College, and Career Readiness: Making High School Matter

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Context for the Conversation

- The future of jobs: Raison d'être for CTE
- How we turned HS into middle school
- Evidence of CTE’s impact on student engagement, achievement and transition to careers and college
Starting Point for POS: The Labor Market

Three Perspectives: Worse, Worser and OMG!
The Labor Market

STEM: Let’s clarify . . .

- 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
Is there a shortage of scientists?

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.”

High Growth Occupations 2010-2020

Veterinarians
Pile-Drive Operators
Mental Health Counselors
Medical Scientists
Cost Estimators
Stonemasons
Health Educators
Audiologists
Bicycle Repairers
Dental Hygienists
Physical Therapists
Brick Masons
Marriage & Family Therapists
Market Research/Analysts
Medical Secretaries
Interpreters
Glaziers
Physical Therapy Aide
Occ Therapy Asst
Medical Diagnostic Tech
Event Planners
Plumber’s Helpers
Physical Therapy Asst
Rebar Workers
Vet Tech
Carpenter’s Helpers
Construction Helpers
Biomedical Engineer
Home Health Aides
Personal Care Aides

 REQUIRED EDUCATION

HIGH SCHOOL

COMMUNITY COLLEGE

4-YEAR COLLEGE OR MORE

Biomedical Engineers
15,700
131,000,000,000
Another Perspective
The USA Today Version of Reality

Annual Salary

- Less than HS
- HS Diploma
- Some College
- Associate Degree
- Bachelor's Degree
- Master's Degree
- Doctoral Degree
- Professional Degree
Education and Future Work: BLS & CEW

![Bar chart comparing USDOL-BLS and CEW data on education levels and future work experiences.]

- BS/BA or more: 23 (USDOL-BLS), 33 (CEW)
- Some College: 30 (USDOL-BLS), 30 (CEW)
- Associate: 5 (USDOL-BLS), 5 (CEW)
- PS Award: 6 (USDOL-BLS), 6 (CEW)
- Work Experience: 8 (USDOL-BLS), 8 (CEW)
- OJT-Short to Long: 58.5 (USDOL-BLS), 58.5 (CEW)
- HS or less: 36 (USDOL-BLS), 36 (CEW)
Sub-Baccalaureate Credentials Pay Off

43% Of PS Credential Programs earn more than Associate Degrees
27% Of PS Credential Programs earn more than Bachelor's Degrees
31% Of all credentials & associate degrees earn more than bachelor's degree
## Middle Skill Occupations (B.A./B.S. NOT Required)

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Traffic Controller</td>
<td>102,300</td>
</tr>
<tr>
<td>Storage and distribution manager</td>
<td>66,600</td>
</tr>
<tr>
<td>Transportation manager</td>
<td>66,600</td>
</tr>
<tr>
<td>Non-retail sales manager</td>
<td>59,300</td>
</tr>
<tr>
<td>Forest fire fighting/prevention supervisor</td>
<td>58,920</td>
</tr>
<tr>
<td>Municipal fire fighting/prevention supervisor</td>
<td>58,902</td>
</tr>
<tr>
<td>Real estate broker</td>
<td>58,720</td>
</tr>
<tr>
<td>Elevator installers and repairer</td>
<td>58,710</td>
</tr>
<tr>
<td>Dental hygienist</td>
<td>58,350</td>
</tr>
<tr>
<td>Immigration and Customs inspector</td>
<td>53,990</td>
</tr>
<tr>
<td>Commercial pilot</td>
<td>53,870</td>
</tr>
</tbody>
</table>

Why Technical Education Matters

Credential Growth

Labor Market Demand

College Graduate Supply

College Graduate Demand

47% of college grads in jobs that require less than BA/BS;
37% in jobs that require HS Only

Vedder, R., Denhart, C., Robe, J. (2010). Why are recent college graduates unemployed.
College for all? Only 40% of 27-year olds have earned an A.A. degree or higher.

What about the 60%?
What about career development for the 40% college completers?

A 3\textsuperscript{rd} Disconcerting Perspective

Computers now exhibit human-like capabilities not just in games such as chess, but also in complex communication such as linguistic translation and speech (Think Siri)
A 3rd Perspective: The Race Against the Machine (The Machines are Winning?)

- The Google car(truck?)
- IBM Watson
- Deep Blue
- The “Square”
- Text readers/ Pattern recognition (goodbye legions of lawyers-only 60% accurate)
- Automated ‘call centers’ (goodbye India)
- GeoFluent (goodbye translators)
- Vending machines for ... everything
Can People Win?

- Instructional methods
- Softer skills
- Instructional focus
- The Human Advantage (for now)
- Khan Academy
- CTSOs/WBL
- Hyperspecialists, entrepreneurship
- Physicality of work
- Advanced pattern recognition
- General problem solving
- Creativity
That’s the Uncertain Reality of the Labor Market

How has education responded?
Rigor = More

A narrow curriculum
High school has become the new middle school

Where Have We Been: 30 Years of “Reform”
Added the equivalent of one full year of core academics (math, science, language arts) to high school graduation requirements.

- (NAEP) **Reading scores have not improved or significantly declined***
- (NAEP) **Science scores have not improved or significantly declined***
- (NAEP) **math scores have remained relatively unchanged**

*Depends on the starting and ending timeframe
Taking more math is no guarantee

- Only 26% of students who took Alg I, II & Geometry scored a 22 (ACT Benchmark) on the ACT exam scoring an average of 17.7

- Adding Trig increases to the average score to 19.9

- Not until calculus is added, does the average score exceed 22 – 5 years of high school math.

- 43% of ACT-tested Class of 2005 who earned A or B grades in Algebra II did not meet ACT College Readiness Benchmarks in math

1. ACT, Inc (2004) Crisis at the Core
One solution?

Be born to smarter parents!
Getting students ready for careers and college: Their future

**Academic**
Mathematics
Science
Communications

**Technical**
Job specific skills valued by employers

**Occupational**
SCANS
21st Century Skills
“Soft” Skills
Employability Skills

**College & Career Ready**

**Required skills**
A Career Development Approach

Focus Career Exploration

Middle School

High School

Focus on Occupational & Technical Skills

Technical and Community College

University

Focus Academic, Occupational & Technical Skills

Focus Academic Skills
Industry Knows This:

**Toyota**

**Next Generation**

Skilled Team Member

- **Totally Multiskilled**
  - (Electrical/Fluid Power/Mechanical/Fabrication)
- **Strong Math Skill**
  - (Upper 1/3 nationally)
- **Strong Reading Skill**
  - (12th Grade level)
- **Fast Technical Learner**
  - (Can learn, apply, improve, and learn again)
- **Uses and Learns With Digital Media**
- **Strong Problem Solver**
- **Effective Verbal & Written Communicator**
  - (Comfortable in group and one-on-one situations)
  - (Develops high quality process manuals, guides)
- **Effective Interpersonal Skills**
- **Natural Teamworker**
- **Qualified for the Next Level**

**Target:**

100% of Maintenance Workforce
Pedagogic Tools for World Class CTE

- Classroom instruction
- Work based learning - WBL
- CTSOs
- Project based learning
- Contextualized learning
- Labs
- Shops
- Job shadowing
- Internships
- School-based enterprise
- Cooperative education
- Apprenticeships
- Leadership development
- Professional development
- Service/social engagement
- Competitive events
Engaging Students through Relevant Classroom Instruction

WHY DO WE HAVE TO LEARN THIS STUFF ANYHOW?

IT'S GOOD FOR YOUR MENTAL DISCIPLINE, SKYLER.

AND IT'LL HELP YOU IN LATER LIFE...
Curriculum Integration
Experimental Research
(Instructional)

- Math-in-CTE: complete
  - Technical Assistance – 7 yrs

- Literacy-in-CTE: complete
  - Technical Assistance – 2 yrs

- Science-in-CTE:
  - Study recently concluded
Teachers Won’t Do It, unless...
What We Learned: Experimental Test of Math Integration

- Students in the experimental classes scored significantly higher on Terra Nova and Accuplacer.
- The effect: 71st percentile & 67th percentile.
- No negative effect on technical skills.
- 11% of class time devoted to math lessons.
The Occupational Expression of Academics

A career ready person is proficient in the core academic subjects, as well as in technical topics. This foundational knowledge base includes competence in a broad range of academic subjects grounded in rigorous internationally benchmarked state standards... Career Readiness Council 2012

Math-in-CTE Curriculum Map: Health Science

<table>
<thead>
<tr>
<th>CTE Course/Unit</th>
<th>CTE Concepts</th>
<th>Math Concepts</th>
<th>Common Core Math Standards Middle School</th>
<th>Common Core Math Standards High School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient assessment</td>
<td>Input/output; Vital signs; Height/weight; Conversions; Instrument reading</td>
<td>Reading measurement; Basic operations; Ratio/Proportion; Solving equations; Scales</td>
<td>6.NS.2; 6.NS.3; 7.NS.1; 6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3; 6.EE.2; 7.EE.3</td>
<td>A.APR.1; A.APR.7; N.RN.3; N.Q.1; G.MG.3; A.CED.4</td>
</tr>
</tbody>
</table>

http://www.nrccte.org/professional-development/math-cte/curriculum-maps
Experimental Test of Reading Interventions in CTE

- Significant improvement from both approaches
- Teachers with two-years experience in method had greater effect
Tools for College & Career Readiness

- Work based learning (WBL)
- Job shadowing
- Internships
- School-based enterprise
- Cooperative education
- Apprenticeships
WBL: Everywhere but in the U.S. . . .

- The % of youth in VET ranges from 5% (Ireland) to 80% (Czech Republic).
- More than 50% youth in VET: Austria, Belgium, Finland, Switzerland, Australia, Germany, Sweden, Denmark and others.
- Japan, United Kingdom, France, Korea and others exceed 20%
- The U.S. doesn’t make the list!

*Learning for jobs* (OECD, 2010)
The Value of WBL

Nations enrolling a large proportion of upper-secondary students in vocational programs that include heavy does of WBL have significantly higher:

- school attendance rates
- higher upper-secondary completion rates
- college attendance

Bishop & Mane, 2004
Pedagogic Tools for World Class CTE

- CTSOs
- Leadership development
- Professional development
- Service/social engagement
- Competitive events
The CTSO: Building Occupational Skills

Function

- Competitive Events
- Leadership Development
- Professional Development
- Social Engagement

Effect

- Academic Engagement
- College Aspirations
- Grades
- Career Efficacy
- Employment Aspirations
- No Effect
- (-)Career Aspirations
- Employment Aspirations
- Career Efficacy

(Alfeld, et al, 2007)
The good news: This is CTE’s Time
“There is one approach that does tend to improve graduation rates and labor market earnings, especially for at-risk youth: high-quality career and technical education (CTE)”

Key points

- Secondary CTE keeps kids in school, especially boys
- High quality, secondary CTE enhances academic achievement; can support CCSS; improves transition to postsecondary - Necessary for College and Career Readiness
- Effective CTE requires intensive and extensive career development beginning no later than middle school
- Effective CTE requires effective teachers; professional development
- Effective CCR preparation requires a systems approach:
  - Vertical integration: high school & postsecondary & employer
  - Horizontal integration: academic & CTE; CTE & academic
  - Internal integration: authentic, contextualized learning
Shameless Promotion . . .

COLLEGE AND CAREER READY IN THE 21ST CENTURY

Making High School Matter

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VISIT OUR WEBSITE OR SEND ME A NOTE

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