



What do we mean

College **AND** Career Ready?

James R Stone III
Director



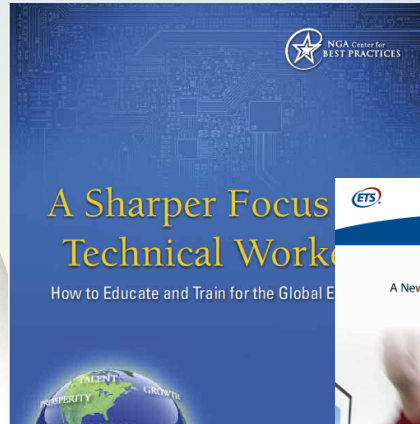
Many Perspectives . . .

Into the Eye of the Storm:
Assessing the Evidence on Science and Engineering
Education, Quality, and Workforce Demand

October 2007

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AMERICA'S FORGOTTEN MIDDLE-SKILL JOBS

EDUCATION AND TRAINING REQUIREMENTS
IN THE NEXT DECADE AND BEYOND



Harry J. Holzer
Georgetown University and The Urban Institute

Robert I. Lerman
American University and The Urban Institute

November 2007



center on reinventing public education

working
papers

2 0 1 0

**Multiple Pathways To Graduation:
New Routes to High School Completion**

Shannon Marsh with Paul Hill

cpe working paper # 2010_2

GRADUATED SUCCESS:

Sustainable Economic
Opportunity Through
One- and Two-Year
Credentials



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)

Another perspective

- No support ... that those not going to college need to be qualified to enter college credit courses in order to enter the workforce.
- Becoming qualified for college-level classes or for entering a job directly out of high school is not the sole purpose of a high school education, e.g. preparing citizens to participate in a democracy.

Barton, P (ETS, 2006)



GOAL
AHEAD

Agenda

- What is college and career ready?
- What is “work ready?”
- How do you ensure work/career readiness?
- How do you assess readiness?

The College & Career Dilemma

9th Grade Cohort

- ▾ 100 enter 9th grade*
- ▾ 75 complete HS
- ▾ 52 Start college

Benchmarks

- ▾ 75% complete HS¹
- ▾ 70% start college immediately²
- ▾ 47% drop out (31% with 0 credits)
- ▾ 57% complete within 6 years³

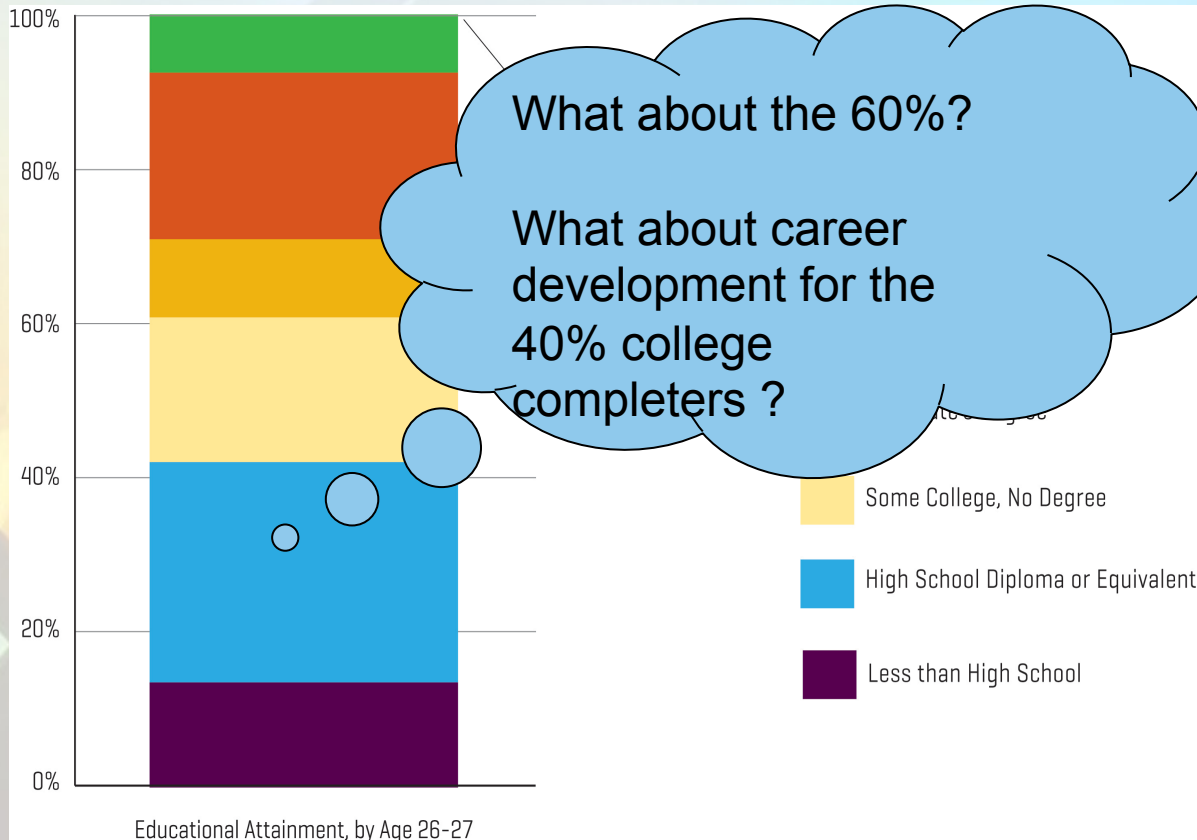
Workforce Credentials

- 25% enter as HS drop outs
- 23% enter as HS grad
- 24% enter with some college & a lot of debt
- 28% enter with college degree (6/4;3/2)

1. Greene et al, 2006
2. NCHEMS, 2009 (2006)
3. NCES, 2010

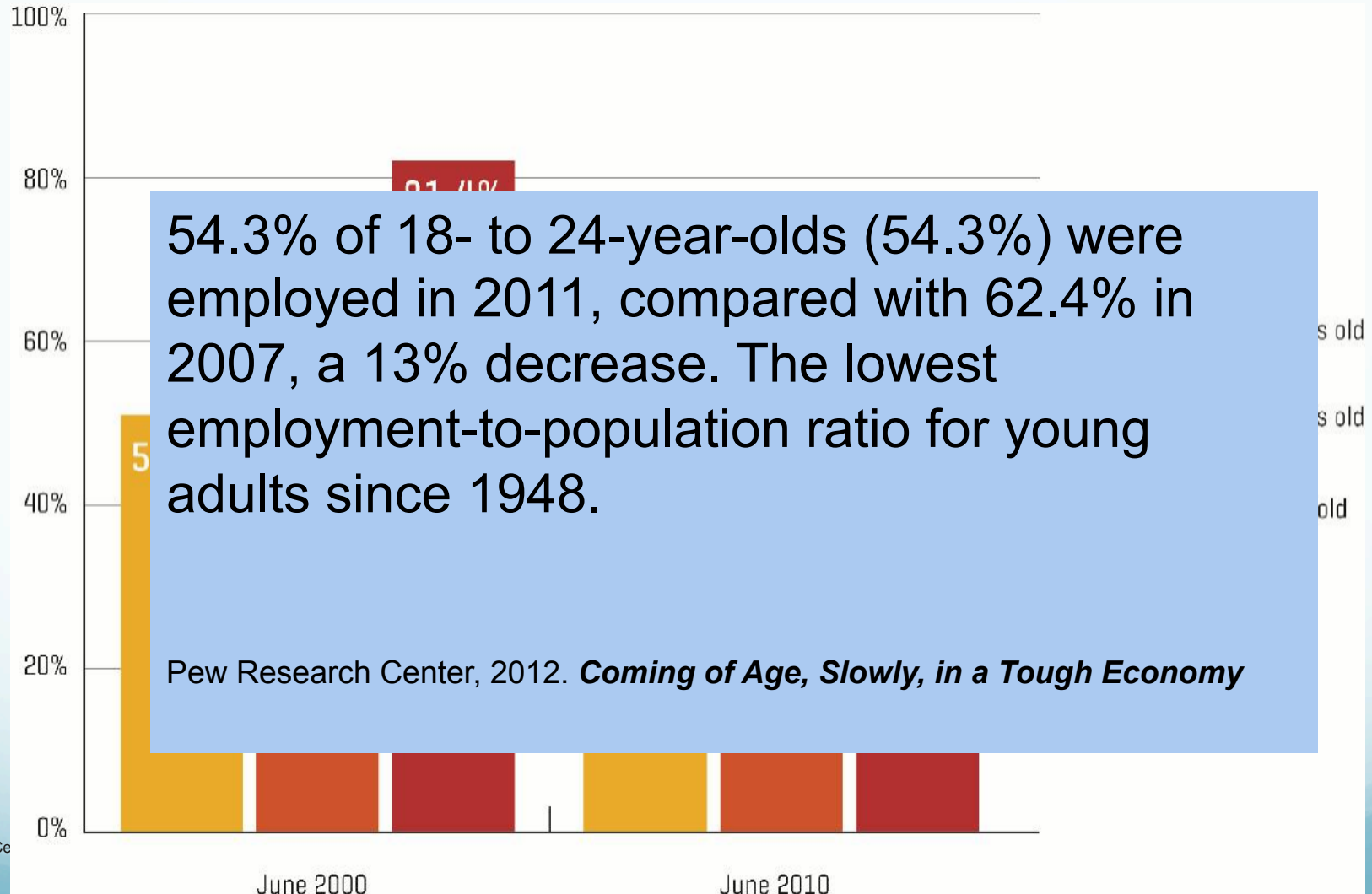
*An unknown number of pre-9th graders never make it to high school

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.
Source: Current Population Survey Annual Social and Economic Supplement.

Teens and Young Adults have been hit the hardest by the Great Recession





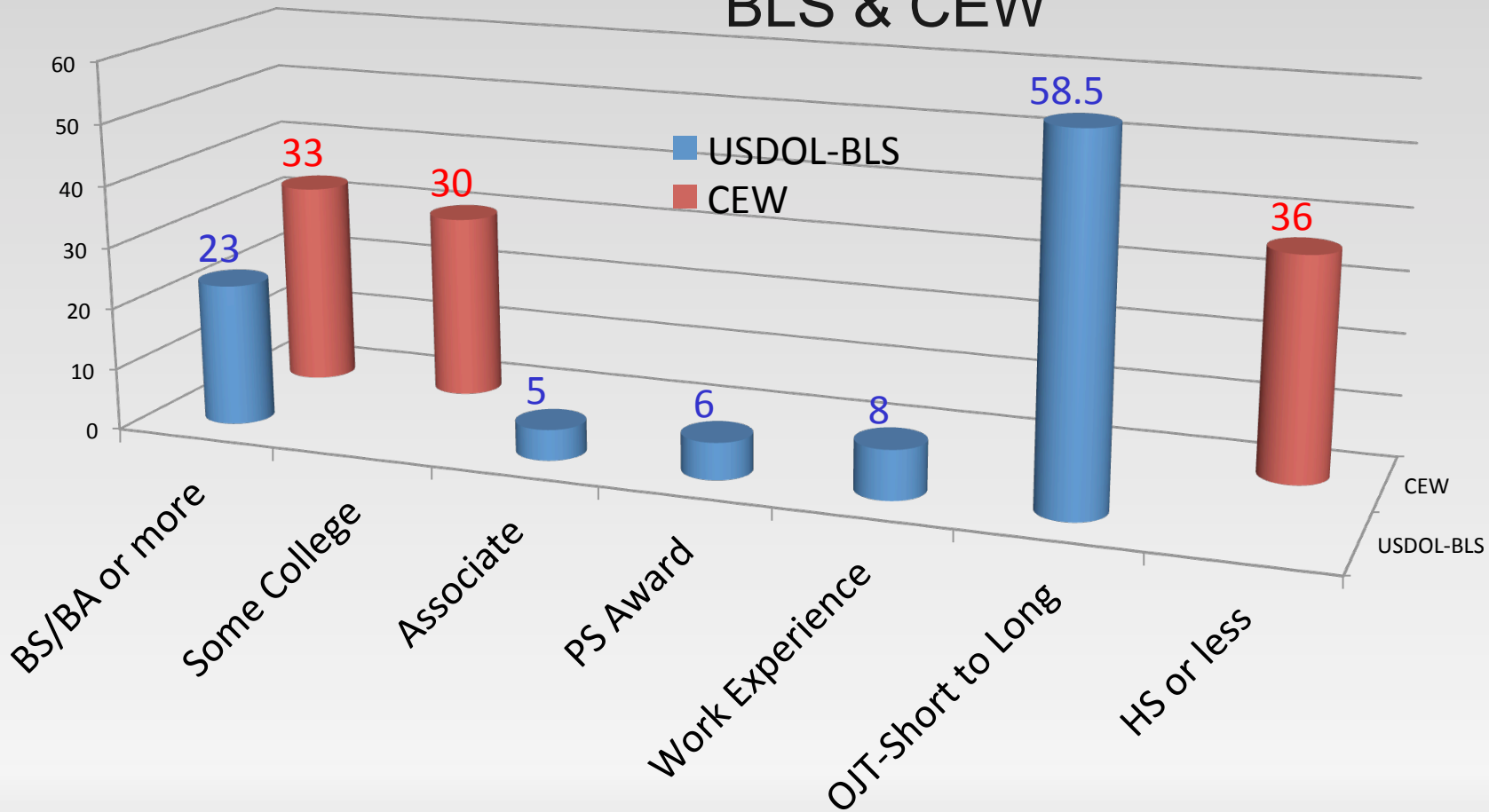
CONSIDER WHAT IS
REQUIRED FOR THE
WORKPLACE OF TOMORROW:
WHAT TO TEACH

**GOAL
AHEAD**

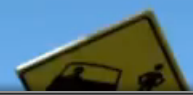


Education and Future Work:

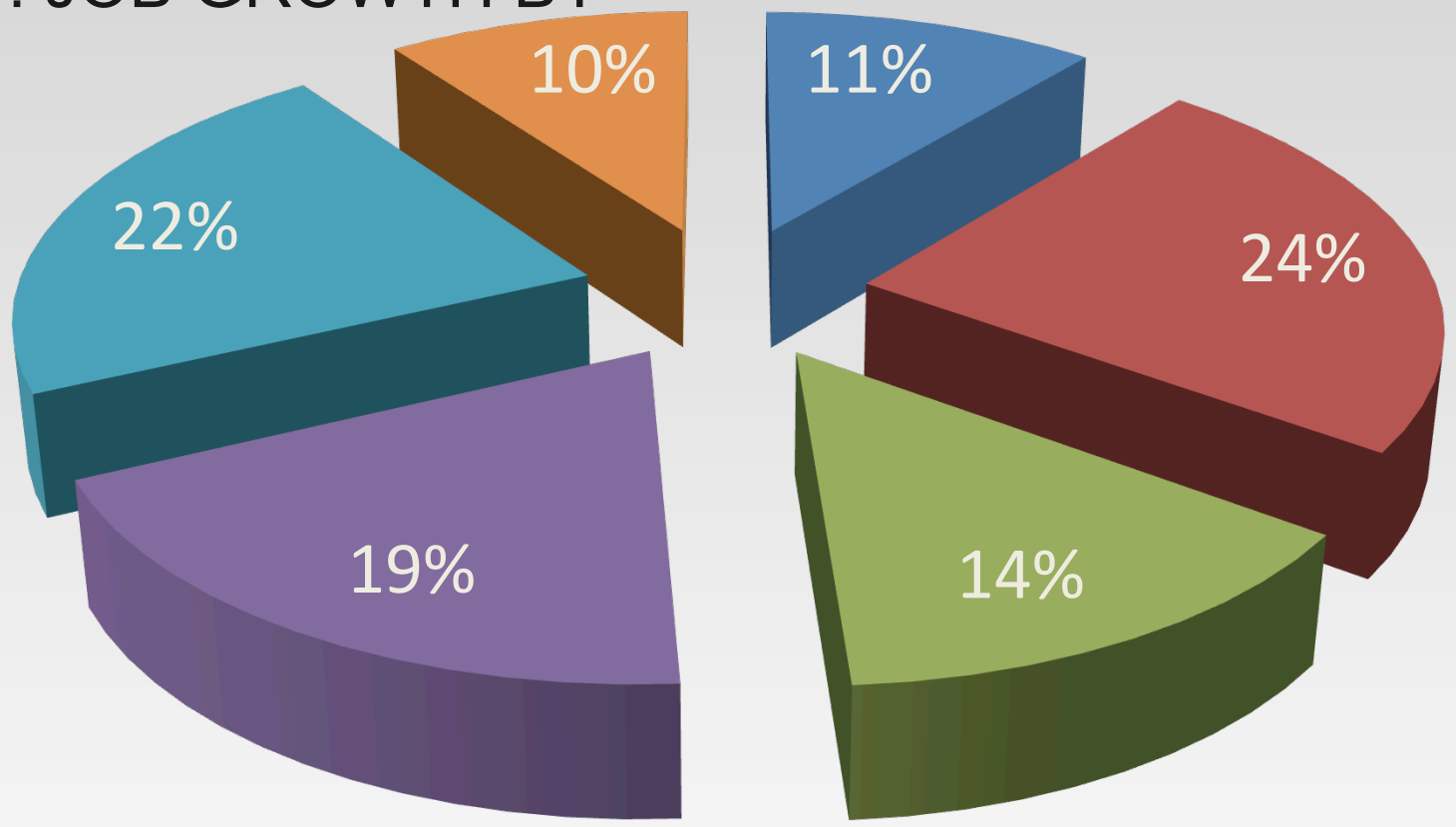
BLS & CEW



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ONE REALITY: JOB GROWTH BY EDUCATION



Less than HS

High School

Some PS

Associate Degree

Baccalaureate

Masters or higher

Getting students ready for careers and college :

Their future

Academic
Mathematics
Science
Communications

Technical
Job specific
skills valued by
employers



Occupational
Employability
Non-cognitive

College & Career
Ready

• **Required skills**

To be college ready: What college, what skills?



Academic Skills & Knowledge

1. Framework
2. Where skills are learned

- Trade/Technical School?
- Apprenticeship?
- Community College?
 - Certificate? Diploma? Degree-Selective or not?
 - Nursing
 - Allied health
 - Law enforcement
 - Engineering technology
 - Computer technology
 - Cut scores?
- Baccalaureate College?
 - MN College Readiness Benchmarks set by ACT: an 18 in English, 22 in Math, 21 in Reading, and 24 in Science.
 - Only 32% of Minnesota's 2009 ACT-tested graduates met all four

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

Career Ready Electronic Technician – Level 5*

Requirements

- ▼ Familiarity with PC and Server Operating Systems
- ▼ Understanding of networking principles.
- ▼ Understanding of network protocols and standards.
- ▼ Ability to troubleshoot network issues.
- ▼ Excellent communication skills.
- ▼ Experience with network hardware and software.
- ▼ Experience with Lexmark printers.
- ▼ Experience with Toledo and Honeywell systems.
- ▼ Experience with Nortel BCM and Toshiba systems.
- ▼ Experience with Fujitsu Self Checkout systems.
- ▼ Experience with Cisco routers and HP network switches.

Skills

- ▼ Tech Skills
- ▼ Tech Skills
- ▼ WBL
- ▼ Soft Skills
- ▼ Soft Skills
- ▼ Soft Skills
- ▼ Soft Skills

***Most ads call for
2-years of ed/training &
experience**

ACT Score	Level	ACT Standard-Associated Task
13-15	Alg I / CC HS	Simplify ratios
16-19	Alg I / CC 8 th	Add, subtract, multiply, and divide rational numbers, including integers, fractions, and decimals, without calculators
	Alg I / CC HS	Use rational numbers to demonstrate knowledge of additive and multiplicative inverses
20-23	Alg I / CC 8 th	Set up and solve problems following the correct order of operations (including proportions, percent, and absolute value) with rational numbers (integers, fractions, decimals)
	Alg I / CC 8 th	Give the domain and range of relations and functions
	Alg I / CC 8 th	Evaluate functions at given values
	Alg I / CC HS	Apply algebraic properties (e.g., commutative, associative, distributive, identity, inverse, substitution) to simplify algebraic expressions
	Alg I / CC HS	Translate real-world problems into expressions using variables to represent values
	Alg I / CC HS	Identify the effect on mean, median, mode, and range when a set of data is changed
	Alg I / CC HS	Find the probability of a simple event
	Geo / CC 8 th	Identify corresponding, same-side interior, same-side exterior, alternate interior, and alternate exterior angle pairs formed by a pair of parallel lines and a transversal and use these special angle pairs to solve problems (e.g., solve equations, use in proofs)

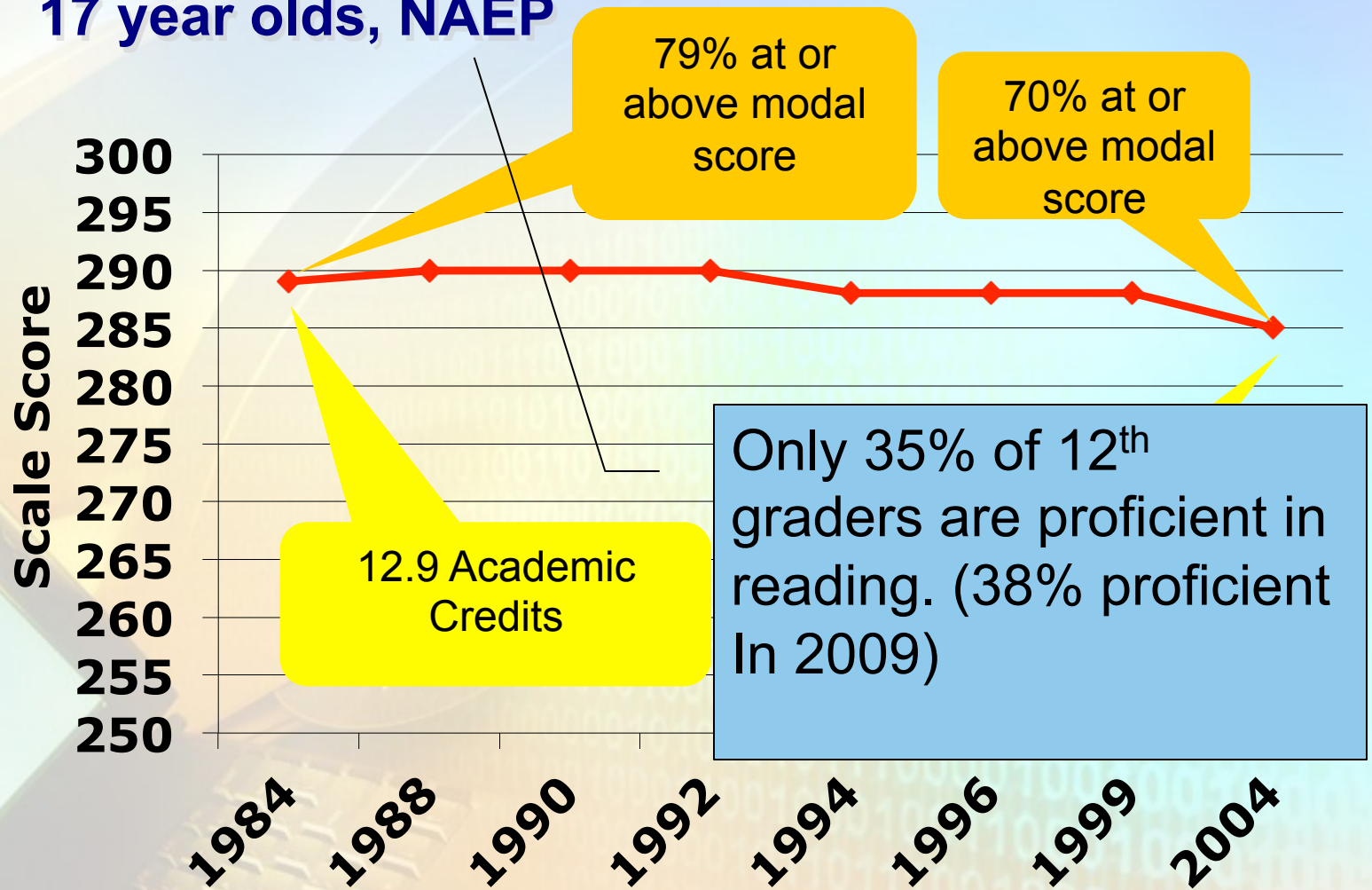
Course/ Common Core	ACT Topic	ACT Score
Alg I CC 8th	Add, subtract, multiply, and divide rational numbers, including integers, fractions, and decimals, without calculators	(16-19)
Alg I CC 8 th HS	Use properties of exponents (including zero and negative exponents) to evaluate and simplify expressions	(28-32)
Alg I CC 8th	Find rational number square roots (without calculators) and approximate irrational square roots (with and without calculators)	(24-27)
Alg I CC 8th	Evaluate and simplify radical expressions	(24-27)
Alg I CC 8th	Use scientific notation when working with very large or very small quantities	(24-27)
Alg I CC 8th	Set up and solve problems following the correct order of operations (including proportions, percent, and absolute value) with rational numbers (integers, fractions, decimals)	(20-23)
Alg 8th	Identify, formulate, and obtain solutions to problems involving direct and inverse variation	(24-27)
Alg I CC 8th	Recognize the concept of slope as a rate of change and determine the slope when given the equation of a line in standard form or slope-intercept form, the graph of a line, two points, or a verbal description	(24-27)
Alg I CC 8th I CC	Translate between different representations of relations and functions: graphs, equations, sets of ordered pairs, verbal descriptions, and tables	(24-27)
Alg I CC 8th	Interpret data from line, bar, and circle graphs, histograms, scatterplots, box-and-whisker plots, stem-and-leaf plots, and frequency tables to draw inferences and make predictions	(28-32)
Alg I CC HS	Simplify ratios	(13-15)
Alg I CC HS	Solve formulas for a specified variable	(24-27)
Geo CC HS	Apply relationships between perimeters of similar figures, areas of similar figures, and volumes of similar figures, in terms of scale factor, to solve mathematical and real-world problems	(28-32)
Geo CC HS	Use cross sections of prisms, cylinders, pyramids, and cones to solve volume problems	(28-32)
Geo CC HS	Find the lateral area, surface area, and volume of prisms, cylinders, cones, and pyramids in mathematical and real-world settings	(28-32)
Geo CC HS	Find the surface area and volume of a sphere in mathematical and real-world settings	(28-32)

Career Ready Math Skills: Getting the job*

Algebra I	Telecommunication Junior Technician
	Nursing
	HVAC
	Survey Technician
	Plumbing
	Automobile Technician
Geometry	Survey Technician
	Plumbing
	Automobile Technician
	Nursing
	HVAC
Algebra II	Telecommunication Junior Technician

*Preliminary analysis, NRCCTE 2012

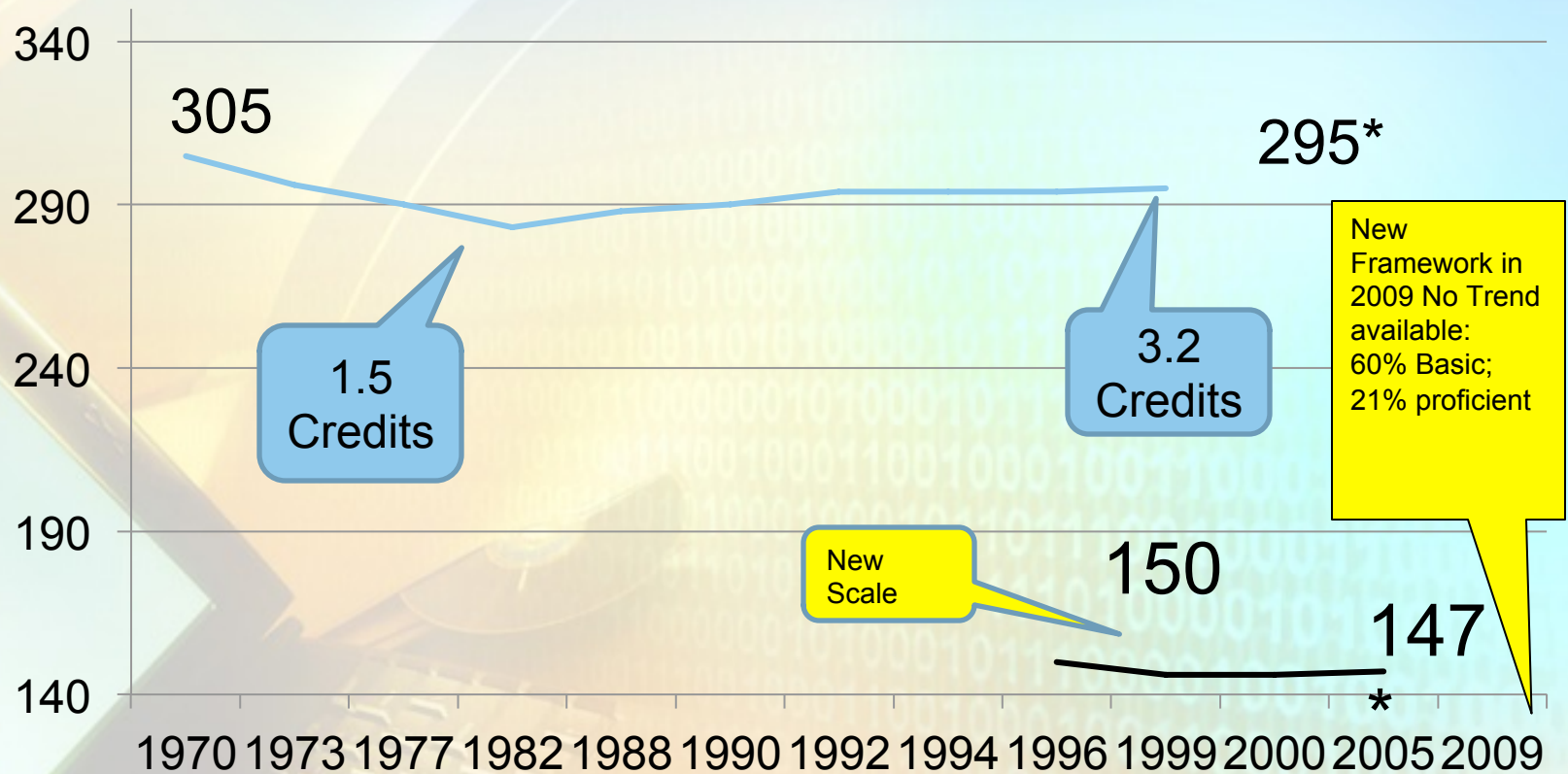
Achievement Flat or Declining in Reading, 17 year olds, NAEP



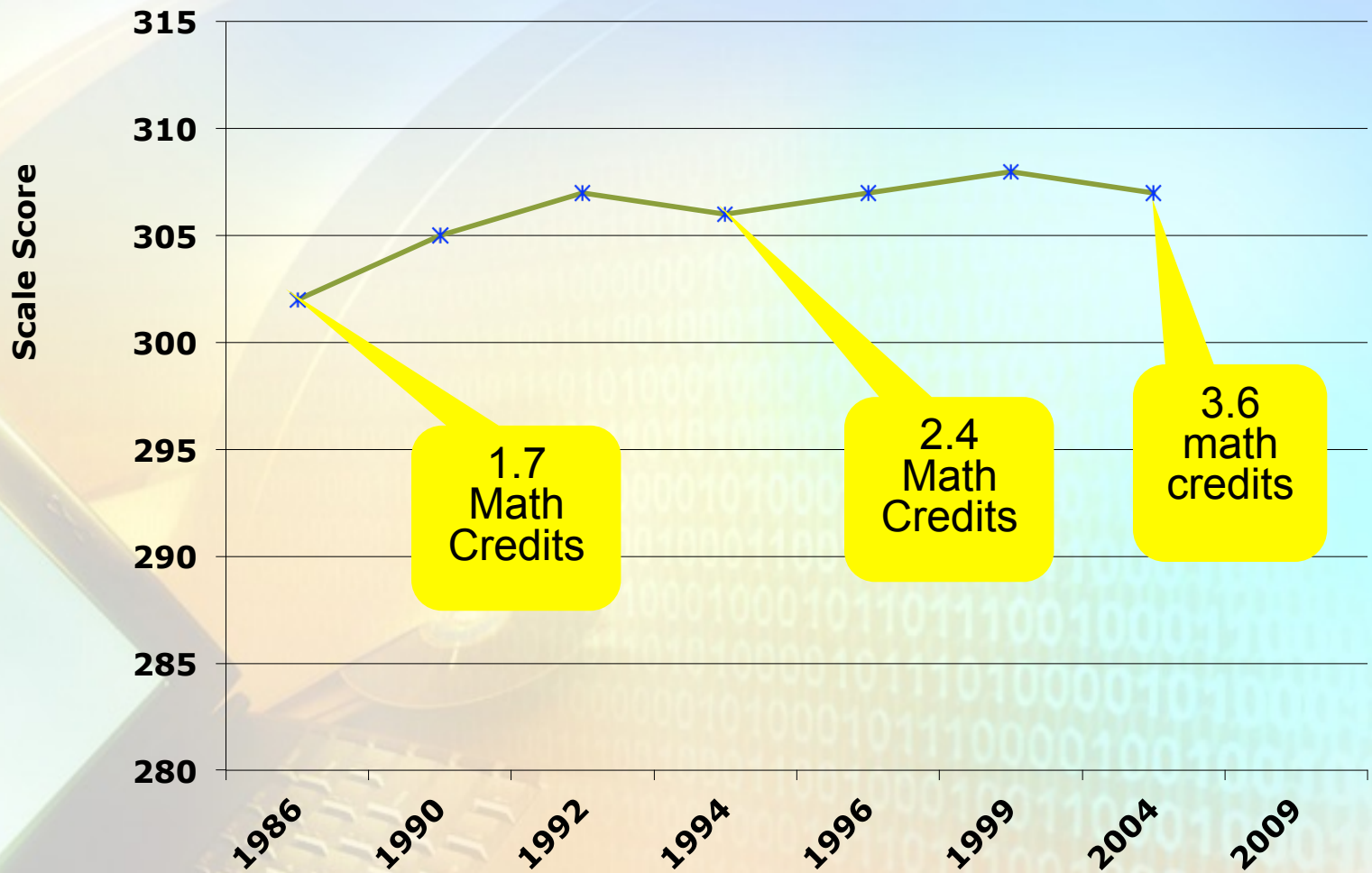
Note: Long-Term Trends NAEP

Source: NAEP 2004 Trends in Academic Progress.

NAEP Science Scores – High School



HS Achievement In Math



Note: Long-Term Trends NAEP

Source: NAEP 2004 Trends in Academic Progress and NAEP 1999 Trends in Academic Progress.

Occupational Skills

Non-Cognitive

- Deal with setbacks
- Stay on track
- Consistency
- Easily distracted
- Hard worker
- Persistence
- 'Stick-to-it tiveness'
- Diligence
- Duckworth, 2011 "Grit"



Employability

- Teamwork
- Oral & written skills
- Professionalism
- Ethics
- Creativity
- Problem solving
- Ethics
- Systems knowledge
- Responsibility
- SCANS, 21st Century

What technical skills?

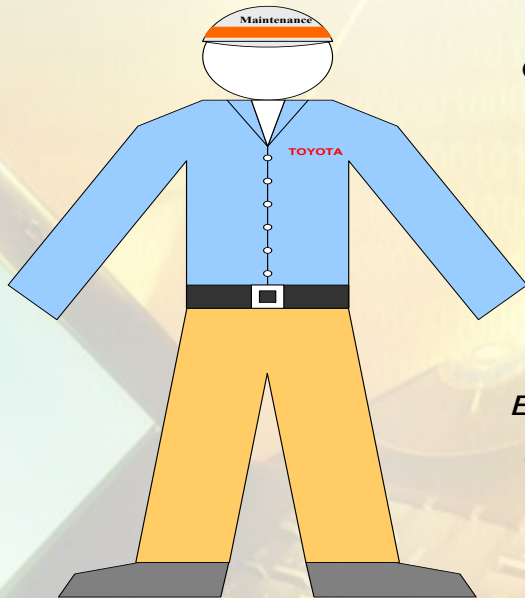


- ▾ Immediate specific job skills*
- ▾ Industry certifications
- ▾ 132 available through HS programs (n=14 states)

* Learning for jobs (OECD)

An Industry Perspective on AOT Skills

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 processes manuals, guides)

Effective Interpersonal Skills

Natural Teamworker

Qualified for the Next Level



Target:
100% of Maintenance Workforce



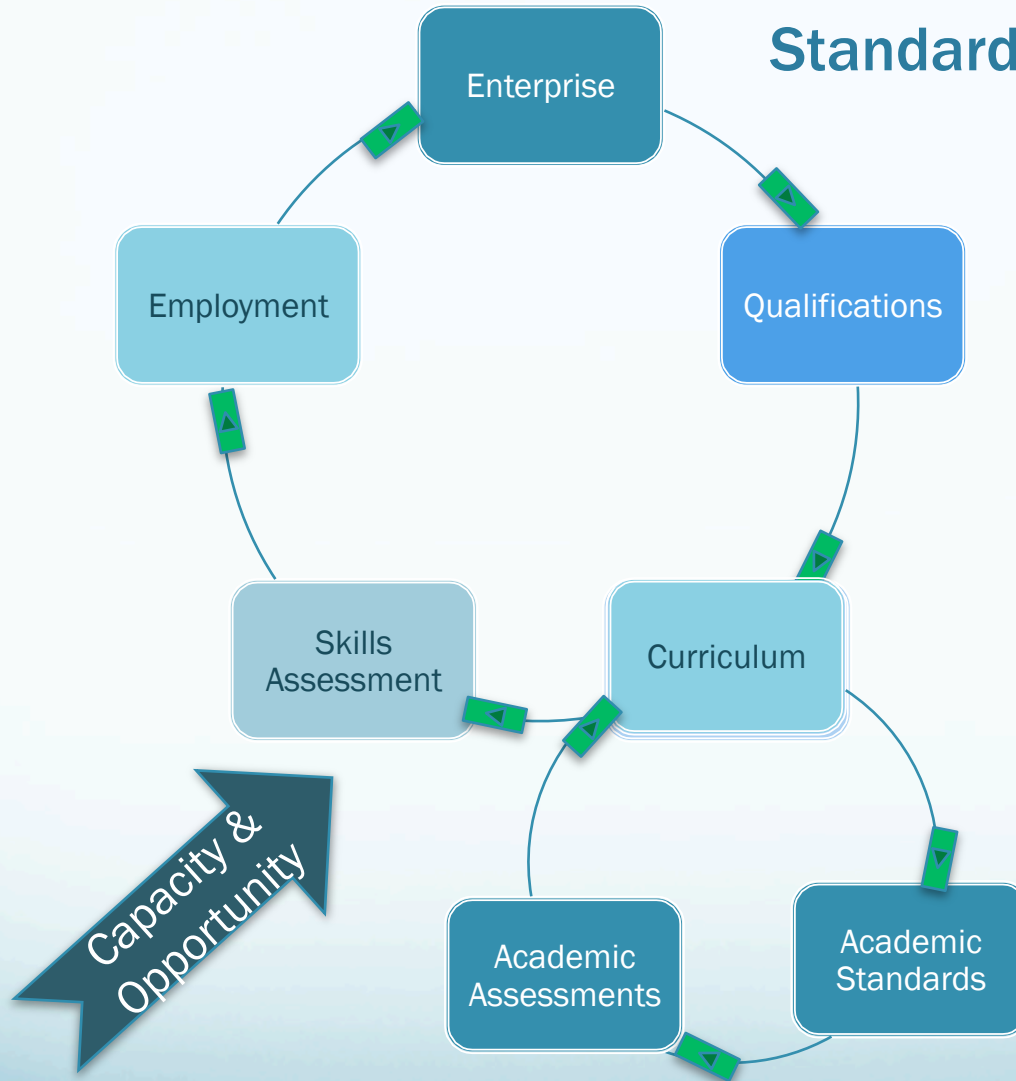
CONSIDER WHAT IS
REQUIRED FOR THE
WORKPLACE OF TOMORROW:
HOW TO TEACH CAREER
READINESS



For **Career** and College Readiness

FOCUS ON CURRICULUM

Curriculum is Derived from Industry AND Academic Standards: A Signature Feature



Industry Certification

- Developed by and used for a specific industry
- Various industries have designated standards for certificates, certifications and licensures
- Certificates may allow individuals to enter directly into the workforce
- Recognized as a as a measure of technical skill attainment for senior preparatory students in career and technical education as a part of Perkins accountability

Source: 705 KAR 4:231, Section 11; Industry-Recognized Certificate Programs and Job Corps: Working Toward a Skilled and Qualified Workforce published by MTC Institute

Linking to Industry Standards*

- Construction Technology
- Engineering Technology
- Digital Design
- NCCER – Construction Curriculum Framework
- NCCER – Construction Math Curriculum Framework
- Adobe Certified Associate
- ASE Brakes, Electrical, Engine Performance

*Florida

Build a System with "Stackable Credentials"

What is a stackable credential?

Part of a sequence of credentials that can be accumulated over time to build up an individual's qualifications and help them to move along a career pathway or up a career ladder to different and potentially higher-paying jobs.



(Source: TEGL 15-10, www.doleta.gov)

Career Pathway – Stackable Credentials

A recent McKinsey Global Institute study concludes, “policymakers and business leaders across the globe will need to find ways to vastly improve their capacity to provide job-relevant education and training. And, in both developing and advanced economies, new approaches to job creation for low and middle-skill workers will be required (Dobbs, et al, 2012)

- More than course credit pathways
- Portable: trusted by employers and institutions of higher education (external validation)
- Stackable: each credential has value (labor market signal) leads to another credential:
 - 51% of CC certificates require less than one year
 - Offer accelerated entry into the labor market
 - Credentialing process can begin in upper secondary education
- Part of a career pathway system

Ohio Stackable Certificates for Health Care



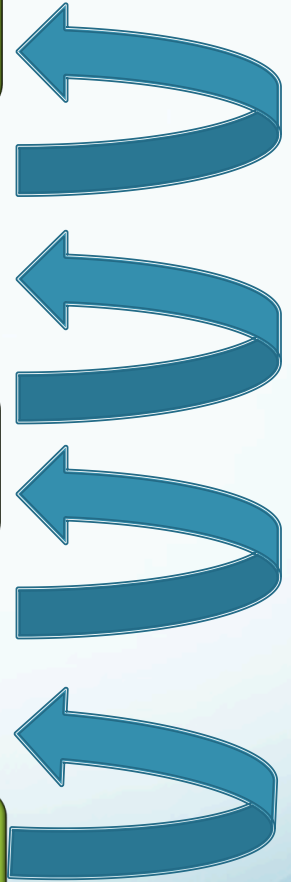
RN

LPN

Patient
Care
Tech

STNA

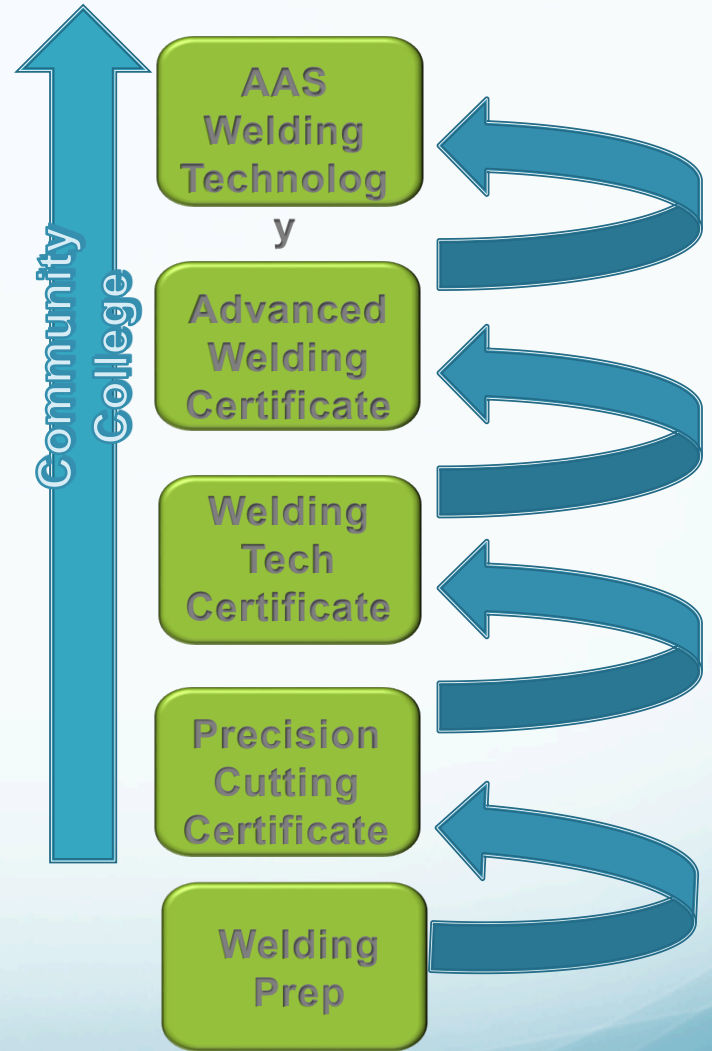
STNA
Prep



Ohio Stackable Certificates for Welding Technology



High School



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*



CLASSROOM INSTRUCTION



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



GOAL
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Experimental design

Random Assignment (classroom level)

Pretest and posttest using established tests

Fidelity of treatment

Monitoring of counterfactual group(s)

Pedagogy of Quality CTE: Curriculum Integration

- ***Math-in-CTE*** - A study to test the possibility that enhancing the embedded mathematics in Technical Education coursework will build skills in this critical academic area without reducing technical skill development.





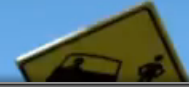
Pedagogy of Quality CTE: Curriculum Integration

Math-in-CTE - A study to test the possibility that enhancing the embedded mathematics in Technical Education coursework will build skills in this critical academic area without reducing technical skill development.





GOAL
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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 enhanced math lessons

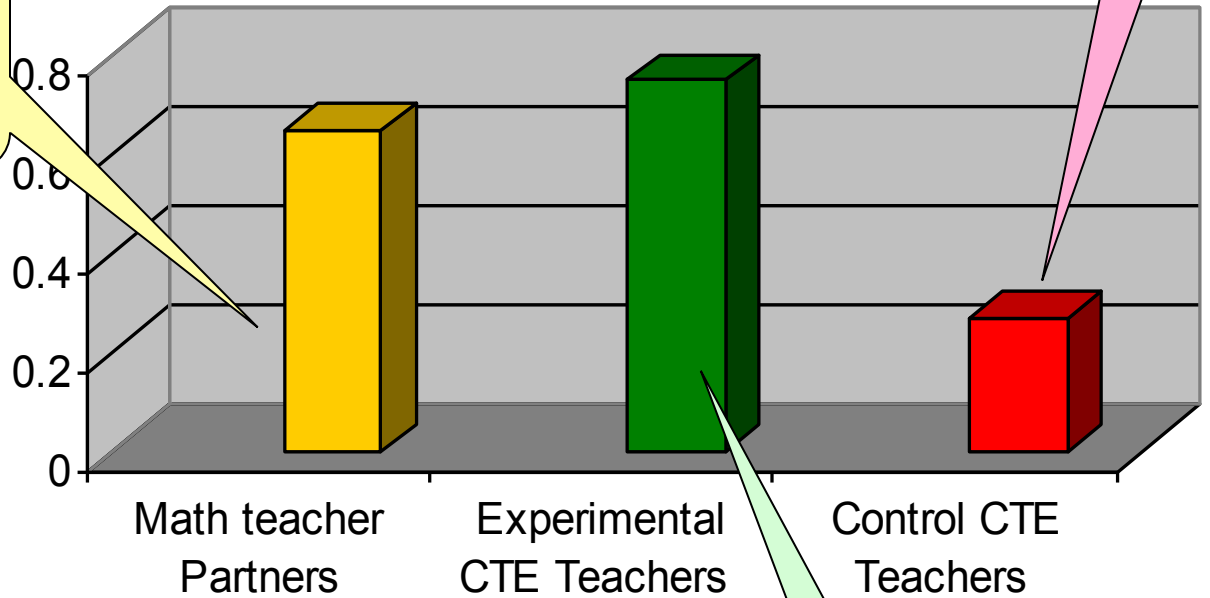
**GOAL
AHEAD**



Old Model
PD

Math in CTE Use 1 Year Later

Total
Surprise!



New
Model
PD

**Power of the New Professional
Development Model**



Building Reading Literacy through CTE

A study to evaluate two reading interventions that CTE teachers can employ to improve reading skills of students in occupational programs



Authentic Literacy: What we tested

	MAX	ASH
Before Reading	M otivation Reducing the anxiety and improving the probability of success in reading	Introduction and modeling of the skill
During Reading	A cquisition Individual silent reading for personal interpretation	Guided practice in learning skill
After Reading	E Xtension Cooperative construction of meaning through discussion, writing, etc.	Reflection on how the skill worked



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



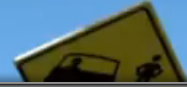
Experimental Test of Reading Interventions in CTE

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



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Core Principles

Begin with the CTE curricula, not with academics

Approach academics as essential workplace skills

Maximize the academics in CTE

Support CTE teachers as “teachers of academics-in-CTE”;
not as academic teachers

Foster and sustain a Community of Practice



GOAL
AHEAD

WHAT WE HAVE LEARNED

*How to Make Curriculum Integration
Effective*



What quality CTE can do best: relevance

What we tested: Math Pedagogic Framework

1. Introduce the CTE lesson

2. The students whose teachers used the **problem based curriculum** in their classrooms scored significantly higher on measures of problem-solving skills (Institute Of Education Sciences, August 9,2010)

3.

4.

5.

6. orr

Transfer of Learning

**Begin with the CTE curricula,
not with the academics**

What is Curriculum Mapping?

- Genesis of the academic integration
 - You have to know where the academic opportunities are located to begin the process
 - Precedes integrated lesson development
- A “process” of investigating the CTE curriculum:
 - What do I teach and
 - Where do the academics naturally occur?
- An ongoing process (not a one-time only)
 - Growing with the process; Revisiting the maps

The Mapping Process...

- Create a “map” for the term or school year in the course/program selected
 - Use the mapping template
- Identify the CTE concepts worthy of academic enhancement.
 - Opportunities may outweigh the time available: Think about what will most help CTE students.
 - Maintain authenticity: Avoid “academics for the sake of academics”

CURRICULUM MAPPING

CTE PROGRAM: HEALTH OCCUPATIONS

CTE UNIT/TOPIC	CTE CONCEPTS	MATH CONCEPTS	ACADEMIC STANDARDS
Human Structure and Function	Compare cell, tissue, organ and body systems relationships	Solve linear equations Read and interpret graphs and charts Problem solving involving statistical data Ratio and proportion	
		Statistical data, ratio and proportion	

Map the Math onto the CTE

Why then do you “align” standards (e.g. CCSS)

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

CTE Course/Unit	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
Patient assessment	Input/output; Vital signs; Height/weight; Conversions; Instrument reading	Reading measurement; Basic operations; Ratio/Proportion; Solving equations; Scales	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	A.APR.1; A.APR.7; N.RN.3; N.Q.1; G.MG.3; A.CED.4

Creating opportunities for students to apply academic knowledge:

- generate examples and lessons in which students solve *authentic workplace problems*
- introduce and reinforce academic skills as “*tools*” *needed in the “real world”*
- *bridge CTE and academic vocabulary* in developing and teaching integrated lessons

Maximize the academics in CTE

Approach Academics as a Workplace Skill

A Process and A Pedagogy

“More than a set of lesson plans...”

a *continuous process...*

...using pedagogic frameworks
through which to enhance and
teach the **embedded academics**

**Support CTE teachers as
“teachers of academics-in-
CTE”; not as academic
teachers**

OTHER LESSONS

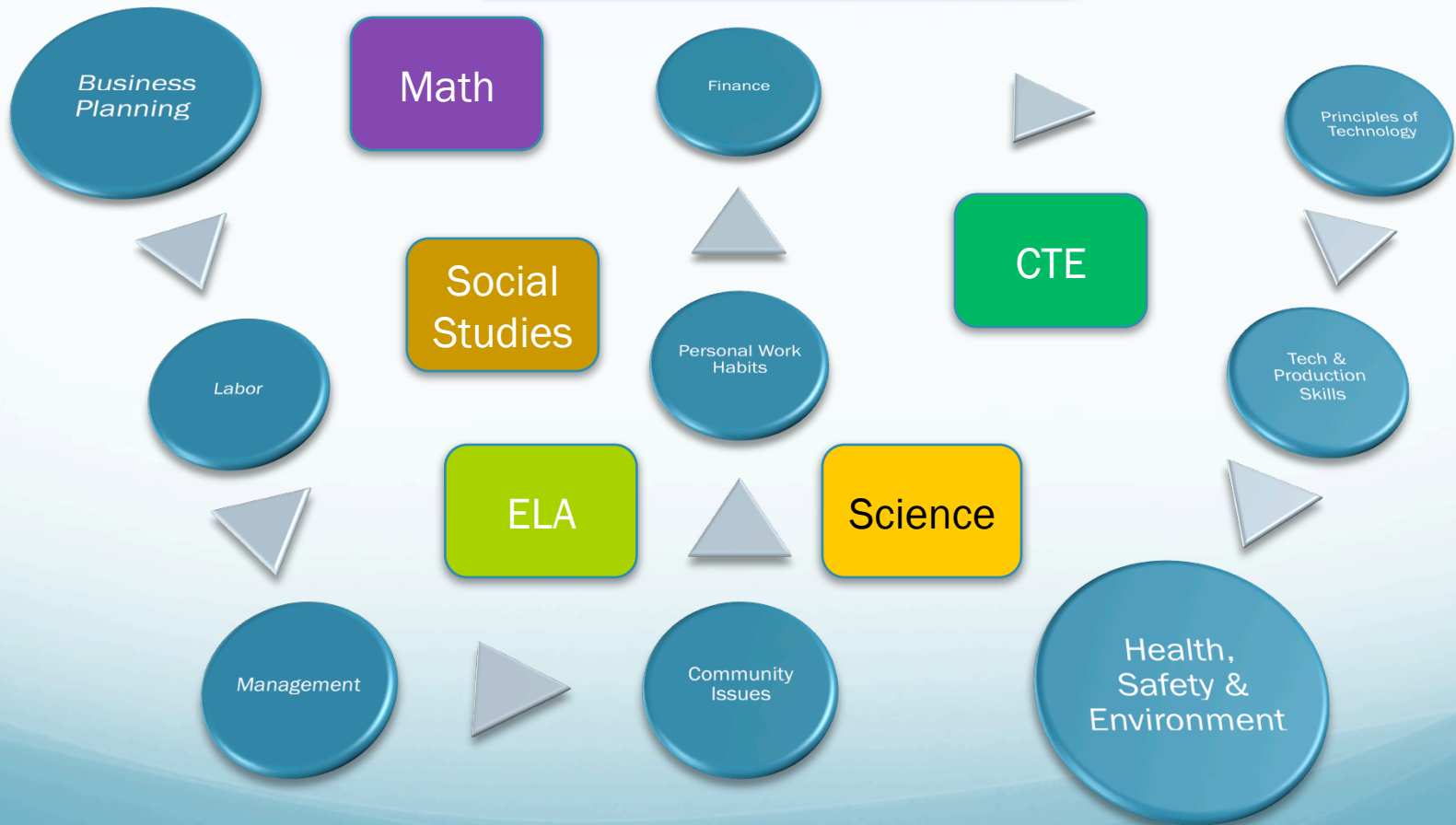
- Maintaining the CTE in integration
- Not a replacement of CTE curriculum
- Rather, an enhancement of existing curricula
- Do-able for CTE teachers
- The tipping point
- Maintaining authenticity

Foster and sustain a Community of Practice



Embed Career Development: A Signature Feature (AAI)

Distributed Guidance





GOAL
AHEAD

For **Career** and College Readiness

FOCUS ON PEDAGOGY

Effective CTE Teachers are skilled: A Signature Feature



Curriculum is Delivered Through Multiple Pedagogies: A Signature Feature

- 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*



**GOAL
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Engaging Students through Work-Based Learning

*Adding value to the
high school
experience*



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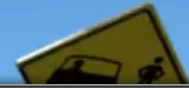
Everywhere but in the U.S. . . .

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!



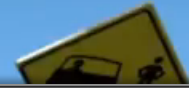
The Value of WBL

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

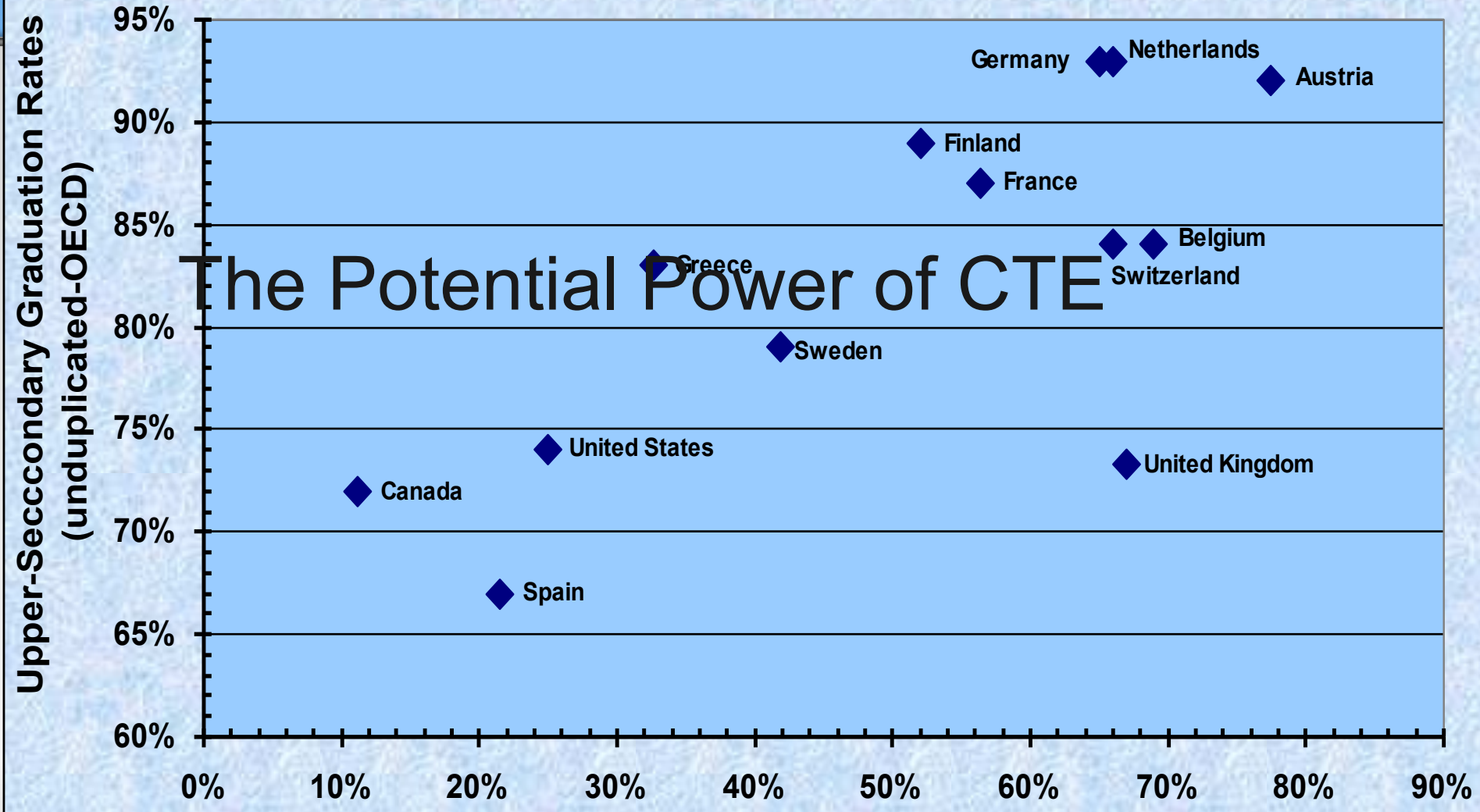
college attendance



Work-Based Learning

Studies have found increases in academic achievement as measured by standardized tests (Bailey & Merritt, 1997; Phelps, 1998; Steinberg, 1998).

Effect of Availability of Career-Tech in Secondary School on Upper-Secondary Graduation Rates



Share of Upper-Secondary Students in Career-Tech Programs
source OECD *Education at a Glance*



**GOAL
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CTE-WBL and Achievement

No WBL; 2.99 college GPA

HS WBL; 3.08 college GPA

No community service; 3.02 college GPA

Community service; 3.11 college GPA

58% with NO HS WBL; college GPA above 3.0

64% of with HS WBL; college GPA above 3.0

Swail, Watson S., and Kampits, Eva (2004). Work-Based Learning and Higher Education: A Research Perspective. Washington, DC: Educational Policy Institute, Inc.



Workbased Learning Approaches

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

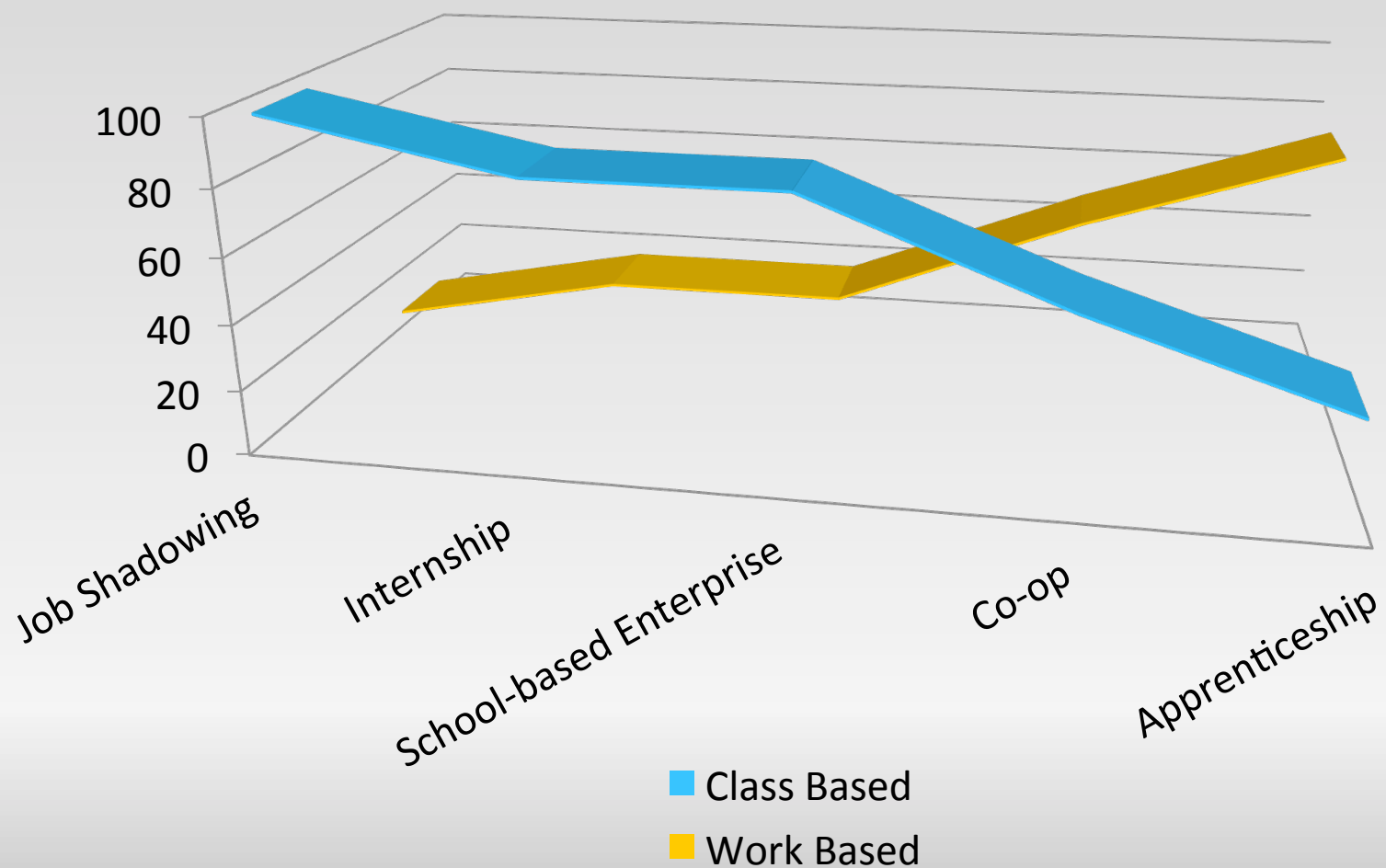
Skills leading to industry certifications

Career development

- ***Developmental***
- ***Increasing intensity***
- ***Linked to industry recognized credentials***



WBL: Combining Work & Learning



**GOAL
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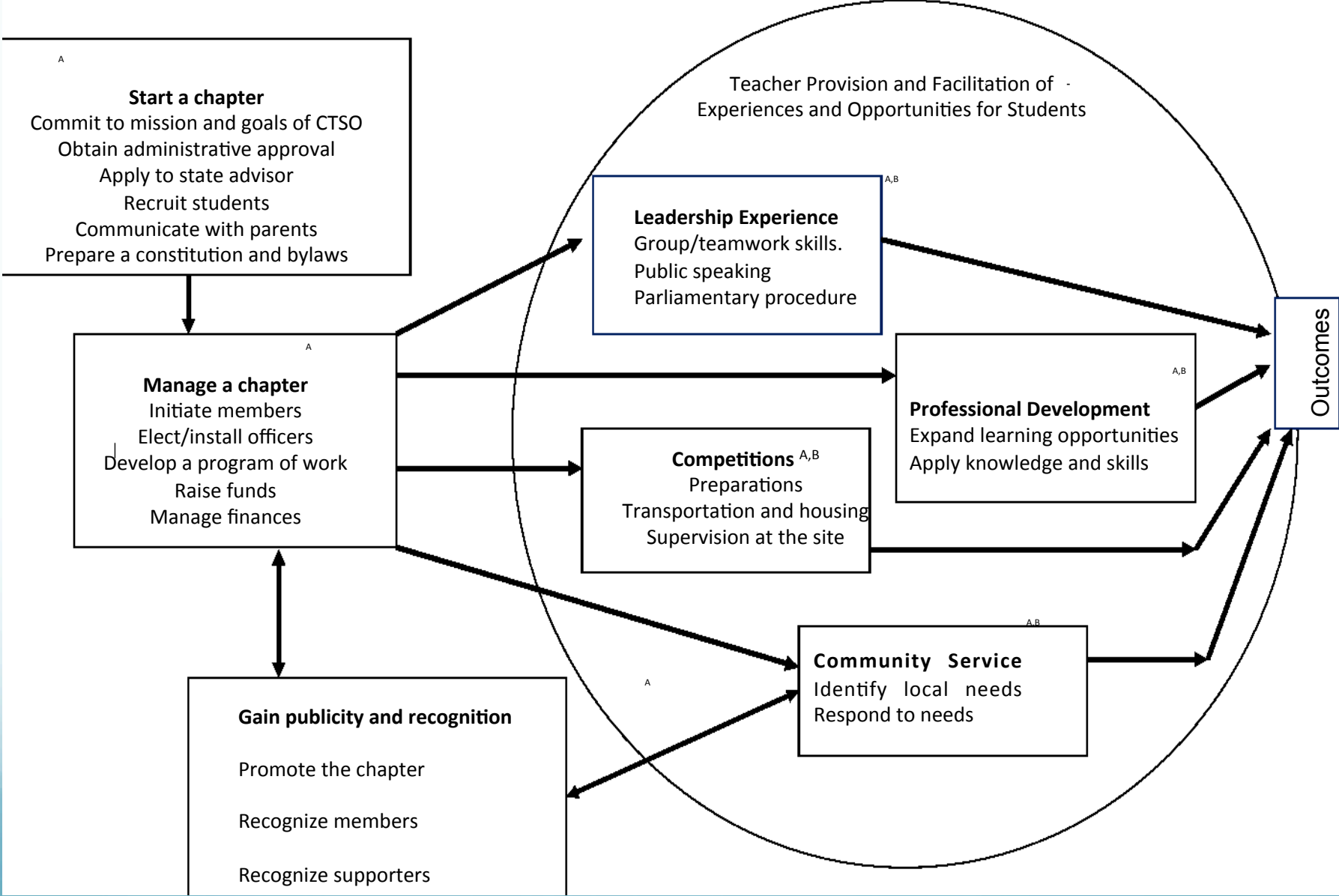


Engaging Students through CTSOs

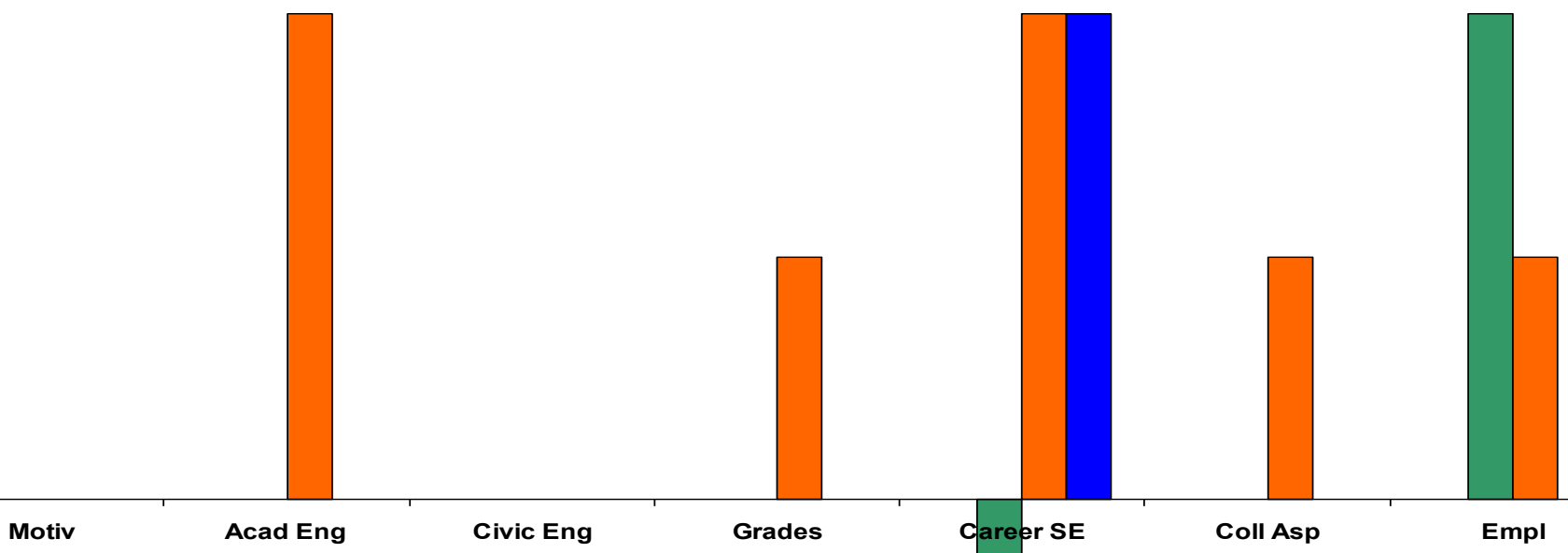
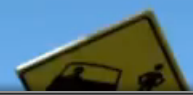
*Adding value to the
high school
experience*



How CTSOs Work



GOAL
AHEAD



- Prof Devel
- Competition
- Community Serv

CTSOs: Findings (Alfeld, et al, 2007)

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

CTSOs: Early Findings (Alfeld, et al, 2007)



GOAL
AHEAD

For **Career** and College Readiness

FOCUS ON ASSESSMENT

KDE College and Career Ready Model 2011-12

KDE College Ready, Career Ready, and College AND Career Bonus

College Ready:
Must meet
benchmarks on
one of following:

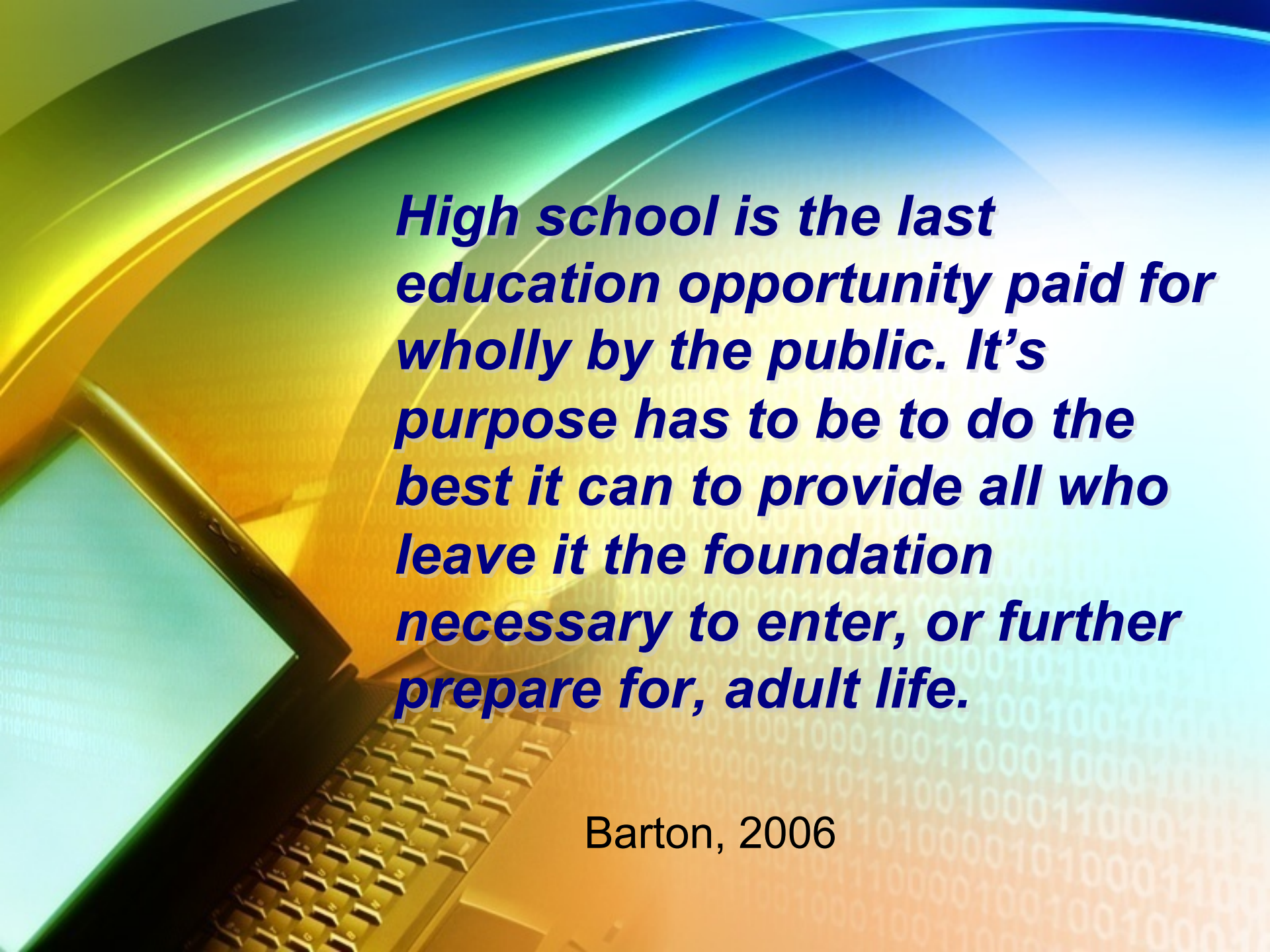
College Ready
ACT
COMPASS
KYOTE

KDE Career Ready: Must meet benchmarks
for one requirement in Career Academic area
and must meet one requirement in Career
Technical area.

Career Ready Academic	Career Ready Technical
Armed Services Vocational Aptitude Battery (ASVAB) OR ACT Work Keys (Applied Math, Locating Information, and Reading for Information)	KOSSA OR Industry Certificates

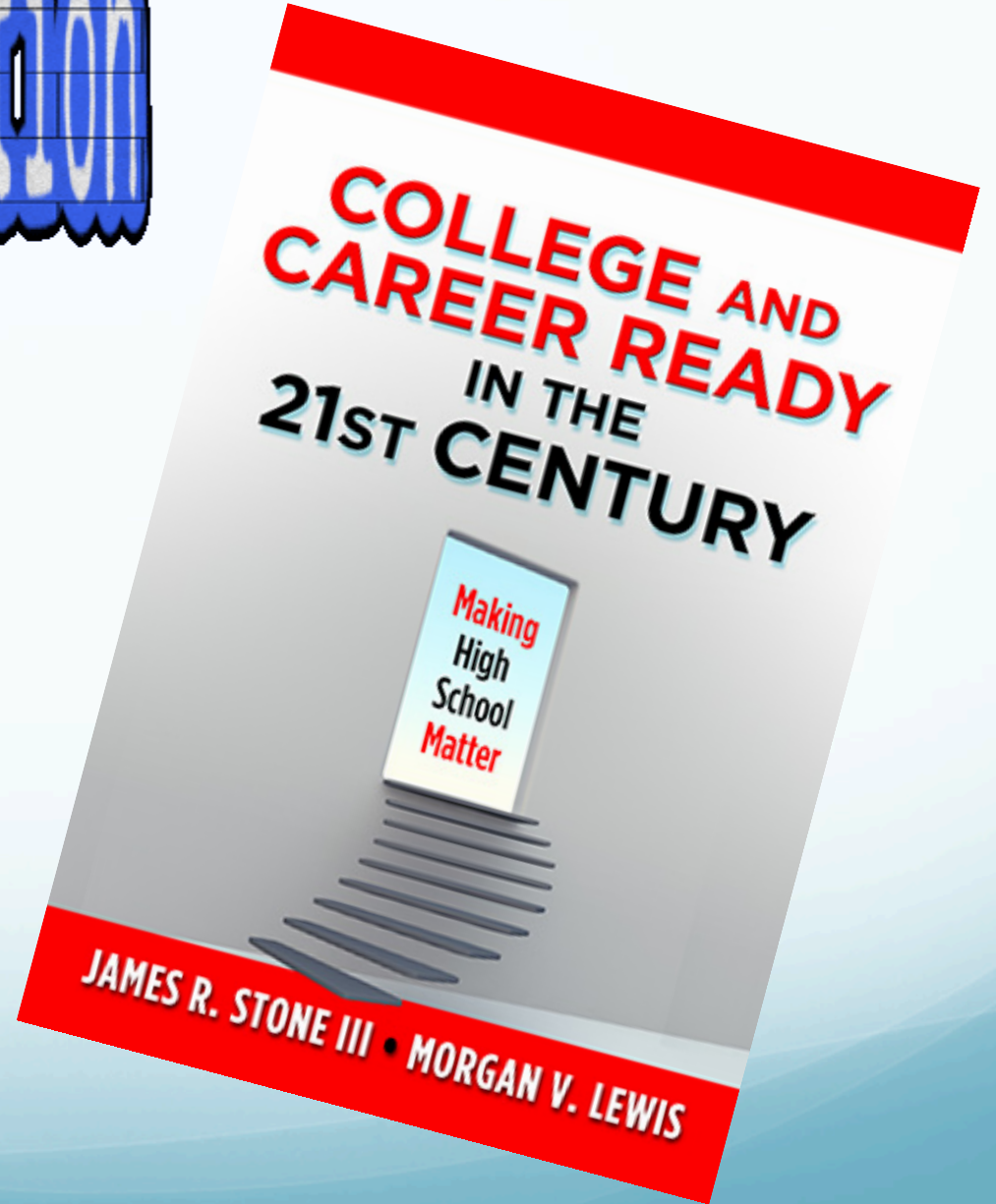
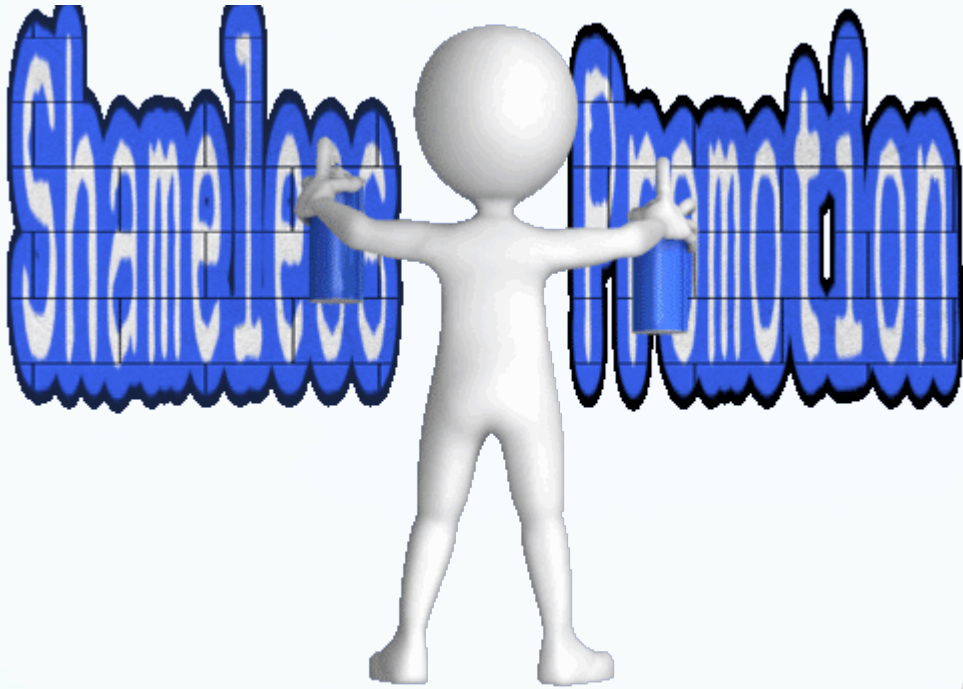
Bonus - College AND Career Ready: Must meet
at least one from each area.

College Ready Academic	Career Ready Technical
ACT or COMPASS or KYOTE	KOSSA
Notes: (1) By meeting the college ready academic definition, the student does not have to take the additional tests of ASVAB or Work Keys for the bonus area. (2) For accountability purposes scores are capped at 100.	Industry Certificates



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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