



# 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

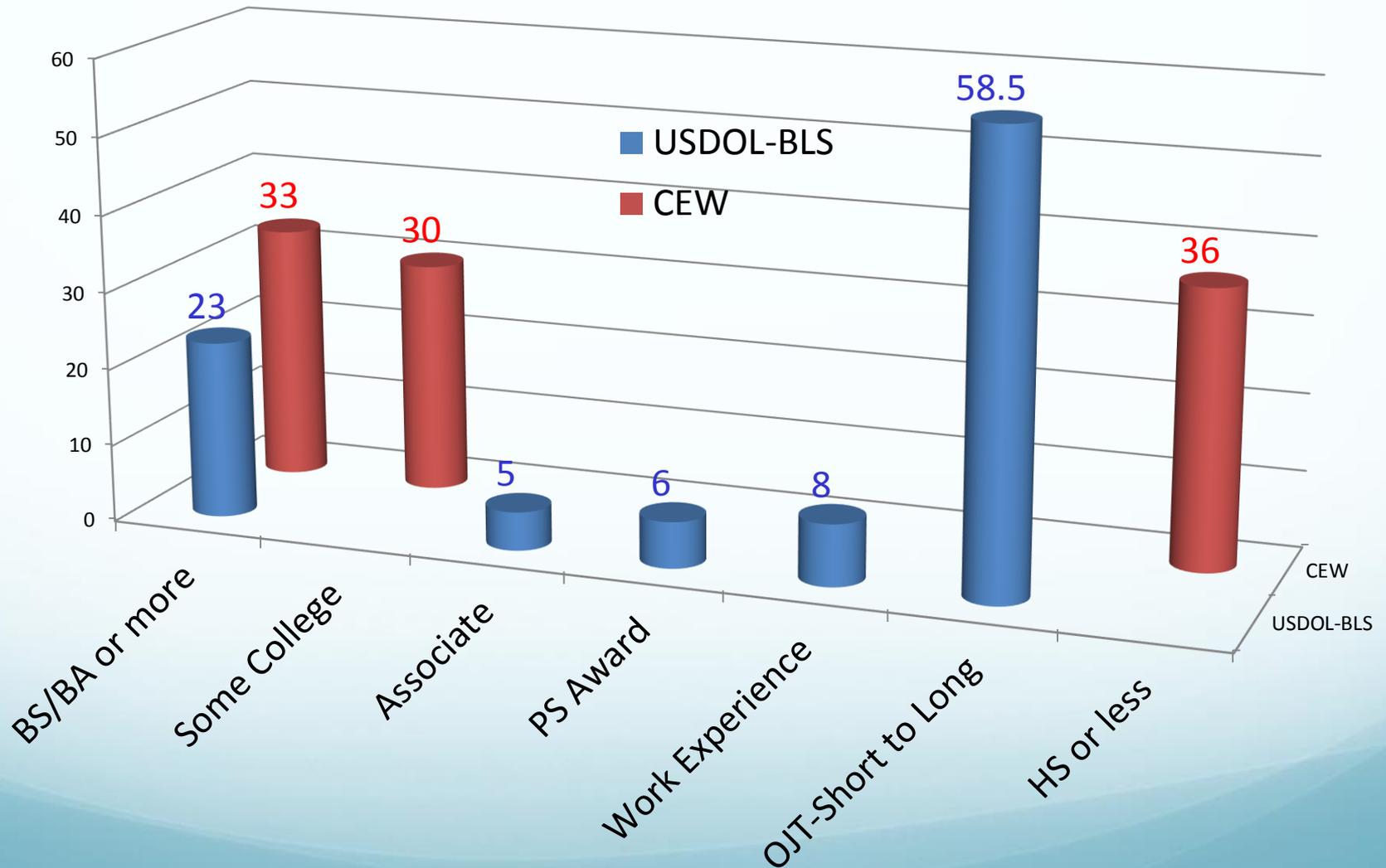
## Largest Growth Jobs

1. **Registered Nurse** (+712,000)
2. Retail Sales Person (+707,000)
3. Home Health Aide (+706,000)
4. Personal Care Aide (+607,000)
5. Office Clerks (+490,000)
10. **PS. Teachers** (+306,000)
15. **Elementary Teacher** (+249,000)

## Fastest Growth Jobs (%)

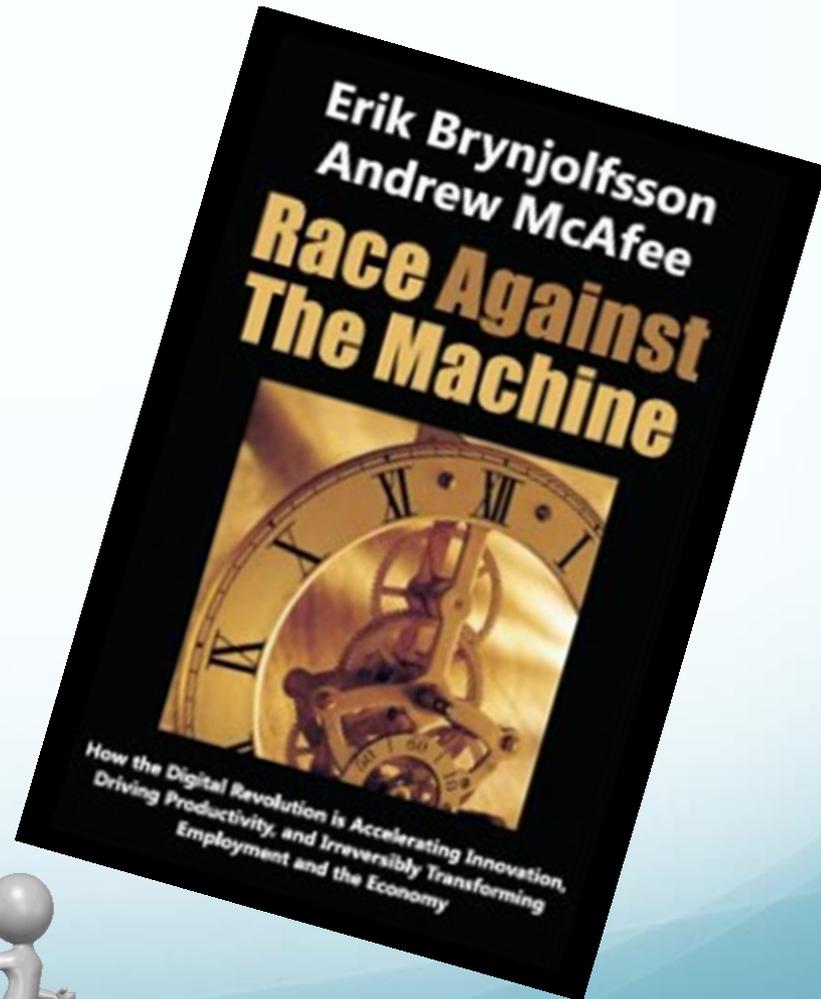
1. Personal Care Aides (+600,000)
2. Home Health Aide (+706,000)
3. **Biomedical Engineer** (+ 9,700)
4. Construction Helpers (+ 17,600)
5. Carpenter's Helpers (+ 25,900)
6. **VetTech** (+ 41,7000)
8. **Physical Therapist Asst** (+45,7000)

# Education and Future Work: BLS & CEW



# A 3<sup>rd</sup> 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<sup>1</sup>
  - 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)<sup>2</sup>
  - 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<sup>2</sup>
  - 60% of employers currently check credit ratings of new hires<sup>1</sup>
  - 78% of employers conduct pre-employment drug testing in 2013<sup>3</sup>, up from 62% in 1993<sup>4</sup>.
- Overall, 15% will prosper in the coming years, 85% will have lower standard of living than today<sup>1</sup>

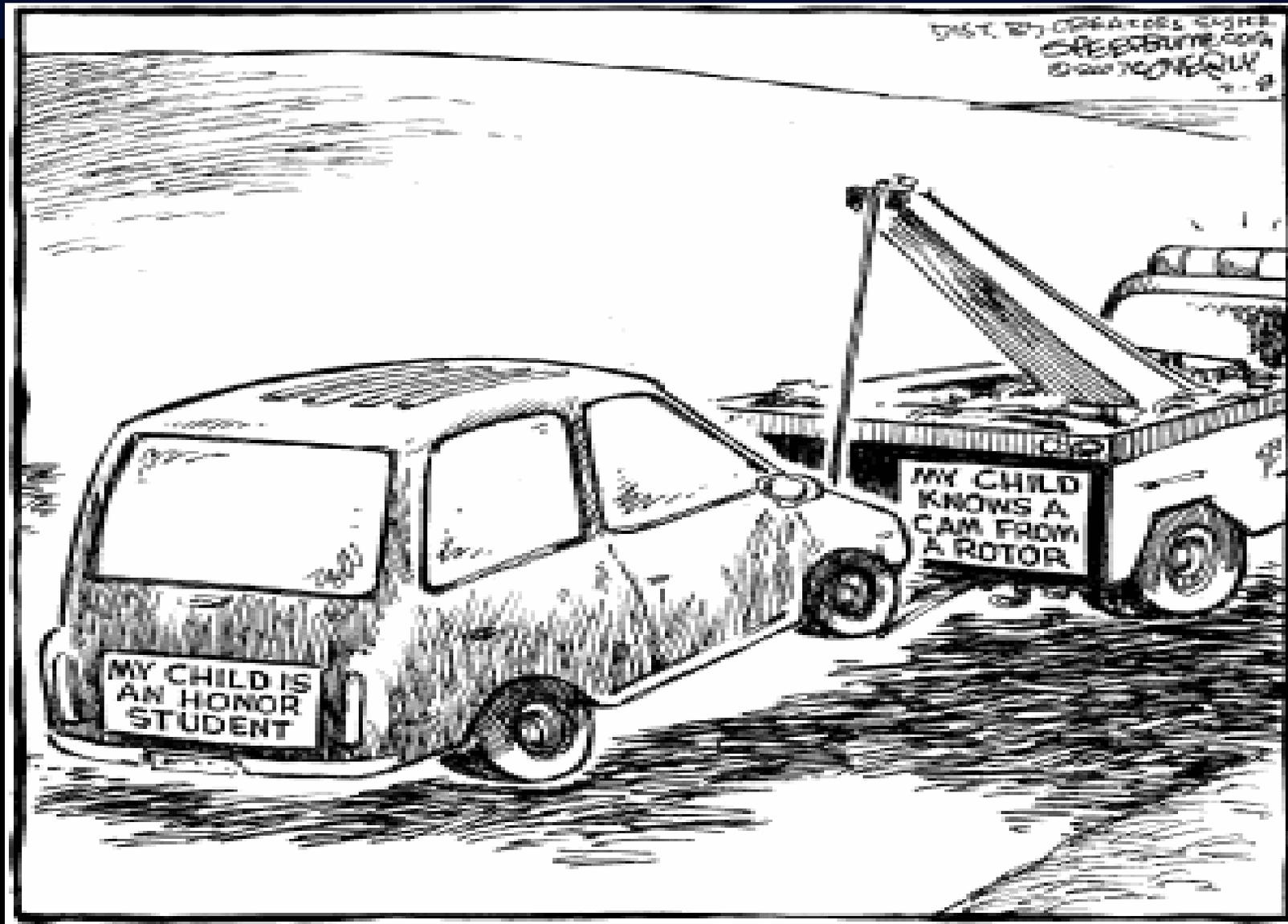
1. *Average is Over*, Cowen(2013)

2. *US News* 9/30/2013

3. SHRM, 2013

4. NBER, 2013

# The Education Problem



# Too Many College Grads?

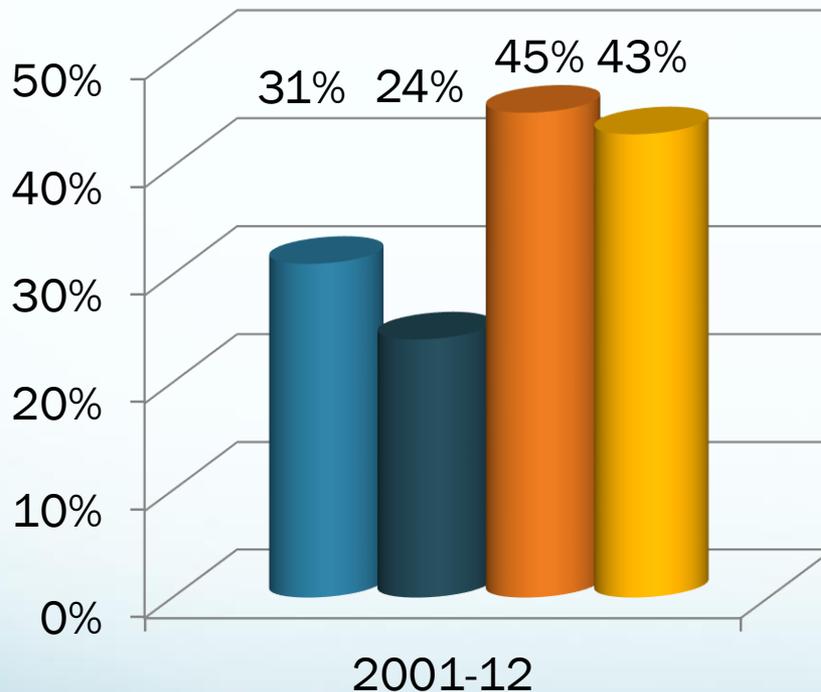
- ...turning out vastly more college graduates than there are jobs in the relatively high-paying managerial, technical and professional occupations to which most college graduates traditionally have gravitated.
- Roughly one of three college graduates is in jobs the BLS says require less than a bachelor's 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.

# 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

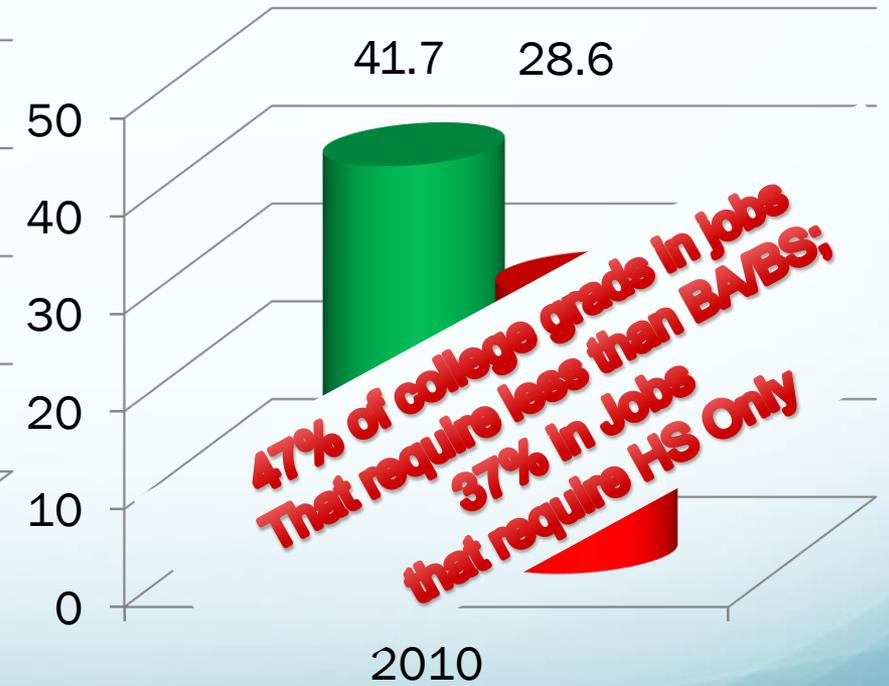
# We Know that Technical Education Matters

## Credential Growth



■ Associates ■ Bachelor's  
 ■ Master's ■ Doctorate

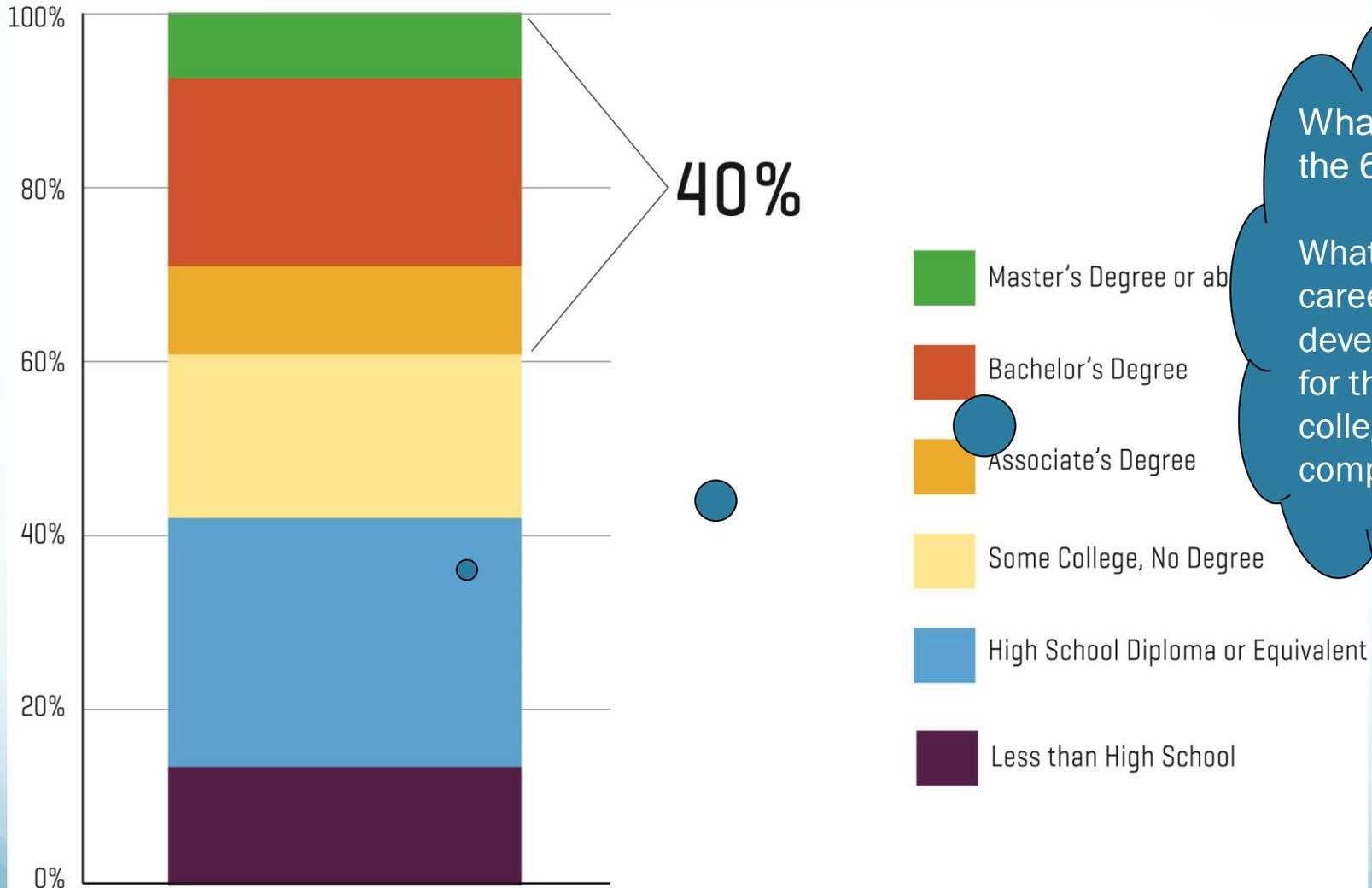
## Labor Market Demand



■ College Graduate Supply  
 ■ College Graduate Demand

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



40%

What about the 60%?

What about career development for the 40% college completers?

Educational Attainment, by Age 26-27

Note: Represents data collected in surveys between 2006-2008; GED is approximation based on data from GED Testing Program.  
 Source: Current Population Survey Annual Social and Economic Supplement.

# 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*

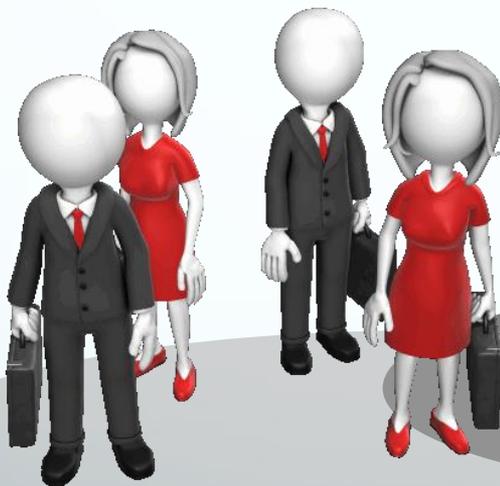
# High Quality CTE Needs to Build These Skills

## Academic

Mathematics  
Science  
Communications

## Technical

Job specific  
skills valued by  
employers



## Occupational

SCANS

21<sup>st</sup> Century Skills

“Soft” Skills

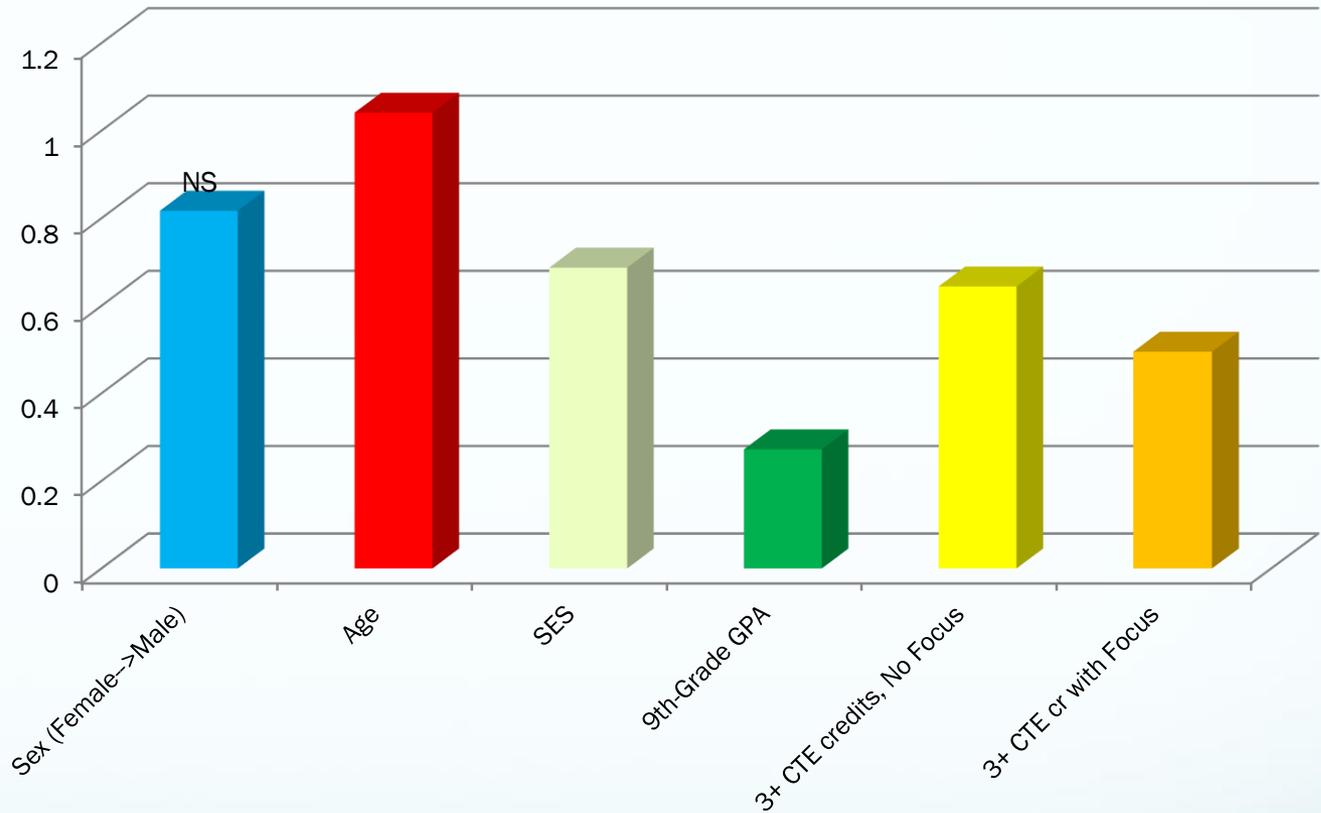
Employability Skills

College & Career  
Ready

• *Required skills*

# Finishing HS: Engagement

## A Survival Analysis



NS=Statistically not significant

- 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*

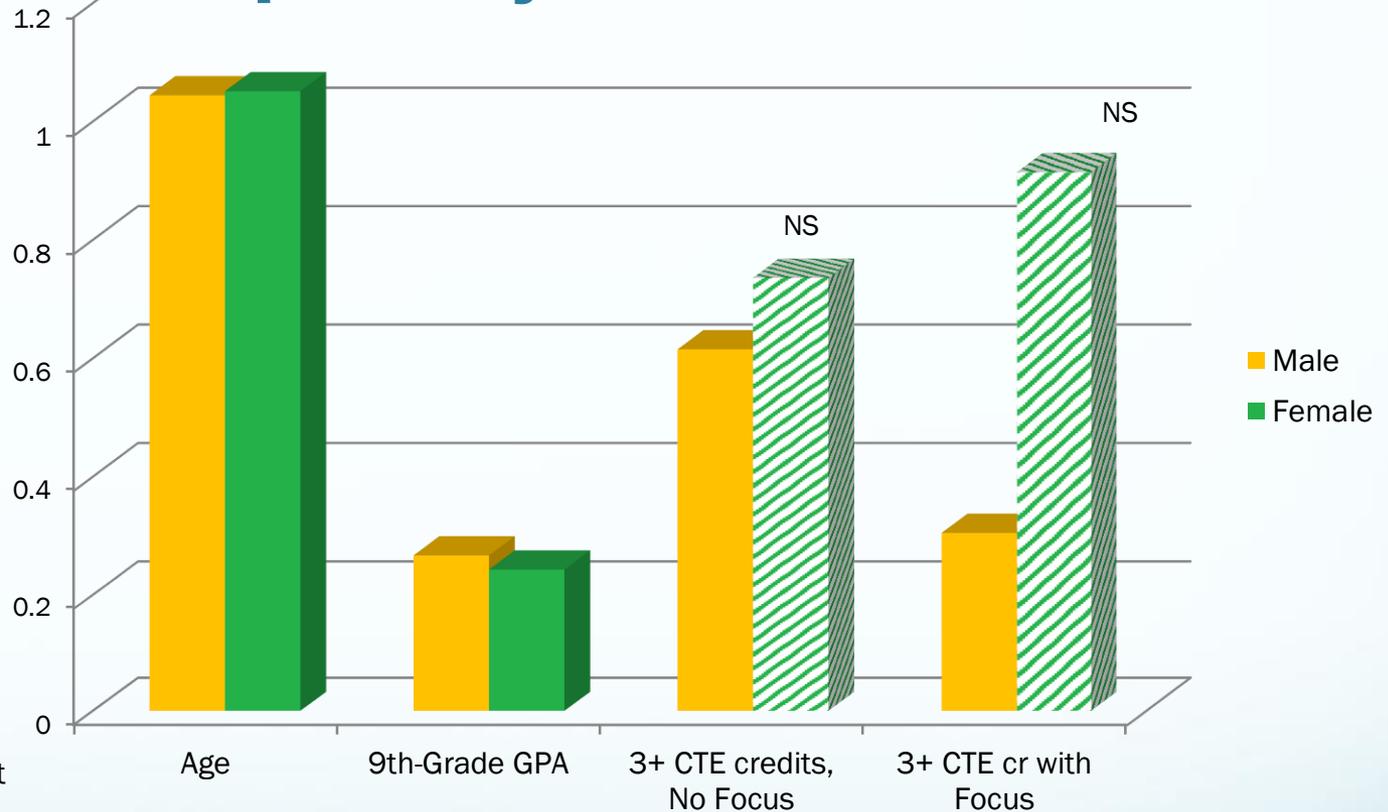
# Engagement: We have a Boy Problem

*... 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<sup>th</sup> grade, male reading scores are below females'
- 11<sup>th</sup> grade boys write at an 8<sup>th</sup> 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 ¾ 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

# 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”*

## Not Just Our Work: Economists' Perspective

“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)”

Holzer, H.J., Lane, J.I., Rosenblum, D.B. & Andersson, F. (2011). *Where are all the good jobs going.*

# Achievement: Pedagogic Tools for High Quality CTE

- **Classroom instruction**



- **Work based learning- WBL**



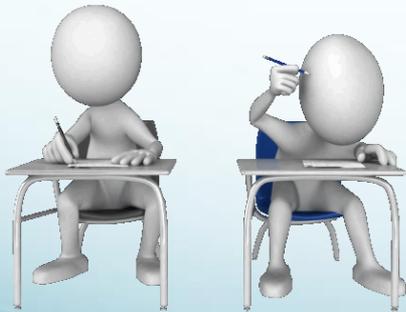
- **CTSOs**



- *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*

# Context: 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. ( $X=17.7$ )<sup>1</sup>
- Adding Trig increases to the average score to 19.9; **37% are CCR**<sup>1</sup>
- 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 2005<sup>1</sup> who earned A or B grades in Algebra II did not meet ACT College Readiness Benchmarks in math<sup>2</sup>

1. ACT, Inc (2004) *Crisis at the Core*

2. ACT, Inc. (2007) *Rigor at Risk*.

# Math for College & Career Readiness

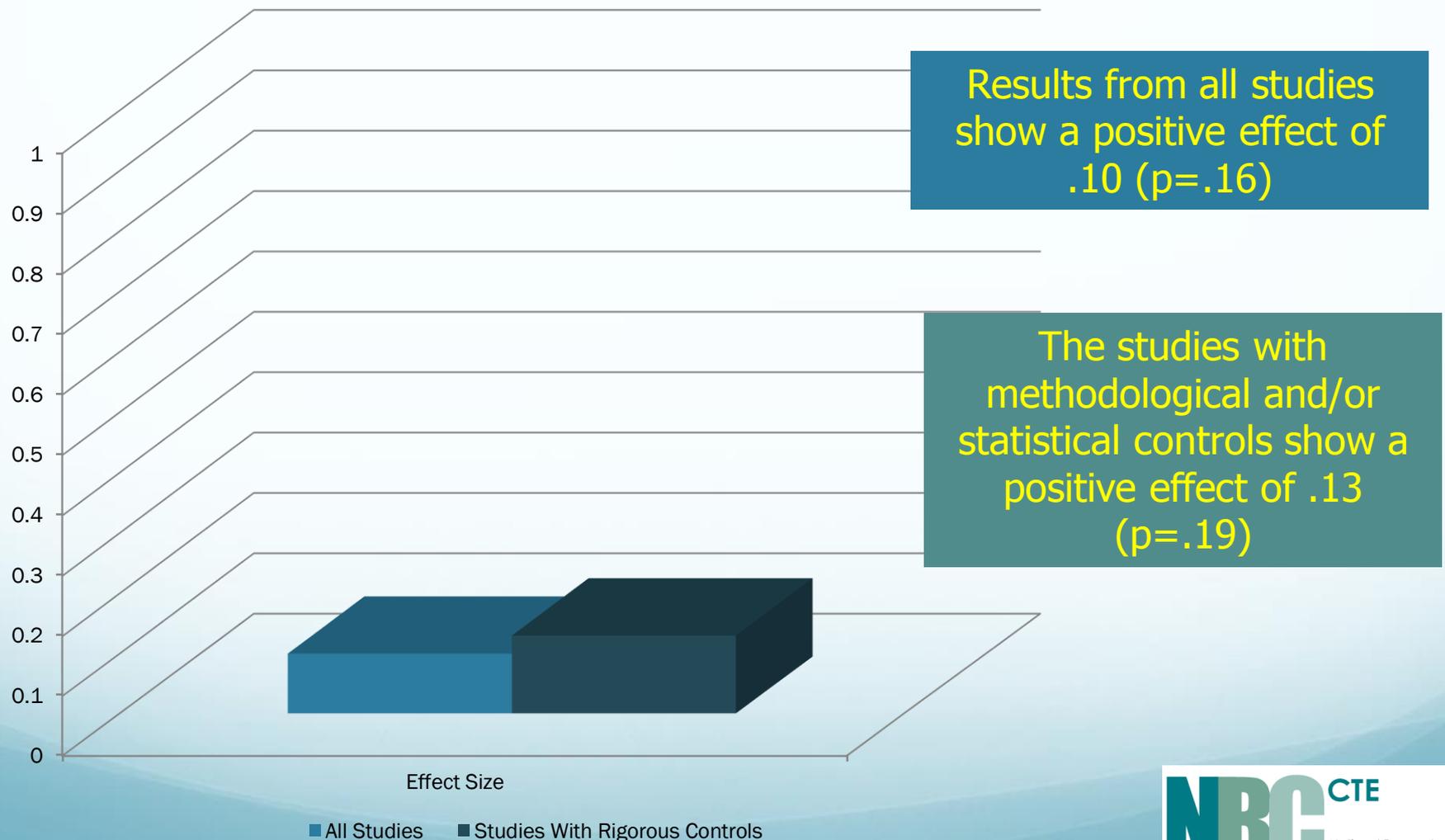
## NCEE, 2013

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

## NRCCTE, 2013

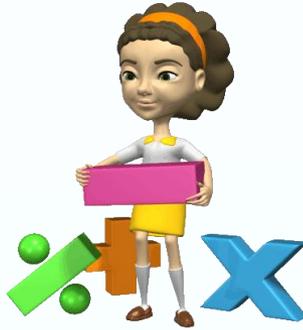
- Math associated with an ACT score of 22 is mostly middle school math, Algebra I and some geometry.
- Math associated with middle skill job employment tests is higher than that required for an ACT score of 22 but still found in middle school math, Algebra I and some geometry

# CTE & Test Scores: Average Effects



# 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: 71<sup>st</sup> percentile & 67<sup>th</sup> percentile
- No negative effect on technical skills
- 11% of class time devoted to math lessons



# Link to the Common Core Standards

- 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



- Significant improvement from both approaches
- Teachers with two-years experience in method had greater effect



## High Quality CTE: Focus on Reading

# 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/21<sup>st</sup> 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 doses of WBL* have significantly higher:

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

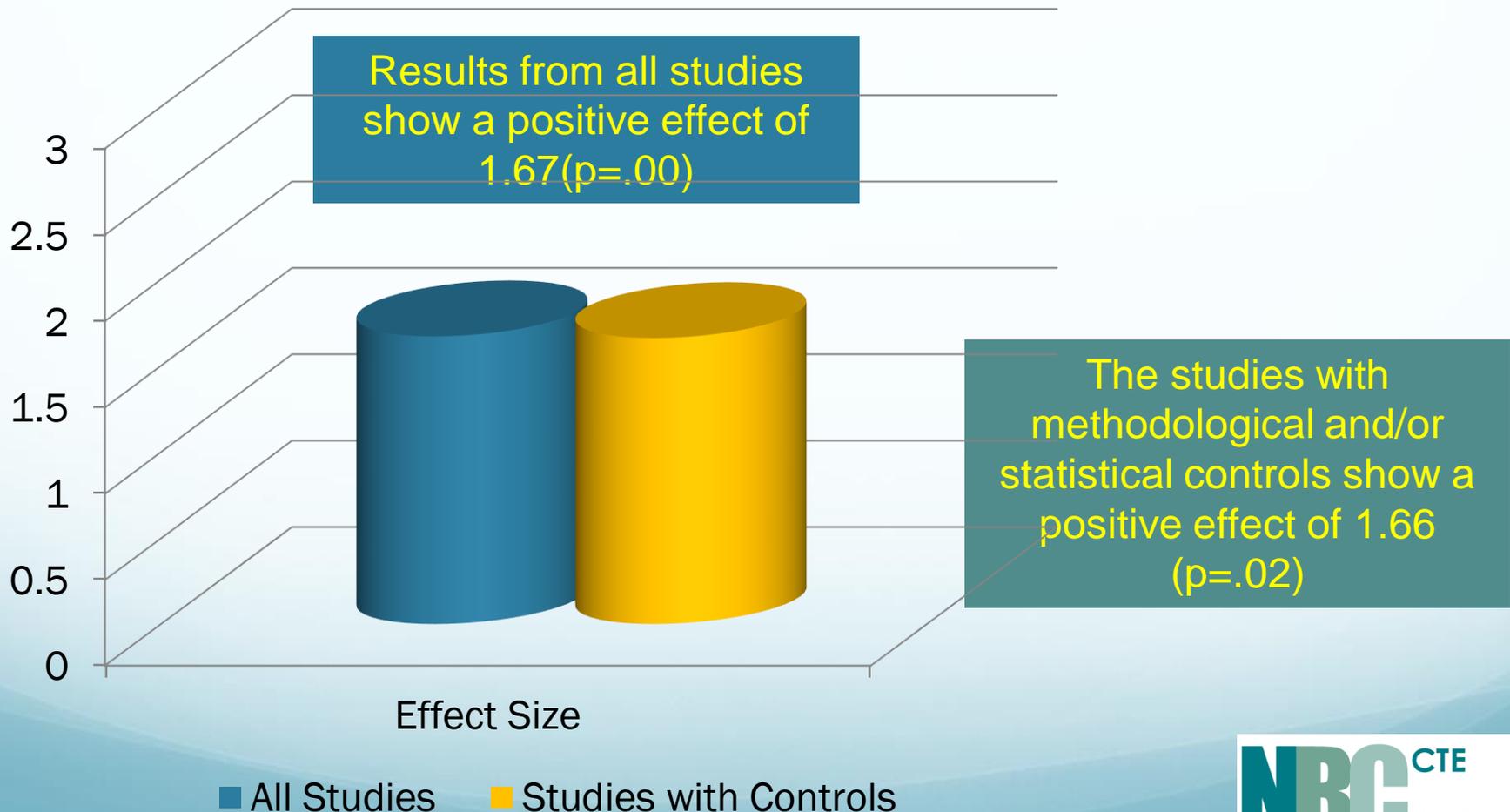
# CTE & Transition

To the workplace, to continuing education

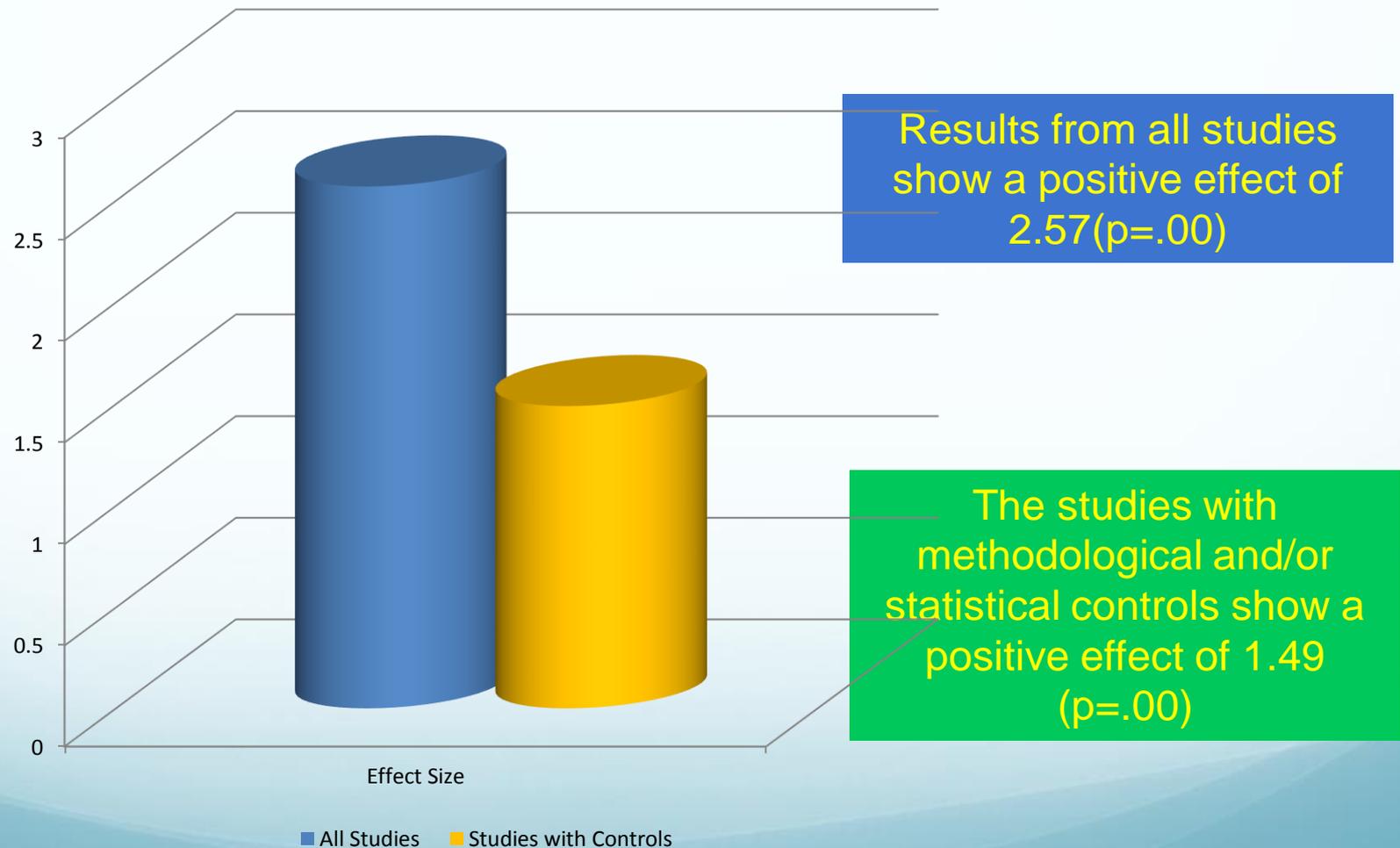


True Measures of College &  
Career Readiness

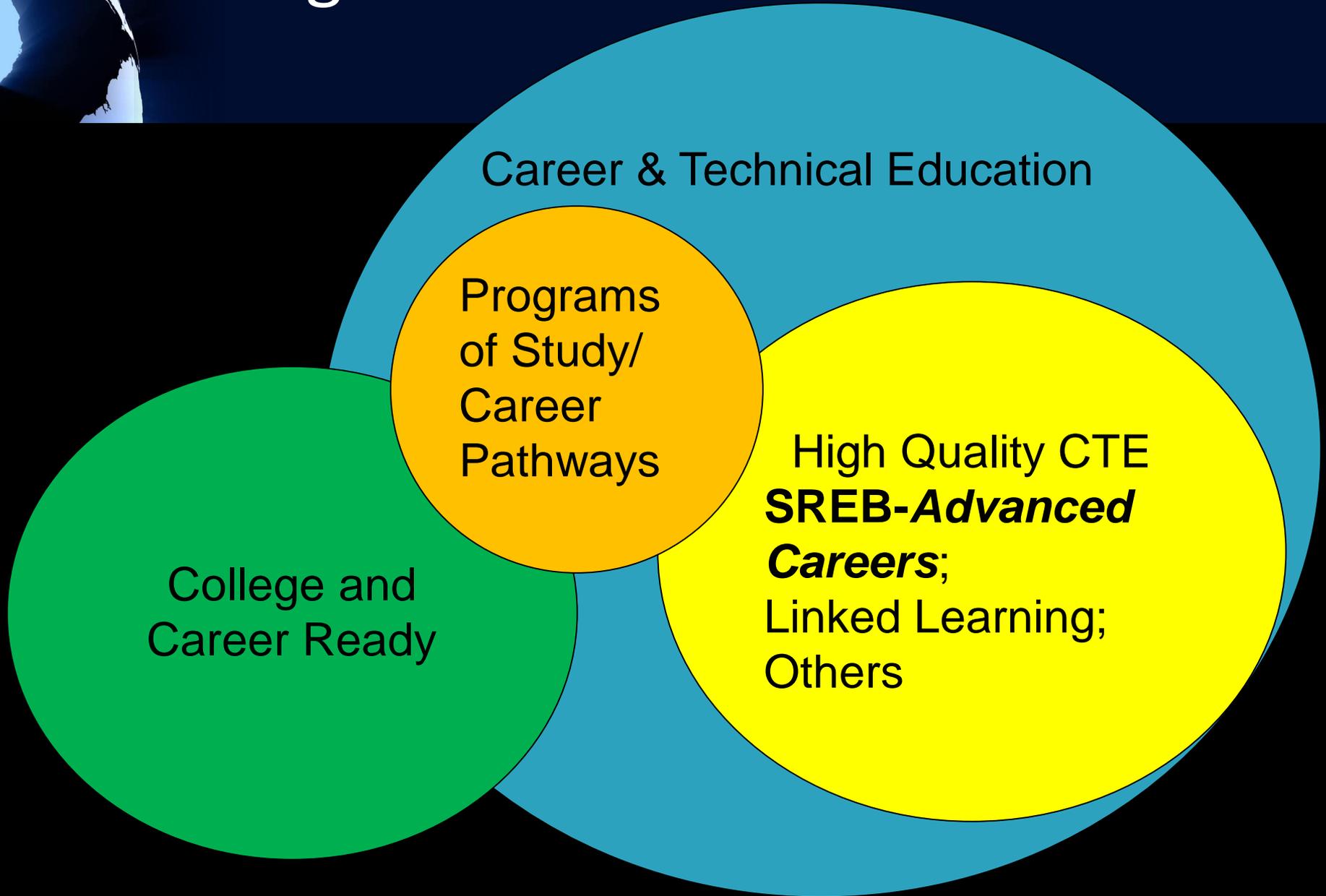
# Meta Analysis CTE Participation & College Enrollment: Average Effects



# Meta Analysis CTE Participation & Employment

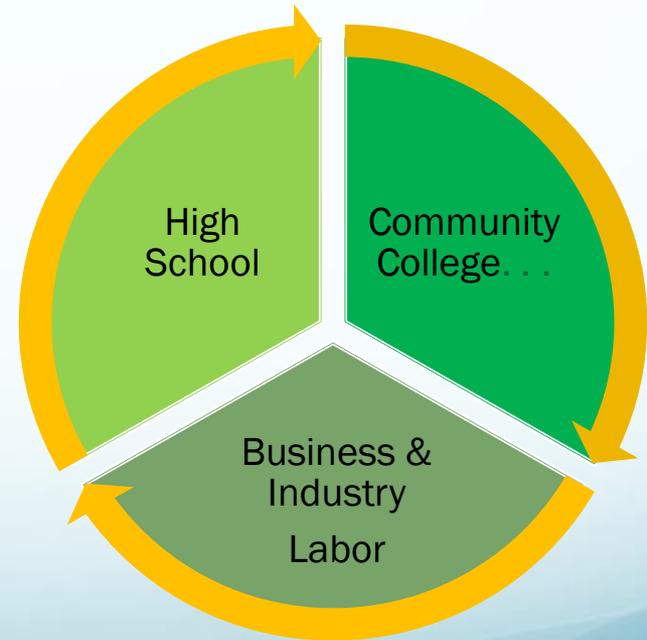


# The good news: This is CTE's Time



# 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

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# Shameless Promotion . . .

