of skills college graduates need for success in the workforce. Many frameworks were reviewed in the Oliveri and Markle paper, and skills were identified as important, including (but not limited to) oral communication, work ethic, critical thinking, teamwork, digital literacy, citizenship, creativity, leadership, adaptability, and cultural awareness. Each of these skills is valued in some way by the workforce, yet it is not always the case that each of them is taught effectively in college. To help students succeed beyond college, as well as ensure better alignment with the 21st century workforce requirements, these skills should become part of the selection criteria for use in admissions and cultivated in higher education coursework.

It is also the case that it is not clear if some of these skills are the same skills or different, and which should be priorities. Thus, a framework that can guide the selection of relevant characteristics used in the admissions process is of the utmost importance. One such framework is the ACT Holistic Framework (Camara, O'Connor, Mattern, & Hanson, 2015). The Holistic Framework details what students should know and be able to do to succeed from kindergarten through to their career and is organized into four broad domains that were developed, "based on a comprehensive review of relevant theory, education and work standards, empirical research, input from experts in the field, and a variety of other sources for each of the four broad domains." (Camara et al., 2015, p. vi). The four domains are as follows:

- Core academic skills
- Cross-cutting capabilities
- Behavioral skills
- Education and career navigation

Each framework domain is hierarchical; at the highest level, they include several broad dimensions of the domain and then drill down into more detailed components, subcomponents, and performance-level descriptors (PLDs). The Holistic Framework also includes additional levels of specificity that are developmentally appropriate and aligned to important transitions in education and work. We should note that there are other skills frameworks that have been developed that also outline the knowledge, skills, and abilities students need to succeed in the current workforce environment. For instance, the National Research Council (2013) developed a framework that outlined cognitive competencies (e.g., critical thinking, creativity), intrapersonal competencies (e.g., openness, work ethic), and interpersonal competencies (e.g., teamwork, leadership) as key 21st century skills. Conley (2008) put forth a college readiness framework that includes cognitive strategies (e.g., reasoning), content knowledge, academic behaviors (e.g., self-management), and contextual skills and awareness (e.g., college knowledge). Finally, the OECD has adopted the Big Five personality framework (conscientiousness, agreeableness, emotional stability, openness, and extraversion) as its organizing framework for the assessment of student and adult noncognitive skills. To the best of our knowledge, however, the ACT Holistic Framework is a much more comprehensive and detailed model than any other model previously advanced. Each of the Framework orientations is described below. What follows is a brief description. More detail on the Framework can be found in Camara et al. (2015).

1 Core Academic Skills

The core academic skills component of the Holistic Framework identifies, describes, and organizes the cognitive knowledge and skills in key foundational areas. No Child Left Behind (2002) and the Common Core State Standards (CCSS; 2010) have focused exclusively on core academic indicators, specifically in mathematics and English language arts (ELA). While readiness in numeracy and literacy are critical prerequisites for success in education and workplace settings, this focus maintains a narrow view of college and career success that is primarily designed to serve accountability needs rather than student needs (Mattern et al., 2014). A holistic model of education and work success should not be restricted to just core academic subjects in K–12 education; rather, it should build upon what we know about how people learn and provide greater insights on not simply what they have learned, but the potential of each individual learner. To that end, the core academic skills framework aims to identify the cognitive learning outcomes required for success at critical education and work transitions and provides a detailed articulation of their development from kindergarten through to a career.

1.1 Core Academic Skills Predict Important Outcomes for Postsecondary Students

Cognitive skills have typically been shown to be strong predictors of academic success (Poropat, 2009). In a comprehensive meta-analysis of predictors of academic performance at all levels of schooling, Poropat found that core academic skills (e.g., ACT/SAT scores) predicted course grades at each educational level. National validity studies have reached the same conclusion with results indicating that ACT and SAT scores predict college GPA throughout the college career (e.g., Mattern & Patterson, 2011).

1.2 Core Academic Skills Predict Important Outcomes for Workers

Cognitive predictors are among the strongest predictors of job performance across a variety of job situations. Schmidt and Hunter (1998) conducted a meta-analysis of the validity of 19 selection methods for predicting job performance. Of all the selection methods investigated, the researchers found that tests of cognitive ability were clearly the most predictive of job performance. This finding has been demonstrated across several meta-analyses (Schmidt & Hunter, 2004), and for job training performance in addition to supervisor-rated job performance

(Colquitt, LePine, & Noe, 2000). Proficiency in each of these core academic skills greatly facilitates later efforts to develop specialized expertise from major courses and job training experiences (Carter, 2002).

1.3 Relevance for International Contexts

Hanushek and Woessmann (2008) looked at the 40-year growth rate of the gross domestic product (GDP) in 50 countries as it related to the average years of schooling in each. They found that each additional year of schooling increased the average GDP growth rate by about 0.37%. A replication with average-test-score performance by country found a 1% improvement in GDP growth for every half-standard-deviation increase in international student achievement test scores. Note that in the realm of economic growth, 1% is a very large number; GDP growth in the United States is currently hovering around 2.3%. Taken together, these results clearly support the value of ensuring that each citizen receives an education that enables participation in the emerging economy.

1.4 Specific Dimensions of the Core Academic Skills Domain

The core academic skills framework includes the three academic subjects (language arts, mathematics, and science), each of which is organized into a set of academic domains specific to each subject. Importantly, the terminology of strands and substrands is meant to emphasize the connected, progressive nature of their content. In this way, each of these academic domains is then broken down into large strands and more focused substrands. Accordingly, each substrand focuses on a sequence of skills, and these skill progressions are supplemented and supported by a comprehensive database of related knowledge, misconceptions, common errors, and strategies in order to provide a richer picture of student learning.

1.4.1 Language Arts and Literacy. ACT has considered both academic and workplace literacy demands in the design of the language arts and literacy framework. Evidence shows that facility with the English language predicts important outcomes at the high-school-to-college transition (Jackson, 2005). One consequence of inadequate literacy proficiency is that students are less prepared to handle the reading tasks required in college, leading to diminished performance (Schoenbach, Greenleaf, & Murphy, 2012).

There are five domains in the language arts and literacy framework, and each are detailed with special attention to the empirical research on developmentally sensitive knowledge, skills, and practices. Because development is integrated across the more specific strands and substrands of language arts and literacy, the framework is organized to show connections to the greatest extent possible.

1.4.2 Mathematics. The ACT mathematics framework proposes an interconnected and progression-based approach to ensure that the concepts against which students are assessed are necessary for education and work success. To succeed in majors and careers that are even moderately demanding mathematically, students must have a level of fluency that allows them to spare attention and working memory to adapt to unfamiliar situations. Additionally, a firm conceptual understanding is critical to leveraging technology to solve real-world problems. The organization of the mathematics framework attends to these foundational and practical considerations.

1.4.3 Science. ACT has long employed an expanded model of college and career readiness that incorporates scientific skills and knowledge. In addition, ACT assessments have long included science as an academic domain because skills and interest in science are not totally subsumed by mathematics or ELA. With the increased demand for STEM (science, technology, engineering, and mathematics) skills, measures of science are critically important to prepare

students, and use of mathematics or ELA as proxies introduces construct irrelevance and does not provide a substantive validity argument to support inferences about science skills. The core academic skills framework expands on the current ACT College and Career Readiness Standards (ACT CCRS) by adding STEM and cross-cutting concepts to the current science framework.

The approach to science readiness enumerated in the core academic framework builds on the ACT CCRS by highlighting knowledge and skills that are foundational in science. This should provide students with the foundation necessary to pursue careers in STEM fields while also enabling them to transfer scientific knowledge and skills to a broad range of non-STEM careers. This focus on scientific reasoning and practices is significant because these evidence-based reasoning skills are central to many fields of study and have wide applicability on the job (Jonassen & Kim, 2010).

1.5 Potential Applications of the Framework

One potential application of the core academic skills framework is to help nontraditional students achieve academic and career success. Adult students who want to continue to pursue either educational or career advancement can use the framework to understand what knowledge and skills they possess (or lack) in order to set goals for their future development.

Another potential application of the core academic skills framework is to help teachers tailor instruction to individual students based on their needs. Because this framework reaches constructs in much more depth than existing standards, teachers can design formative assessments to diagnose students' strengths and weaknesses and help them achieve academic success in an effective, efficient, and timely manner.

1.6 Summary

The core academic skills framework serves as an anchor for the ACT Holistic Framework, which offers an expanded view of education and work success. By identifying and organizing these core academic knowledge and skills, ACT looks to provide detailed articulation of progress from kindergarten-to-career that is developmentally sensitive and emphasizes the connected, progressive nature of learning.

2 Cross-Cutting Capabilities Framework

ACT's cross-cutting capabilities (CCCs) are transferable skills that extend and enhance learners' abilities to succeed in a global society rich with both information and opportunity. These CCCs are collections of skills that include behaviors, thinking skills, and technology skills. When combined with the core academic knowledge and skills, CCCs can empower learners to fulfill their potential as effective and creative knowledge seekers, communicators, and problem solvers. ACT currently includes four CCCs frameworks in the Holistic Framework:

- Information and Communication Technology
- Collaborative Problem Solving
- Learning Skills
- Critical Thinking

2.1 CCCs and Postsecondary Setting

The role of CCCs in the postsecondary setting has been more implicit than explicit. Despite this, the ability of students to succeed in the postsecondary setting is increasingly dependent on CCCs. Critical thinking skills have long been understood to be valuable for success in the post-secondary environment, showing significant correlations with GPA (Facione, 1991). Technology skills are increasingly required to access course materials and complete course assignments. Levels of technology use have also been linked to grades in post-secondary courses (Huffman & Huffman, 2012). Effective interpersonal skills are required to collaborate with peers

and professors and improve cognitive learning outcomes (Pace, 1990; Simons & Peterson, 2000). The role of learning skills in the postsecondary environment has taken on new importance with an improved understanding of the role that behaviors central to the learning skills framework plays in successful learning outcomes (e.g., Lounsbury, Saudargas, Gibson, & Leong, 2005; Steel, 2007).

2.2 CCCs and the Modern Workforce

The value of CCCs is particularly apparent in the 21st century workforce and economy, which place a premium on skills required for innovation, collaboration, technology, and problem solving (Autor & Price, 2013; Baller, Dutta, & Lanvin, 2016). This could be considered a reflection of the changing nature of work and an increasingly global economy (Baller, Dutta, & Lanvin, 2016). These new environments are bringing together resources, insights, tools, and fields (e.g., physical, biological, technological) and merging them in ways to create new and groundbreaking insights. Indeed, innovation often requires the coordination of expertise from a range of backgrounds and fields, rather than simply the contributions of an individual expert (Schwab, 2016; World Economic Forum (WEF), 2016).

Success in the future workforce will also require that workers have the ability to upskill and reskill as necessary as well as harness the skills necessary to use technology effectively (WEF, 2016). Occupations requiring high levels of thinking skills are predicted to increase, as well as experience an increase in wages (Autor & Price, 2013). Interpersonal and intrapersonal skills that support collaboration and learning skills have also been linked to job satisfaction and performance (e.g., Lindqvist & Vestman, 2011; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007).

2.3 Relevance for International Contexts

The degree to which tertiary educational institutions take CCCs into account for admissions varies across the globe. While the inclusion for admissions of assessments that measure these skills explicitly is still rare, more common is the inclusion of course requirements that draw upon these skills either explicitly (e.g., computer science) or implicitly (e.g., business) as an indication of the degree to which these skill sets are valued by educational institutions.

The importance of these skills for the workforce has long been a focus for the OECD and the WEF. The OECD has focused on these skills specifically through their inclusion as the supplemental constructs for both Programme for International Student Assessment (PISA) and Programme for the International Assessment of Adult Competencies (PIAAC; OECD, 2013). The WEF has also highlighted a range of CCCs as of critical importance for the current and future workforce (2016).

2.4 Organization of the Domain

The ACT CCCs exist within the ecosystem of the ACT Holistic Framework. This dynamic ecosystem allows us to identify and align the knowledge, behaviors, and skills shared between existing constructs, supporting their acquisition and application. Individual CCCs are divided into dimensions supported by components, subcomponents, and performance level descriptors (PLDs). The PLDs for the Framework are supported by the identification and alignment of knowledge, skills, and behaviors from the behavior and core academic areas of ACT's Holistic Framework. ACT currently includes four CCCs frameworks in the Holistic Framework, and a brief description of each follows.

2.4.1 Information and Communication Technology (ICT). The components in this dimension outline the knowledge and skills required to acquire and apply information using technology. This includes the knowledge and skills necessary to plan an information search using sources

accessed using technology; locate, collect, and evaluate information accessed using technology; transform information using technology; and share information using technology. These skills have become an essential component of both academic and work environments. The ACT ICT framework outlines and details the knowledge and skills required to fulfill these highly valuable functions.

2.4.2 Collaborative Problem Solving (CPS). The CPS dimension is divided into team effectiveness and task effectiveness components. The subcomponents of these components outline the cognitive and behavioral skills required to support an effective team dynamic including inclusiveness, clarity, communication, and commitment. The subcomponents of the task effectiveness component outline the cognitive and behavioral skills necessary for successful task completion including problem space and goal awareness, strategy, execution, and monitoring.

2.4.3 Learning Skills. Modern society has expanded our independent access to knowledge and the tools to access that knowledge. The learning skills dimension focuses on the intrapersonal skills and learning strategies that support learners' abilities to effectively access, acquire, and retain knowledge. The framework outlines the cognitive, noncognitive, metacognitive, and technology skills that empower learners to understand themselves as learners, as well as to outline the strategies and processes that support effective learning.

2.4.4 Critical Thinking. Critical thinking has long been in high demand by educators and employers. It is often a key part of the bridge that brings together the K–12 educational system and the workforce. ACT's critical thinking framework contains the fundamental divisions of critical thinking and the skills involved in those divisions. The function of this framework is to provide an outline of the nature of critical thinking and the skills involved in critical thinking. The framework itself is divided into seven subcomponents: argument analysis, basic epistemology, argument development, argument evaluation, advanced epistemology, properties of statements, and argument extension.

2.5 Potential Applications of the Framework and Summary

The implication of including these skills for secondary admissions is primarily in their ability to provide a more authentic representation of the skills that will be required for success in college and careers. Researchers continue to support the understanding that cognitive diversity is associated with better performance outcomes (Hong & Page, 2004; Page, 2008) and that diversity, more broadly defined, supports a more effective workforce (Lanvin & Evans, 2018). The inclusion of a diverse set of skills in the admissions process could also serve to allow students with diverse backgrounds and strengths to demonstrate their potential in ways that may not present themselves in traditional academic contexts. A better understanding of students' proficiencies with this expanded range of skills, as well as the role that these skills play in supporting successful outcomes, could serve to improve alignments in recruitment, retention, and completion.

3 Behavioral Skills

The third major domain of the ACT Holistic Framework is behavioral skills. This is the first truly noncognitive domain of the Holistic Framework. As a key component of the holistic approach ACT takes to education and work readiness, the behavioral skills domain focuses on interpersonal, self-regulatory, and effortful behaviors related to successful performance in education and workplace settings. Our conceptualization of this domain leverages research from multiple areas of psychology, including educational, developmental, industrial/organizational,

and personality, to define what individuals need to know and be able—and willing—to do from a behavioral perspective in order to be successful across a range of settings.

3.1 Behavioral Skills Predict Outcomes for Postsecondary Students

When it comes to an individual's performance in postsecondary settings (college and graduate-level programs), research has shown that behavioral skills predict grades above and beyond the effects of admission tests (ACT or SAT) and high school GPA (e.g., Poropat, 2009). Research also shows that these predictors are related to engagement in academic and interpersonal college environments, such as participating in class discussions, participating in extracurricular activities, and establishing relationships with peers (e.g., Asendorpf & Wilpers, 1998); these are important contributors to higher quality academic experiences and improved performance in college (e.g., Conley, 2007). In addition, there is a growing literature that shows behavior (measured by checklists, experience sampling, or other ratings) predicts a range of other outcomes in postsecondary settings, including academic dishonesty, time management and procrastination, ability to cope with problems and stressors, satisfaction with the college environment, and health and well-being (e.g., Lounsbury et al., 2005; Steel, 2007).

3.2 Behavioral Skills Predict Important Outcomes for Workers

Industrial/organizational (I/O) psychology provides substantial evidence concerning the role of behavioral skills for predicting important workplace outcomes. Specifically, this literature documents the utility of behaviors for predicting a broad range of job performance criteria, including task performance, engaging in appropriate and ethical work conduct, effective use of interpersonal skills (e.g., leadership), and other important outcomes like work satisfaction and perceived work stress (e.g., Lindqvist & Vestman, 2011; Roberts et al., 2007; Schmidt & Hunter, 1998). Specifically, the *sustaining effort* dimension of the behavioral skills domain is also important for people moving into the workforce, has repeatedly been shown to be the strongest predictor of job performance after cognitive ability (e.g., Schmidt & Hunter, 1998) and is consistently considered to be the most important behavior dimension for work whether one is looking at predictors of performance, employer-desired attributes in employees, or skills required on the job (Sackett & Walmsley, 2014).

3.3 Relevance for International Contexts

Aspects of the behavioral skills domain have been found in studies of personality and individual differences throughout the world (Ashton et al., 2004; Roberts, Martin, & Olaru, 2015), showing that these skills are truly universal expressions of human behavior. International organizations such as the OECD have recognized this, incorporating measures of personality and behavior into their programming and frameworks that lay out the skills students need to be successful in the 21st century (OECD, 2013, 2016).

3.4 Specific Dimensions of the Behavioral Skills Domain

This section presents research evidence on the validity of some of the specific dimensions within this domain (and their underlying behaviors) for specific outcomes in college and at work. The work was guided by the HEXACO taxonomy (Ashton et al., 2004), a taxonomy that has been replicated across cultures and thus represents a near universal description of human behavioral characteristics. Specifically, an attempt was made to group behavioral skill dimensions within the appropriate HEXACO domains.

3.4.1 Acting Honestly. Although this dimension is a relatively new addition to the literature, behaviors such as being honest, ethical, and fair have been of interest to educators and organizations for a long time, and research shows that components from this domain relate to measures of integrity (Lee, Ashton, & de Vries, 2005). Behaviors such as acting sincerely,

treating others fairly, and being modest are associated with higher GPAs and lower levels of counterproductive behavior in college students (de Vries, de Vries, & Born, 2011), as well as higher levels of other positive outcomes, such as continuous learning, ethics, and leadership (McAbee, Oswald, & Connelly, 2014).

3.4.2 Getting Along Well With Others. The components in this dimension have to do with the manner in which a person interacts with others, such as being respectful and patient, showing concern when appropriate, and trusting and assisting others. Among college students, they predict higher performance (Okun & Finch, 1998) and are associated with higher levels of study and communication skills, social connections with others, and commitment to college (Peterson, Casillas, & Robbins, 2006).

3.4.3 Keeping an Open Mind. Traditionally, this dimension, consisting of components such as curiosity, creativity, and flexibility, was not considered to be strongly relevant for performance-related outcomes, but this view is beginning to change. For example, components in this domain have recently been shown to predict achievement in college (Paunonen & Ashton, 2013). High levels of these components also predicted greater levels of continuous learning, appreciation for diversity and the arts, and interpersonal skills (McAbee et al., 2014). In addition, intellectual curiosity was found to be a strong predictor of academic performance independently of intelligence (von Stumm, Hell, & Chamorro-Premuzic, 2011).

3.4.4 Maintaining Composure. Research on components in this dimension has shown that being effective at tolerating stress, regulating emotion, and having confidence improves one's chances of success. In academic contexts, components in this domain containing behaviors such as effectively managing stress and anxiety and making decisions without being overly reliant on others predict academic achievement and performance in K–12 students (Poropat, 2009) and college students (Robbins, et al. 2004).

3.4.5 Socializing With Others. Research has found that components of this dimension, including sociability, assertiveness, and optimism, consistently predicts positive outcomes such as higher GPAs in college (Paunonen & Ashton, 2013). In particular, measures of optimism predict higher levels of performance and engagement in employees (Judge, Rodell, Klinger, Simon, & Crawford, 2013) and more continuous learning, adaptability and life skills, and perseverance in college settings (McAbee et al., 2014).

3.4.6 Sustaining Effort. In all the research on behavior, personality, and their correlates, aspects of this dimension, including being motivated, organized, dependable, and self-controlled, have consistently been found to relate strongly to performance across all age groups. When examining effects in individual studies on academic achievement, it was the only dimension that consistently predicted achievement from elementary school through to college (Poropat, 2009). The persistence component in particular, which includes overcoming challenges in the face of obstacles, maintaining effort, and focusing on tasks in the presence of distractions, predicts higher GPAs in college students (de Vries et al., 2011) and in medical school students (Lievens, Ones, & Dilchert, 2009).

3.5 Potential Applications of the Framework

One potential application of this domain is in the context of postsecondary admissions. Given the relationships between behavioral skills and important postsecondary outcomes cited above, they could be used to supplement information currently collected by postsecondary institutions. This information could then be used to identify those students who may fall just below standard achievement-based criteria such as GPA and standardized test scores, but who have the behavioral skills (e.g., motivation, persistence) that make them more likely to succeed.

Additionally, behavioral skills can be used to inform the assessment of alternative job-related performance outcomes. For example, they have been associated with a range of activities that generally involve more interpersonally relevant tasks, such as working in teams, providing courteous service, managing conflict, and displaying leadership (e.g., Judge, Bono, Ilies, & Gerhardt, 2002; Morgeson, Reider, & Campion, 2005; Organ & Ryan, 1995). Similarly, these interpersonal and self-regulatory behaviors have been associated with inappropriate interpersonal conduct (e.g., Bolton, Becker, & Barber, 2010).

3.6 Summary

The behavioral skills domain of the ACT Holistic Framework lays out skills that research has shown to be critical for success in educational and workplace settings.

4 Education and Career Navigation

The fourth domain of the ACT Holistic Framework is education and career navigation. It focuses on the knowledge, skills, and other factors needed to negotiate key education and work transitions successfully. The navigation domain emphasizes what individuals know about themselves and their environments, and how they use this information to make informed, personally relevant decisions and build actionable plans as they move along their education and career paths.

4.1 Navigation Important for College and Work Success

Research on education and career navigation shows that its components are important contributors to postsecondary educational outcomes. Studies indicate that these components predict academic performance (Lent, Brown, & Gore, 1997), as well as college persistence, major persistence, and degree attainment (Allen & Robbins, 2008). Further, these predictors are related to college student adjustment, college major choice, certainty of career choice, and greater satisfaction with the college experience (Bowman & Denson, 2014; Chen & Yao, 2015).

Research also points to the importance of navigation factors for predicting work outcomes. Regarding job performance, research shows that interests provide incremental validity above and beyond the effects of cognitive ability and personality variables (Van Iddekinge, Putka, & Campbell, 2011), especially when there is good interest-job fit (Nye, Su, Rounds, & Drasgow, 2017). Navigation predictors contribute to other outcomes such as organizational commitment, job continuance intentions, and job satisfaction (Kristof-Brown, Zimmerman, & Johnson, 2005; Oh et al., 2014).

4.2 Education and Career Navigation is Relevant for International Contexts

International research and practices have provided insights as to how different countries and cultures facilitate the education and career trajectories of their inhabitants. Components of the navigation domain have been found in cross-cultural comparison studies and non-U.S. studies (Lent et al., 2014; Oh et al., 2014), highlighting that these critical knowledge and skills are being examined across the globe. The OECD also recognizes the importance of navigation, calling for “improving the information available to young people when choosing their field of study,” increasing students’ familiarity with the labor market, and strengthening “measures that make it generally easier for students to gain work experience . . .” (OECD, 2014, p. 213).

4.3 Dimensions of the Education and Career Navigation Domain

4.3.1 Self-Knowledge. For this dimension, research on self-perceptions of abilities/skills, interests, and values components are related to a sense of belonging and subsequent retention in college (Soria & Stubblefield, 2015), measures of job knowledge (Van Iddekinge et al., 2011), and intentions to remain in a STEM major (Perez, Cromley, & Kaplan, 2014), respectively. College and academic self-efficacy (ability to complete tasks and succeed in the college and academic

environment) are significant predictors of first to second semester persistence (Wright, Jenkins-Guarnieri, & Murdock, 2013) and retention (Robbins, Lauver, Davis, Langley, & Carlstrom, 2004). Research also shows that less discrepancy between student expectations and college experiences predicts retention (Pleitz, MacDougall, Terry, Buckley, & Campbell, 2015).

4.3.2 Environmental Factors. The components in this dimension consist of education and work knowledge (e.g., types of majors, work settings), experience, as well as the supports and barriers (e.g., financial, family, school resources) that influence education or work progress. Research shows that social supports predict satisfaction with academics among African college students (Lent et al., 2014), and perceived institutional support is predictive of college completion intentions (Thomas, 2014). Participation in experiences (co-op or internship) predicts retention in STEM majors and college (Raelin et al., 2015).

4.3.3 Integration. The components in this dimension have to do with exploring and using knowledge about oneself and the environment to evaluate options, and make good fit goals, choices, and action plans. Extensive research evidence on the compatibility between personal and environmental characteristics (i.e., fit) shows it is a meaningful predictor of STEM field choice, major persistence, GPA, and college satisfaction (Allen & Robbins, 2008; Bowman & Denson, 2014; Le, Robbins, & Westrick, 2014). In terms of work outcomes, fit predicts job performance, organizational commitment, turnover intentions, and job satisfaction (Oh, et al., 2014; Yu, 2016). Further, choosing a major later during college or changing majors contributes to delays in graduation and degree attainment (Yue & Fu, 2017).

4.3.4 Managing Education and Career Actions. Research on components in this dimension has shown that being effective at implementing education and career plans and engaging in appropriate search behaviors contributes to success. Among unemployed individuals, focused career plans that include a range of job-search strategies contributed to higher quality reemployment and job satisfaction (Koen, Klehe, Van Vianen, Zikic, & Nauta, 2010). Research also shows that role clarity in a work context and role balance (work-life balance) is related to job satisfaction (Brough et al., 2014).

4.4 Potential Applications with Education and Career Navigation

With research showing the importance of navigation components (e.g., goals, fit) for postsecondary success, these components can provide supporting information beyond existing admissions criteria. For example, examining person-environment fit when considering which students to admit to a particular college or program of study provides additional information that may improve the likelihood of entering student persistence to degree. Navigation can also be used to increase postsecondary access to traditionally underserved student populations (e.g., first-generation students). For example, incorporating components (e.g., supports, barriers, experience) that may be particularly salient for these students into admissions interviews provides opportunities for institutions to more fully understand their prospective students, and to consider this information when determining which students may be more likely to succeed.

4.5 Summary

The research-based navigation domain emphasizes the ongoing process of developing and employing personally relevant knowledge and skills to be successful in education and work contexts.

5 Discussion

The time is right to expand the number of characteristics colleges and universities consider in prospective students. Why? The world is changing, and probably faster than most think. Consider how technology has accelerated the pace of change in how we live our everyday

lives. After landline telephones were invented, it took 75 years before 50 million people were using them. It took television 13 years to reach 50 million users. Contrast these numbers with what we are seeing today. In merely 2 years, Twitter reached 50 million users. Even more astonishing, 50 million people were playing the app *Angry Birds* only 35 days after its release (Aeppel, 2015). Imagine how quickly the next “big thing” can infiltrate our lives and imagine the type of person that must have the ability adapt to these changes.

Similarly, technological innovation is changing the way we work and the skills needed in the workforce. For example, one often cited study found that the share of routine cognitive and routine manual work tasks has fallen sharply since 1960 (Autor & Price, 2013). These are tasks that follow relatively well-defined procedures often taught in school. One example of a routine cognitive task is accounting; and, consistent with this study, a recent analysis from the field of economics predicts a 94% probability that computerization will lead to major job losses in that field in the next two decades (Frey & Osborne, 2017). In contrast, nonroutine analytic and nonroutine interpersonal work tasks are on the rise since 1960. Nonroutine tasks are those that cannot be automated through computerization. Many of these tasks require skills such as collaborative problem solving, critical thinking, and teamwork.

So, where can colleges and universities go for help in identifying the most important characteristics student need to succeed in this changing environment? Our argument is that the ACT Holistic Framework, with its extensive research basis, is currently the most comprehensive framework in existence that outlines the things students should know and be willing and able to do in order to succeed throughout both their education and work lives. The Framework can be used in several ways. Some examples of this are

- to serve as a guiding framework in the selection and prioritization of measured constructs on student applications,
- to serve also as a guiding framework in the development and revision of outcome measures assessing the effectiveness of college and university education, and
- more specifically, to use PLDs (an empirically derived set of performance level descriptors developed for the behavioral skills portion of the Framework that provide example behaviors at different levels of effectiveness) as items for assessment content to accurately measure a student’s level on several skills (Latino, et al., 2017).

However, as it is ultimately used, the ACT Holistic Framework represents a significant advancement in our thinking of what it means to be ready for college and, later, the workforce. In light of our rapidly changing world, it is our contention that such thinking can better serve individuals and society as a whole.

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