College & Career Ready: A Conceptual Framework for Increasing Engagement, Achievement and Transition

James R. Stone III
Director National Research Center for Career and Technical Education
Seen stuck in traffic on A45 South
Two Key Questions:

1. What is the appropriate mix of academic, occupational and technical skills required for the emerging labor market?
2. How can schools help students develop these skills?
Defining College & Career Ready

- Whatever skills needed to succeed in credit bearing CC courses (Tucker, NCEE)

- Being ready for college means that a high school graduate has the knowledge and skills necessary to qualify for and succeed in entry-level, credit-bearing college courses without the need for remedial coursework. (Achieve Inc)

- 4 years of math, English; 3 years of science & social science (College Board)

- Skills needed for living-wage, entry level jobs are same as skill needed to succeed in college (ADP)
The Education Challenge

- Engagement - Completing secondary education; completing postsecondary credential

- Achievement - test scores and industry recognized credentials

- Transition - to continued education and training and/or the workplace
THE EMERGING AMERICAN WORKPLACE
S&E occupations make up only about one-twentieth (5%) of all workers (5.3% in 2018), Urban Institute, 2007

435,000 U.S. citizens and permanent residents a year graduated with bachelor's, master's, and doctoral degrees in science and engineering. Over the same period, there were about 150,000 jobs added annually to the science and engineering workforce.

http://www.businessweek.com/print/smallbiz/content/oct2007/sb20071025_827398.htm
Murray said that none of the companies she has talked with has suggested that there is a shortage of qualified chemists or life scientists. She said that employers’ greatest concern “is not numbers, it is training.” She cited the example of managers who told her they could interview hundreds of candidates for an organic chemistry position but wish they knew how to identify those candidates who “can behave collaboratively” and have the other broad competencies discussed at the workshop. She argued that the degree to which scientists have these other capabilities “really seems to be the problem.”

IS THERE A SHORTAGE OF SCIENTISTS?

Middle Skill Credentials Pay Off

Earnings are not just a function of postsecondary attainment. Occupational choice also influences earnings potential.

Source: National Education Longitudinal Study 2000

- **43%** of licenses and certificates earn more than an Associate's degree
- **27%** of licenses and certificates earn more than a Bachelor's degree
- **31%** of Associate's degrees earn more than a Bachelor's degree.
Achievement Flat or Declining in Reading, 17 year olds, NAEP

Only 35% of 12th graders are proficient in reading. (38% proficient in 2009)

79% at or above modal score
70% at or above modal score

Note: Long-Term Trends NAEP

## The College & Career Dilemma

<table>
<thead>
<tr>
<th>9th Grade Cohort</th>
<th>Benchmarks</th>
<th>Workforce Credentials</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 enter 9th grade*</td>
<td>70% complete HS&lt;sup&gt;1&lt;/sup&gt;</td>
<td>30% enter as HS drop outs</td>
</tr>
<tr>
<td>70 complete HS</td>
<td>62% start college immediately&lt;sup&gt;2&lt;/sup&gt;</td>
<td>25% enter as HS grad</td>
</tr>
<tr>
<td>43 Start college</td>
<td>47% drop out (31% with 0 credits)</td>
<td>19% enter with some college &amp; a lot of debt</td>
</tr>
<tr>
<td></td>
<td>57% complete within 6 years&lt;sup&gt;3&lt;/sup&gt;</td>
<td>18-24% enter with college degree (6/4;3/2)</td>
</tr>
</tbody>
</table>

1. Greene et al, 2006
3. NCES, 2010

*An unknown number of pre-9th graders never make it to high school.
College & Career Ready: 3 Domains

1. **Framework**
   - Technical Skills & Knowledge
   - Occupational Skills & Knowledge

2. **Where skills are learned**
   - Technical Expression
   - Occupational Expression

- **Academic Skills & Knowledge**
What Academic Skills?

- College Ready Academic Skills
- Career Ready Academic Skills
Measuring College & Career Readiness

College Ready?
- Using traditional assumptions (i.e., preparation for 4-year college), only 32% of HS graduates are college ready (Greene, 2003)
- 28% of 4-year college entrants require remediation (NCES, 2007)
- 50% of HS grads (who take the ACT exam) are college ready (ACT, 2005)

Career Ready (the academic side)?
- ACT Work Readiness Assessment (based on O’Net data) measures:
  - Reading for information
  - Locating information
  - Applied math
ACADEMIC SKILLS IN THE WORKPLACE
Academic Skills Needed for College are the Same Needed for Careers . . . ?

Career Ready (the academic side)?

• ACT Work Readiness Assessment (based on O’Net data) measures:
  • Reading for information
  • Locating information
  • Applied math
• Zone 3 Jobs, Level 5 Math Skills
## Mathematics Skills for College and Workforce Training Readiness

<table>
<thead>
<tr>
<th>Skill Group</th>
<th>ACT Mathematics Test College Readiness Standards (20-23 Range)</th>
<th>WorkKeys Applied Mathematics Test Skills (Level 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Algebra and Algebraic Thinking</strong></td>
<td>Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average</td>
<td>Solve problems that include a considerable amount of extraneous information</td>
</tr>
<tr>
<td></td>
<td>Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor</td>
<td>Calculate using several steps of logic</td>
</tr>
<tr>
<td></td>
<td>Evaluate algebraic expressions by substituting integers for unknown quantities</td>
<td>Perform single-step conversions within or between systems of measurement</td>
</tr>
<tr>
<td></td>
<td>Add and subtract simple algebraic expressions</td>
<td>Look up and use a single formula</td>
</tr>
<tr>
<td></td>
<td>Solve routine first-degree equations</td>
<td>Calculate using mixed units (e.g., 3.5 hours and 4 hours 30 minutes)</td>
</tr>
<tr>
<td></td>
<td>Perform straightforward word-to-symbol translations</td>
<td>Find the best deal using one- and two-step calculations and then comparing results</td>
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<tr>
<td></td>
<td>Multiply two binomials</td>
<td>Calculate percentages, percentage discounts, or percentage markups</td>
</tr>
<tr>
<td></td>
<td>Evaluate quadratic functions, expressed in function notation, at integer values</td>
<td>Divide negative numbers</td>
</tr>
<tr>
<td></td>
<td>Use exponents, including exponents in fractions and formulas</td>
<td>Decide what information, calculations, or unit conversions to use to solve the problem</td>
</tr>
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</table>
Career Ready
Electronic Technician – Level 5*

Requirements

- Fundamental knowledge of PC and Server Operating Systems.
- Fundamental knowledge of networking principles.
- Strong Electronics and Mechanical background.
- Highly motivated and energetic.
- Strong communication skills and work ethic.
- Strong organizational skills.
- Working knowledge of Microsoft Office applications.
- Excellent troubleshooting skills.
- Experience with IBM POS equipment.
- Experience with Lexmark printers.
- Experience with Toledo and Hobart scale systems.
- Experience with Nortel BCM and Toshiba CTX systems.
- Experience with Fujitsu Self Checkout systems.
- Experience with Cisco routers and HP network switches.

Skills

- Tech Skills
- WBL
- Soft Skills
What Occupational Skills!!!!!

(AKA Employability Skills)

Frameworks: SCANS, 21st Century Skills

- Critical thinking
- Teamwork/collaboration
- Problem solving
- Creativity
- Technology-information application
- Oral & written communication skills
- Responsibility
- Professionalism
- Ethics
- Systems knowledge

Occupational Skills & Knowledge
Skills for the 21st Century

The four “C”s

- Critical thinking and problem solving
- Communication
- Collaboration
- Creativity and innovation

As the three “R”s serve as an umbrella for other subjects, the four “C”s do for other skills.
What technical skills

- Immediate specific job skills*
- Industry certifications
- 132 available through HS programs (n=4 states)

Technical Knowledge & Skills

* Learning for jobs (OECD)
The Road to an American Solution
Elements of the Pathways System

Core

1. Multiple Pathways

2. An Expanded Role for Employers

3. A new Social Compact with Young People

Key Elements:

- Elevate career education to world-class levels
- Provide high-quality career counseling
- Greatly expand and improve opportunities for work-based learning
Programs of Study (USDE)

- Incorporates secondary education and postsecondary education elements;
- Includes coherent and rigorous content aligned with challenging academic standards and relevant career and technical content in a coordinated, non-duplicative progression of courses that align secondary to postsecondary education;
- Leads to an industry-recognized credential or certificate at the postsecondary level or an associate or baccalaureate degree; and
- May include opportunity for secondary education students to gain postsecondary education credits through dual or concurrent enrollment programs or other means.
STRATEGIES

Systems
- CAREER PATHWAYS
- CAREER ACADEMIES
- CAREER THEMED HIGH SCHOOLS

Pedagogy
- CURRICULUM INTEGRATION
- WORK BASED LEARNING
- CAREER-TECHNICAL STUDENT ORGANIZATIONS (CTSO)
- CAREER GUIDANCE
What we know

• Vocational education & training has been neglected*
• Public investment in initial VET can deliver good economic returns*
• Strong VET programs can increase competitiveness*
• Integrated curriculum builds academic skills**
• CTE engages students and reduces drop out rates**

• *Learning for jobs OECD 2010
• **NRCCTE, 2006
High school is the last education opportunity paid for wholly by the public. It’s purpose has to be to do the best it can to provide all who leave it the foundation necessary to enter, or further prepare for, adult life.

Barton, 2006