

2015 Massachusetts PISA Results

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MASSACHUSETTS DEPARTMENT OF
ELEMENTARY AND SECONDARY
EDUCATION



- About PISA
- PISA Aggregate Results
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About PISA

- International assessment of 15-year-olds
- Administered by OECD every 3 years in:
 - ✓ Science (2015 focal subject)
 - ✓ Reading
 - ✓ Mathematics



2015 PISA in Brief

In 2015, over half a million students...

- Representing 28 million 15-year-olds in 72 countries/economies

... took an internationally agreed 2-hour test...

- Goes beyond testing whether students can reproduce what they were taught to assess students' capacity to extrapolate from what they know and creatively apply their knowledge in novel situations
- Total of 390 minutes of assessment material

... and responded to questions on...

- Their personal background, their classes and schools, their well-being and their motivation

... while parents, principals, teachers and system leaders provided data on:

- School policies, practices, resources, and institutional factors that help explain performance differences
- 89,000 parents, 93,000 teachers and 17,500 principals responded



About PISA

- U.S. has participated since 2000
 - ✓ 240 schools
- MA has participated twice: 2012 & 2015
- In MA in 2015:
 - ✓ 1,700 students
 - ✓ 49 schools
 - Principal questionnaire
 - Teacher questionnaire
 - 10 science per school
 - 15 non-science per school



About PISA Science

Three dimensions

- ✓ Content: explain phenomena scientifically
- ✓ Systemic: evaluate & design scientific inquiry
- ✓ Epistemic: interpret data & evidence scientifically

“the ability to engage with science-related issues, and with the ideas of science, as a reflective citizen”



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The “League Table”

72 participating education systems

	SCIENCE		READING		MATH	
	US	MA	US	MA	US	MA
Higher	40	1	44	0	30	11
Similar	12	10	13	8	5	20
Lower	19	60	14	63	36	40

All comparisons are statistically significant



PISA Science Finding

- Since 2012:
 - ✓ Across OECD, science performance declined
 - ✓ MA science performance increased slightly (not statistically significant)



PISA Science Performance

Baseline (Level 2) proficiency students can:

- ✓ Draw on basic science content & procedures
- ✓ Explain, interpret data, & identify question addressed in experiment

Top performers (Levels 5 & 6) can:

- ✓ Apply scientific knowledge & skills
- ✓ To variety of situations, including unfamiliar ones



PISA Science Performance

Low performers (Level 1)

- ✓ 12% of MA students
- ✓ 20% of US students
- ✓ 21% of OECD students

Top performers (Levels 5 & 6)

- ✓ 14% of MA students
- ✓ 9% of US students
- ✓ 8% of OECD students



PISA Science Findings

- Only 14% of variance in MA science performance attributable to students' socio-economic background
- 86% of variance in MA science performance attributable to instructional strategies, school practices, and student attitudes about science



PISA Science Findings

- Student performance is substantially stronger in classes where teachers:
 - ✓ Explain scientific ideas frequently
 - ✓ Frequently adapt lessons to students' needs and knowledge
- Student performance is substantially stronger in schools that:
 - ✓ Offer extracurricular science activities (such as clubs)
 - ✓ Sponsor science competitions



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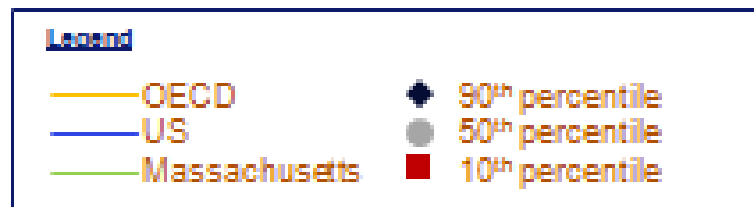


PISA MA Highlights

- Compared to 2012 (not all are statistically significant)
 - ✓ Hispanic performance improved in all 3 subjects
 - ✓ African-American performance improved in science & reading
 - ✓ Gender gap in reading narrowed
 - ✓ Asian performance declined in all 3 subjects

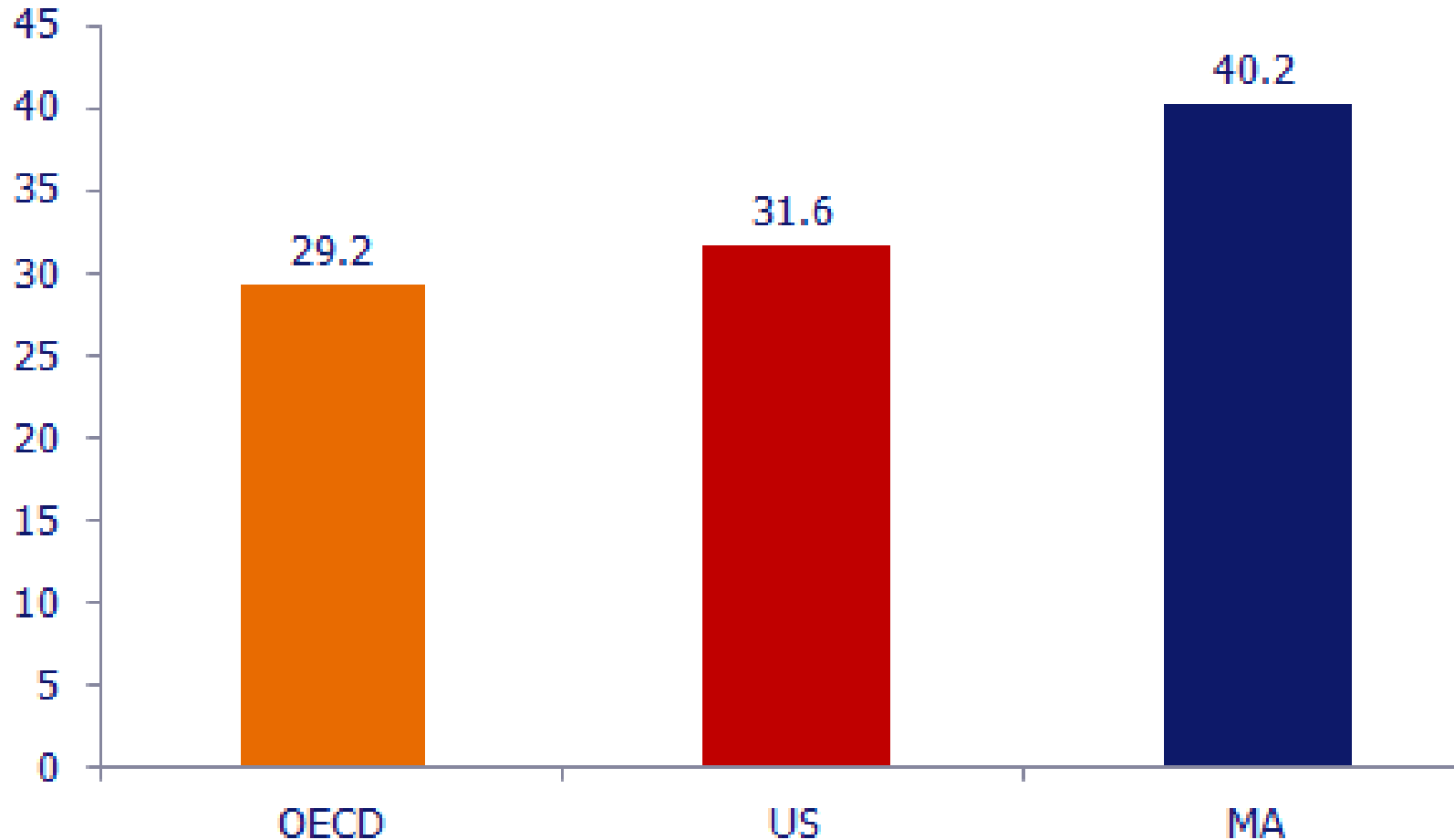


90th, 50th, and 10th percentile scores on the 2015 PISA assessment



“Resilience”

Percent of students in the bottom quarter of the OECD economic, social, & cultural status index who scored in top quarter of the PISA 2015 science assessment



PISA MA Highlights

- Compared to 2012 (not all are statistically significant)
 - ✓ Higher poverty schools largely improved in all three subjects
 - ✓ The lowest poverty schools (less than 10 % free/reduced lunch) declined in all three subjects



PISA Science: Gender Findings

- No gender gap in MA science performance
- MA girls (36%) more likely than boys (30%) to expect to pursue science-related career
 - ✓ Higher than OECD
 - ✓ Lower than US



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Implications**



PISA Policy Implications

(from the International Data)

- Commitment to universal achievement
- Incentive structures & accountability
- Capacity at point of delivery
- Coherence
- Learning system
- Resources where they yield most
- Gateways, instructional systems



PISA Policy Implications

Aligned incentive structures & accountability

- Students
 - ✓ Gateways
 - ✓ Incentives to study hard
- Teachers
 - ✓ Continuous individual improvement
 - ✓ Collective responsibility



PISA Policy Implications

Capacity at point of delivery

- Class size versus student/teacher ratio
- Large class size (e.g., Singapore, China, Vietnam) coupled with low student/teacher ratio yields more time for:
 - ✓ Teacher development
 - ✓ Teacher collaboration
 - ✓ Customized student intervention



PISA Policy Implications

Learning system

- Rigorous, coherent, focused learning standards
 - ✓ Progression to mastery
 - ✓ Supported by instructional system
- Characterized by
 - ✓ Policy alignment and coherence
 - ✓ Consistency and fidelity of implementation



PISA Policy Implications

Resources where they yield most

- Alignment of resources with key challenges
 - ✓ Japan, Singapore, & China tie teacher advancement to willingness to move to higher challenge assignments
- Effective spending choices that prioritize teacher efficacy over smaller classes



PISA Policy Implications

- Capable central authority with authority to act
- Robust mechanisms for tackling low performance



PISA Science Implications

- Ensure that teachers:
 - ✓ Explain scientific ideas frequently
 - ✓ Adapt lessons to students' needs and knowledge
- Promote:
 - ✓ Extracurricular science activities (such as clubs)
 - ✓ Science competitions



PISA Science Implications

- Support widespread engagement with science while aiming for scientific excellence
- Improve both skills and attitudes
- Challenge gender stereotypes of STEM occupations



PISA Testing Finding

- MA and US fall in middle of frequency of mandatory testing among high-performing systems.
- In other nations, mandatory testing is often high stakes for students and not for educators



OECD/PISA for Schools

- Individual school feedback
 - ✓ Performance
 - ✓ Practice & policies
- Network with other schools
 - ✓ MA schools meet summer 2017
 - ✓ US schools meet fall 2017
- Offered internationally
 - ✓ 17 MA high schools committed
 - ✓ Approximately 30 considering
 - ✓ MA participation underwritten by foundations

