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2008 Brown Center Report on American Education: How Well Are Students Learning?

The Use and Misuse of International Assessments

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February 25, 2009

Powerful Consortium Supports Benchmarking to PISA (NGA, Achieve, CCSSO)

"As governors, we must have consistent, comparable data in order to make informed decisions about our state's education system. Benchmarking will help us identify the qualities and characteristics that make up education systems that best prepare students for success. Understanding these policies gives us the option of incorporating the best of them into our own educational structure."

Sonny Perdue, Governor of Georgia, co-chair, NGA Advisory Group on Benchmarking, 9/8/08

Five Serious Problems with PISA

1. Selective Use of Data
2. Policy Recommendations Go Beyond Data
3. Ideological Bias
4. Not Aligned with School Curriculum
5. Governance

Methodology

- Examine PISA 2006 test of science literacy
- Focus on Chapter 3, “A Profile of Student Engagement in Science”
- “In PISA, attitudes are seen as a key component of an individual’s science competency and include an individual’s values, motivational orientations, and sense of self-efficacy.” PISA 2006, vol. 1, p. 164

What is PISA? Comparison of PISA and TIMSS

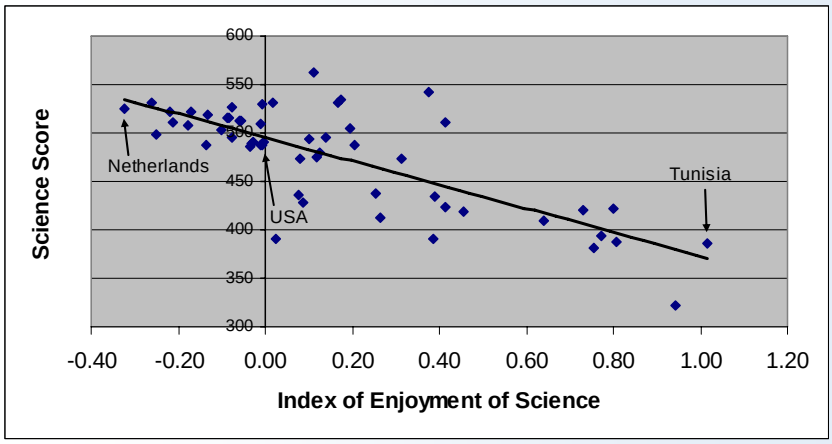
Characteristic	PISA	TIMSS
Governance	Government representatives	Researchers and government representatives
Sample	Age-based: 15-year-olds	Grade-based: 4th and 8th grades
Philosophy of assessment	Measures the ability to apply what has been learned to real-world situations (socio-constructivist)	Measures what has been learned in the school curriculum
Scope	Learning inside and outside of school, including attitudes, values, and beliefs	Topics in school curriculum
Content—Math	Mathematical literacy: Space and shape, change and relationships, quantity, uncertainty	Grade 4 mathematics: Number, geometric shapes and measures, data display Grade 8 mathematics: Number, algebra, geometry, data and chance
Content—Science	Scientific literacy: Physical systems, living systems, earth and space systems, technology systems	Grade 4 science: Life science, physical science, earth science Grade 8 science: Biology, chemistry, physics, earth science
Policy Recommendations	Numerous	Sparse

Selective Use of Data in PISA

"Within each country, students who reported that they enjoy learning science were more likely to have higher levels of science performance. While this does not show a clear causal link, it appears that students with greater interest and enjoyment of science are more willing to invest the effort to do well."

PISA 2006 Executive Summary, p. 28

Achievement and Enjoyment Between Country Relationship, r = -0.76



Correlation Coefficients

- Range from -1.00 to +1.00.
- -1.00 perfectly negative
  0.00 neutral
  1.00 perfectly positive
- In scatter plot graphs:

  positive /

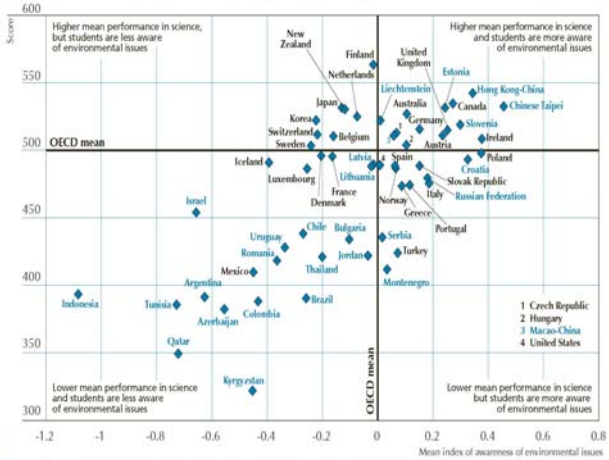
  neutral —

  negative \

Figure 4 Performance in science and awareness of environmental issues

Students who are aware of environmental issues reported that they were familiar with or knew something about the following:

The consequences of clearing forests for other land use; acid rain; the increase of greenhouse gases in the atmosphere; nuclear waste; use of genetically modified organisms.

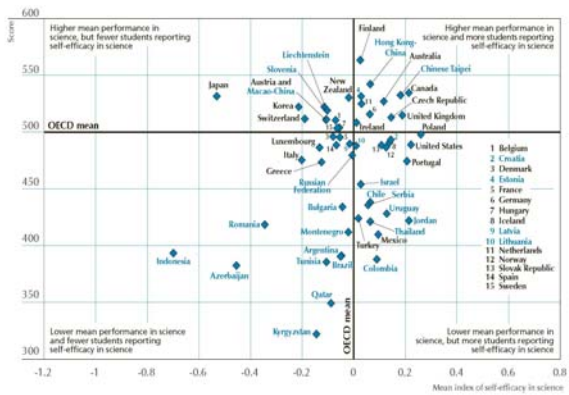


Source: OECD PISA2006 database. Table 3.16 and 2.1c, Figure 3.18, *PISA 2006: Science Competencies for Tomorrow's World.*
StatLink http://dx.doi.org/10.1787/141846760512

Figure 3 Performance in science and self-efficacy in science

Students reporting self-efficacy in science believed they could perform the following tasks either easily or with a bit of effort:

Explain why earthquakes occur more frequently in some areas than in others; recognise the science question that underlies a newspaper report on a health issue; interpret the scientific information provided on the labelling of food items; predict how changes to an environment will affect the survival of certain species; identify the science question associated with the disposal of garbage; describe the role of antibiotics in the treatment of disease; identify the better of two explanations for the formation of acid rain; discuss how new evidence can lead you to change your understanding about the possibility of life on Mars.



Source: OECD PISA2006 database. Tables 3.3 and 2.1c, Figure 3.6, *PISA 2006: Science Competencies for Tomorrow's World.*
StatLink http://dx.doi.org/10.1787/141846760512

Correlations of Attitudinal Variables and Student Performance on PISA 2006
(Rank-ordered by between-nation coefficient)

Table 1-2

Variable	Between-Nation (Brown Center)	Pooled Nations (OECD)
Students' awareness of environmental issues	0.66	0.43
Self-efficacy in science	0.23	0.33
Students' responsibility for sustainable development	-0.24	0.18
Students' level of concern for environmental issues	-0.48	0.01
General value of science	-0.49	0.22
Support for scientific enquiry	-0.52	0.25
Students' optimism regarding environmental issues	-0.52	-0.17
Personal value of science	-0.72	0.12
Self-concept in science	-0.73	0.15
Enjoyment of science	-0.76	0.19
Instrumental motivation to learn science	-0.77	0.09
Students' science-related activities	-0.79	0.04
Interest in scientific topics	-0.80	-0.06
General interest in science	-0.82	0.13
Future motivation to learn science	-0.83	0.08

Going Beyond the Data: Does self-efficacy lead to achievement?

"PISA cannot show to what extent lack of self-efficacy is a cause or an effect of weakness in scientific literacy, **but** this strong association shows that building students' confidence in their ability to tackle scientific problems is an important part of improving scientific performance."

PISA 2006, vol. 1, p. 165

PISA Asserting Causality

"In fact both prior research and PISA results give strong reasons for assuming that confidence helps to drive learning success rather than simply reflecting it."

PISA 2006, vol. 1, p. 137

Political Ideology: Sustainable Development

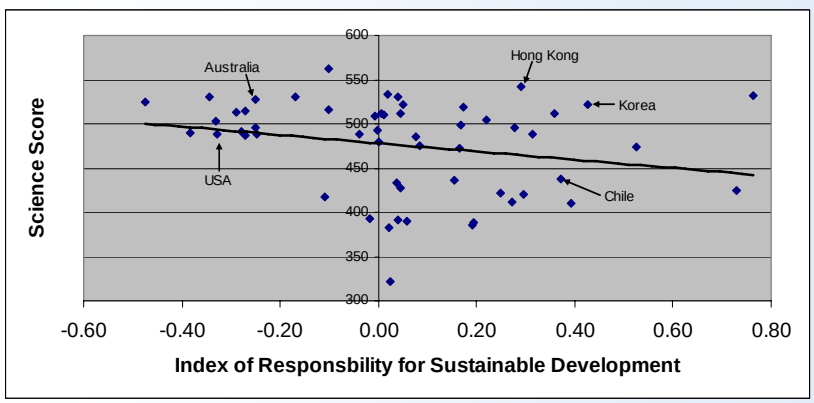
"To gain a sense of students' responsibility for sustainable development students were asked whether or not they agreed with seven possible sustainable development policies. Students who responded that they either agreed or strongly agreed were classified as expressing a sense of responsibility for sustainable development."

PISA 2006, vol. 1, p. 161

Sustainable Development Policies

- *Industries should be required to prove that they safely dispose of dangerous waste materials.*
- *I am in favor of having laws that protect the habitats of endangered species.*
- *It is important to carry out regular checks on the emissions from cars as a condition of their use.*
- *To reduce waste, the use of plastic packaging should be kept to a minimum.*
- *Electricity should be produced from renewable sources as much as possible, even if this increases the cost.*
- *It disturbs me when energy is wasted through the unnecessary use of electrical appliances.*
- *I am in favor of having laws that regulate factory emissions even if this would increase the price of products.*

Achievement and Responsibility for Sustainable Development, Between country relationship, r=-0.24



Eliciting Views on Policies is Inappropriate for an International Assessment

- Reflects Political Judgment
- Error is compounded by interpreting students' responses as reflecting environmental responsibility.
- NAEP constrained. Why not PISA?

Recommendations

PISA is inappropriate for benchmarking until flaws are corrected:

1. Scrub for ideological bias.
2. PISA reports should discuss data contradicting the report's positions.
3. Policy recommendations should be made sparingly and within the constraints of cross-sectional data.
4. Governance should include researchers and other non-governmental representatives.
5. If PISA is to be used to judge school systems, the content must be aligned with what school systems teach.

Now taking Questions and Answers

Thank you for participating. Pdf files of the report and press release are available to download at:

http://www.brookings.edu/reports/2009/0225_education_loveless.aspx .

Any further questions can be directed to Lydia Pelliccia, lpelliccia@lipmanhearne.com.