Programs of Study

If POS is the Solution, What is the Problem?

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THE PROBLEM: THE LABOR MARKET & THE CONDITION OF EDUCATION

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

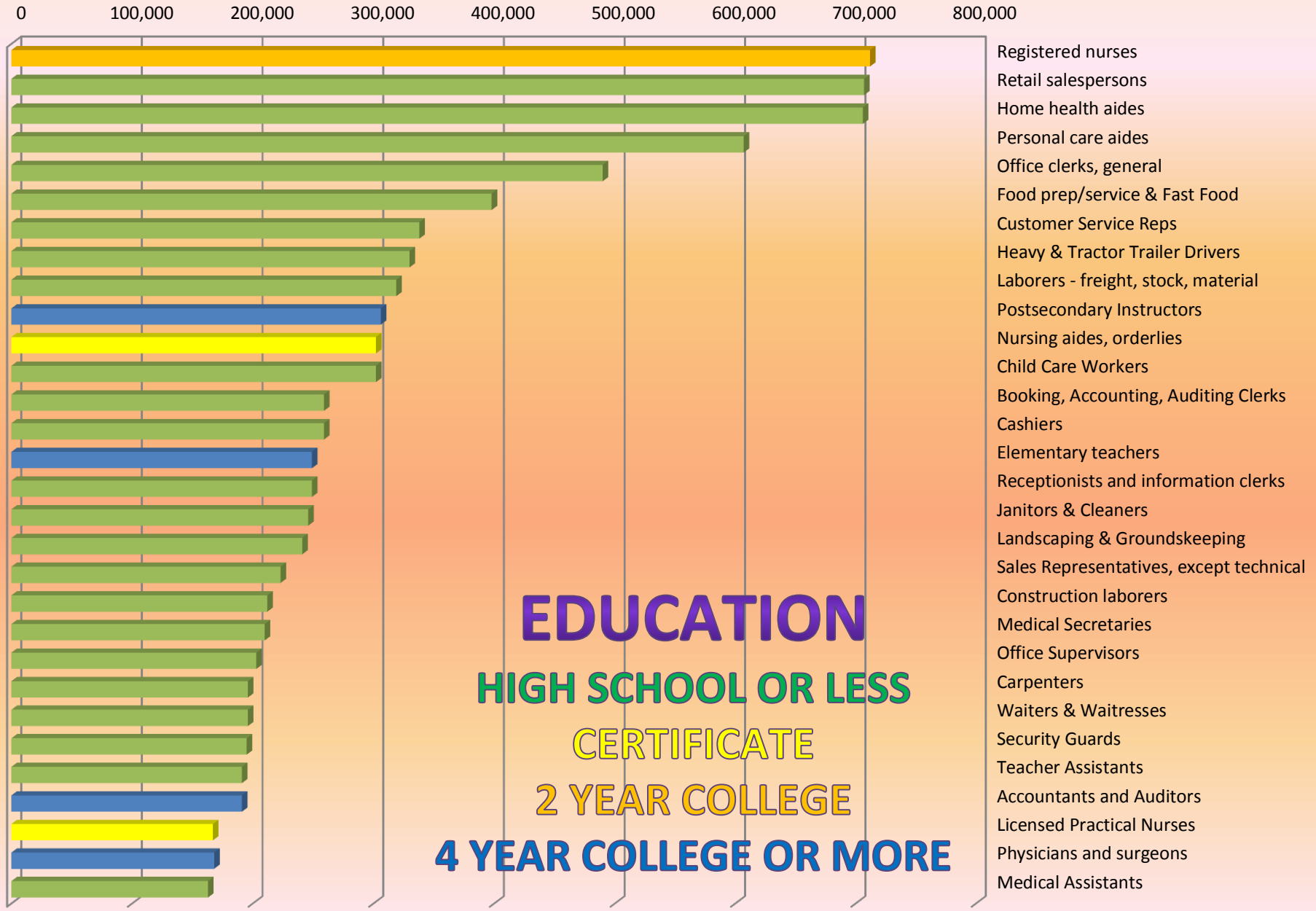
Murray said that none of the companies she has talked with has suggested that there is a shortage of qualified chemists or life scientists. She said that ***employers' greatest concern "is not numbers, it is training***." She cited the example of managers who told her they could interview hundreds of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

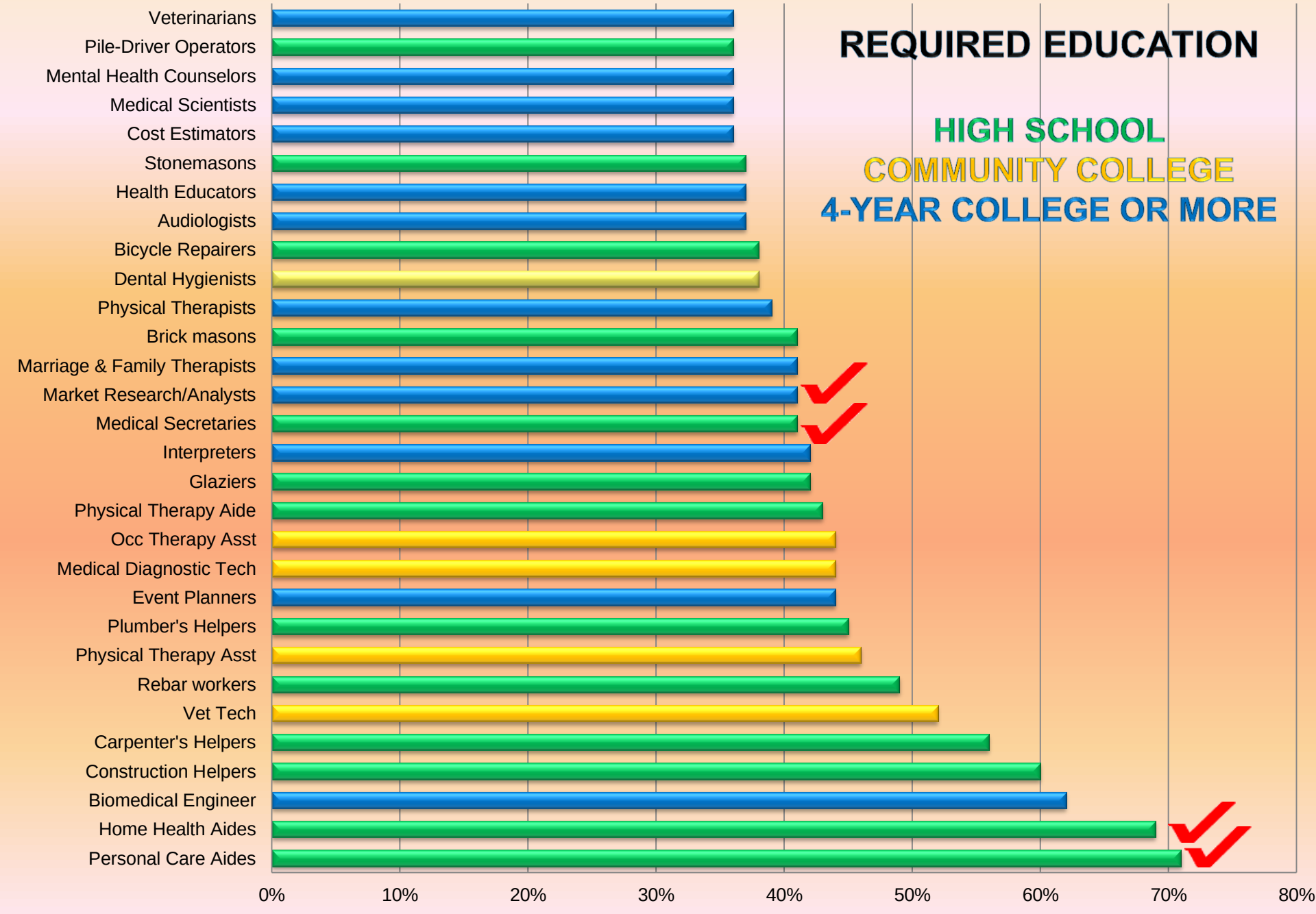
National Research Council. (2008). Research on Future Skill Demands: A Workshop Summary. Margaret Hilton, Rapporteur. Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

High Demand Occupations 2010-2020

The BLS Perspective

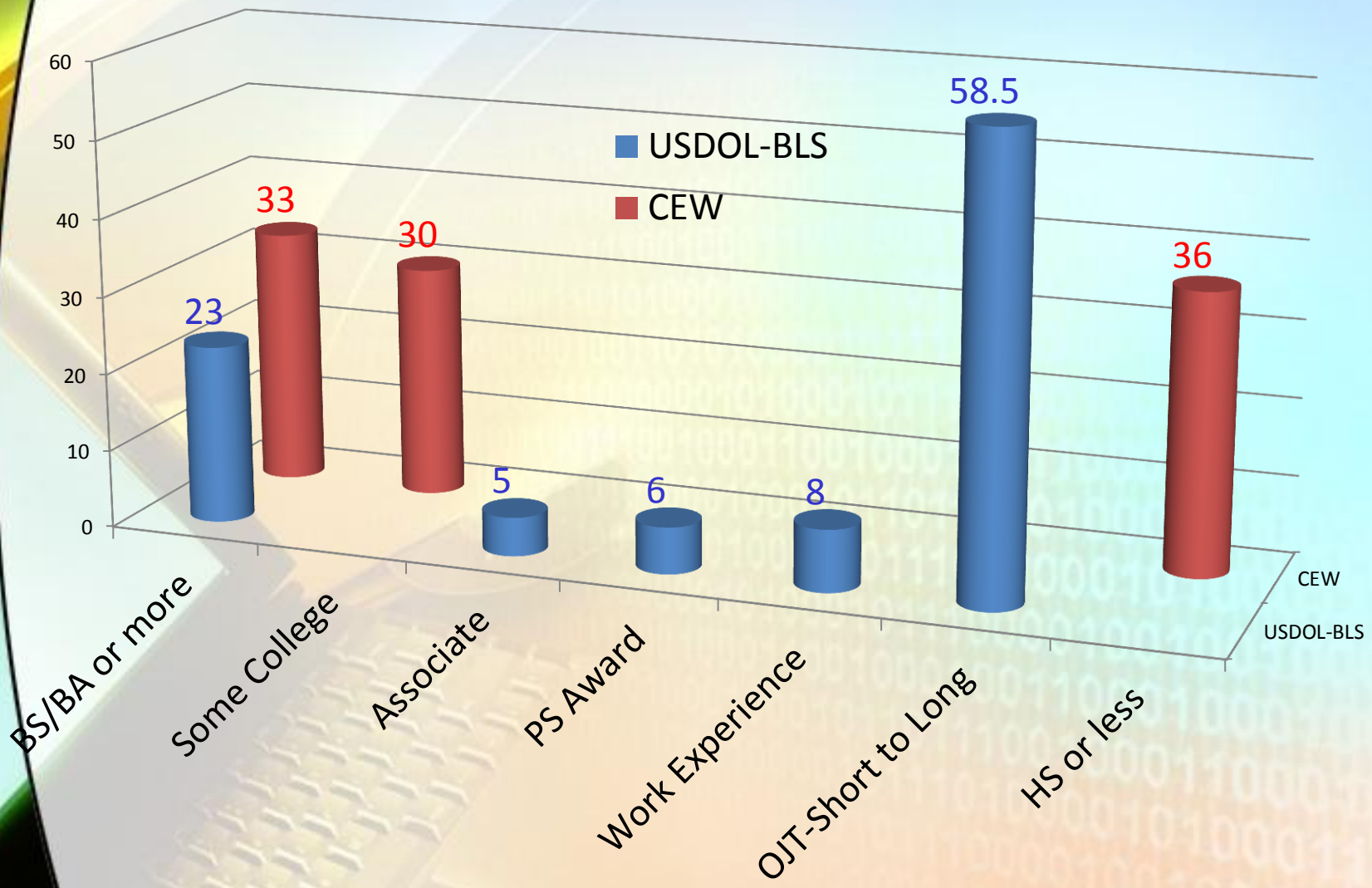


High Growth Occupations 2010-2020

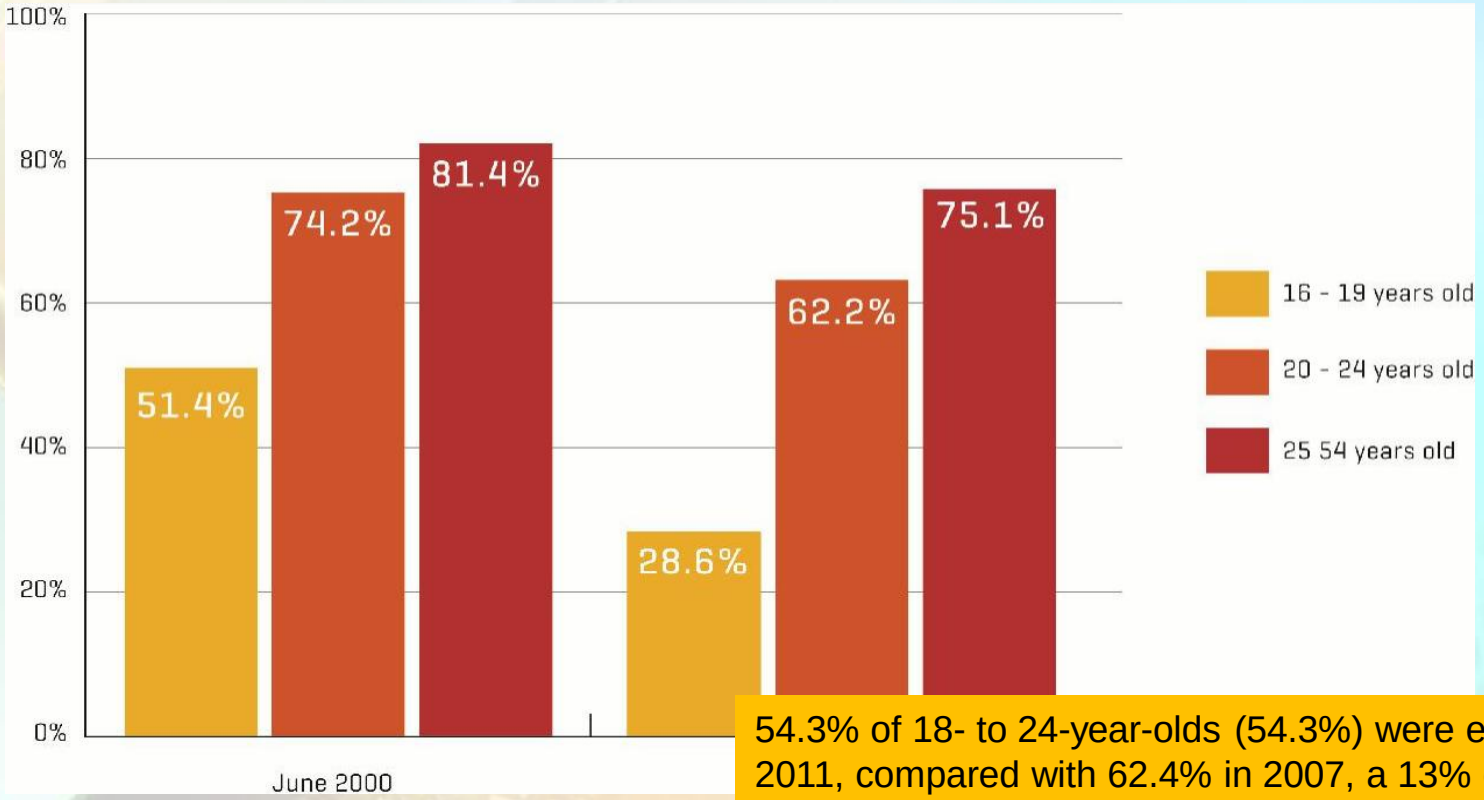


The Other Perspective

Education and Future Work: BLS & CEW



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



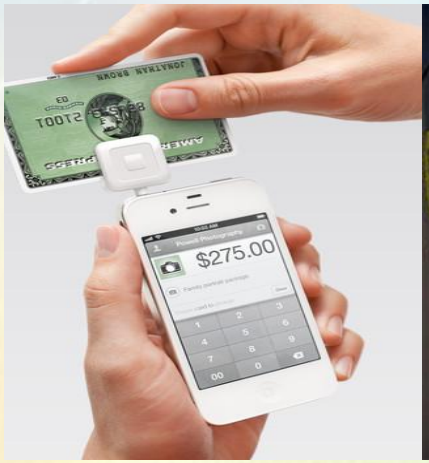
54.3% of 18- to 24-year-olds (54.3%) were employed in 2011, compared with 62.4% in 2007, a 13% decrease. The lowest employment-to-population ratio for young adults since 1948.

Pew Research Center, 2012. ***Coming of Age, Slowly, in a Tough Economy***

Source: Center for Labor Market Studies; U.S. Bureau of Labor Statistics, "CPS Labor Force Statistics".

Sub-Baccalaureate Credentials Pay Off

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

The Economic Context
Technology Impact

Winners

- High Skilled
- "Superstars"
  - Top 1% - 65% of wealth growth since 2002
  - Top .01%(n=15,000) share of national income doubled to 6%
  - CEO pay: 70x to 300x worker
- Capital
  - Equipment +26%
  - Payrolls flat
  - Corporate profits at 50 year high
  - Wages & Benefits at 50 year low

Losers

- Low Skilled
- Everyone else
- Labor

Can People Win?

- Instructional methods
- Softer skills
- Instructional focus
- The Human Advantage (for now)
- Khan Academy
- CTSOs
- Hyperspecialists, entreprenuership
- Physicality of work
- Advanced pattern recognition
- General problem solving
- Creativity

The Education Solution/Problem

Rigor = MORE

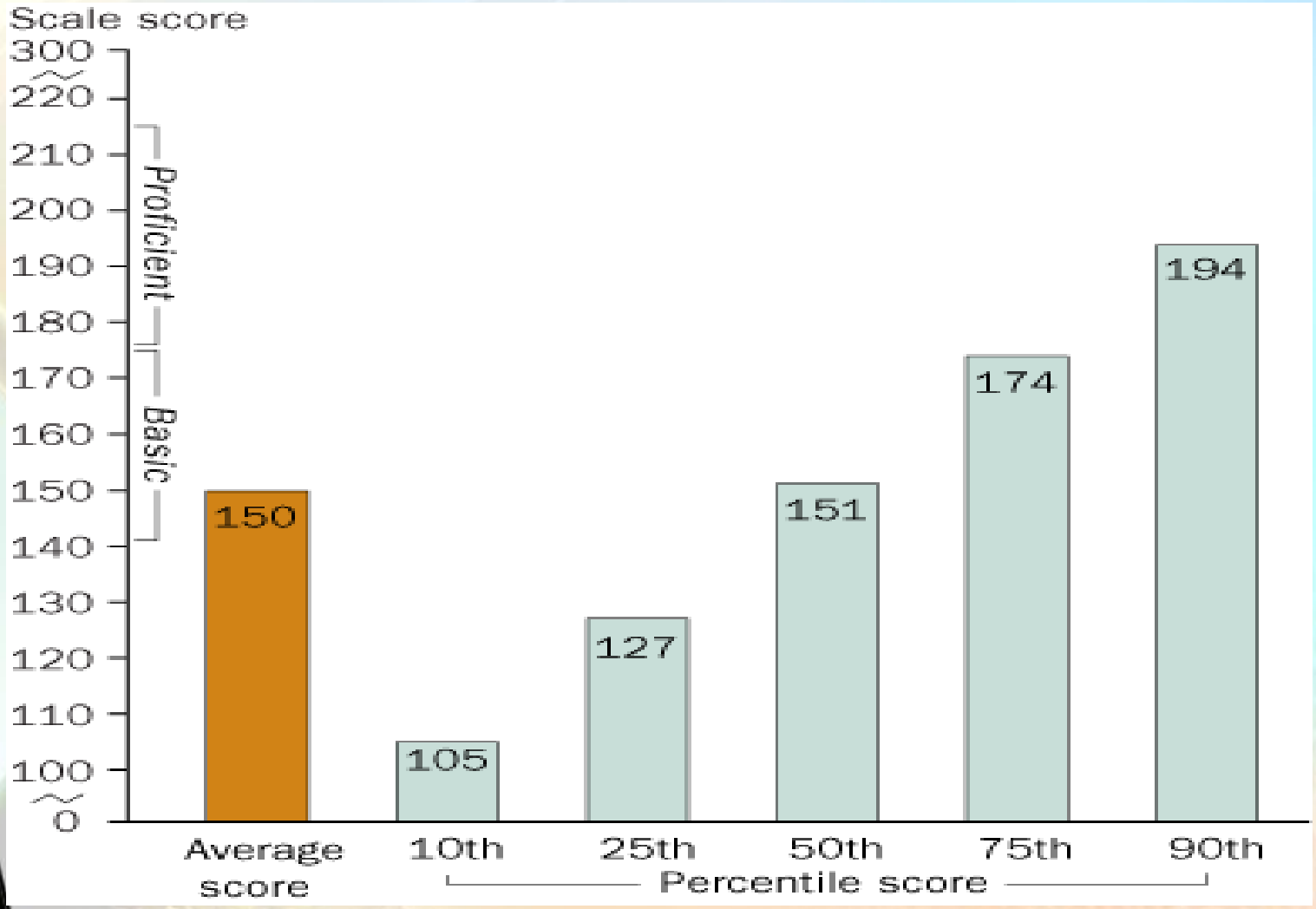
What has 25 years of education "reform" accomplished?

Since the mid-1980s we have

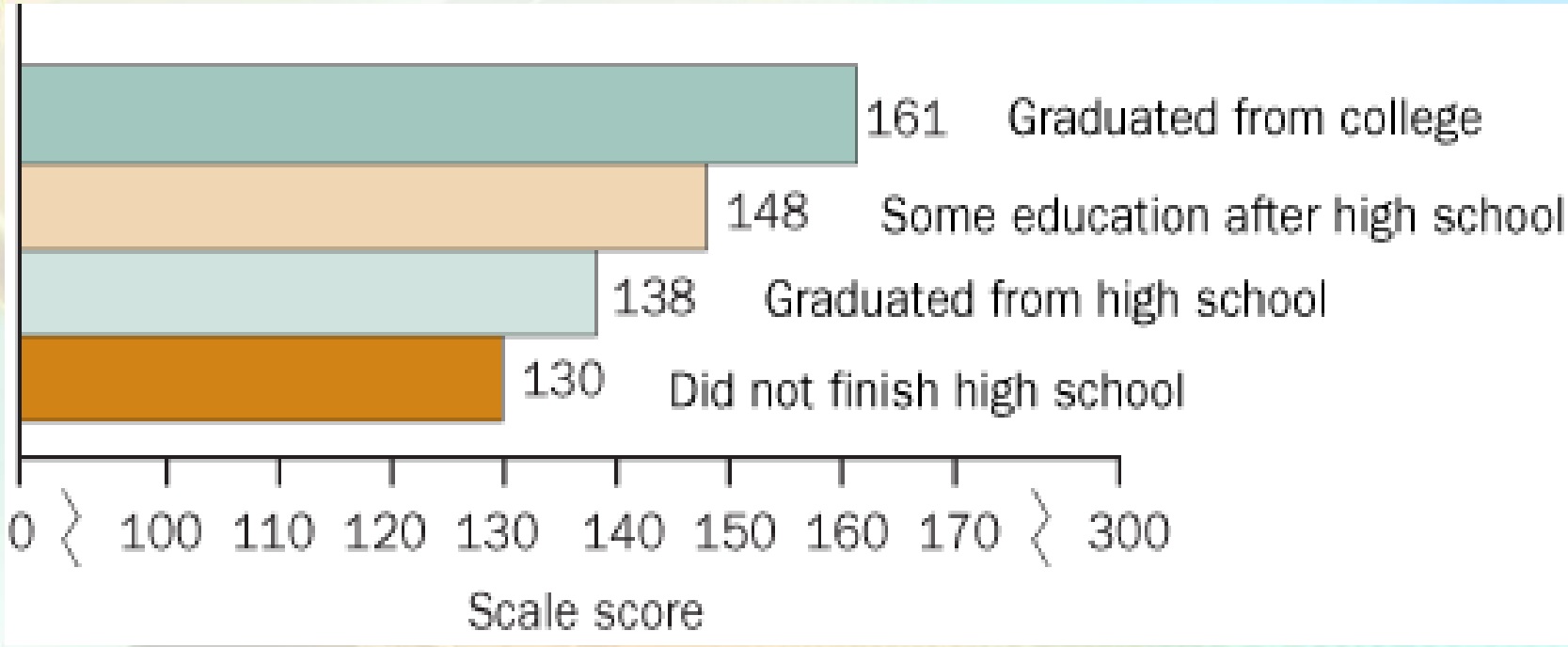
- Added the equivalent of *one full year* of core academics (math, science, language arts) to high school graduation requirements.

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

12th Grade Math Scores 2005

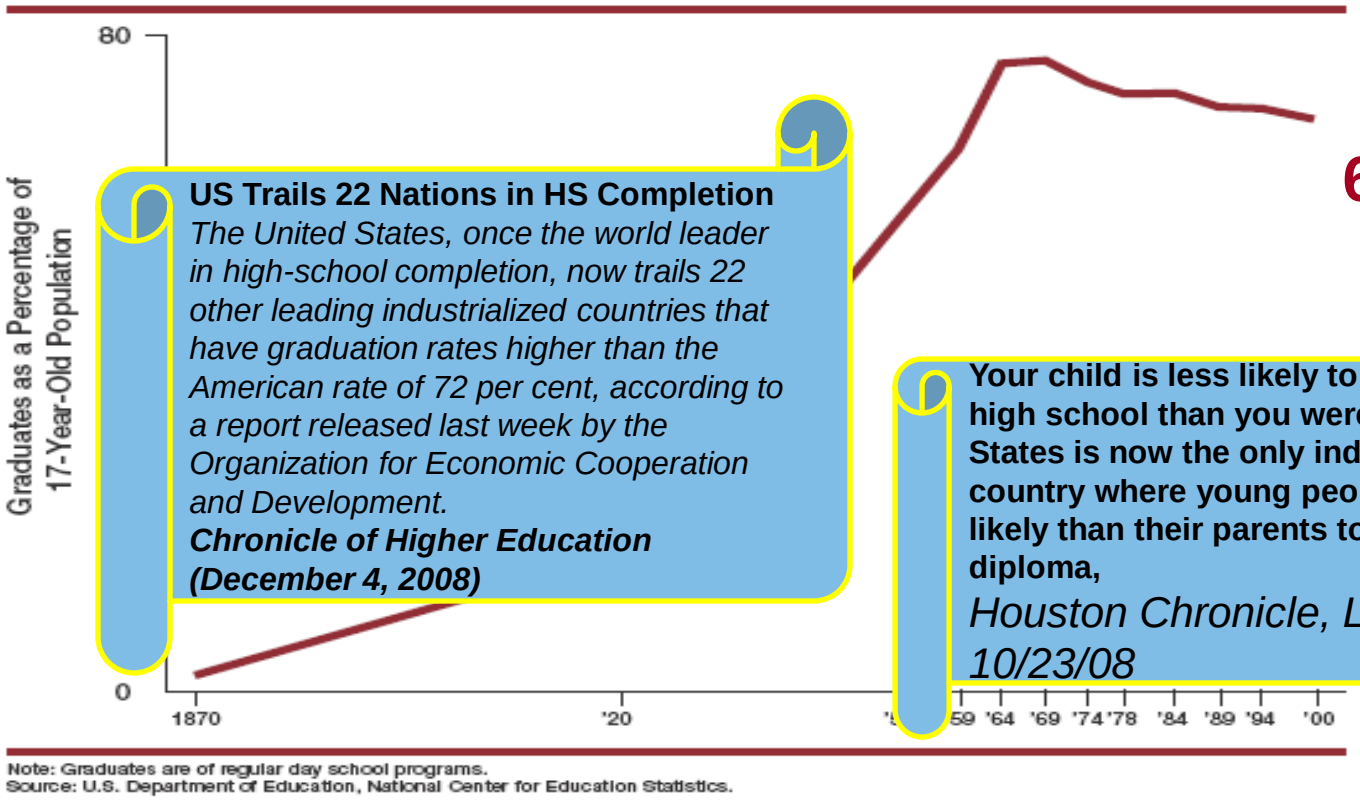


One solution?



Be born to smarter parents!

It is getting worse



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

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

NRCCTE
National Research Center for Career and Technical Education

The Education Challenge

. Engagement - Completing secondary education; completing postsecondary credential

. Achievement - test scores and industry recognized credentials

. Transition - to continued education and training and/or the workplace

CAVEATS!

The Solution

PROGRAMS OF STUDY

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(?)

Research Teams

Clemson – SC Pathways

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U of L – Rigorous Test

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Laura Overman

FHI360 – Mature Programs

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Katie Ellison

POS Questions Across the Studies

- Impact of POS on:
  - Engagement – completion of education
  - Achievement – academic, occupational, technical
  - Transition from HS to PS and/or work
  - Completion of HS and Credential
- Impact of economic resources on POS
- What are the key components of POS in practice?

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*."

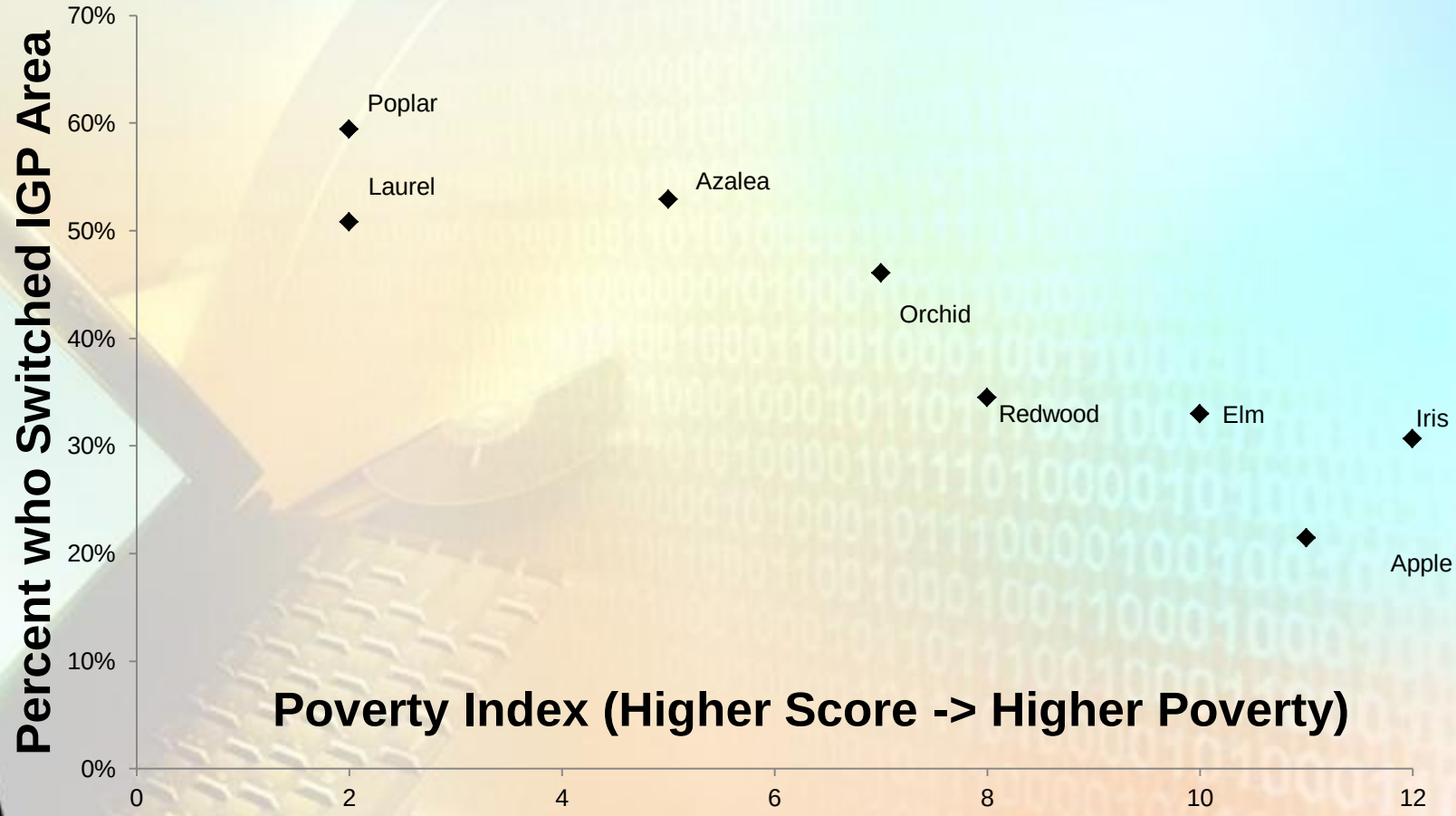
Do POS make a difference for students?

- 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

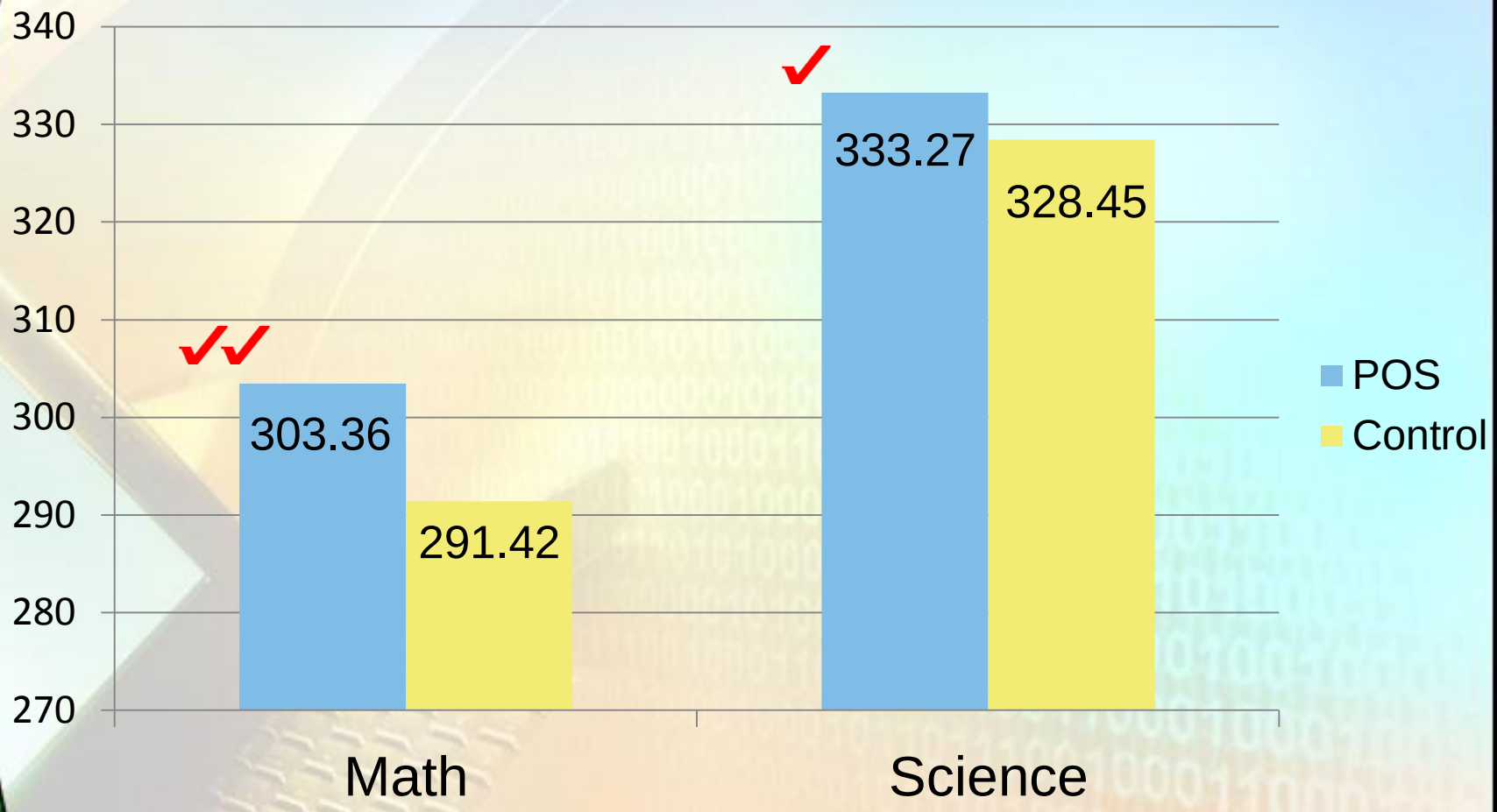
Student Behavior-Engagement

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

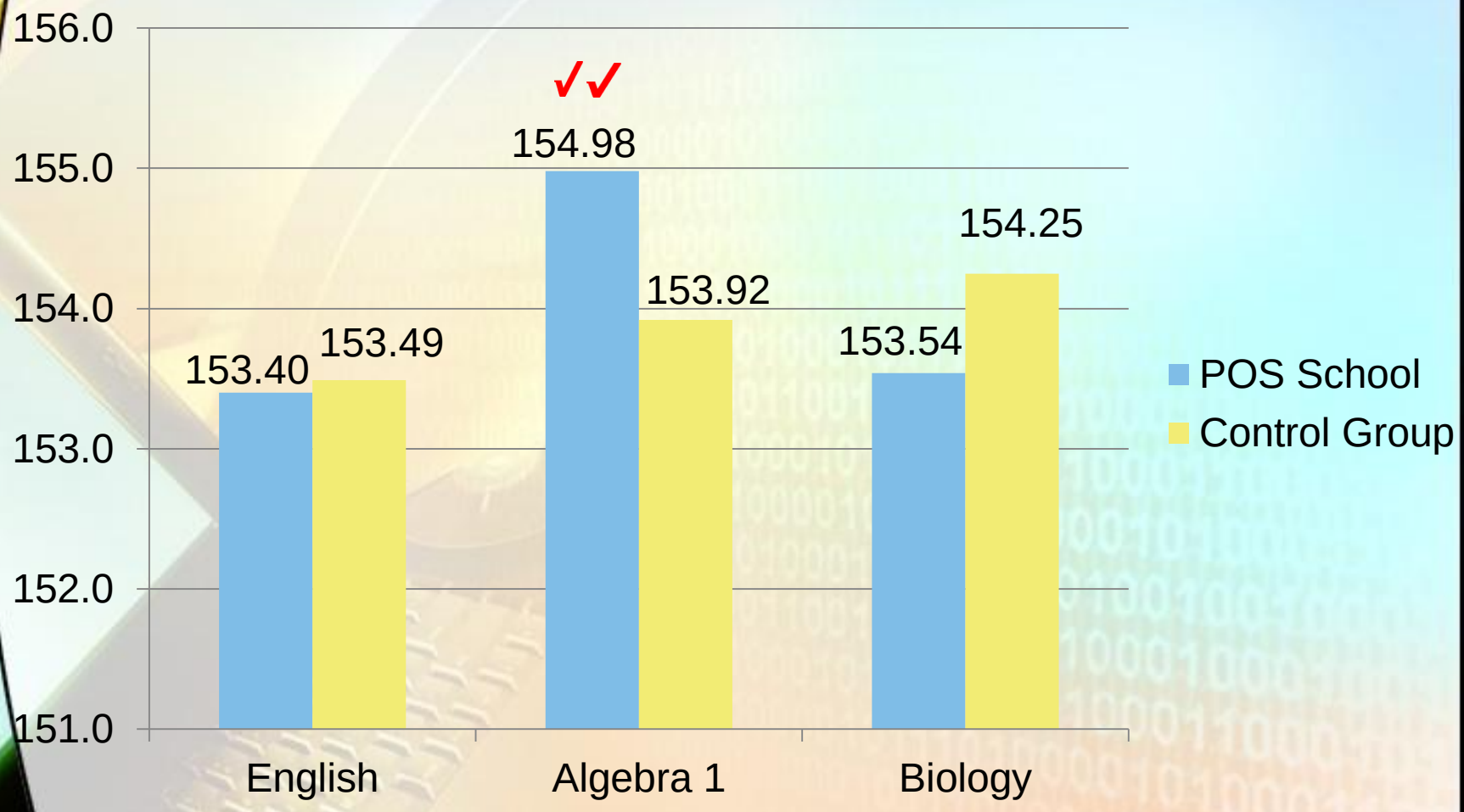


ACHIEVEMENT

West District 10th Grade Test Scores



East District 10th Grade Test Scores



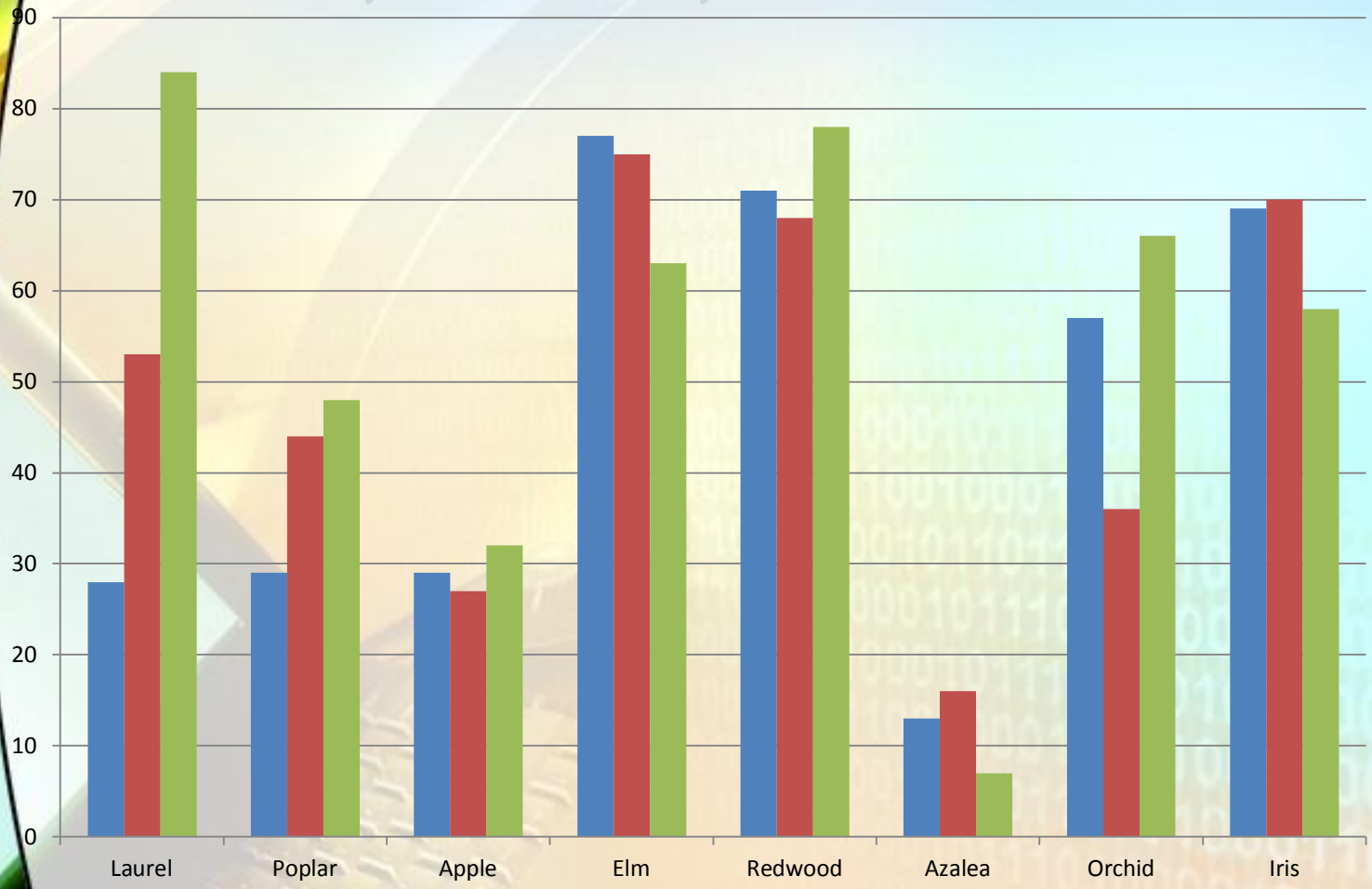
"Mature POS" High School Students

- 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

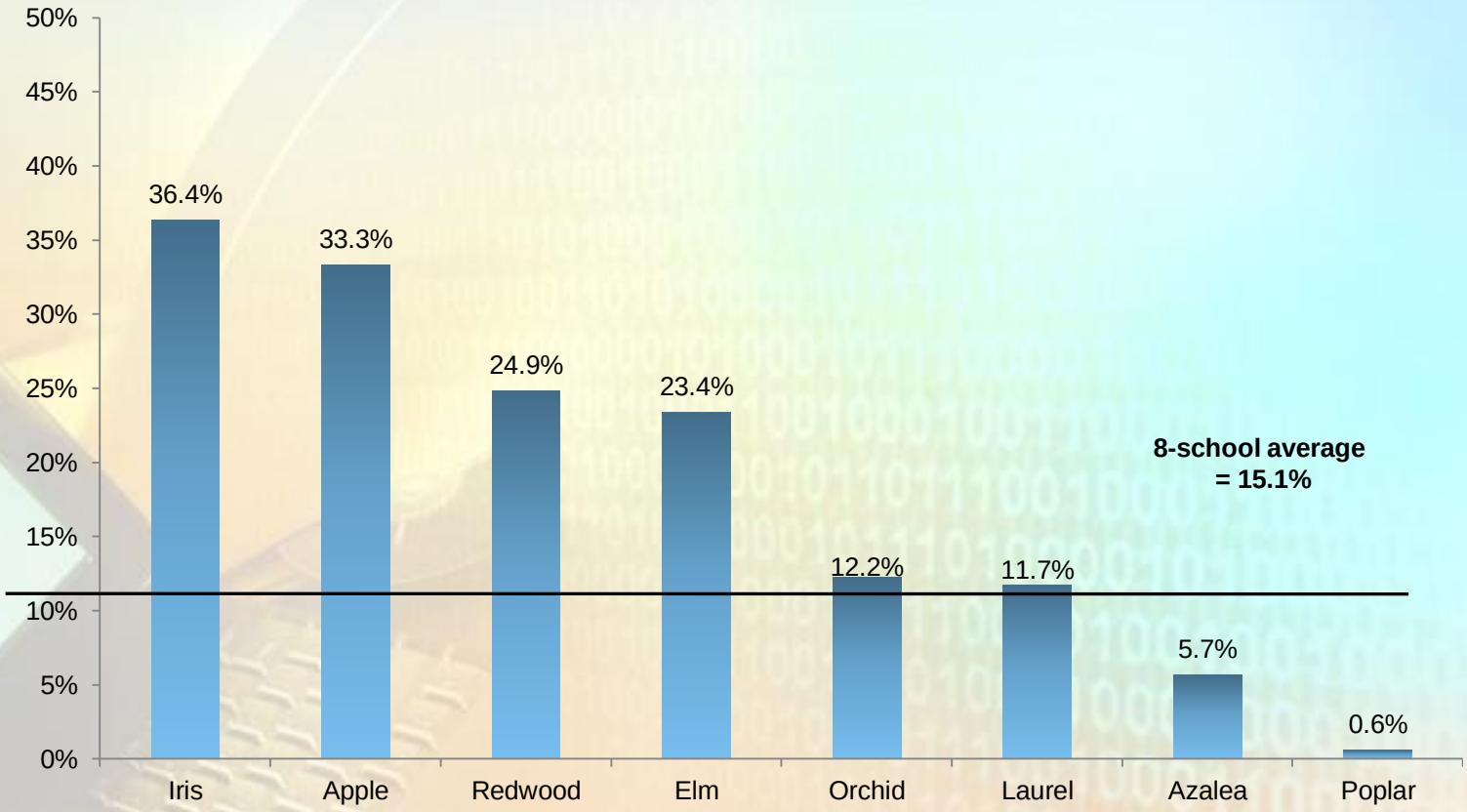
[Further transcript analyses, including HS to college longitudinal analyses, are forthcoming.]

Numbers of CTE Program Completers

2008-09, 2009-10, & 2010-11



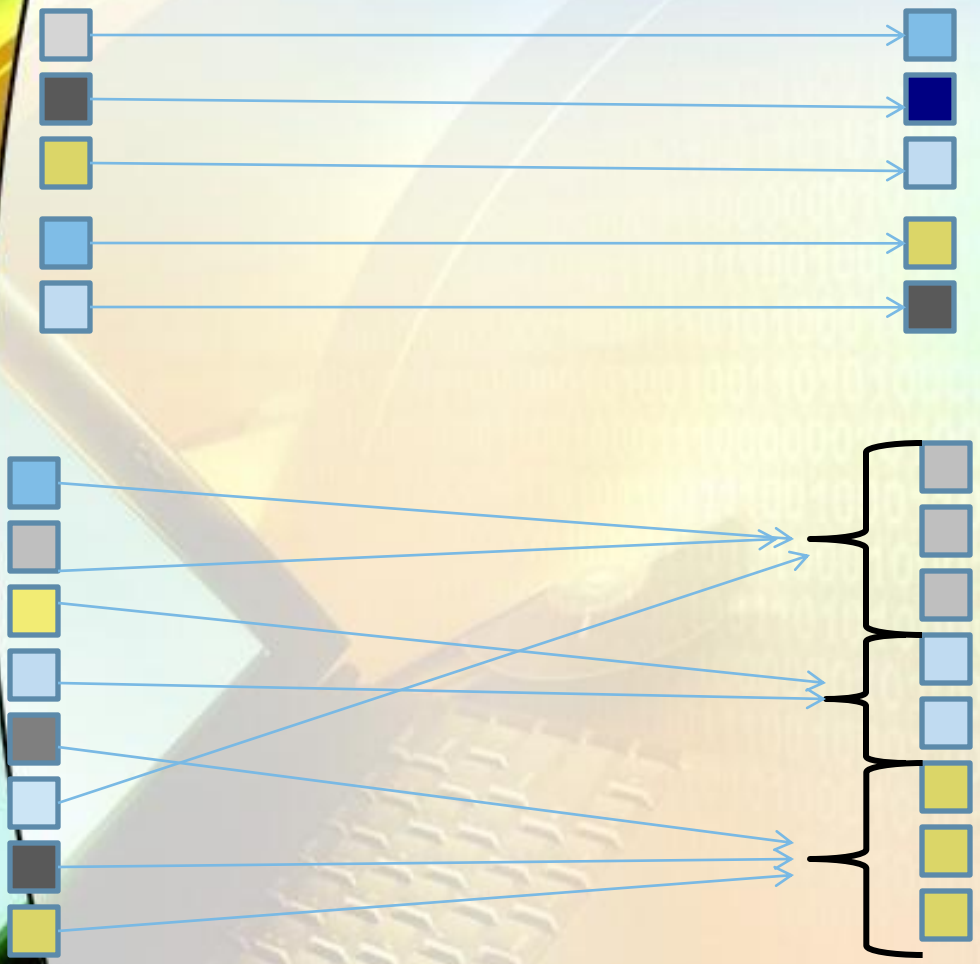
Academic/CTE Content in Non-Duplicative Progression of Courses (e.g. concentrator)



% of students completing a CTE course sequence in SC study sites

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

FINDINGS: THE 10 ELEMENTS

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

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

Actual Mature POS vs. POS Conceptual Framework

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

?

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

Industry Driven POS-Toyota

THE SKILL PIPELINE PROBLEM

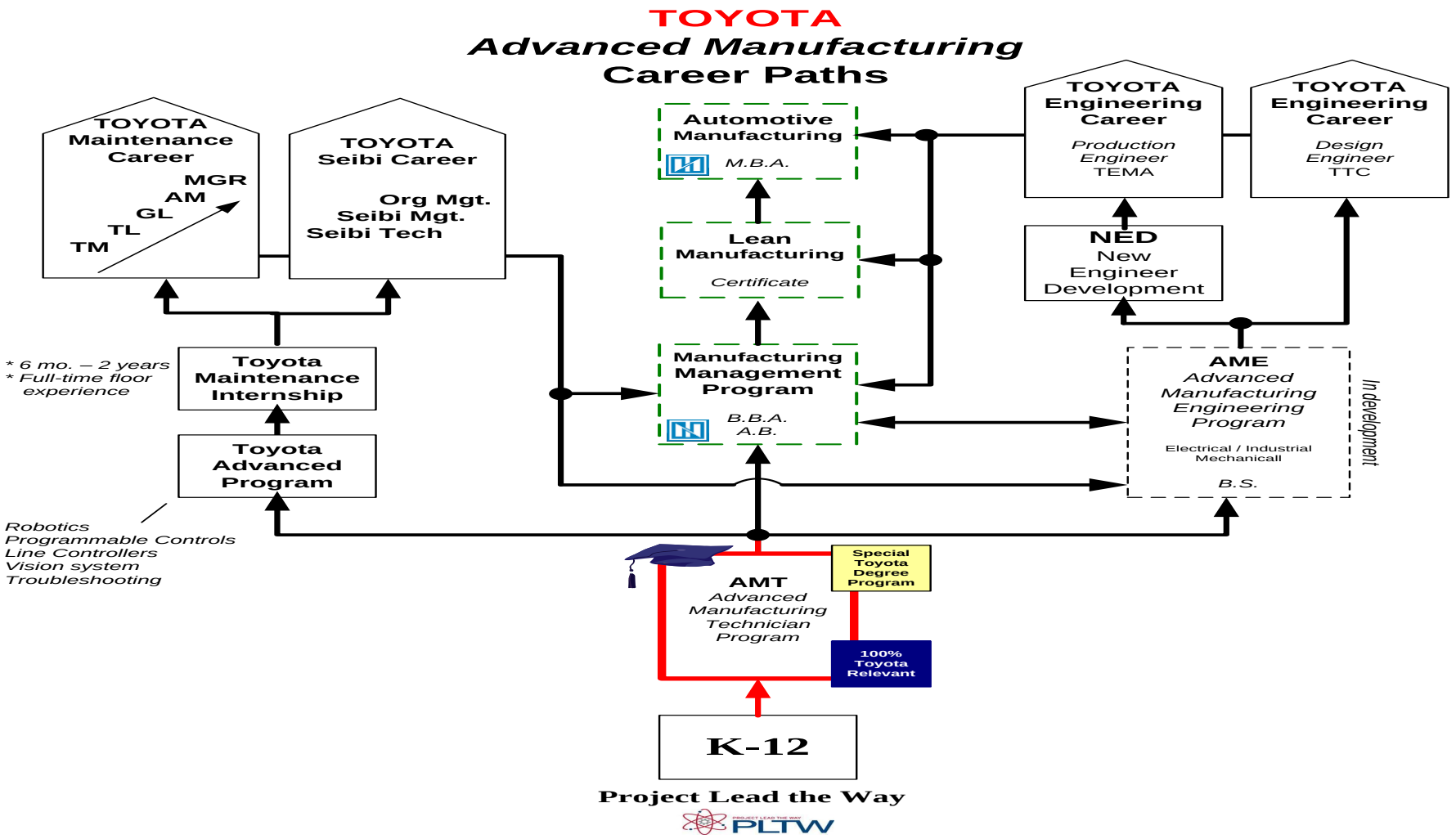
The U.S. community college system produces less capable graduates than parallel systems in competitor nations

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 Solution

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



The Solution

Totally Redesign the Learning Environment

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

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

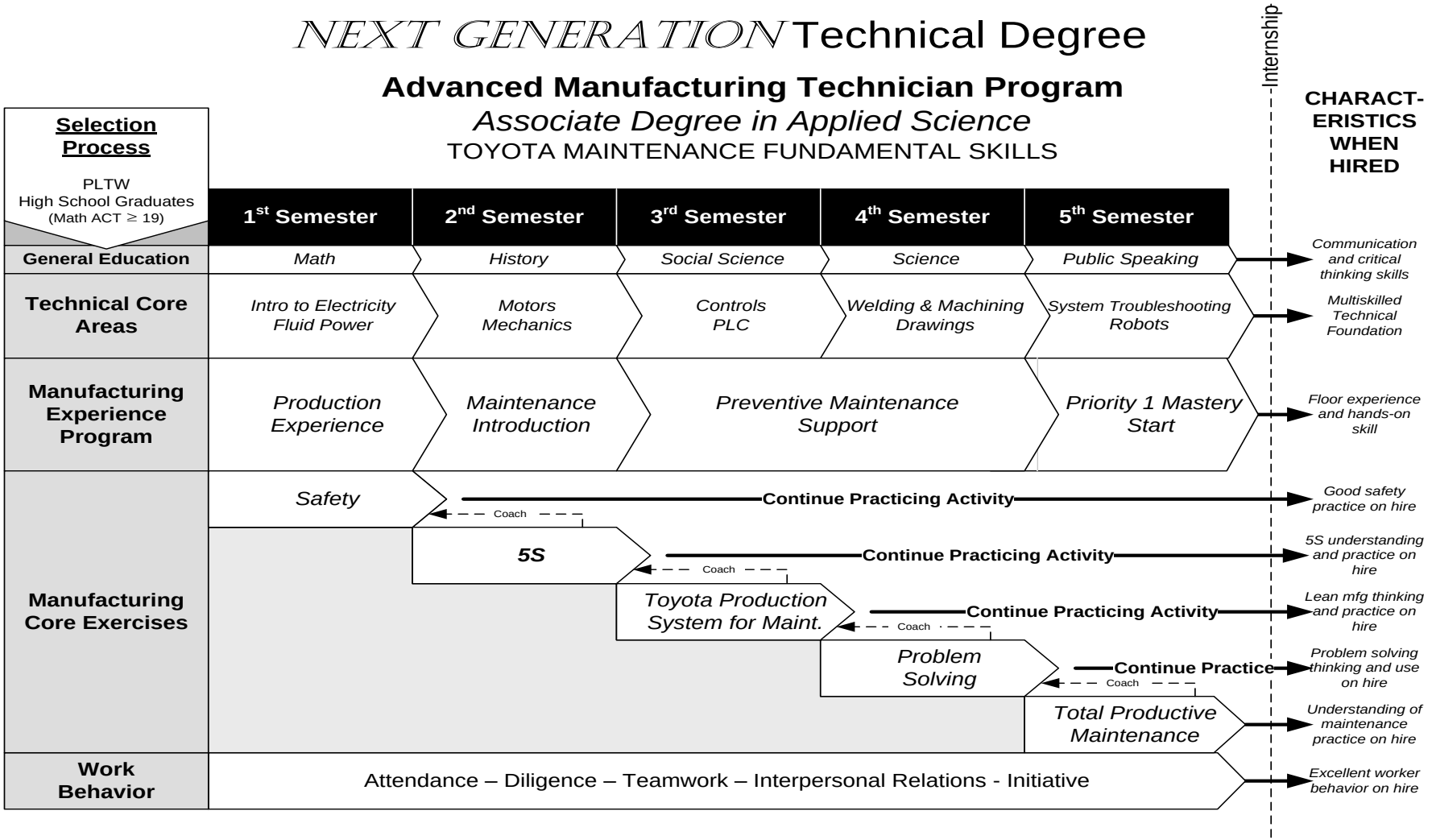
ORGANIZED BY FUNDAMENTAL SKILL
Electricity / Fluid Power
Mechanics & Fabrication

PROCESS LEARNING
Students learn in a structure sequence

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

The Solution

Totally Redesign The Community College Program



The Solution

Target Best Practice K-12 Programs

Project Lead the Way

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.

Attracts full spectrum of students
Certification driven!!
More choose STEM careers
Do better in ALL subjects

First Robotics

Toyota AMT Program:
<u>1/3</u> drop-out rate of non-PLTW students

A Few Summary Thoughts

- Some evidence of academic achievement effect
- 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)

A Few Summary Thoughts

- 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)
- What will POS success mean?
  - Enrolled in any college?
  - Pursuing same POS pathway?
  - Student sense of contribution of POS?

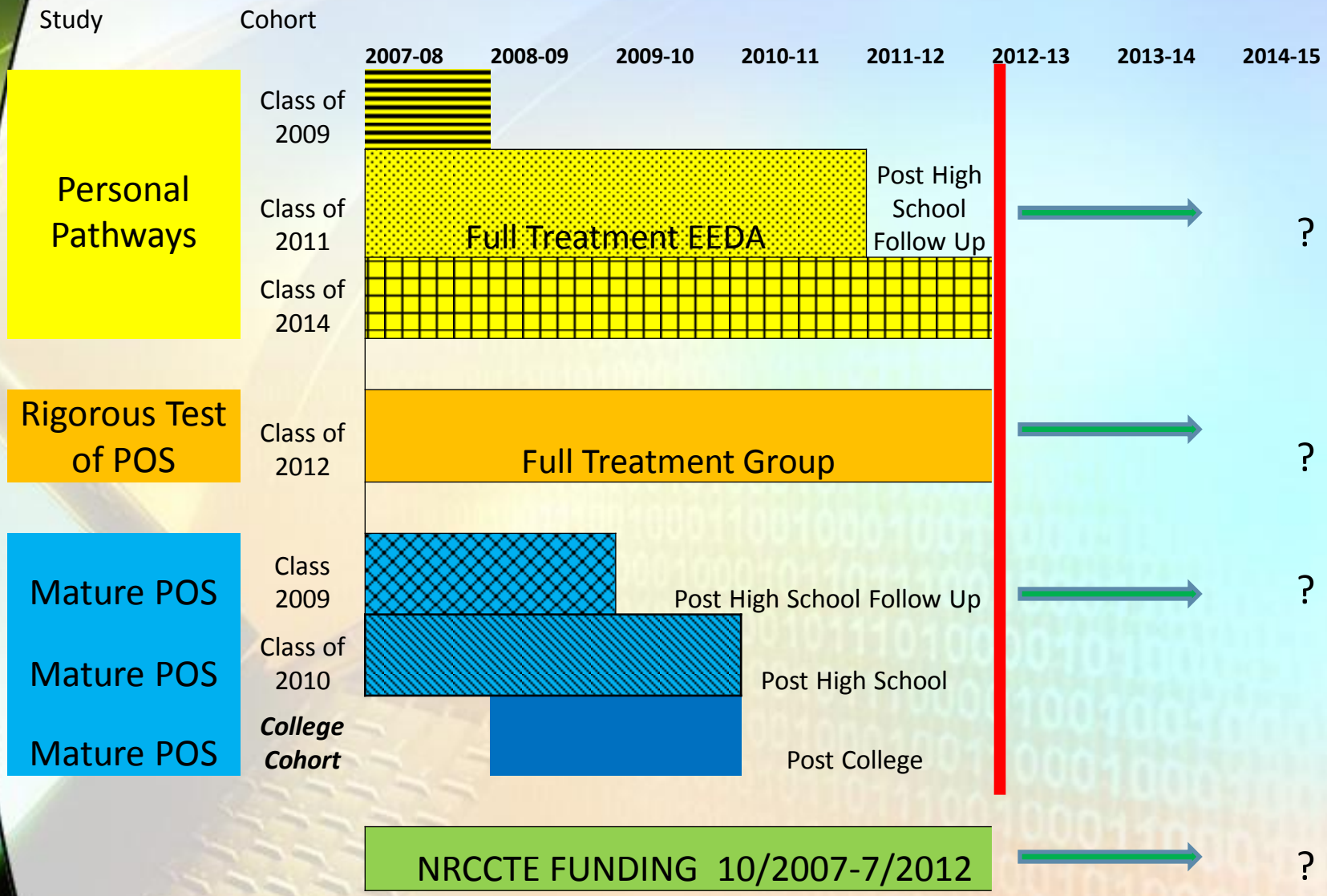
Things We Don't Know . . . Yet

- 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

The Future of POS Research?



"Secondary ……&……Postsecondary Elements"

VISIT OUR WEBSITE OR SEND ME A NOTE

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