

*NOTE: This is a draft version of the final editorial used for the book, *Minding the Gap: Why Integrating High School with College Makes Sense and How to Do It*. If you are interested in purchasing the final edited version provided by Harvard Education Press, visit <http://hepg.org/hep-home/books/minding-the-gap>.

All One System

The Promise of O*Net

Anthony P. Carnevale

Since 1983, when *A Nation at Risk* equated educational adequacy with national competitiveness and individual employability, rhetoric has justified reform in the interest of career objectives. However, with the emergence of education beyond high school as the dominant arbiter of economic opportunity, the interests of both efficiency and equity call for greater alignment between education and occupational knowledge, skills, abilities, interests, and values.

In the past quarter century, we have moved from "high school for all" to "college for all" as the prerequisite for middle-class jobs, and it is now widely accepted that access to college begins in preschool. Yet over the same period, it has become equally apparent that we cannot afford to continue to satisfy the growing demand for education efficiently or fairly by simply adding more years of universal schooling at both ends of the education pipeline. Thus far, the response to the core problems of efficiency and equity in education has been broad support for aligning teaching and learning with education standards, but largely ignored has been the alignment of education and career opportunities.

Today, this alignment seems to be an obvious step to take along the path of reform. Moreover, it also seems intuitively obvious that if we could better understand how teaching and learning in school relate to the diverse kinds of knowledge, skills, abilities, values, and interests that lead to successful careers, we could open up career pathways to the diverse talents of our youth, thereby expanding choices and distributing economic opportunity more equitably.

Granted, the education system and the labor market have been gradually aligning since industrialization began, yet there is still a profound disconnect between academic content and the occupational knowledge, skills, abilities, values, and interests required for economic success. As a result, there are two separate labor markets in America, paralleling the separation of content taught in the K-16 system from the actual competencies required in workplaces: (1) a labor market in experienced workers rewards proven *competence* as observed by employers and peers; and (2) a labor market in entry-level workers uses education as the marker of *potential* for further learning on the job.

America's education system and labor markets are likely to remain separate as the developmental needs of individuals and employers simultaneously expand and diverge. The demand for entry-level preparation will continue to grow as learning requirements escalate on the job in response to the blurring pace of economic and technological change. More-robust knowledge, skills, and abilities will be required for individuals to get a fast start up the learning curve in entry-level jobs, to keep up on the job, and to expedite transitions from job to

job. Professionalism will need to take new forms as individuals pursue occupational interests and protect occupational values initially nurtured in educational institutions.

As a result, we will obviously need strong bridges between education and work, but the heavy construction will have to occur on the education side of the gap. Governments, educators, and individuals will have to take increasing responsibility for providing students with occupational knowledge, skills, and abilities, as well as for nurturing occupational interests and values as employers continue to recede as the incubators for developing human capital.¹

THE MISMATCH BETWEEN CURRICULA AND COMPETENCIES

The most profound disconnect of schools from careers lies in the apparent discontinuity between academic disciplines and 21st-century occupational competencies. This evident lack of fit raises obvious questions as to whether the current curriculum, which is the focus of hard-won reform in American high schools, is the most effective way to deliver those competencies for all students. To begin with, the current college prep curriculum does not provide an obvious transition to the more-applied focus of postsecondary education and training. In postsecondary education, the vast majority of students avoid the academic silos of math, science, and the humanities in favor of curricula that have a stronger career focus, with the business major leading the pack.²

For a very long time, employers have asserted that jobs actually require a complex set of competencies that are neither reflected in academic credentials nor nurtured through academic pedagogy. Until very recently, our ability to observe and measure these skills and their distribution among occupations has been largely anecdotal. All of that has changed with the recent completion of the O*Net database, which allows us to measure the value of these competencies, and to at least begin a dialogue over the appropriate roles of educational institutions and employers in providing core 21st-century competencies.

LINKING EDUCATION AND OCCUPATIONS: A STATE-OF-THE-ART TOOL

The O*Net database specifies the full set of occupational competencies required for success in particular occupations and related clusters of similar careers. Operated by the National O*Net Consortium and funded by the U.S. Department of Labor, the database includes occupational knowledge, skill, abilities, work values, work contexts, and work interests, as well as key performances (tasks and activities). Its primary use so far has been as a counseling tool for career planning, delivered online through a user-friendly interface.³ With the exception of occupational knowledge, though, very few of the O*Net competency domains look like words one finds in a course catalog or a K-12 content model.

¹ Employers will need workers with robust competencies, but they are unlikely to take on greater human resource development responsibilities at a time when they are shedding long term commitments and are overburdened with the world's highest labor costs. In addition, as the global labor market for college-educated labor grows and job tenure declines, employers will increasingly become buyers-not developers-of skilled labor.

² Of the 1,399,542 bachelor's degrees conferred in 2004, 42,106 were conferred in the liberal arts and sciences, general studies, and humanities. In 2004, there were 13,327 bachelor's degrees awarded in math, but 307,149 in business; 22,164 in parks, recreation, leisure, and fitness studies; 70,968 in communications; and 77,181 in the visual and performing arts. The same pattern is reinforced in the expansion in applied associate's degrees, certificates, certifications, and customized training. Of the 665,301 associate's degrees conferred in 2004, 227,650 were conferred in the liberal arts and sciences, general studies, and humanities, and only 801 were conferred in mathematics.

³ See www.onetcenter.org.

O*Net's occupational data are anchored in a tripartite set of cognitive competencies: knowledge, skill, and ability.

- *Knowledge* classifications are content domains familiar to educators, from math and the sciences, to the humanities, to knowledge in more-applied disciplines like accounting.
- *Skills* are competencies that promote further learning. They are divided into content, processing, and problem-solving skills. Content skills are fundamental skills needed to acquire more specific skills in an occupation. These include reading comprehension, active listening, speaking, writing, math, and science. Processing skills are procedures that contribute to the more-rapid acquisition of knowledge and skill. These include critical thinking, active learning, learning strategies, and monitoring. Problem-solving skills involve the identification of complex problems and related information required to develop and evaluate options and implement solutions.
- *Abilities* are defined as enduring and developed personal attributes that influence performance at work. In the parlance of education psychology, these closely approximate "aptitudes." O*Net divides abilities broadly into creativity, innovation, mathematical reasoning, and oral and written expression. Each of these broad abilities is subdivided into component elements. For example, innovative abilities include fluency of ideas, problem sensitivity, deductive reasoning, and inductive reasoning.

In addition to the cognitive competencies, O*Net classifies competencies that are tied to personality traits that are markers for success in particular occupations. These key competencies are work style, work values, and interest.

- *Work style* is a personal characteristic that can affect how well someone does a job. Some of these characteristics are creativity, leadership, analytical thinking, attention to detail, integrity, social orientation, stress tolerance, teamwork, independence, and adaptability.
- *Work values* are individual preferences for work outcomes. Important outcomes for individuals include recognition, achievement, working conditions, security, advancement, authority, social status, responsibility, and compensation.
- *Interest* is defined as individual preferences for work environment. Interests are classified as realistic, artistic, investigative, social, enterprising, and conventional.

The O*Net data also measure particular work contexts in which occupational work and learning occurs.

- *Work context* is defined as the physical and social factors that influence the nature of a job. These factors are interpersonal relationships, physical work conditions, and structural job characteristics. Interpersonal relationships refer to competencies required in contact and interaction with others and the ability for group work. The level and intensity of interpersonal relations is high in jobs like doctors, dentists, firefighters, teachers, barbers, and policemen.
- *The physical working condition* refers to one's physical environment.
- *Structural job characteristics* refer to the responsibility and level of independence one has on the job.

The O*Net database includes tasks and activities associated with individual occupations and occupational clusters. Tasks and activities represent key performances that combine occupational knowledge, skills, abilities, values, and interests. As such, they point toward authentic teaching opportunities and key opportunities for assessment. Once specified, these broad competencies can be taught and assessed more self-consciously and, hence, more equitably.

CONNECTING THE DOTS

Connecting the dots between the K-16 education system and "the real demands of work" is more easily said than done. There are notable exceptions, especially in vocational and professional education, but as a rule, school and work in the United States are characterized by separate experiences, separate curricula, and separate modes of learning. Academic and occupational learning also tend to be separated sequentially. There is a tendency to provide general education first, then to put an occupational point at the end of each student's academic pencil, increasingly in the postsecondary years. By way of comparison, the European apprentice system mixes academic and applied learning.

However, while linking education and careers is a complex and ongoing project, the first steps are actually easy. We can already link student records and employment records, as a handful of states have done. Student records tied to wage records, available for all workers since in the 1930s, tell us about the employment and earnings returns to education programs, all the way down to the individual course and instructor level. Eleven states already link student records and wage records, at least in part.

On that foundation, the development of a deeper alignment and transparency between education curricula and competencies can begin with O*Net, which can throw open the mysterious black box at the interface between education and the economy.

While O*Net cannot tell us exactly how to teach key competencies, it can:

- track career competencies back to academic curricula and translate particular academic disciplines into applied forms as career competencies;
- measure the extent to which career competencies are learned on the job or in school, and track the transferability of competencies and academic knowledge among different occupations;
- show how academic knowledge and competencies combine as recipes for success in particular occupations and occupational clusters;
- calculate the earnings returns from academic knowledge and career competencies;
- show the current and projected demand for academic knowledge and career competencies; and
- provide key tasks and activities in occupations that are the true venues for learning a particular set of competencies and the true basis for assessing mastery of any combined set of competencies.

O*Net could become the golden spike that joins education and career tracks. As such, it would serve to clarify and expedite transitions from school to work, as well as transitions from job to job. Tools like O*Net can also be used to promote upward mobility. With O*Net, we can begin to understand the full set of knowledge domains, skills, abilities, values, and interests that lead to career choices. Once these are understood, we can develop these competencies across the full range of economic classes.

Of course, education cannot succeed in meeting its cultural and civic responsibilities simply by providing foot soldiers for the advancing armies of global capitalism. But the O*Net data suggest that it is a mistake to view the economic, cultural, and civic value of education as a zero-sum game. The knowledge, skills, abilities, values, and interests required for 21st-century careers codified in O*Net are broad and diverse enough to serve the educators' cultural and civic missions as well as individual employability.