High Quality CTE: What the Research Shows

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My Grandkids will be competing against...

In a very, very flat world
Today

• The labor market/economy: short term view; longer term trends
• Impact of 30 years of education “reform”
• Evidence of CTE’s impact on student engagement, achievement and transition to careers and college
• Quality CTE: Different (overlapping?) Perspectives

If your assumptions about a problem are wrong, then it is very likely your solution will be as well
A Brief Labor Market Environmental Scan

Three Perspectives: Worse, Worser and OMG!
## The Next 10 Years-BLS

<table>
<thead>
<tr>
<th>Largest Growth Jobs</th>
<th>Fastest Growth Jobs (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Registered Nurse (+712,000)</td>
<td>1. Personal Care Aides (+600,000)</td>
</tr>
<tr>
<td>2. Retail Sales Person (+707,000)</td>
<td>2. Home Health Aide (+706,000)</td>
</tr>
<tr>
<td>3. Home Health Aide (+706,000)</td>
<td>3. Biomedical Engineer (+  9,700)</td>
</tr>
<tr>
<td>4. Personal Care Aide (+607,000)</td>
<td>4. Construction Helpers (+ 17,600)</td>
</tr>
<tr>
<td>5. Office Clerks (+490,000)</td>
<td>5. Carpenter’s Helpers (+ 25,900)</td>
</tr>
<tr>
<td></td>
<td>6. VetTech (+ 41,7000)</td>
</tr>
<tr>
<td>10. PS. Teachers (+306,000)</td>
<td>8. Physical Therapist Asst (+45,7000)</td>
</tr>
<tr>
<td>15. Elementary Teacher (+249,000)</td>
<td></td>
</tr>
</tbody>
</table>
Education and Future Work: BLS & CEW

- BS/BA or more: USDOL-BLS 23, CEW 33
- Some College: USDOL-BLS 30, CEW 30
- Associate: USDOL-BLS 5, CEW 30
- PS Award: USDOL-BLS 6, CEW 6
- Work Experience: USDOL-BLS 8, CEW 8
- OJT-Short to Long: USDOL-BLS 58.5, CEW 36
- HS or less: USDOL-BLS 23, CEW 33
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
Conversation in Context

• Only 63% of Americans are in the labor market, lowest percentage since the depression\(^1\)
  • Young workers are not getting jobs (13% drop since 2007; lowest rate since 1948) and do not earn a median income until age 30 (26 in 1980)\(^2\)
  • Women have recovered the jobs lost in the “Great Recession.” Young male job seekers employment rate has dropped from 84% in 2000 to 65% in 2012\(^2\)
  • 60% of employers currently check credit ratings of new hires\(^1\)
  • 78% of employers conduct pre-employment drug testing in 2013\(^3,4\), up from 62% in 1993\(^4\).

• Overall, 15% will prosper in the coming years, 85% will have lower standard of living than today\(^1\)

1. *Average is Over*, Cowen(2013)
3. SHRM, 2013
4. NBER, 2013
The Education Problem

[Cartoon Image]

- Front of car: "MY CHILD IS AN HONOR STUDENT"
- Side of car: "MY CHILD KNOWS A CAM FROM A ROTOR"
Too Many College Grads?

- ...turning out vastly more college graduates than there are jobs in the relatively high-paying managerial, technical and professional occupations to which most college graduates traditionally have gravitated.

- Roughly one of three college graduates is in jobs the BLS says require less than a bachelor's degree.

- ... College graduates, on average, are smarter and more disciplined and dependable than high-school graduates—so much of the reported earnings differential has little to do with college learning.

- We have engaged in massive and costly credential inflation to certify competency for jobs.

Richard Vedder, director of the Center for College Affordability and Productivity WSJ 6/21/2012
Not Enough College Grads?

By 2020, our research projects that the United States may have 1.5 million too few workers with college or graduate degrees and 6 million more without a high school diploma than employers will demand. McKinsey Global Institute, 2012
We Know that Technical Education Matters

Credential Growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Associates</th>
<th>Bachelor's</th>
<th>Master's</th>
<th>Doctorate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-12</td>
<td>31%</td>
<td>24%</td>
<td>45%</td>
<td>43%</td>
</tr>
</tbody>
</table>

Labor Market Demand

<table>
<thead>
<tr>
<th>Year</th>
<th>College Graduate Supply</th>
<th>College Graduate Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>41.7</td>
<td>28.6</td>
</tr>
</tbody>
</table>

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.

Note: Represents data collected in surveys between 2006-2008; GED is approximation based on data from GED Testing Program.

What about the 60%?
What about career development for the 40% college completers?
High Quality CTE: Perspectives

Georgetown Center for Law and Poverty

- Integral part of secondary school
- Built on strong career guidance
- Accessible to students of all ability levels
- Strong emphasis on contextualized learning linked to rigorous state (academic) standards
- Rigorous technical skill development
- Develops employability skills
- More . . .

Southern Region Education Board

- Career pathway design
- Student Assignments
- Curriculum
- Classroom Assessment
- Counseling & Guidance
- Staff Qualifications
- Accountability
- Business Partners
- *Advanced Careers*
High Quality CTE Perspectives

National Academy Foundation

- **Academy Development and Structure**: open to all students; small classes; teacher collaboration across subject areas.

- **Advisory Board**: made up of local business, higher education, and community leaders.

- **Curriculum and Instruction**: NAF curricula are created in partnership with industry professionals and designed around projects that help students make connections across subject areas, acquire valuable workplace skills, and see their education as a step toward long-term career options.

- **Work-based Learning**, including Internships: Academy students participate in a series of work-based learning activities, culminating in compensated internships, designed to provide context and career exposure and build their professional experience and networks.

Linked Learning

- Career Pathways based
- Challenging academics
- Project based learning
- Demanding technical content
- Work based learning
- Support services
CTE Research

- CTE Systems
  - Career Pathways
  - Career Academies
  - Career Magnets
  - CTE Centers

- CTE Programs/Curriculum (e.g. Auto Technology;)

- CTE Pedagogy
  - Classroom
  - CTSO
  - WBL

- Average Effects
- Effects of High Quality CTE
High Quality CTE Needs to Build These Skills

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
CTE Participation helps students “survive” high school.
Each CTE credit taken (at 3 or more) reduces the hazard of dropping out compared to students taking less than 3 CTE credits.
... but many of the people who don’t fit in are boys. A decade or so ago, people started writing books and articles on the boy crisis. At the time, the evidence was disputable and some experts pushed back. Since then, the evidence that boys are falling behind has mounted. The case is closed. **The numbers for boys get worse and worse.**

- By 12\textsuperscript{th} grade, male reading scores are below females’
- 11\textsuperscript{th} grade boys write at an 8\textsuperscript{th} grade girl level
- Boys used to have an advantage in math and science, but that gap is nearly gone.
- Boys are more likely to have discipline problems
- Boys account for $\frac{3}{4}$ all D’s and F’s
- Men are a minority in college (40%)
- 2 million fewer men graduate from college over the past decade than women
- Grad school gap is even higher

David Brooks, NYT July 5, 2012
Engagement:
CTE Keeps Boys in School!

A Survival Analysis

- CTE Participation helps boys “survive” high school
- There is no CTE “survival” effect for girls; but it “does no harm”
“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)”

Achievement: Pedagogic Tools for High Quality 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
Since the mid-1980s we have:

- 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

(ACT College Ready Math=22)

- Only 26% of students who took Alg I, II & Geometry scored a 22 (ACT Benchmark for CCR) on the ACT exam. (X=17.7)¹
- Adding Trig increases to the average score to 19.9; 37% are CCR¹
- Not until calculus is added, does the average score exceed 22; 55% are CCR – 5 years of high school math.
- 43% of ACT-tested Class of 2005¹ who earned A or B grades in Algebra II did not meet ACT College Readiness Benchmarks in math²

1. ACT, Inc (2004) *Crisis at the Core*
Math for College & Career Readiness

NCEE, 2013

- Math needed is mostly middle school
- Alg II is not a prerequisite for CC success or most careers
- College reading requires 11th/12th grade skills
- Students enter CC weak in needed math and reading skills

NRCCTE, 2013

- Math associated with an ACT score of 22 is mostly middle school math, Algebra I and some geometry.
- Math associated with middle skill job employment tests is higher than that required for an ACT score of 22 but still found in middle school math, Algebra I and some geometry.
CTE & Test Scores: Average Effects

Results from all studies show a positive effect of 0.10 (p=.16).

The studies with methodological and/or statistical controls show a positive effect of 0.13 (p=.19).
High Quality CTE: A Research Sampler

- Mathematics
- Literacy
- Science
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
Core academic skills that students need to succeed in a changing, globally competitive world include not just mastering core content but also performance skills such as:

- Ability to think critically and solve complex problems
- Work collaboratively
- Communicate effectively
- Learn how to learn (e.g., self-directed learning)

Academic content knowledge and these performance skills are inextricably linked—impossible to have one without the other (often referred to as “deeper learning”)

Common Core State Standards reflect this link
High Quality CTE: Focus on Reading

- Significant improvement from both approaches
- Teachers with two-years experience in method had greater effect
Science Integration: Experimental Studies

- Overall, no effect
- Significant effect for nonwhite males and females
Workbased Learning

WBL Approach

- Labs
- Shops
- Job shadowing
- Internships
- School-based enterprise
- Cooperative education
- Apprenticeships
- Service Learning

Potential Learning

- All aspects of an industry-curriculum integration
- Relevance of academics
- SCANS/21st Century Skills
- Skills leading to industry certifications
- Career development

- Developmental
- Increasing intensity
- Linked to industry recognized credentials
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
CTE & Transition
To the workplace, to continuing education

True Measures of College & Career Readiness
Results from all studies show a positive effect of 1.67 (p=.00).

The studies with methodological and/or statistical controls show a positive effect of 1.66 (p=.02).
Results from all studies show a positive effect of 2.57 (p=.00)

The studies with methodological and/or statistical controls show a positive effect of 1.49 (p=.00)
The good news: This is CTE’s Time

Career & Technical Education

Programs of Study/Career Pathways

High Quality CTE SREB-Advanced Careers; Linked Learning; Others

College and Career Ready
Elements of High Quality CTE

- **Rigorous Programs/Curriculum**: Such as:
  - Programs of Study (early NRCCTE evidence-experimental design)
  - Career academies – some correlational evidence
  - HSTW – strong correlational evidence
  - Project Lead the Way – strong internal evaluations
  - NCEE Board Examination Model-new
  - Linked Learning (CA)-early evidence
  - National Academies Foundation

- **Effective Pedagogy:**
  - Integrated learning-NRCCTE
  - Dual/Concurrent Enrollment
  - Work based learning-OECD

- **Systems Approach**
  - Vertical & Horizontal Integration
  - Robust Career Development
  - Link to stackable industry credentials

- **Professional Development**
Key points

• Secondary CTE keeps kids in school, especially boys
• High quality, secondary CTE enhances academic achievement; can support CCSS; improves transition to postsecondary
• High Quality CTE requires intensive and extensive career development beginning no later than middle school
• High Quality CTE requires effective teachers-technical & applied academics and professional development
• High Quality CTE nested in a robust CCR framework:
  – Vertical integration: high school & postsecondary, labor & employer
  – Horizontal integration: academic & CTE; CTE & academic
  – Internal integration: authentic, contextualized learning
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
VISIT OUR WEBSITE OR SEND ME A NOTE

www.nrccte.org

James.stone@nrccte.org
Shameless Promotion . . .

College and Career Ready in the 21st Century

Making High School Matter

James R. Stone III • Morgan V. Lewis