Programs of Study: Secondary and Postsecondary Outcomes From the NRCCTE's Longitudinal Research

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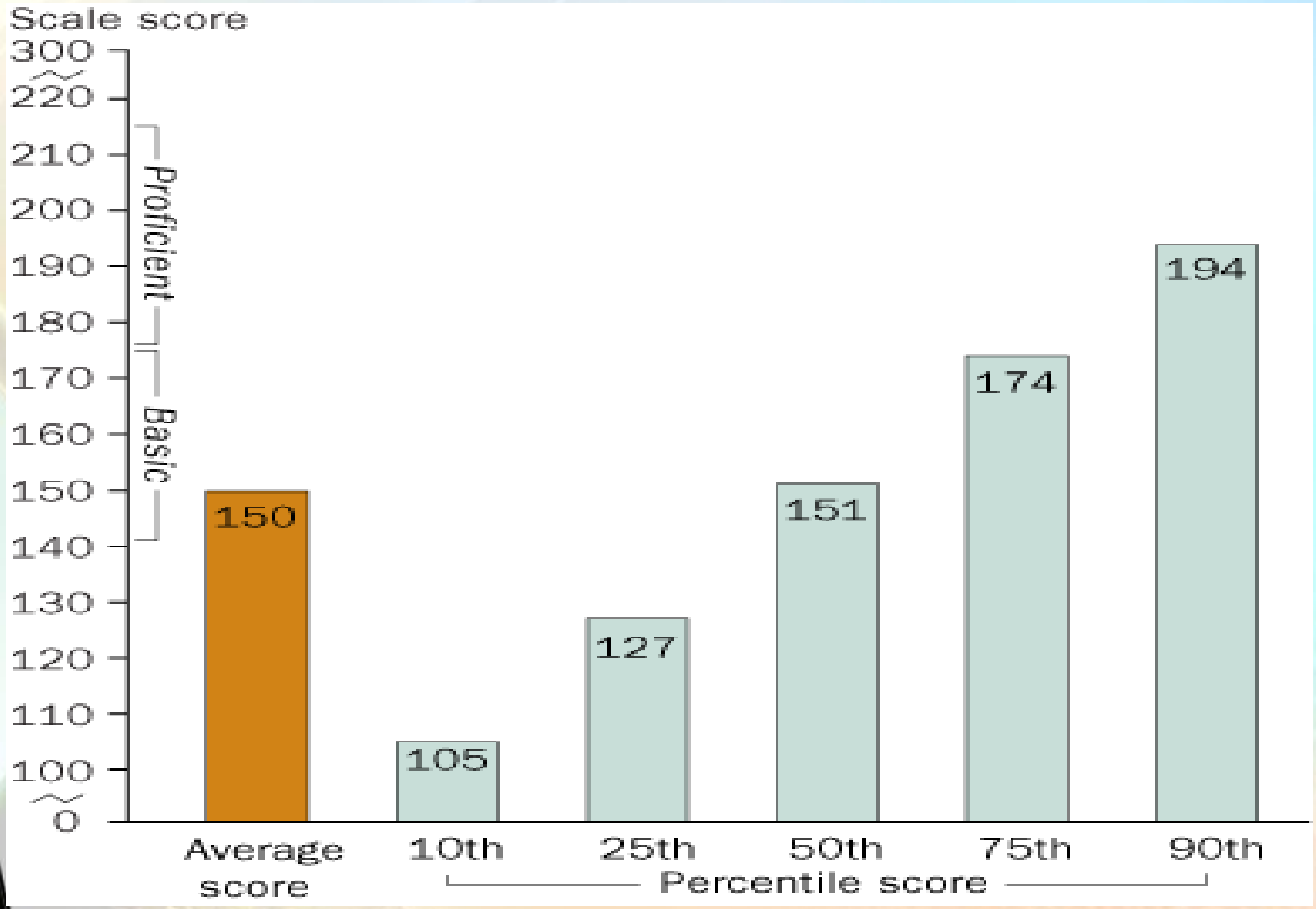
Since the mid-1980s we have

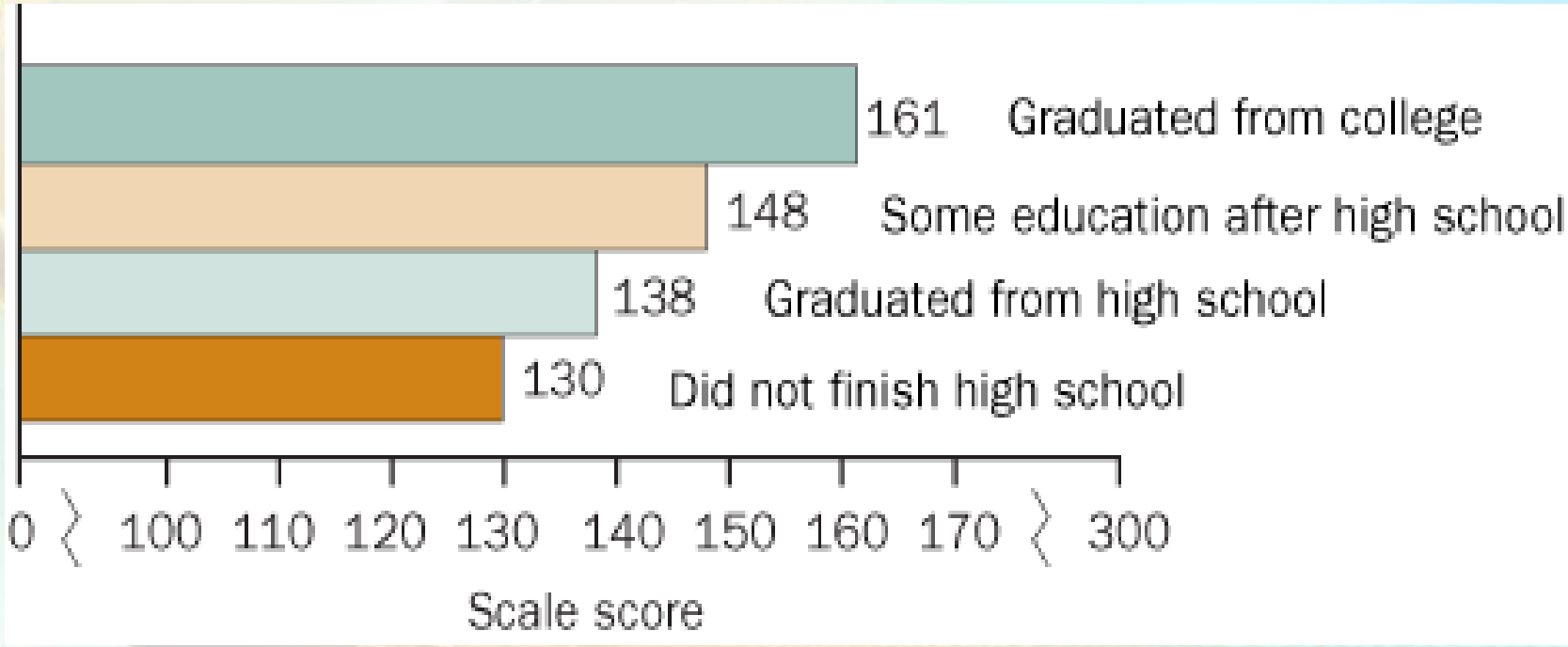
Added the equivalent of *one full year* of core academics (math, science, language arts) to high school graduation requirements.

- (NAEP) ***Reading scores have significantly declined***
- (NAEP) ***Science scores have significantly declined***
- (NAEP) ***math scores have remained relatively unchanged***

12th Grade Math Scores 2005



One solution?



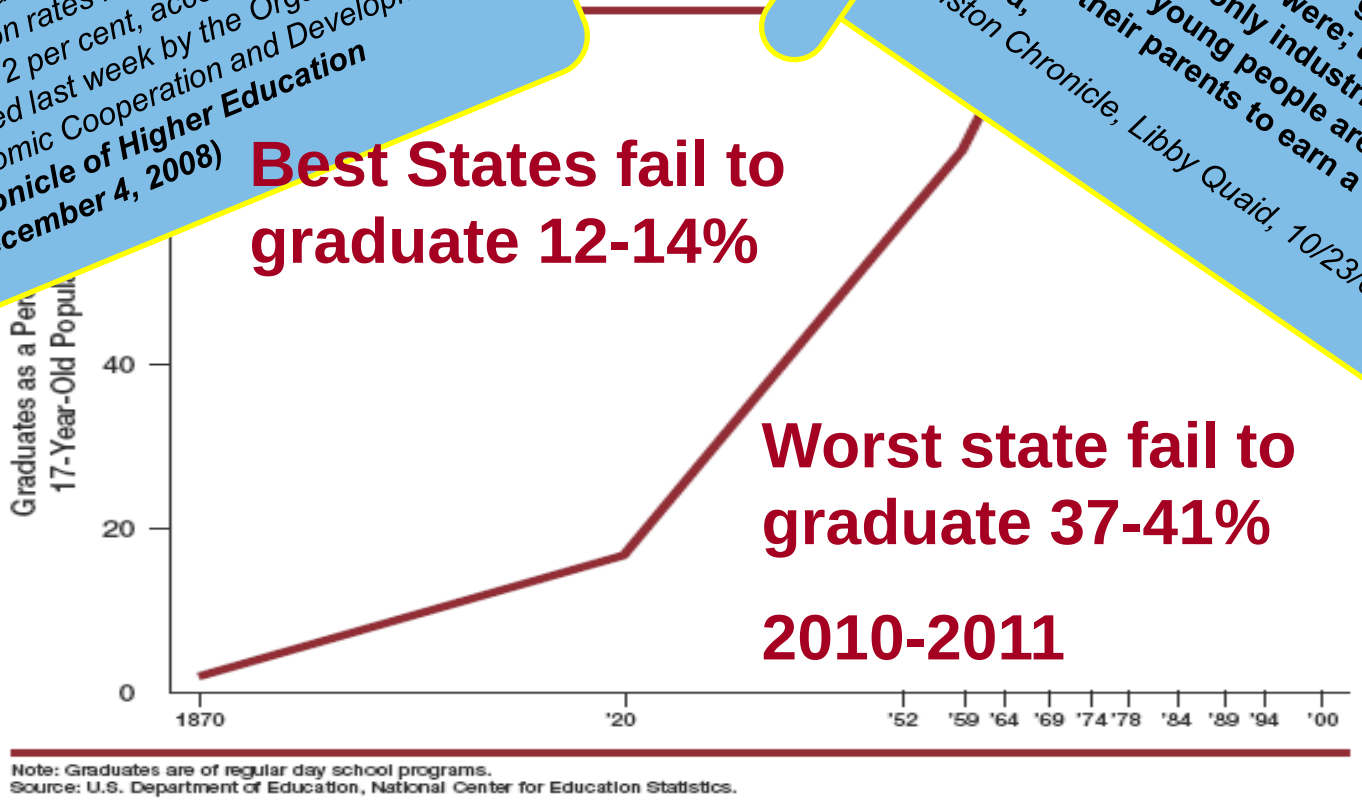
Be born to smarter parents!

...t getting ...er

US Trails 22 Nations in HS Completion
The United States, once the world leader in high-school completion, now trails 22 other leading industrialized countries that have graduation rates higher than the American rate of 72 per cent, according to a report released last week by the Organization for Economic Cooperation and Development.
***Chronicle of Higher Education* (December 4, 2008)**

Your child is less likely to graduate from high school than you were; the United States is now the only industrialized country where young people are less likely than their parents to earn a diploma,
Houston Chronicle, Libby Quaid, 10/23/08

Best States fail to graduate 12-14%



Worst state fail to graduate 37-41%

2010-2011

Source: *One-Third of a Nation* (ETS, 2005)

Special Concern: We have a boy problem

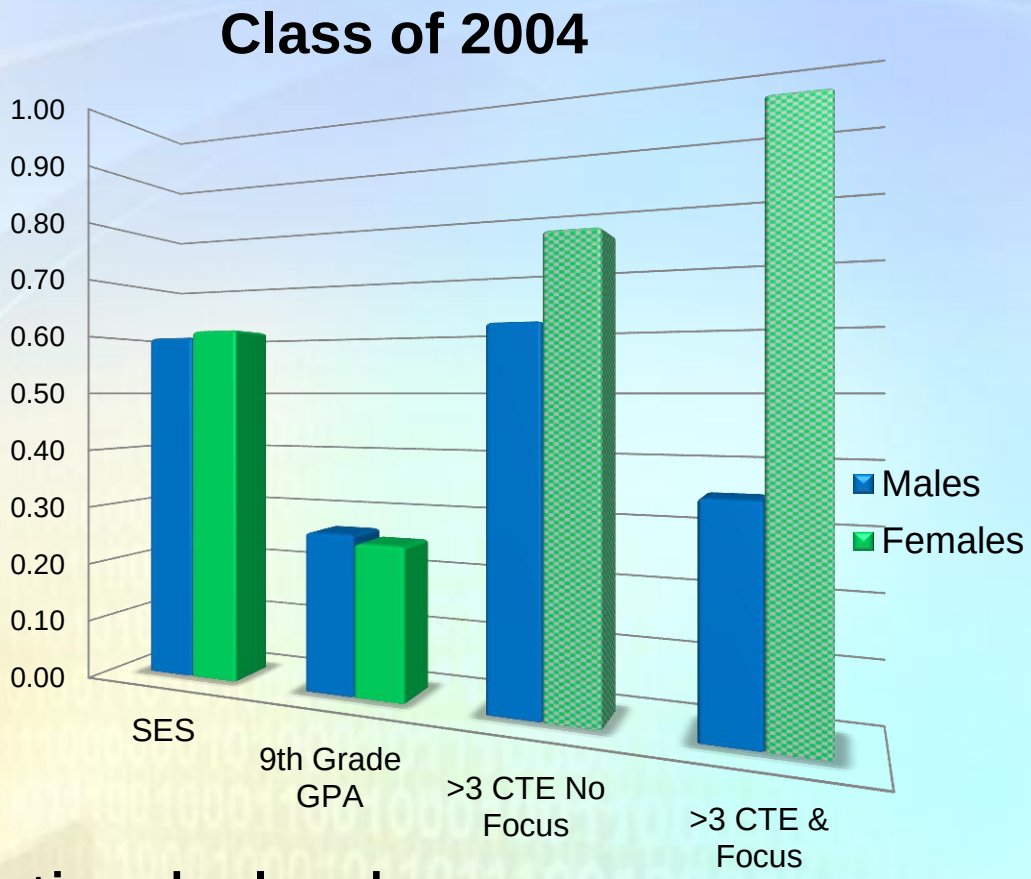
… but many of the people who don't fit in are boys. A decade or so ago, people started writing books and articles on the boy crisis. At the time, the evidence was disputable and some experts pushed back. Since then, the evidence that boys are falling behind has mounted. The case is closed. The numbers for boys get worse and worse.

David Brooks, NYT July 5, 2012

- By 12th grade, male reading scores are below females'
- 11th grade boys write at an 8th 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

One Solution:

A Survival Analysis



CTE Participation helps boys "survive" high school

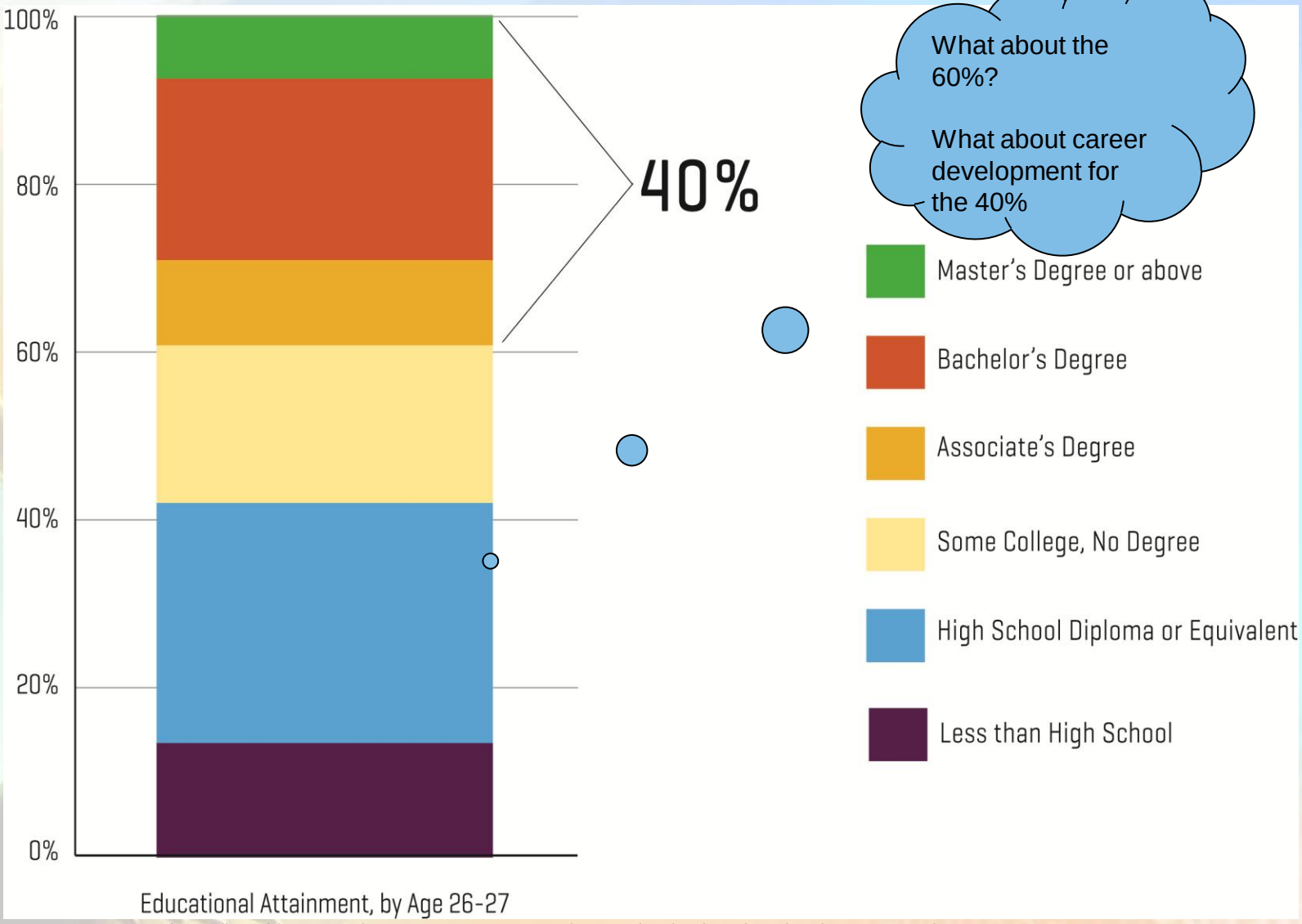
There is no CTE "survival" effect for girls; but it "does no harm"

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?

PROGRAMS OF STUDY – WHAT FOCUS?

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.

More STEM or . . .

- S&E occupations make up only about one-twentieth (5%) of all workers (5.3%) in 2018 Urban Institute, 2007; (6%) in 2018, Carnevale, 2010.

- **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

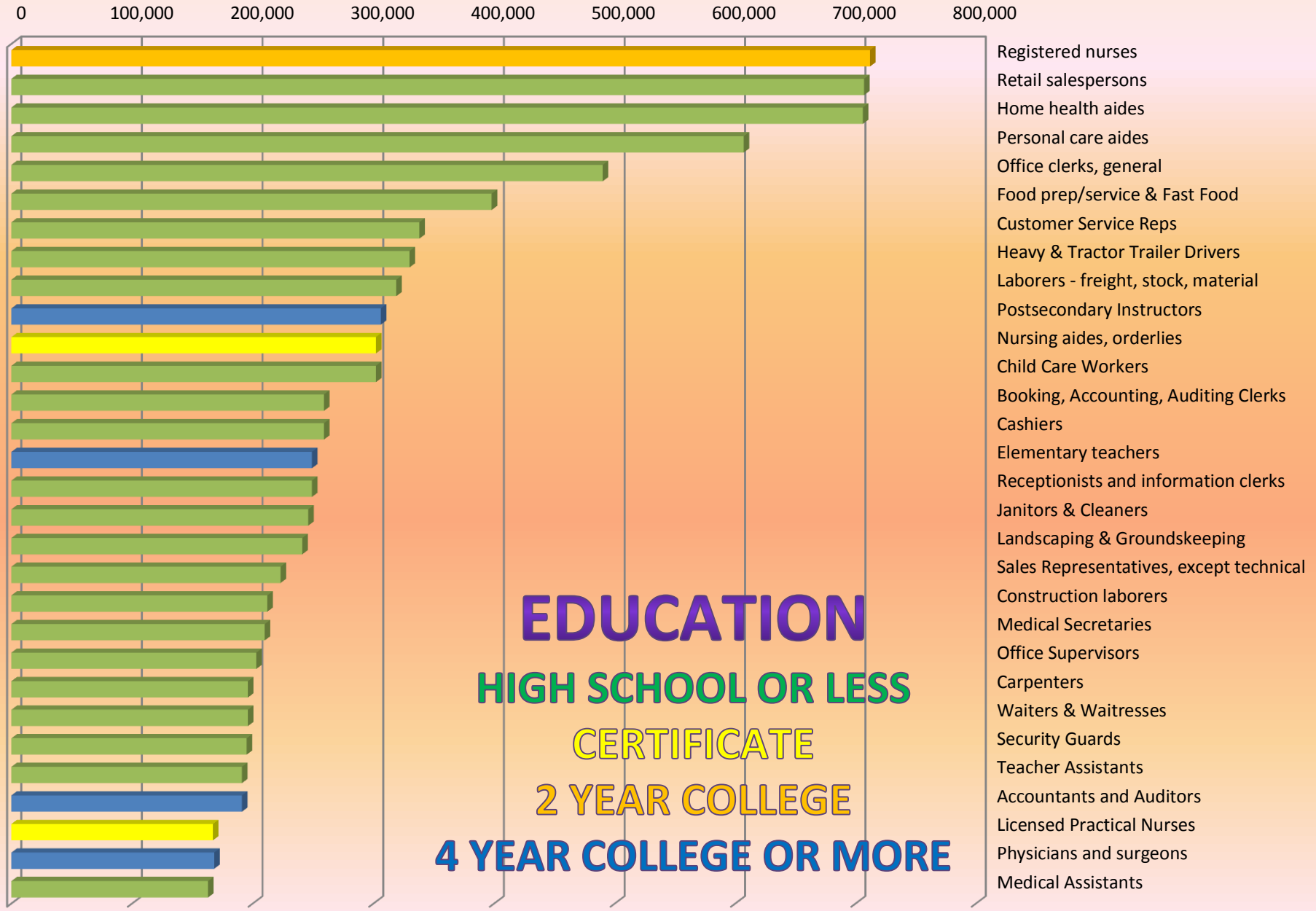
Murray said that none of the companies she has talked with has suggested that there is a shortage of qualified chemists or life scientists. She said that ***employers' greatest concern "is not numbers, it is training***." She cited the example of managers who told her they could interview hundreds of 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?

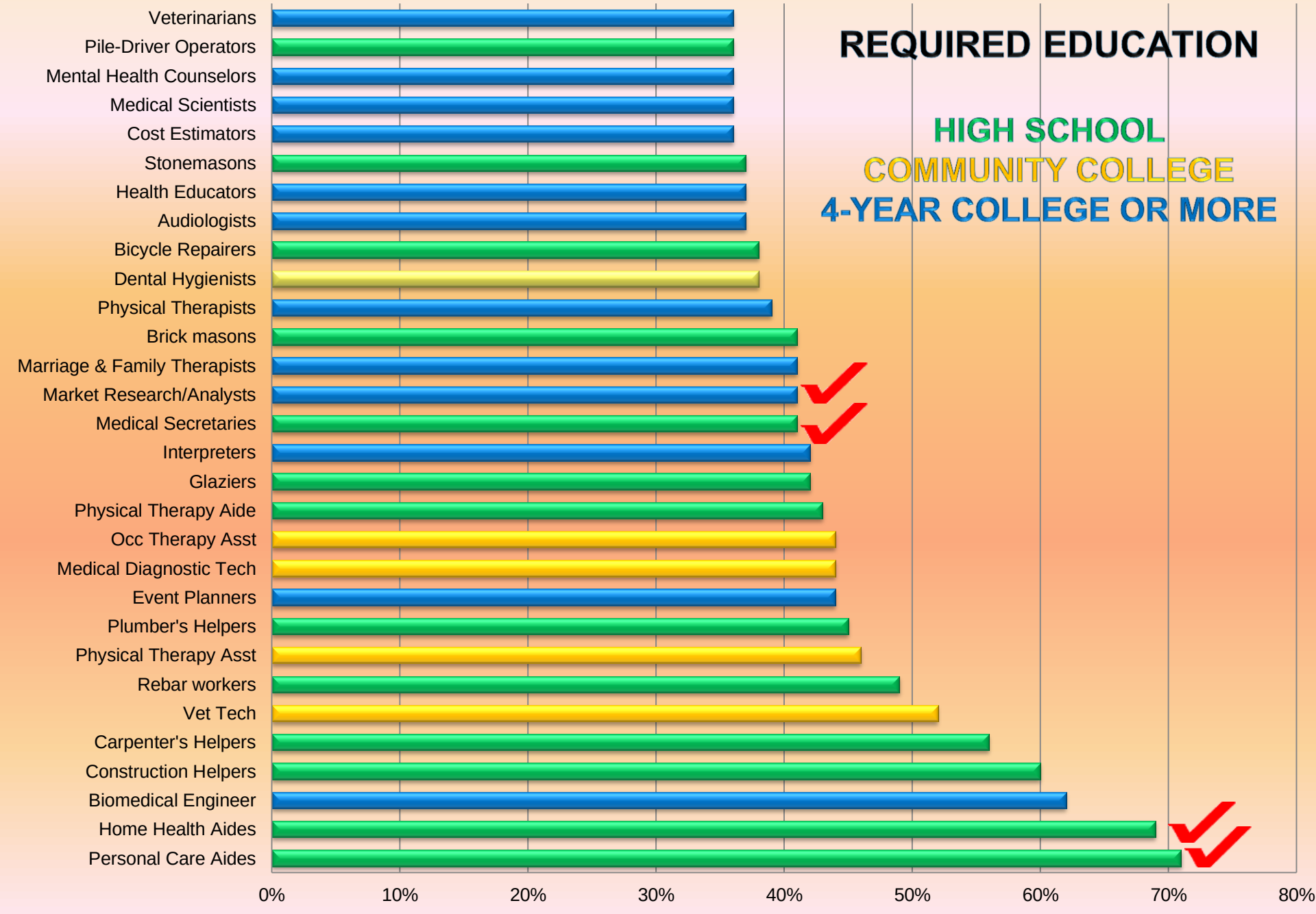
National Research Council. (2008). Research on Future Skill Demands: A Workshop Summary. Margaret Hilton, Rapporteur. Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

High Demand Occupations 2010-2020

The BLS Perspective



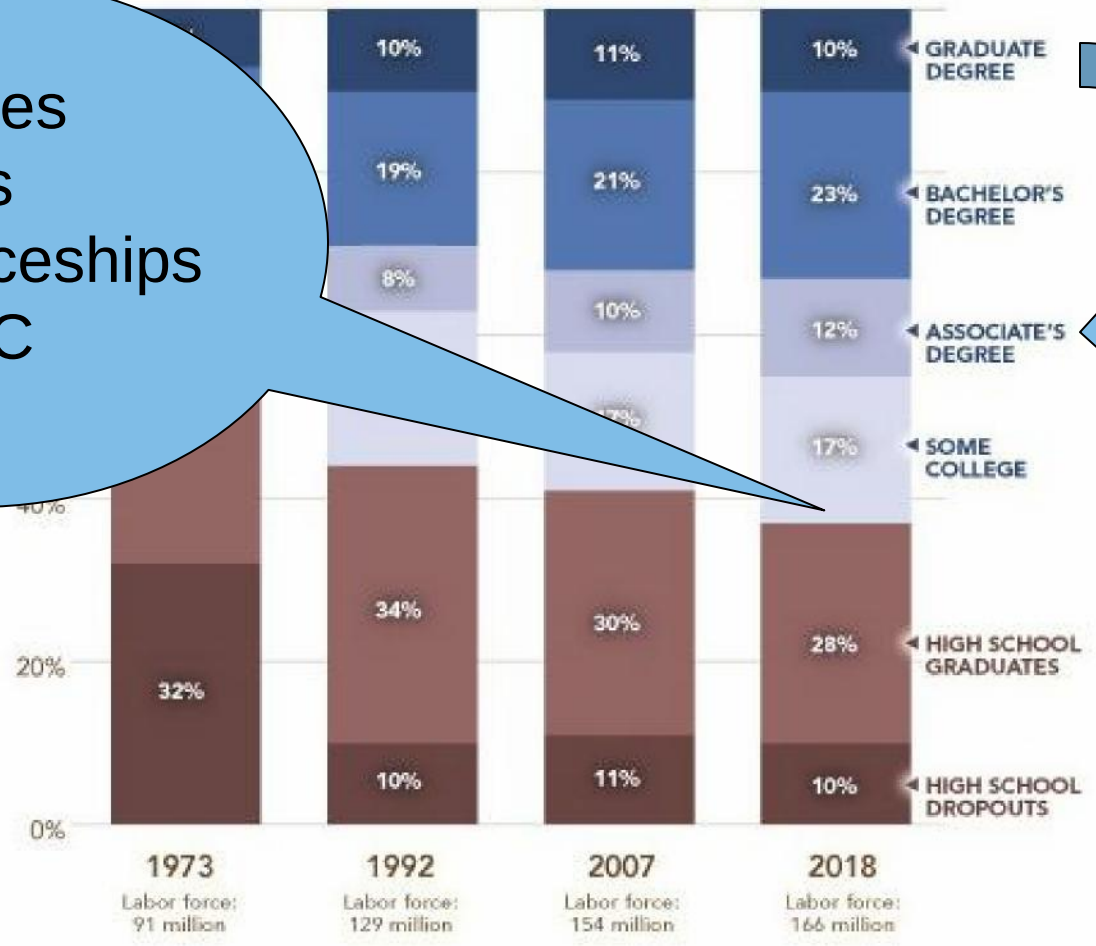
High Growth Occupations 2010-2020



The Other Perspective

63% of all jobs will require some college or better by 2018.

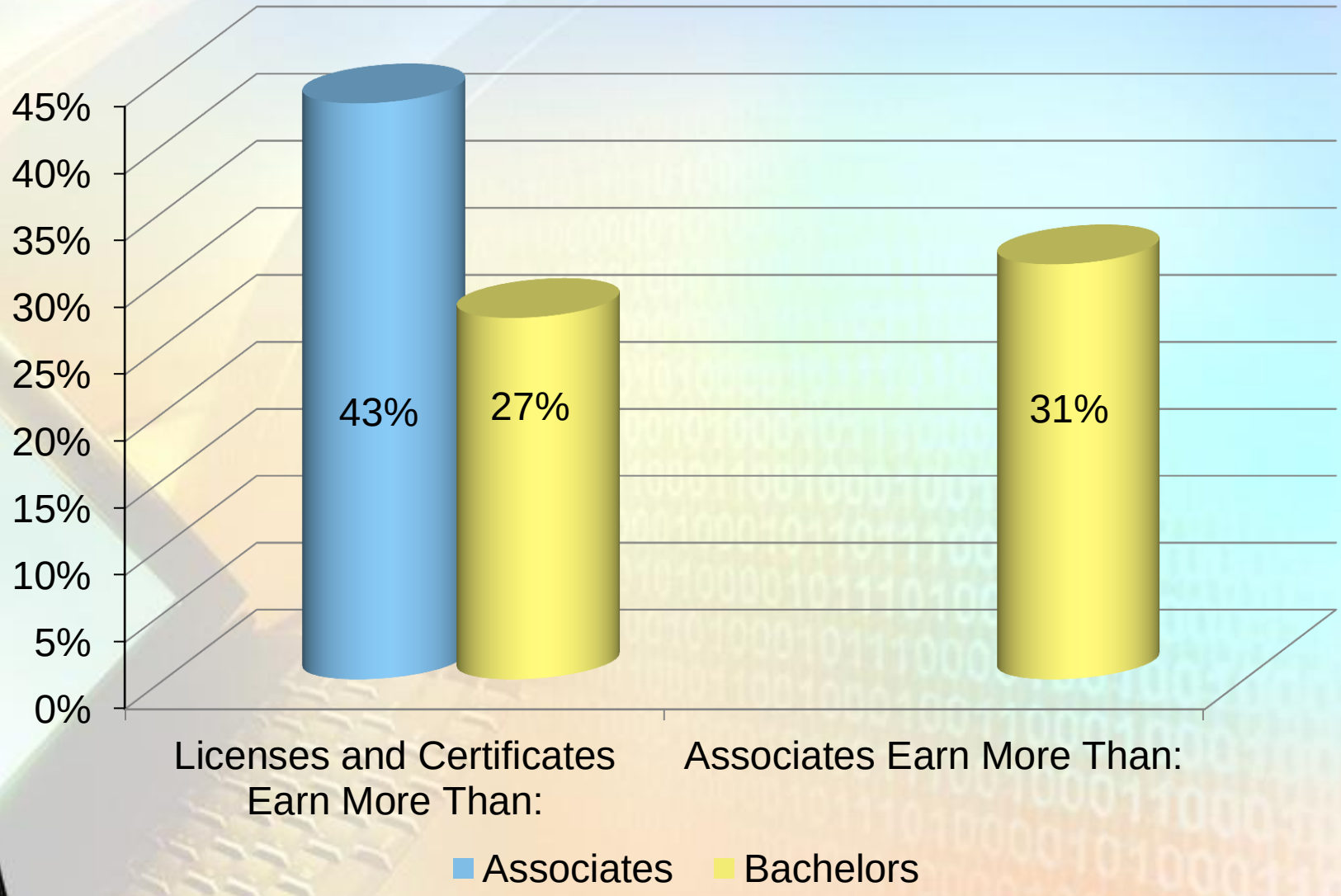
Certificates
Diplomas
Apprenticeships
Other IRC



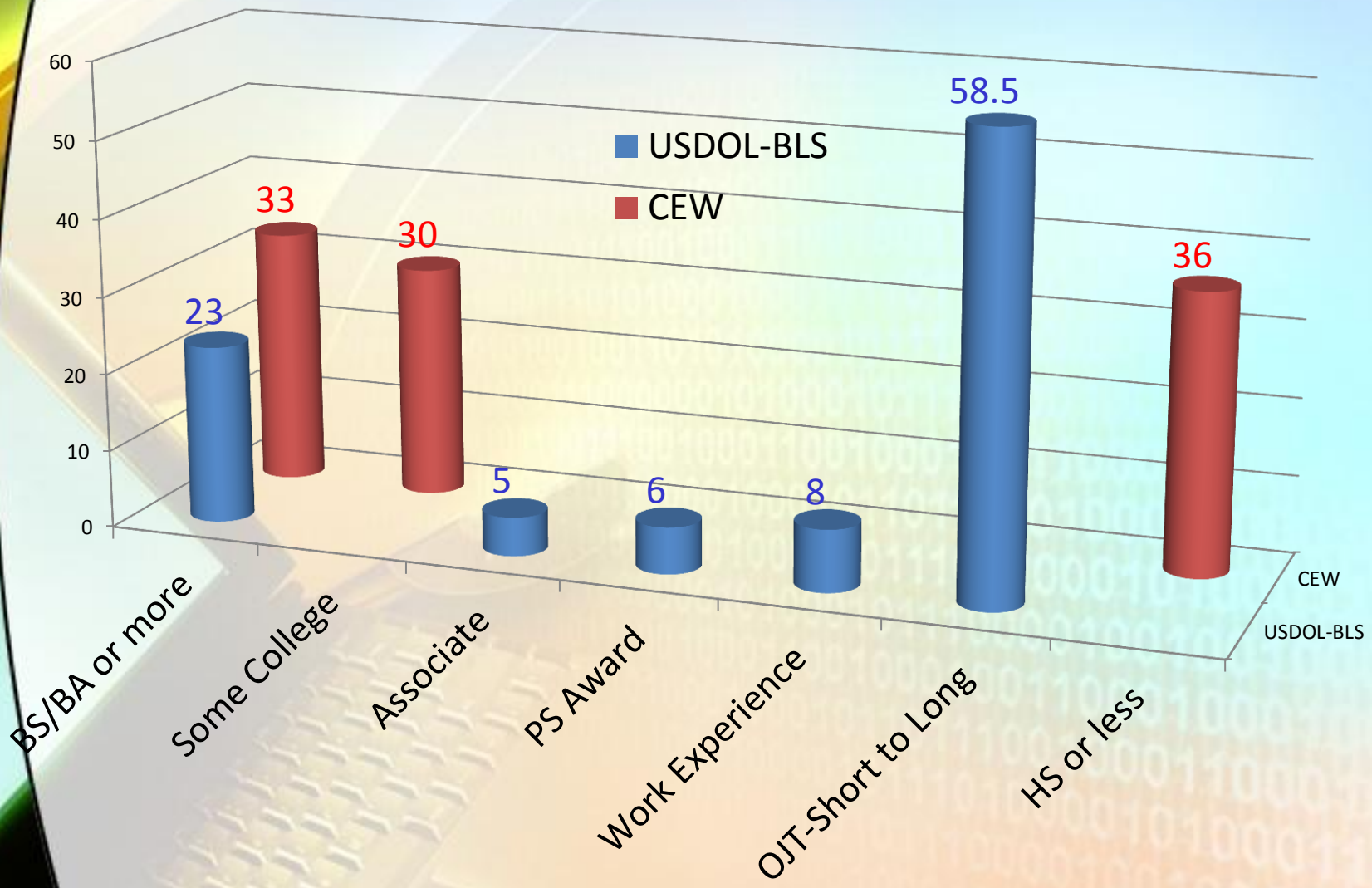
GEORGETOWN UNIVERSITY
Center on Education and the Workforce

- Source: Analysis of March CPS data, various years,
- Center on Education and the Workforce forecasts of education demand to 2018.

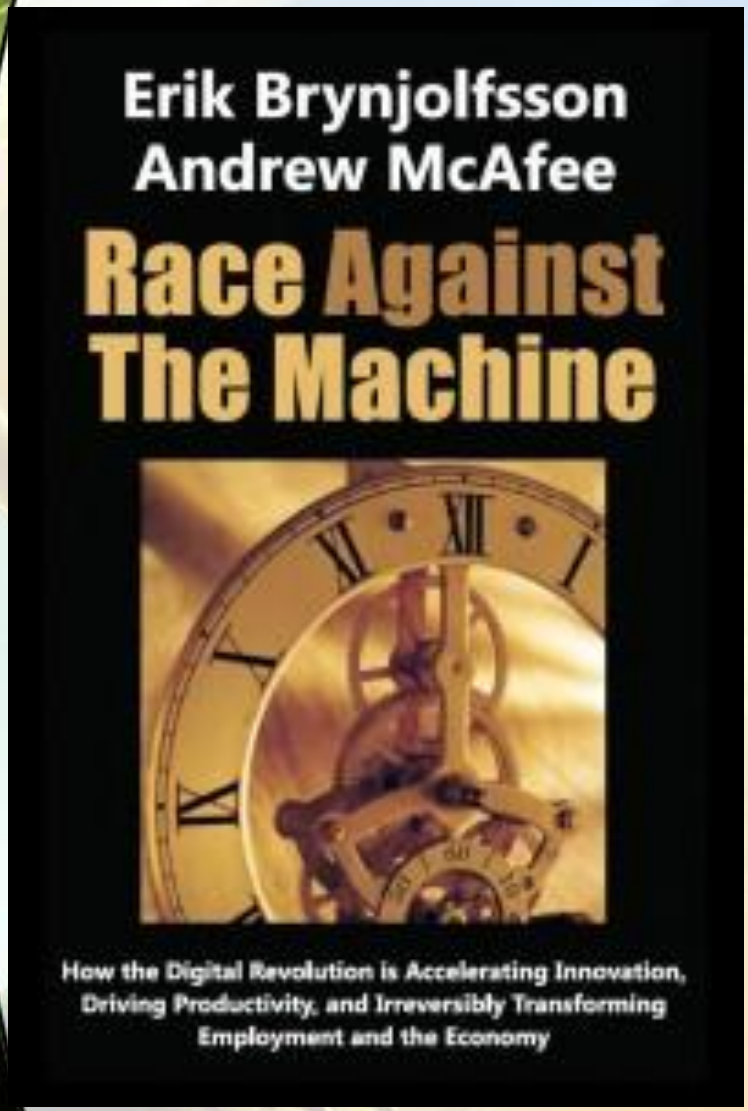
Sub-Baccalaureate Credentials Pay Off



Education and Future Work: BLS & CEW



A 3rd 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. These new abilities stem from “pattern recognition” technologies – the same techniques that underpin, for example, the Siri voice recognition tool in Apple’s iPhone 4S.

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, entreprenuership
- Physicality of work
- Advanced pattern recognition
- General problem solving
- Creativity

CAVEATS!

The Solution

PROGRAMS OF STUDY

Why We do Experimental Research: A Cautionary Tale

- The Japanese eat very little fat and suffer fewer heart attacks than the British or Americans.
- The Mexicans eat a lot of fat and also suffer fewer heart attacks than the British or Americans
- The Japanese drink very little red wine and suffer fewer heart attacks than the British or Americans
- The Italians drink excessive amounts of red wine and also suffer fewer heart attacks than the British or Americans
- The Germans drink a lot of beer and eat lots of sausages and fats and suffer fewer heart attacks than the British or Americans
- CONCLUSION: Eat and drink what you like.
- **Speaking English is apparently what kills you.**

FOR POS TO BE SUCCESSFUL

Increase Student Engagement

Completing HS

Completing PS/ industry credential

Facilitate Transition

To continuing education;

To the workplace;

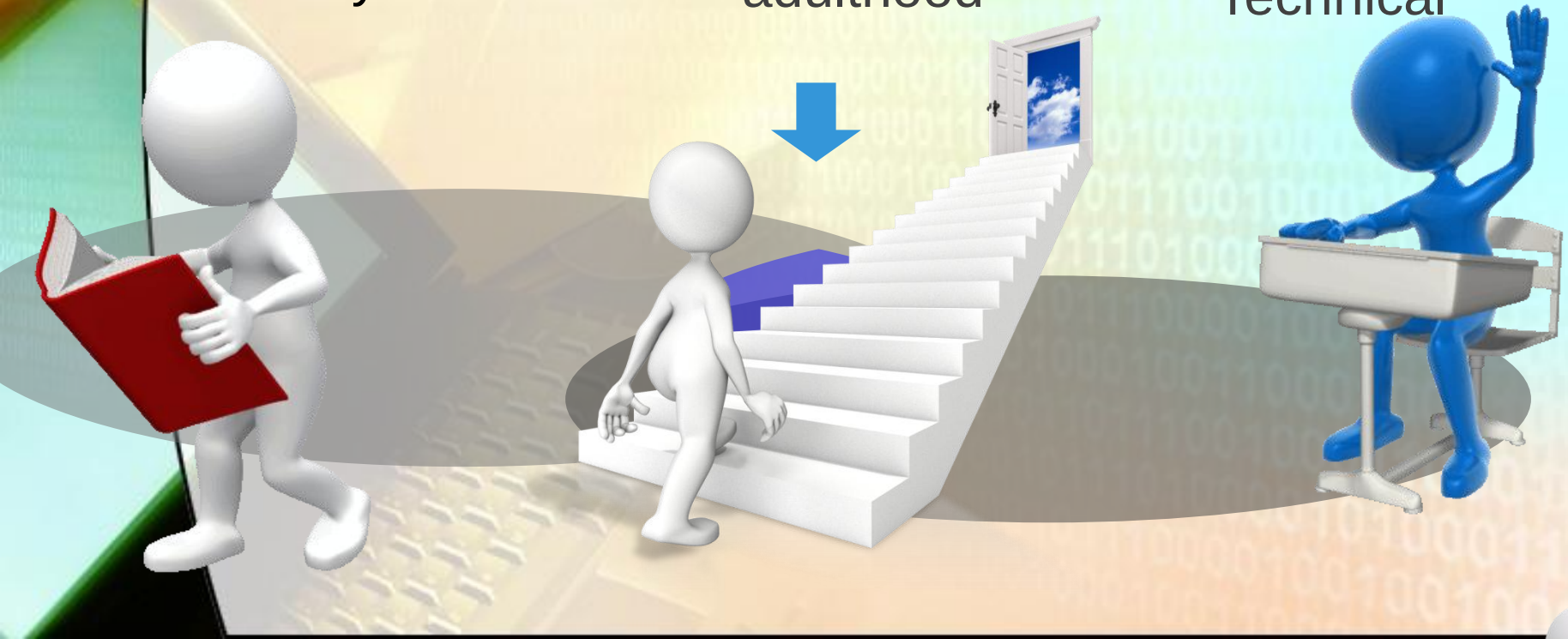
To a successful adulthood

Improve Achievement

Academic

Occupational

Technical



Rigorous, Longitudinal POS Studies: Mixed Method Studies*

- A longitudinal study of three cohorts in SC (6^{th}, 9^{th}, 11^{th} graders) in three diverse WIAs
- A backward mapping (from CC) study of three sites with 15 years of history of POS-like programs
- A random assignment or propensity match study in five sites (3 states)

* Systems Data (transcript) & Interview, Survey Data

Caveats

- These are longitudinal studies
- Data collection lags actual events
  - Students have to complete the “thing”
  - A true POS includes HS&PS – 4+ 2-3 years minimum
  - Release of system lags by 4 months to 4 years.
- Early findings will point toward proximal variables
  - Progress toward graduation
  - Behaviors
  - Self-efficacy
  - Academic & Technical Achievement
- Evidence on distal variables 5+ years(?)

ENGAGEMENT

POS Student Opinion

- At the comprehensive HS one student's brother attends,

"*they don't think about their future as much as they do here*."

- Regarding her POS HS, another student said: "*I feel really prepared because of the workload and the different ways that we are learning why we're doing something. Not just learning the actual topic…[but] the reasons behind it*."

POS Student Opinion #2

- One student said she'd been disengaged from school freshman year but by senior year, she loved school and looked forward to her nursing career:

"*This school has really changed – could really change someone. It gets you to the career path that you want and if you're around people that want to do it and succeed you'll want to succeed*."

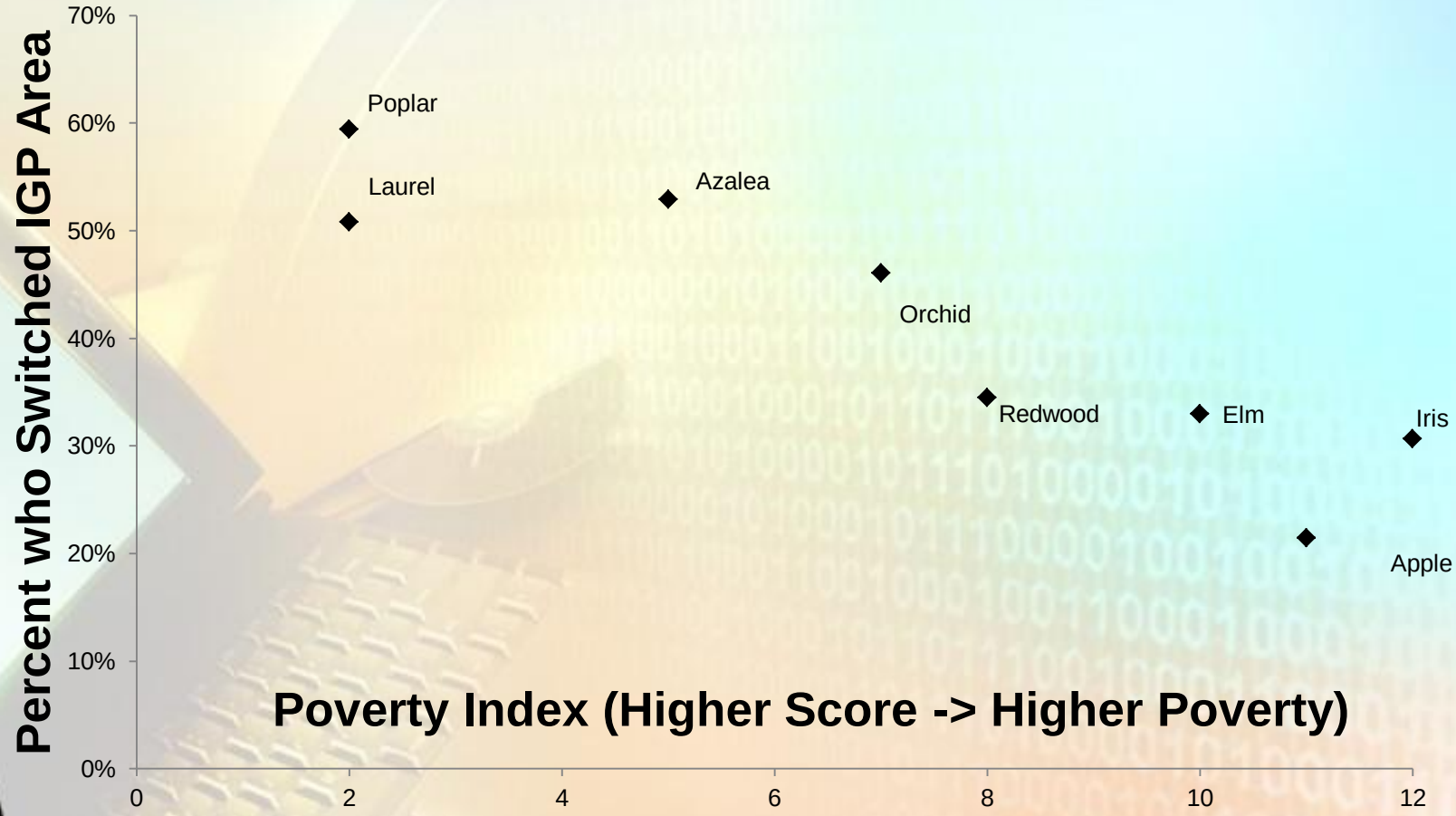
Do POS make a difference for students?

- Over 70% of high school students reported being in a POS made them more engaged in school and better prepared for college and careers

- 35% of sample enrolled in the local (POS affiliated) college. Of these:
  - 45 - 57% continued to study in their POS area (next slide)
  - 29% of our sample (compared with 17% of students from non-POS affiliated HS), reported feeling “very” prepared for college level studies

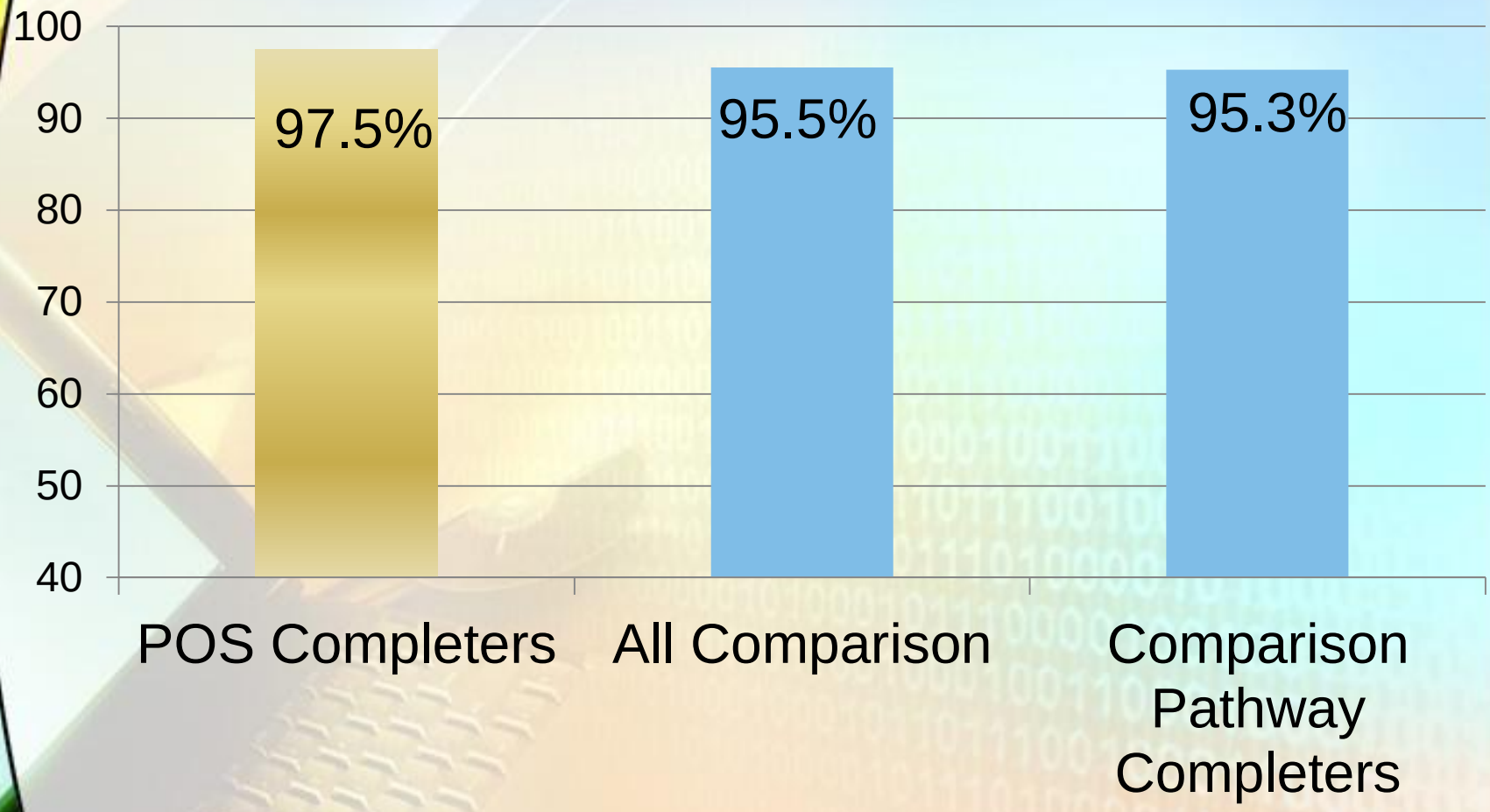
Student Behavior-Engagement

Percentage of POS1 2011 Cohort Switching IGP Career Clusters, by School Poverty Index (POV)



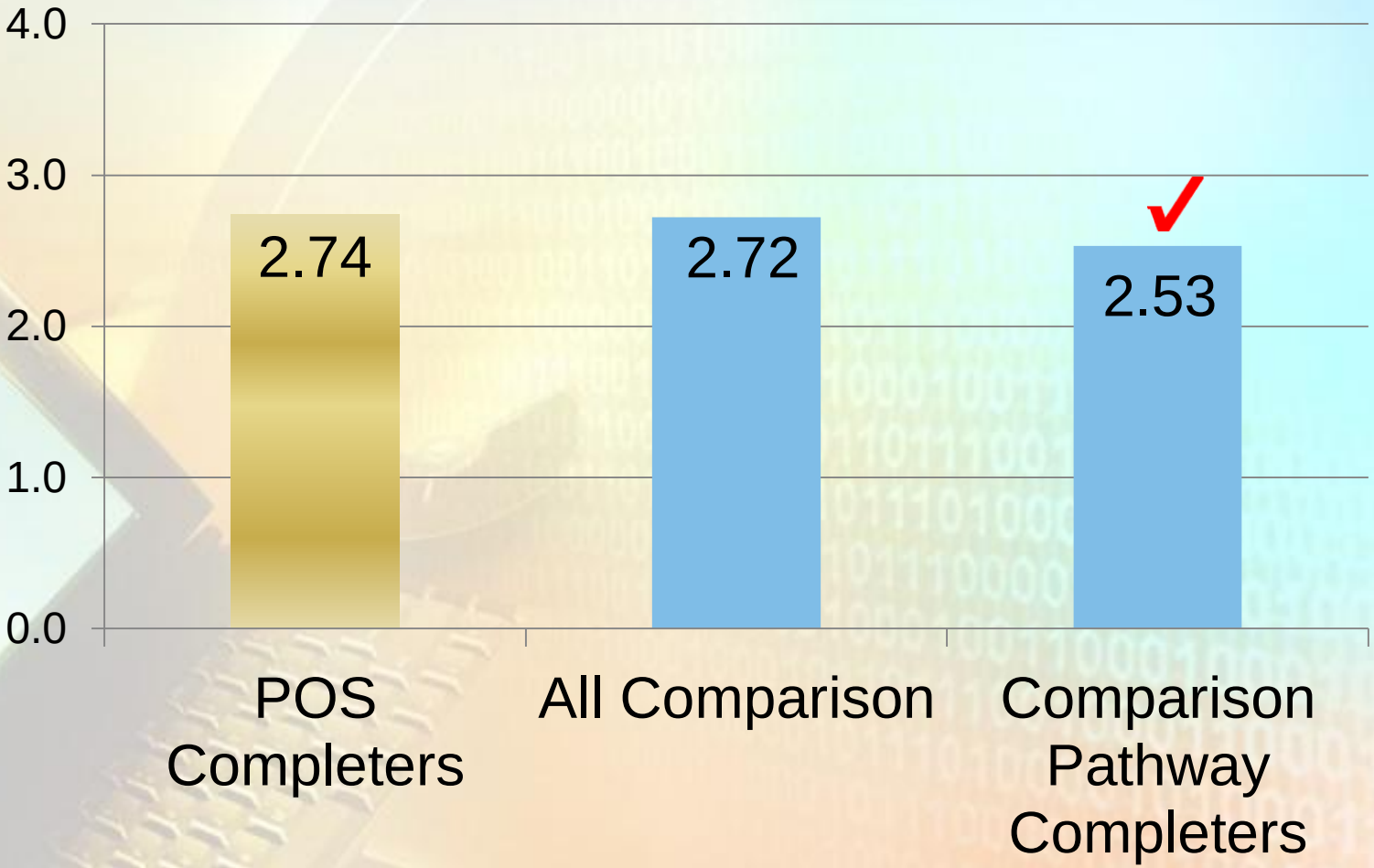
Hot off the press: Graduation Rates

(10:30 this morning)

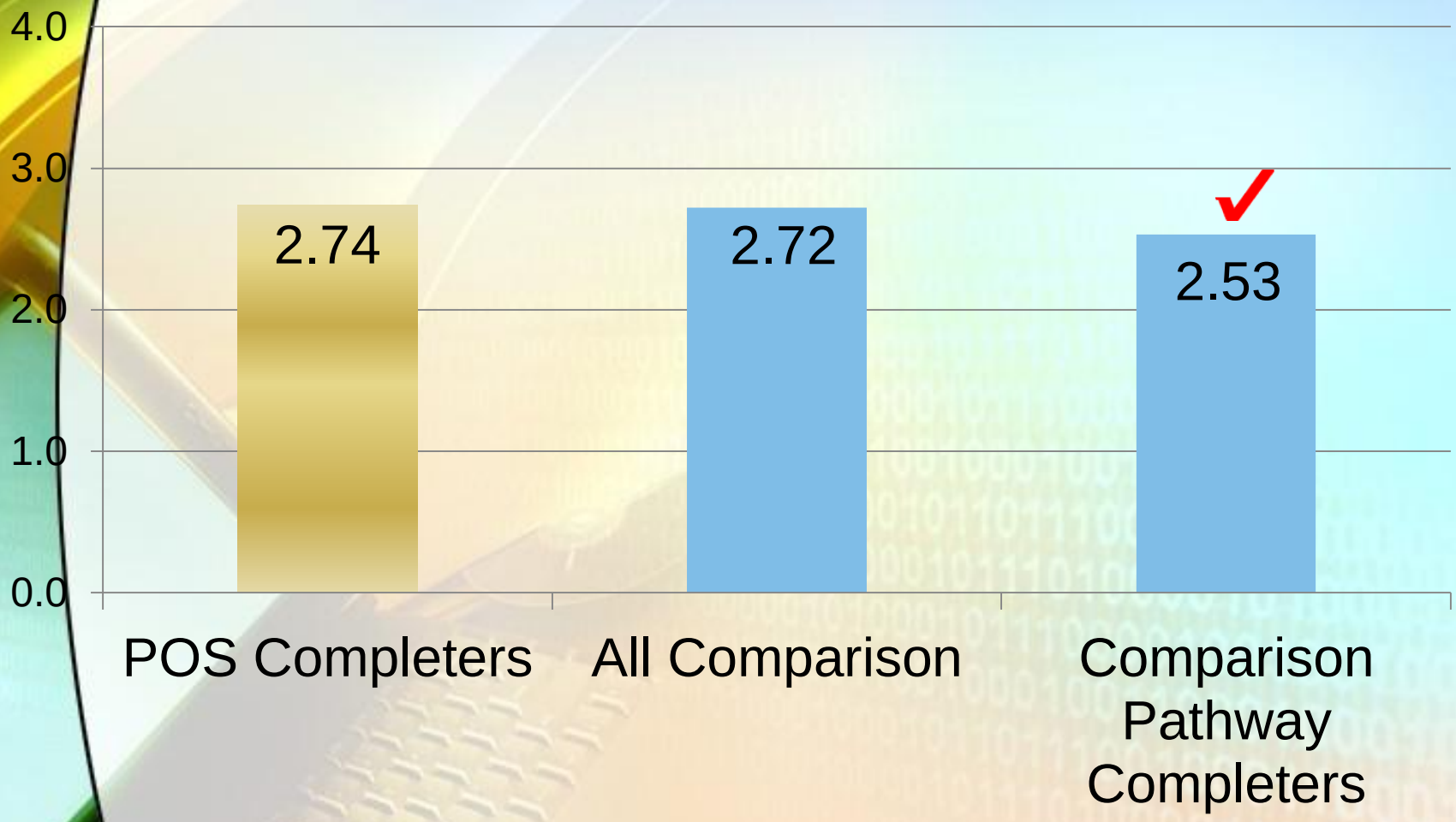


ACHIEVEMENT

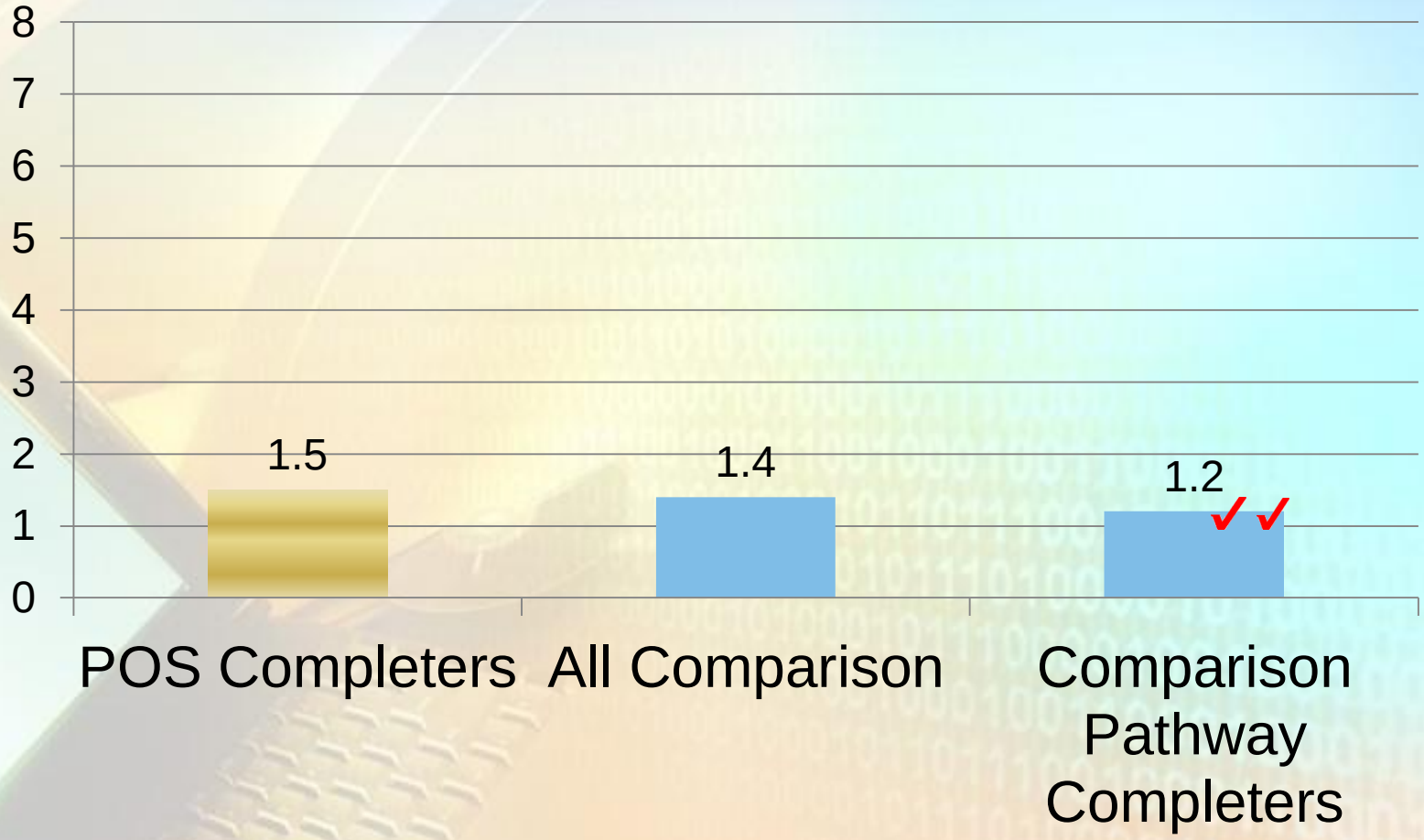
Weighted Cumulative Overall GPA HOT OFF THE PRESS



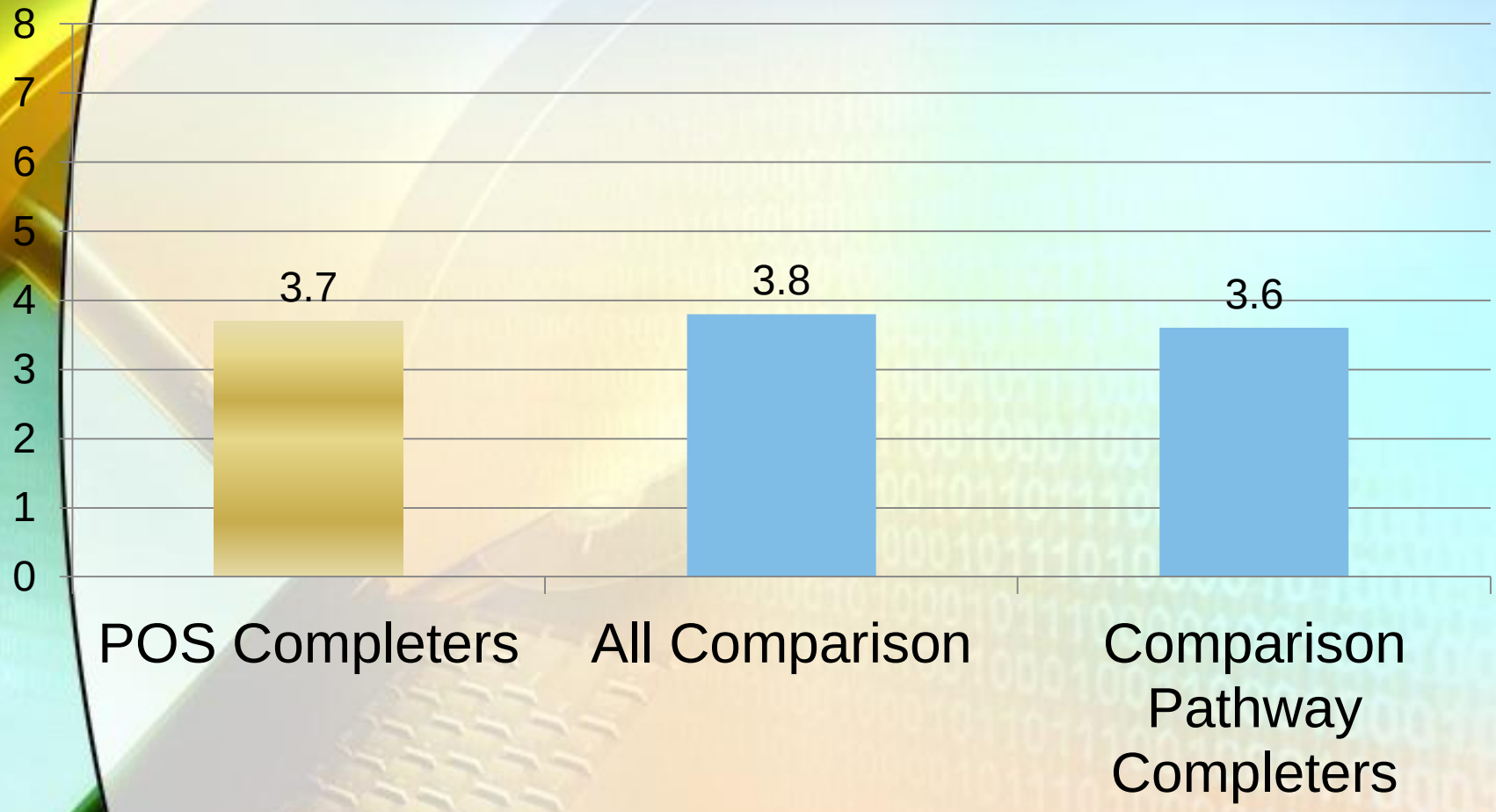
Weighted Cumulative Overall GPA (Hot off the press)



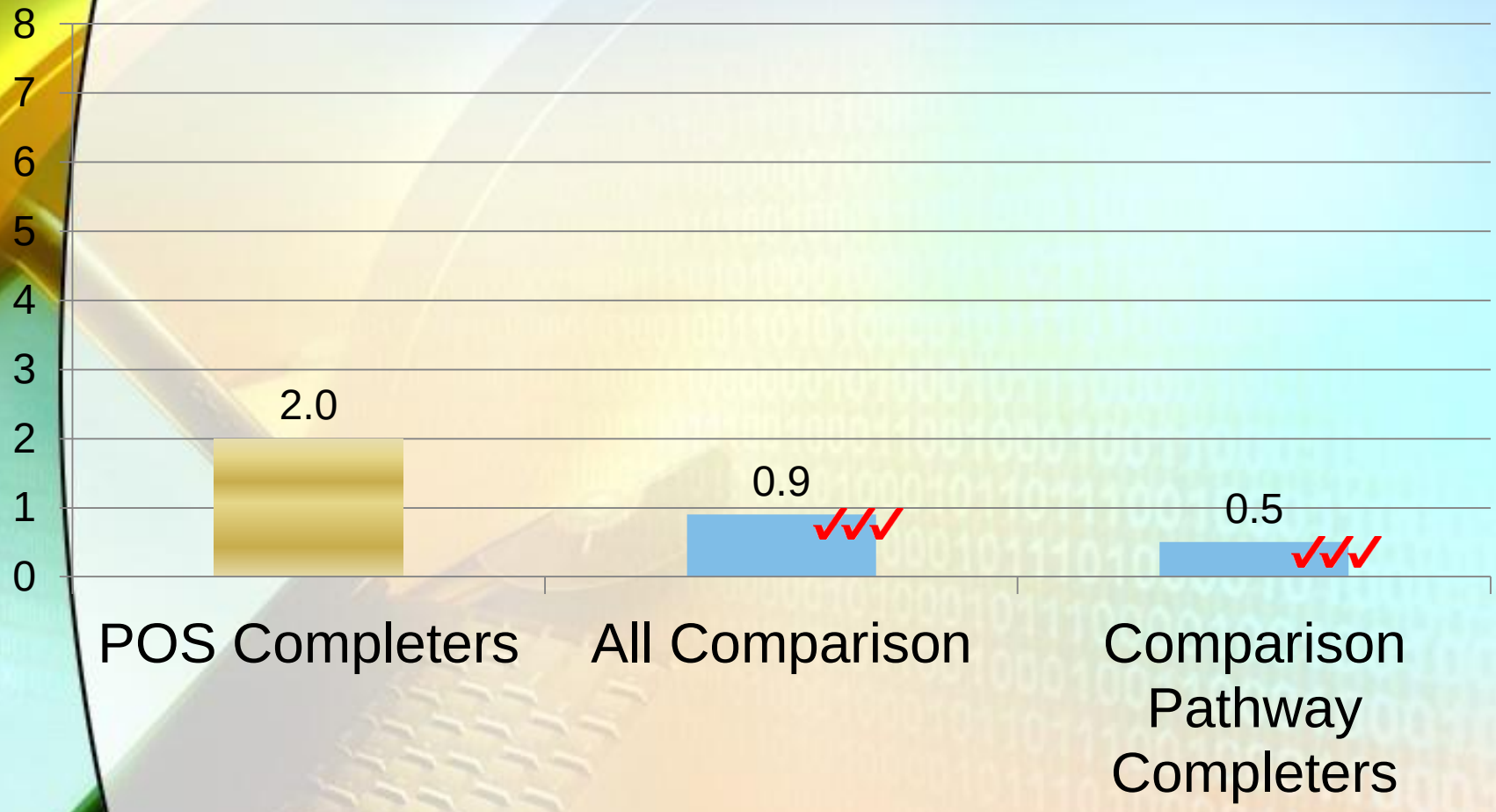
Higher Math Credits Earned (Hot of the Press!)



Science Credits Earned



AP Credits Earned

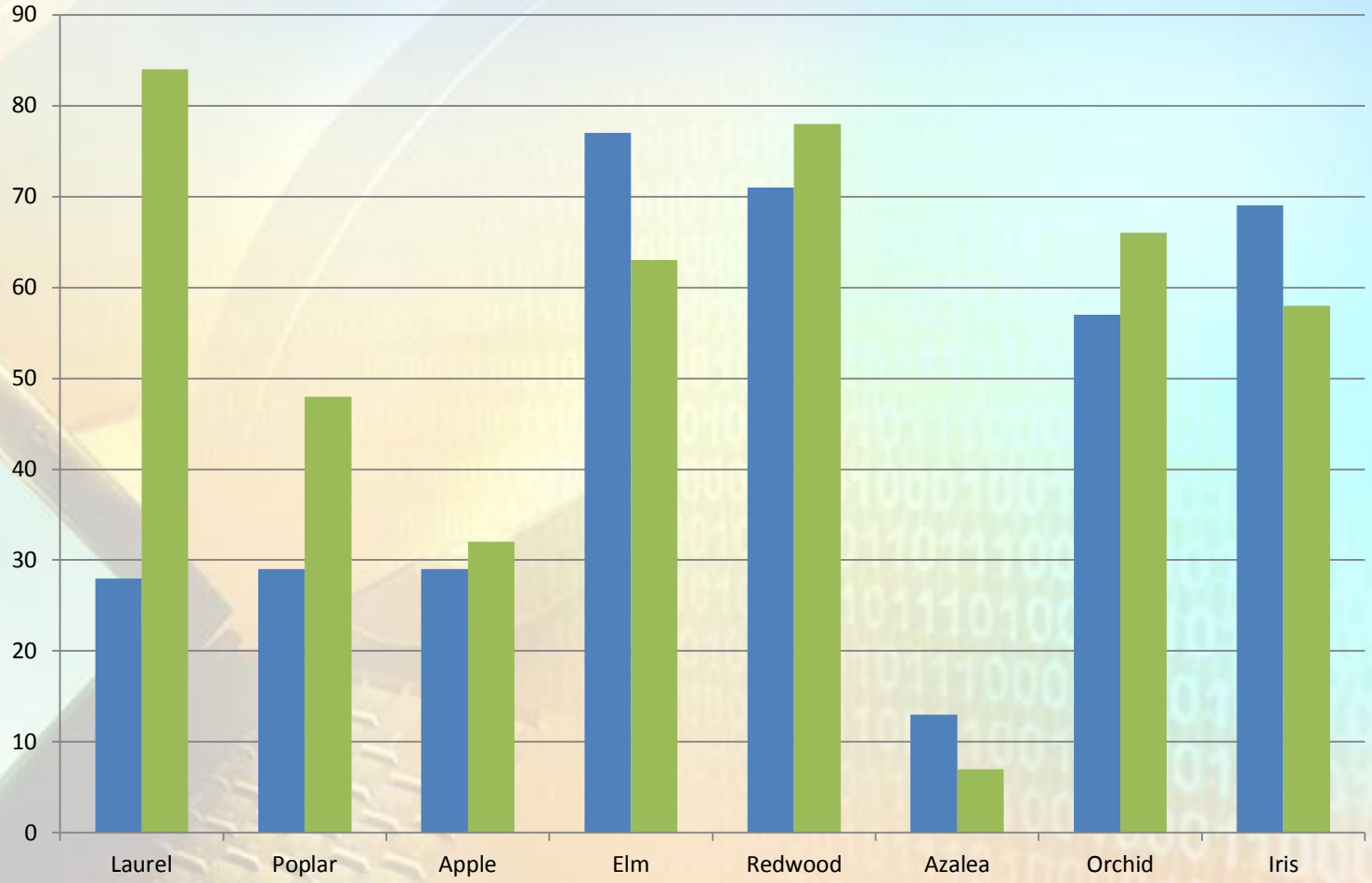


"Mature POS" High School Students

- Taking more CTE courses is related to taking more math and science credits, and to a higher GPA in science
- CTE course taking has a positive relationship (i.e., not detrimental) with academic motivation and skills

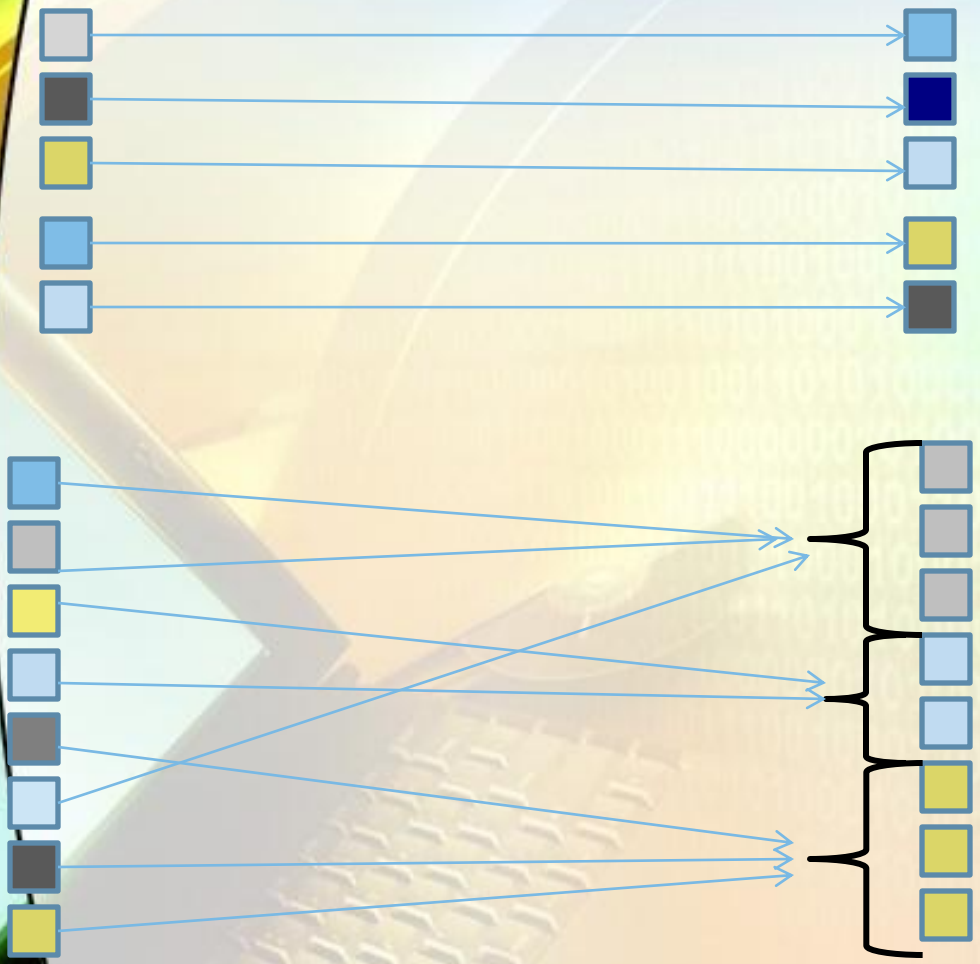
[Further transcript analyses, including HS to college longitudinal analyses, are forthcoming.]

Numbers of CTE Program Completers
Comparison Group & Test Group



TRANSITION

Transition to Affiliated College (35% of sample)



Of those who entered affiliated college, 45% stayed in the same POS (e.g., culinary) as in HS

57% stayed in the same career cluster (e.g., hospitality) as their HS POS

Did they do what they planned?

	2009 plans	2012 actual status*
Technical/trade school	8%	12%
2 year college	28%	41%
4 year college	45%	29%
Work	5%	13%
Military	6%	2%
Not sure	7%	N/A
Unemployed & Not in school	N/A	4%

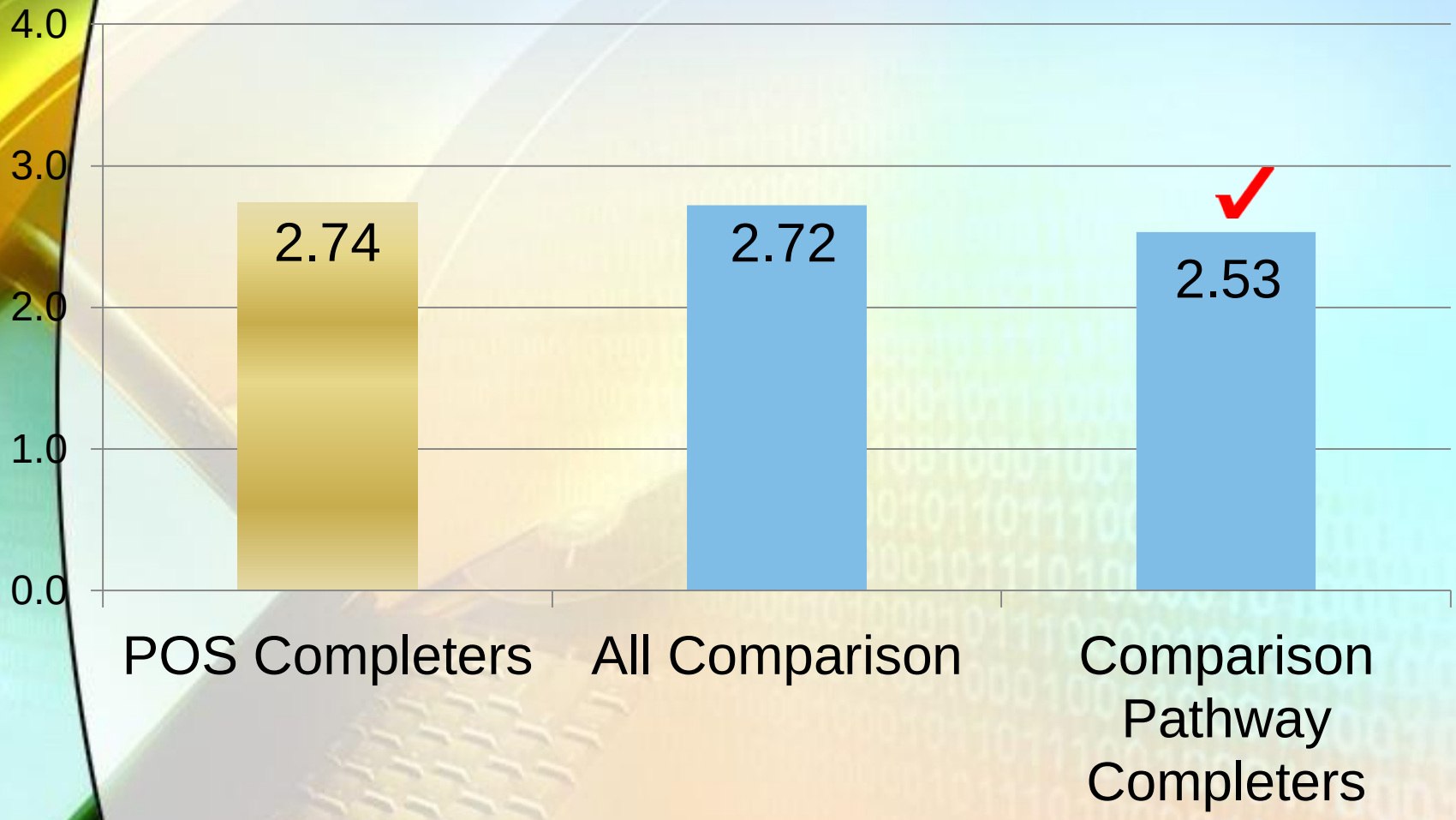
* Based on final survey responses and other means of tracking students

Factors Most Strongly Associated with Student Retention and Completion at Three Community Colleges

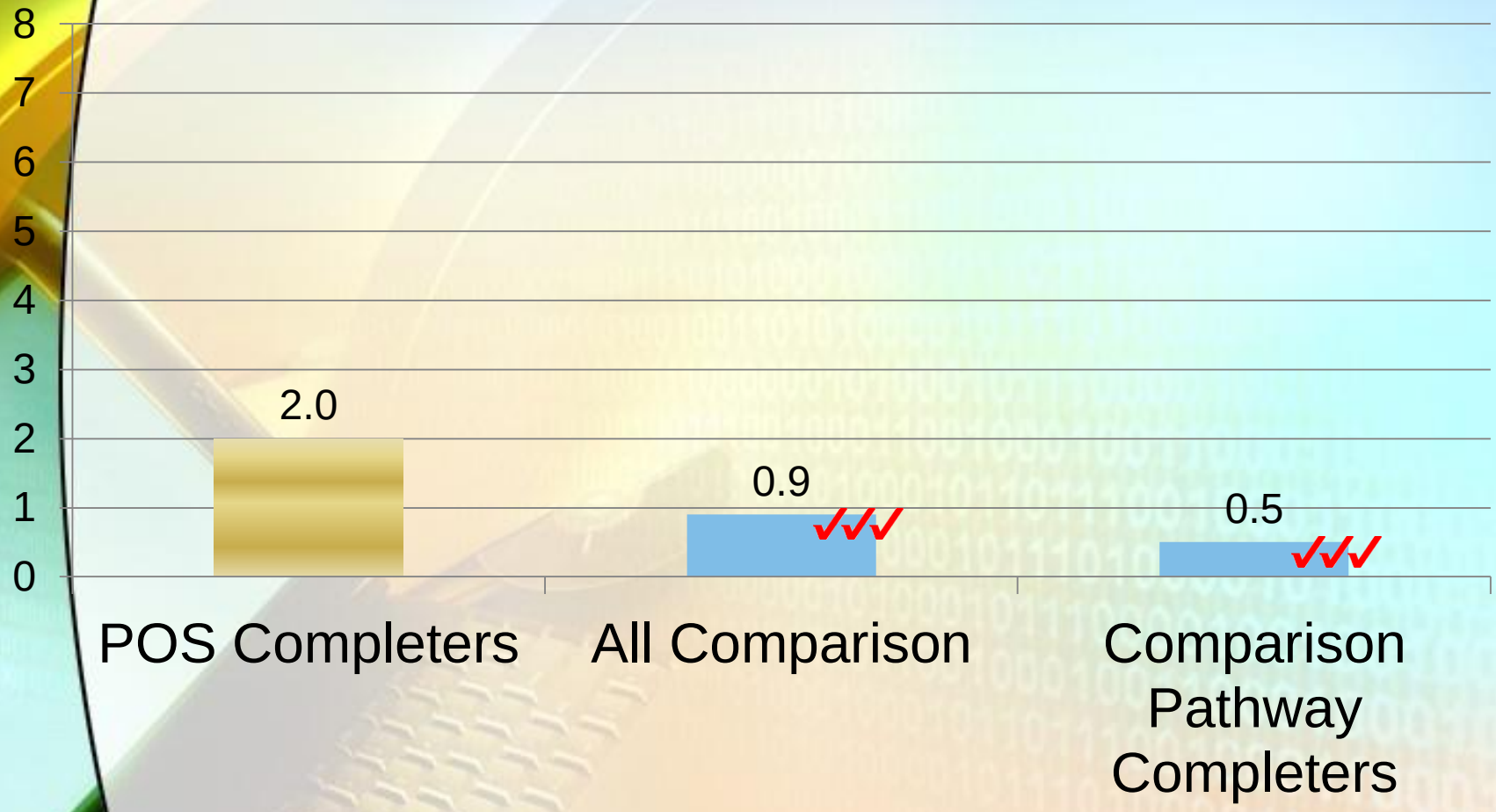
- Math placement test scores
- Age (older students do better)
- Receipt of financial aid
- ***Status as occupational major***
- Use of tutoring services in first term in college

From Bremer, C. D., Center, B. A., Medhanie, A., Opsal, C. L., Geise, A., & Jang, Y. J. (in review). Outcome Trajectories of Developmental Reading and Writing Students in Community Colleges

Weighted Cumulative Overall GPA (academic, CTE, elective)



AP Credits Earned



FINDINGS: THE 10 OVAE ELEMENTS

10 Supporting Elements of POS*

- Legislation and Policies
- Partnerships
- Professional Development
- Accountability and Evaluation Systems
- College and Career Readiness Standards
- Course Sequences
- Credit Transfer Agreements
- Guidance Counseling & Academic Advisement
- Teaching and Learning Strategies
- Technical Skill Assessments

***OVAE Programs of Study Design Framework, http://bit.ly/tA385f**

Guidance & Counseling: A Critical Component

Percentage of Respondents	Class of 2009	Class of 2011
No One	12%	4%
Parent	34%	29%
Teacher	9%	5%
Guidance	36%	58%
Friends	6%	2%
Multiple Responses	4%	2%

Typical "Progression of courses" template

9th Grade	10th Grade	11th Grade	12th Grade
English I or English I-Honors	English II, World Lit. Honors, or Business Communications	American Lit., AP English, or Applied Communication	English IV or Technical Report Writing
Algebra I, Algebra I-Honors, Geometry, or Geometry Honors	Algebra I, Algebra I-Honors, Algebra II, Algebra II-Honors, Applied Algebra II, Geometry, or Geometry Honors	Geometry, Geometry Honors, Algebra II, Algebra II-Honors, Applied Algebra II, Pre-Calculus Honors, or Trigonometry and Prob/Stats.	Pre- Calculus or Calculus or Statistics
Principles of Science or Biology I-Honors	Biology I, Biology I-Honors, Chemistry I, or Chemistry I-Honors	Chemistry I, Chemistry I-Honors, AP Chemistry, Physics I, or Physics I-Honors	Physics or AP Physics
World History or AP World History	US History or AP US History	US Government	Foreign Language
Physical Education I	Physical Education II	**Accounting I (1 credit)**	***Office Technology II (2 credits)** or *Computerized Accounting (2 credits)
Freshman Academy	Intro to Business Technology (semester) Multimedia & Desktop Publishing (semester)	Office Technology I (2 credits)	
Health/Drivers' Ed (semester)			
Introductory Computer Concepts (semester)			

Certifications	Possible Articulated Courses	Post Secondary Options
MCAS (Microsoft Certified Applications Specialist)	**ACC135B – Bookkeeping I** **IS 101**	CC – Division of Business State College – Business Administration University – College of Business Administration

Opportunity to Acquire PS Credits
(No Consistent Models)

DUAL CREDIT

- At West, college **credit is immediately granted** if students pass the HS course with an A or a B; the credits are portable
- At East and South, students **must pass an extra exam** and/or show an IRC, and they must attend that CC to get the credits

DUAL ENROLLMENT

- At West, students are **free to enroll** in college courses and earn credits
- At East and South, **only gen ed courses** are available to HS students

Options for College Credit: SC Pathways

Table 11. Change in Course-Taking Over Time

	2009	2011	Diff
Non-POS Students			
Percent Students AP/IB	26%	28%	2%
Average Number of AP/IB Credits	3.4	3.6	0.2
Percent Dual Credit	10%	9%	-1%
Average Number of Dual Credits	2.3	2.6	0.3
Number of 10/11th Credits	7.0	7.2	0.27***
POS Students			
Percent Students AP/IB	11%	9%	-2%
Average Number of AP/IB Credits	2.0	1.5	-0.5
Percent Dual Credit	9%	16%	7%**
Average Number of Dual Credits	2.1	2.5	0.4
Number of 10/11th Credits	8.0	8.1	0.1

Lead to Industry-Recognized Credential, Certificate, AA, or BA

- All POS in the study lead to IRC in HS or CC, or AA/AAS or BA/BS programs
- Many IRCs can be earned in HS – South District's goal is to have students graduate with HS diploma "and something else"
- Time, personnel, and funding cited as problematic: ***East District can no longer cover exam costs*** and have downplayed this aspect of POS

What We Found

POS Framework in Action

Shared vision
Flexibility
Relationships
Industry involvement
Credit transcription
Need Career Guidance
Dedicated staff
Grant funding
Students on campus

OVAE POS Framework

Legislation and Policies
Course Sequences
Partnerships
Credit Transfer Agreements
Guidance Counseling
Professional Development
Technical Skills Assessments
Teaching/Learning Strategies
Accountability/Evaluation
College/Career Ready Standards

?

Emergent trends

- Some evidence of academic achievement effect, but the evidence is mixed
- Mandate did not appear to have much effect on POS implementation (e.g., % of students engaged in POS, use of dual credit)
- 10 elements are not equally important or too costly to employ (e.g., TSA)
- Other elements may be more important (e.g., external funding)

Emergent Trends II

- Even when the policy is required by law, implementation is uneven and may be skewed towards lower performing districts.
- Career guidance/career development is emerging as a necessary condition for RPOS
- Cost is a barrier (counseling, TSAs, professional development)

Things We Don't Know . . . Yet

- Transition to postsecondary education
  - Limited evidence from the Mature POS study
  - No follow up with HS cohorts in SC Pathways or U of L Rigorous Test sites
- Transition to work
  - Acquisition of credentials and,
  - The signaling power of the earned credentials

Implicit Assumptions: With Policy Implications

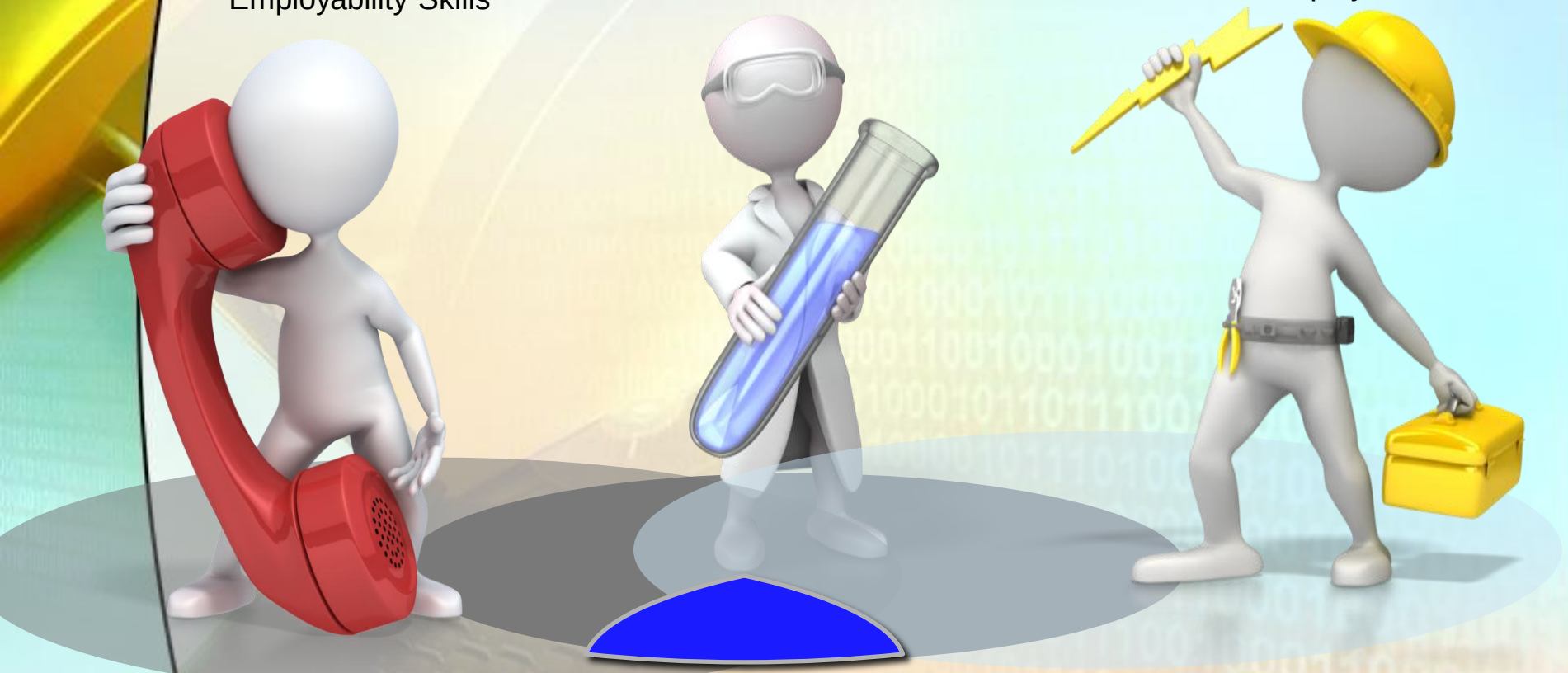
- Education reforms operate independently of economic context
- Adolescents are rational, logical decision makers
- The 10 “elements” are the right elements to ensure POS success
- Accountability challenges for POS
  - What will POS success mean?
  - Enrolled in any college?
  - Pursuing same POS pathway?
  - Student sense of contribution of POS?

POS MUST EMBRACE COLLEGE & CAREER READINESS

Occupational
SCANS
21st Century Skills
"Soft" Skills
Employability Skills

Academic
Mathematics
Science
Communications

Technical
Job specific skills valued by employers



College & Career Ready

An Industry Driven POS-Toyota

THE SKILL PIPELINE PROBLEM

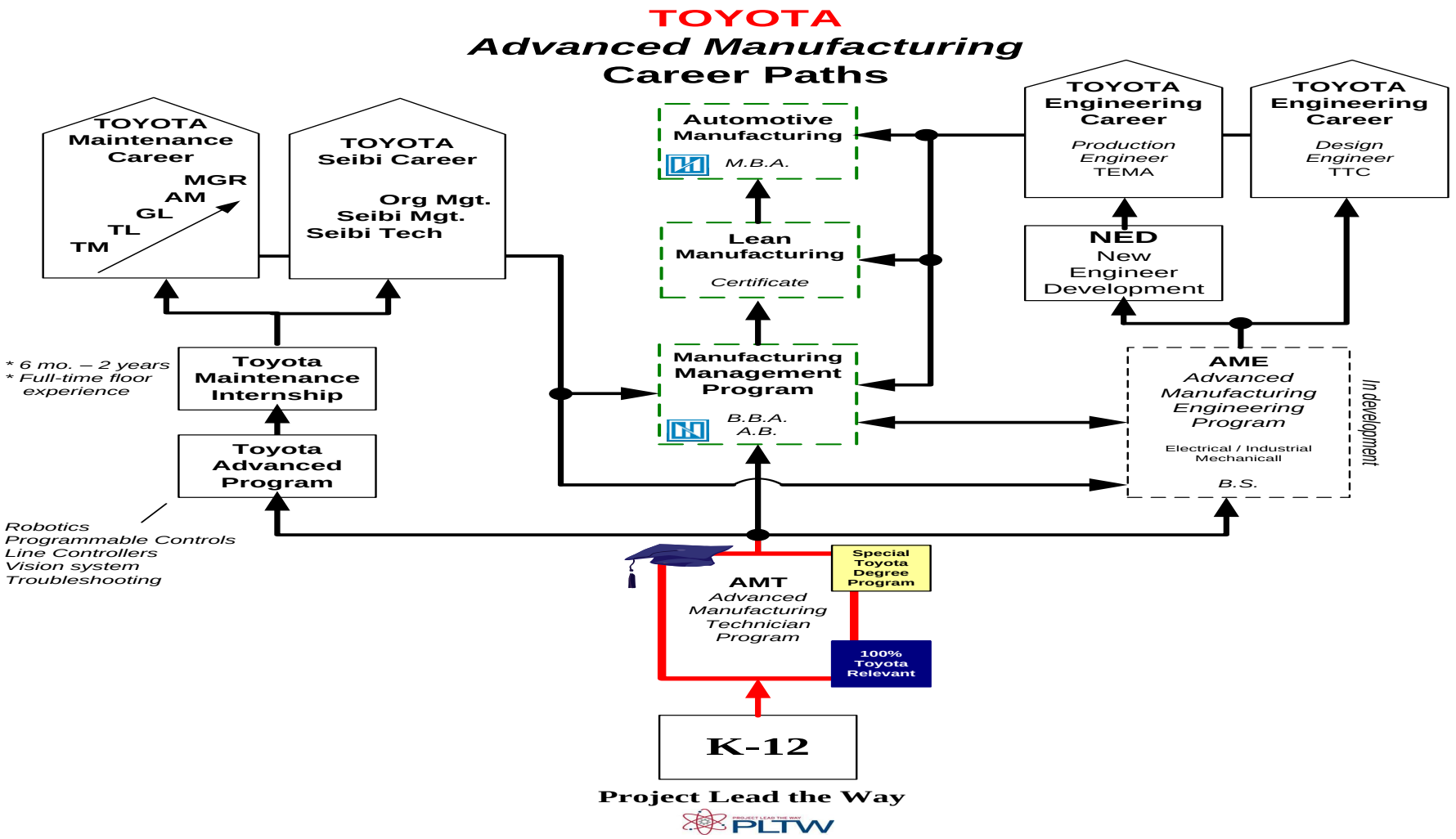
The U.S. community college system produces less capable graduates than parallel systems in competitor nations

Intentional preparation consists mostly of academic education only, i.e. pass technical courses and get a degree.

Schools do not produce graduates with vital preparation for workplace success, such as a highly developed safety culture, skills in workplace organization, lean work skills, and problem solving.

The Toyota Solution

Seamlessly Connect Paths for Career Long Growth and to Strengthen the Whole Company



The Solution

Totally Redesign the Learning Environment

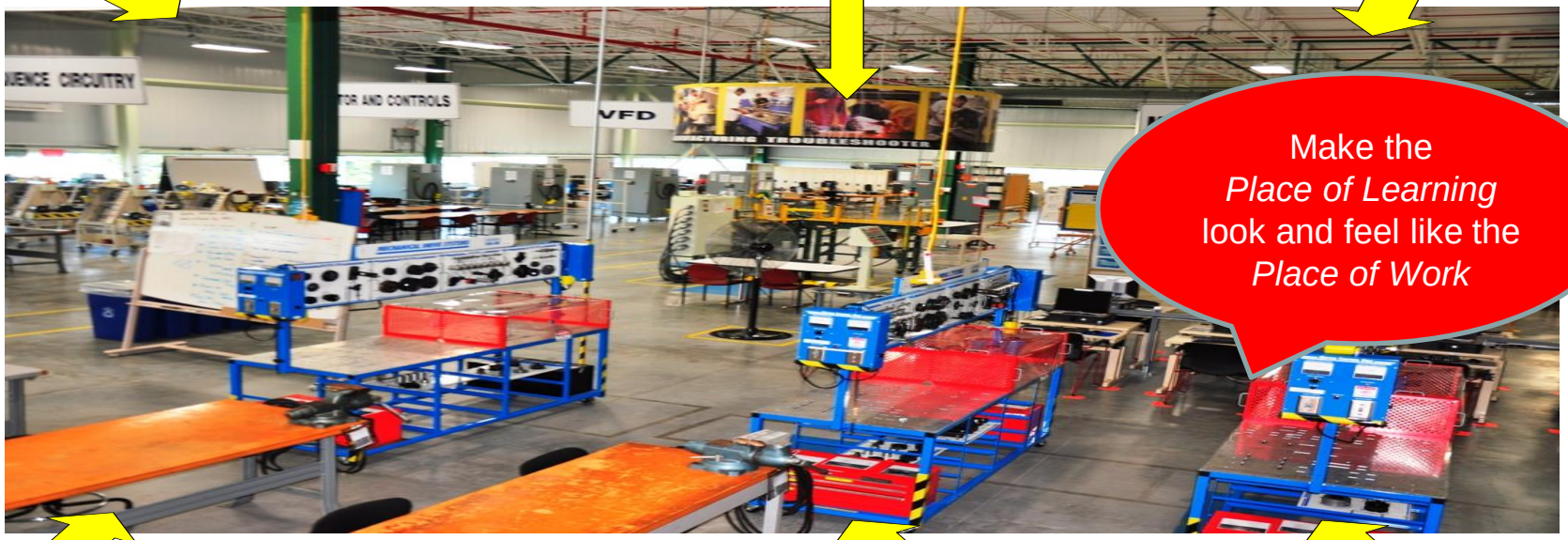
The New Model School

For Manufacturing

MORE REALISTIC
Looks Like a Factory
Feels Like a Factory

MANUFACTURING SIMULATOR
Central Focus
Reason for Learning
Toyota Troubleshooting

TOYOTA LEARNING
Safety, TPS, 5S
Learning Lab



Make the
Place of Learning
look and feel like the
Place of Work

ORGANIZED BY FUNDAMENTAL SKILL
Electricity / Fluid Power
Mechanics & Fabrication

PROCESS LEARNING
Students learn in a structure sequence

Students Learn the *Right* Way the *First* Time

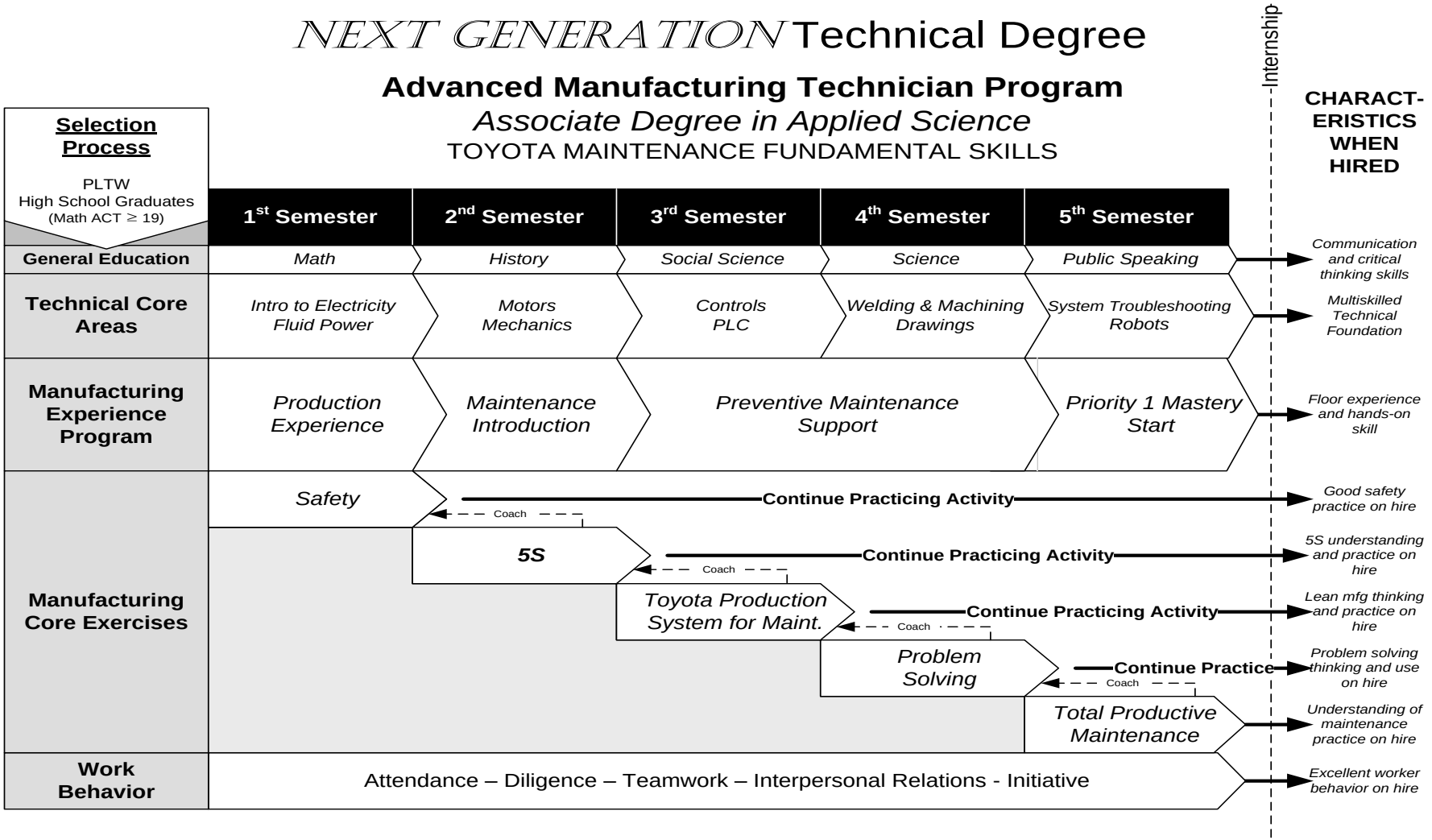
The Solution

Target Best Practice K-12 Programs

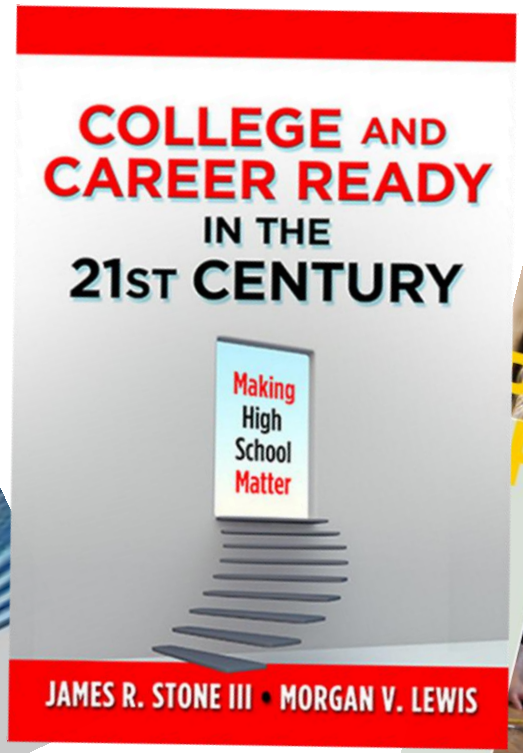
Tech Ed and vocational programs, as they exist now, are not part of the solution. On they whole they do not produce graduates with the capabilities that give U.S. companies advantage over off-shore based competitors and they create too much cost to up-skill when hired.

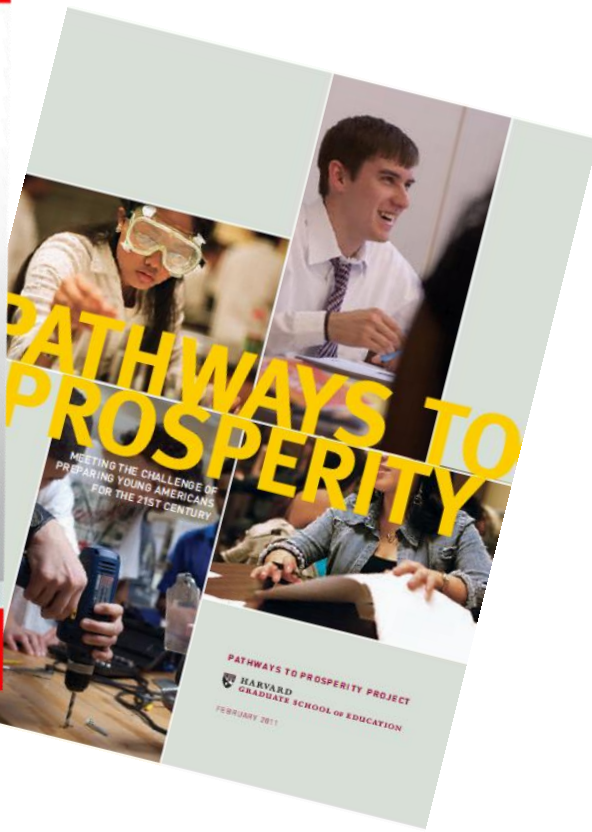
The Solution

Totally Redesign The Community College Program



Three Reports on Career & College Ready





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