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the emergence of global educational governance

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CHAPTER 13

The International Efficiency of American Education: the bad and the not-so-bad news

STEPHEN P. HEYNEMAN

ABSTRACT There is ample evidence to suggest that American schools perform worse than schools in many other countries. The United States ranks toward the bottom of the industrialized nations on international tests of academic achievement in science and mathematics. Not only may American schools perform worse, they may do so at the same time as they use more resources than other school systems. In essence, American schools may not only be poor in quality, they may also be less efficient. This chapter will explore some of the evidence on education efficiency. It will suggest that in many ways the assumption is correct – American schools *are* less efficient. It will suggest that the reason for the inefficiency of American schools is the difference in the 'demand to learn' between American and other school children. But the chapter will also explore evidence that suggests that American schools are not less efficient, and in one new way of looking at the problem, it will argue that American schools are more efficient than the schools in the Republic of Korea, one of the world's leading school systems. The chapter will conclude with some advice on the proper role which international comparisons may play in the design of domestic education policy.

Background

Bad news about American education is a tradition. Often the news emerges from national commissions (Commission on Higher Education, 1947; Committee on Education Beyond High School, 1956; *Saturday Review*, 1961; National Commission on Excellence, 1983; Commission on the Future of Higher Education, 2006; State Scholars Initiative, 2008; Wolk, 2009). In many instances the bad news includes statements that American schools have declined in quality or have been bested by school systems in other countries. International tests of academic achievement have been used to suggest that American school children do not learn as much as children in many other school systems, including the school systems of America's most important trading partners (Lemke et al, 2004; Baldi et al, 2007; Heyneman & Lee, forthcoming).

Sometimes, the school systems which attain first place in the ranking of achievement become a subject of headline news. This was the case, for instance, with the scores of Shanghai on PISA 2009 (*New York Times*, 2010). Attention has turned not only to the rankings of other countries on achievement tests, but also to the comparative efficiency of one system versus another in those rankings (*New York Times*, 2009).[1]

Efficiency: the bad news

The bad news is not new. Two decades ago the United States spent more money on education yet performed worse on tests of 8th-grade mathematics (Table I).

Country	Public expenditure on education/capita (A) in dollars	Proportion of students over the international median in 8th-grade mathematics (B) as a percentage	Ratio A/B
Norway	1111	46	24
United States	1040	45	23
Kuwait	848	3	287
Singapore	724	94	7
United Kingdom	649	48	14
Japan	602	83	7
Israel	584	56	10
Republic of Korea	362	82	4
Hong Kong	309	80	4
Czech Republic	297	70	4
Hungary	272	60	4
Thailand	206	54	4
Iran	183	9	20
Latvia	147	40	3
Lithuania	71	34	2
Romania	55	36	2

Table I. International education efficiency (1991).
Source: Heyneman, 2004.

Table I displays the results of the international test designed by the Educational Testing Service (ETS) used in 1991 prior to PISA. Norway, for instance, spent US$1111 for each adult citizen in the population. A total of 46% of the Norwegian students performed over the international median in

8th-grade mathematics. This wo
US$24/adult citizen for an additi
over the international mathem
US$1040/adult citizen and 45%
the international median. To ge
median, the United States would r

Country	Total test score	Score ranking	Sp (
Finland	1631	1	7
Australia	1589	2	7
Switzerland	1552	3	1(
Belgium	1528	4	8
Poland	1503	5	3
Norway	1501	5	10
Denmark	1497	7	8
United States	1496	8	10
Sweden	1486	9	8
Czech Republic	1471	10	4
Portugal	1469	11	5
Hungary	1464	12	4
Germany	1461	13	6
Latvia	1460	14	
Italy	1458	15	7
Greece	1419	16	4
Russia Federation	1405	17	1
OECD average	1500		6

Notes:
1. Total test score is the sum of three co
scientific literacy.
2. Rankings are based on sample countr
3. Cumulative education spending is in
Purchasing Power Parity (PPP).
4. 'Ratio of scores to expenditure' = test
expenditure for one score point' is an av
Both of them are calculated by the auth

Table II. Student performance in PISA
student. Source: OECD (2010, 2011).

In other countries, however, the cos
would only cost US$7 to have an
over the international median; in K

8th-grade mathematics. This would imply that it would cost an additional US$24/adult citizen for an additional one percent of the students to achieve over the international mathematics median. The United States spent US$1040/adult citizen and 45% of the American students performed over the international median. To get an additional 1% over the international median, the United States would need to spend an additional US$23/citizen.

Country	Total test score	Score ranking	Spending (US$)	Ratio of scores to expenditures	Ratio ranking	Average expenditure for one score point
Finland	1631	1	71,385	0.023	7	43.77
Australia	1589	2	72,386	0.022	8	45.55
Switzerland	1552	3	104,352	0.015	14	67.23
Belgium	1528	4	80,145	0.019	10	52.45
Poland	1503	5	39,964	0.037	2	26.59
Norway	1501	5	101,265	0.015	14	67.47
Denmark	1497	7	87,642	0.017	12	58.55
United States	1496	8	105,752	0.014	16	70.69
Sweden	1486	9	82,753	0.017	12	55.69
Czech Republic	1471	10	44,761	0.033	3	30.42
Portugal	1469	11	56,803	0.026	6	38.67
Hungary	1464	12	44,342	0.033	3	30.29
Germany	1461	13	63,296	0.023	7	43.32
Latvia	1460	14	.	.	.	.
Italy	1458	15	77,310	0.019	10	53.02
Greece	1419	16	48,422	0.029	5	34.12
Russia Federation	1405	17	17,499	0.080	1	12.45
OECD average	1500		69,135	0.021		46.09

Notes:
1. Total test score is the sum of three core subjects, reading, mathematical and scientific literacy.
2. Rankings are based on sample countries examined in this chapter.
3. Cumulative education spending is in equivalent US dollars converted using Purchasing Power Parity (PPP).
4. 'Ratio of scores to expenditure' = test scores achieved when $1 is spent; 'average expenditure for one score point' is an average expenditure to get one test score point. Both of them are calculated by the author.

Table II. Student performance in PISA 2009 and cumulative education spending per student. Source: OECD (2010, 2011).

In other countries, however, the cost would be less. In Singapore and Japan it would only cost US$7 to have an additional 1% of their students perform over the international median; in Korea, Hong Kong, the Czech Republic and Thailand it would only cost US$4. Arguably the most efficient education systems in 1991 were located in Latvia, Lithuania and Romania, where only US$2 or US$3 would be required to have an additional 1% of their students perform over the international median. And the least efficient school system was that of Kuwait, which would require US$287 for an additional 1% of its students to perform over the international median.

Using PISA results from 2009, it appears that the United States has not improved on its level of education efficiency by comparison with other countries (Table II).[2] If one takes the total PISA test score (reading, mathematics and science taken together), the United States ranks 8th out of 17 countries. However, if one incorporates education spending, the United States' ranking drops from 8th to 16th, next to last. The countries with the highest efficiency ranking included Russia, Poland, the Czech Republic and Hungary.

Figure 1 illustrates monetary efficiency in a slightly different way. As one can see, the United States is among the countries which had the highest secondary student expenditures but is positioned lower than many other countries in terms of PISA mathematics performance.

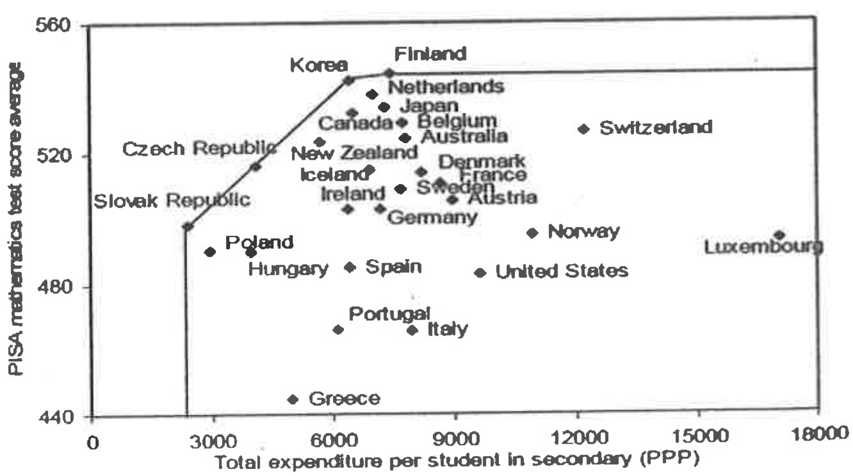

Figure 1. Secondary education spending and average PISA mathematics scores. Sources: OECD Education at Glance 2006; Verhoeven et al, 2007.

Figure 2 illustrates this same issue using cumulative spending for ages 6-15 rather than spending on secondary school students alone. In this case the United States is the highest-spending country in the sample and yet in middle of the sample in terms of total PISA test score performance.

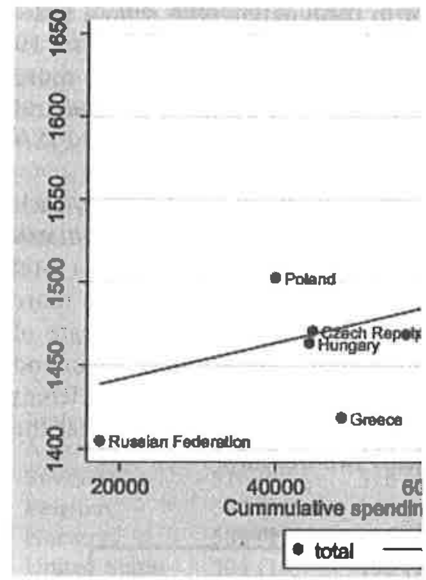

Figure 2. Relationship between student
spending. Source: OECD (2010, 2011)

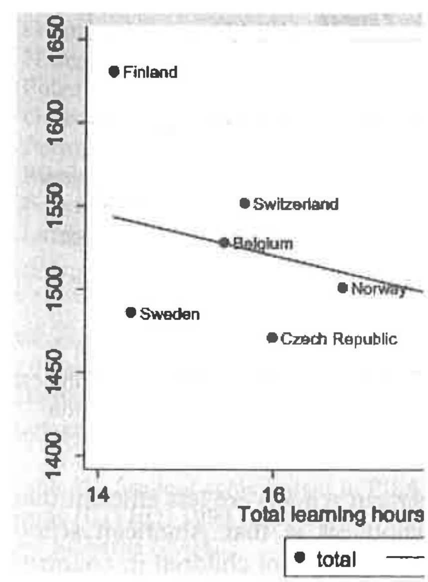

Figure 3. Relationship between student
devoted to core subjects. Source: OECD

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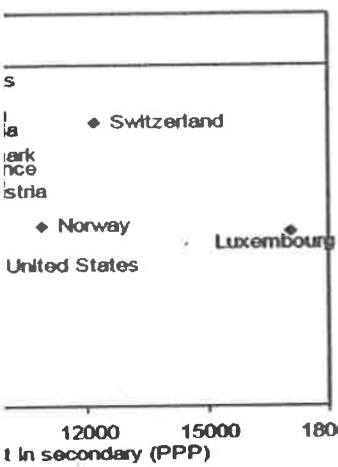

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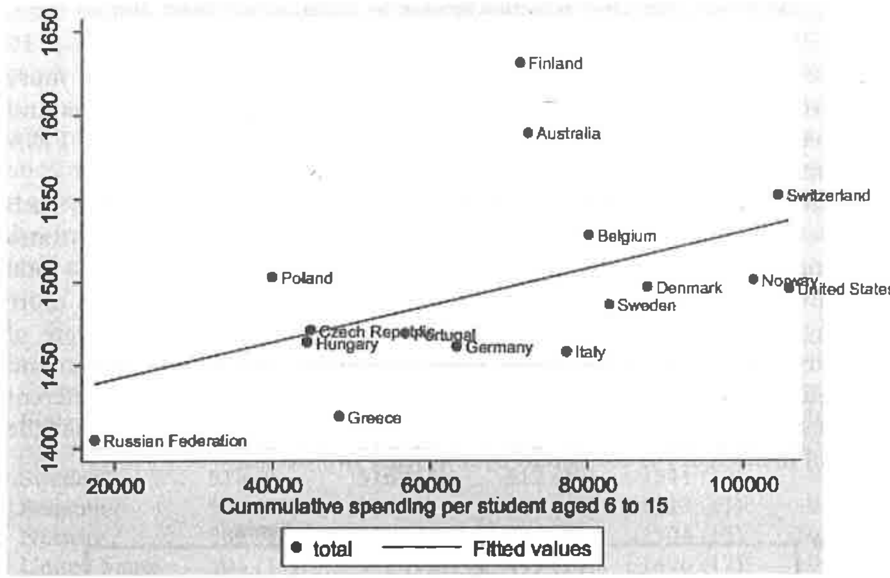

Figure 2. Relationship between student achievement in PISA 2009 and cumulative spending. Source: OECD (2010, 2011).

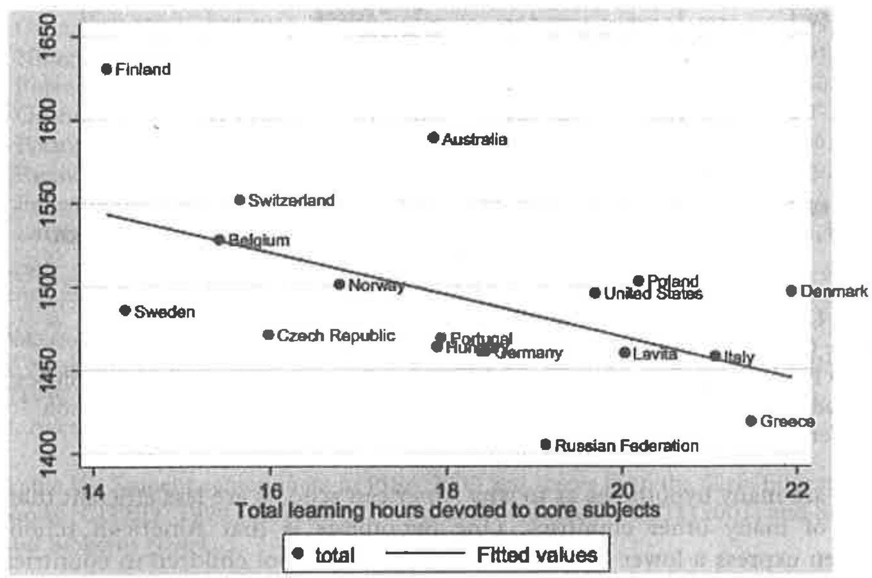

Figure 3. Relationship between student achievement in PISA 2009 and total hours devoted to core subjects. Source: OECD (2010, 2011).

Efficiency can be calculated in many ways; achievement on the basis of pupil expenditure is one. Another is achievement in conjunction with school time. Figure 3 illustrates this principle. American schools devote almost 19 hours/week to core subjects, equivalent to Latvia and Poland, and far more than Sweden, Finland, Belgium and Switzerland. Yet Finland, Switzerland and Australia devote less time to core subjects but have higher PISA achievement scores.

Efficiency can also be calculated in terms of an output indicator, such as the rate at which enrolled students actually graduate. Figure 4 illustrates the connection between secondary school graduation rate and total expenditures per secondary school student. The United States spends more than any other country, with the exception of Switzerland, yet the rate of secondary school graduation is lower than any other country save Spain and New Zealand. The sum of this evidence would suggest that by many different measures the United States is less efficient than other countries and that the record of inefficiency is consistent over at least two decades.

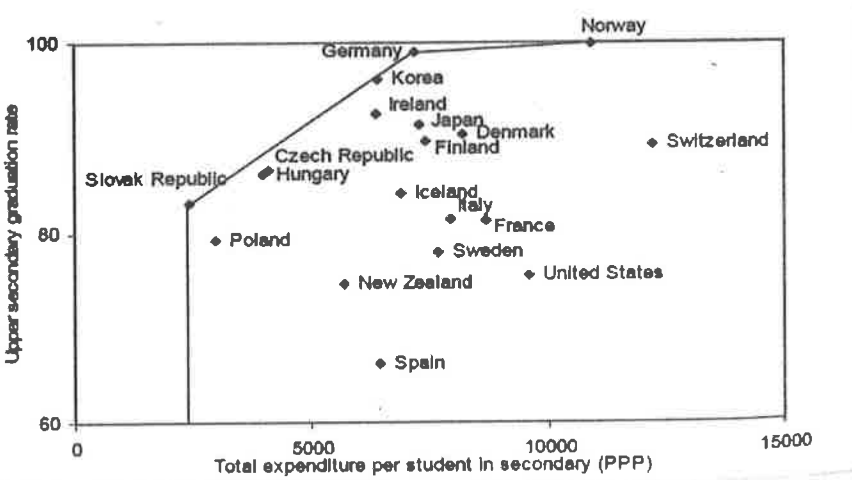

Figure 4. Secondary education spending and upper secondary graduation rates. Source: OECD Education at a Glance 2006, http://www.oecd.org/edu/eag2006; OECD PISA and IMF staff calculations. The line connects countries with the highest observed efficiency and depicts the best practice frontier unadjusted for estimation bias (Verhoeven et al, 2007).

There are many hypotheses as to why American schools are less efficient than those of many other countries. One hypothesis is that American school children express a lower 'demand to learn' than school children in countries with high efficiency in their school systems (Heyneman, 1999). This is sometimes noted as whether 100% of the children want to come to school each day and to try hard each day. In essence, the 'demand to learn' is a culturally shaped attitude or disposition that places the value of education

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Country	Reading literacy	Mathema literac
Finland	546 (1)	536 (4
Australia	528 (4)	533 (5
Sweden	516 (9)	516 (1
Belgium	507 (10)	520 (9
Norway	505 (13)	499 (1
United States	504 (15)	493 (1
Denmark	497 (16)	514 (1
Switzerland	494 (17)	529 (1
Czech Republic	492 (19)	498 (1
Italy	487 (20)	457 (2
Germany	474 (21)	490 (2
Hungary	480 (23)	488 (21
Poland	479 (24)	470 (24
Greece	474 (25)	447 (2
Portugal	470 (26)	470 (24
Russia Federation	462 (27)	478 (22
Latvia	458 (28)	462 (25
OECD average	500	500

Notes:
1. Numbers in parentheses are rankings a
CIVED respectively.
2. Average of civic knowledge is internati

Table III. Student achievement in PISA
Study (CIVED) 1999 (rankings in parent
and Sibberns (2004).

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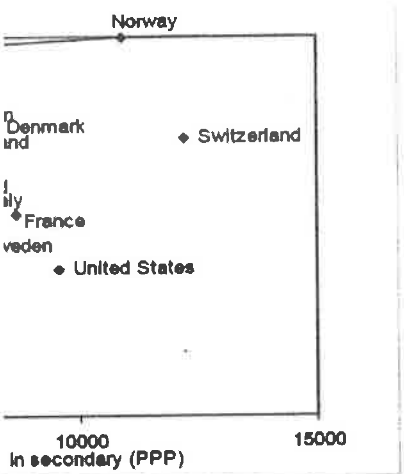

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rican schools are less efficient than pothesis is that American school than school children in countries ems (Heyneman, 1999). This is children want to come to school sence, the 'demand to learn' is a hat places the value of education

higher or lower on a scale of socially desirable activities. There is, moreover, a gap in the 'demand to learn' between children of different backgrounds in the United States, whereas in high-efficiency school systems there is less of a gap between children of different backgrounds. This suggests that the barrier to student achievement in American schools is not poverty or race but the lack of the demand to learn and the difference in the demand to learn from one social group to another (Heyneman, 2005). This also suggests that better teacher training, a different curriculum or a longer school day will not have the intended effect until the demand to learn is generally augmented and until a high demand to learn is characteristic of all social groups.

Country	Reading literacy	Mathematical literacy	Scientific literacy	Total test score	Civic knowledge
Finland	546 (1)	536 (4)	538 (3)	1620 (3)	109.3 (2)
Australia	528 (4)	533 (5)	528 (7)	1589 (6)	101.7 (11)
Sweden	516 (9)	516 (15)	512 (10)	1544 (10)	99.1 (18)
Belgium	507 (10)	520 (9)	496 (17)	1523 (11)	94.7 (22)
Norway	505 (13)	499 (17)	500 (13)	1504 (15)	102.9 (9)
United States	504 (15)	493 (19)	499 (14)	1496 (17)	106.5 (6)
Denmark	497 (16)	514 (12)	481 (22)	1492 (18)	100.4 (14)
Switzerland	494 (17)	529 (14)	496 (17)	1519 (13)	98.3 (19)
Czech Republic	492 (19)	498 (18)	511 (11)	1501 (16)	102.6 (10)
Italy	487 (20)	457 (26)	478 (23)	1422 (24)	105.4 (7)
Germany	474 (21)	490 (20)	487 (20)	1451 (21)	99.8 (15)
Hungary	480 (23)	488 (21)	296 (15)	1464 (20)	101.6 (12)
Poland	479 (24)	470 (24)	483 (21)	1432 (23)	110.6 (1)
Greece	474 (25)	447 (28)	461 (25)	1382 (27)	107.9 (4)
Portugal	470 (26)	470 (24)	459 (28)	1399 (26)	96.2 (21)
Russia Federation	462 (27)	478 (22)	460 (26)	1400 (25)	99.6 (16)
Latvia	458 (28)	462 (25)	460 (27)	1380 (28)	91.5 (26)
OECD average	500	500	500	1500	100

Notes:
1. Numbers in parentheses are rankings among all countries participating in PISA and CIVED respectively.
2. Average of civic knowledge is international average, not OECD.

Table III. Student achievement in PISA 2000 and scores from the Civic Education Study (CIVED) 1999 (rankings in parentheses). Sources: OECD (2001) and Schulz and Sibberns (2004).

Efficiency: the not-so-bad news

Achievement in Subjects Other Than Math and Science

Most discussions of achievement concentrate on math and science; some on reading. But the purpose of public schooling and the reasons nations invest in public schooling are broader than skills, jobs and productivity. They include the degree to which schools are able to influence citizenship behavior. On this dimension, American schools may do rather well. Table III illustrates the differences in international ranking using different achievement measures on PISA 2000 and CIVED 1999. The United States was ranked 15th out of 28 countries in reading literacy, 19th in mathematical literacy, and 14th in scientific literacy. However, the United States was ranked 6th in the field of civics education. This could be rather important. Nations which struggle for social cohesion are nations which also struggle economically (Heyneman, 2000). Civil tension reduces trust, and a reduction in trust reduces internal cooperation and trade (Heyneman, 2002/3). One reason why the US economy continues to perform in spite of the low ranking in science and mathematics performance may be associated with the rather good job of the American schools in influencing citizenship.

Internal Variation in Performance

The United States is typical of all large and diverse nations in that academic performance is significantly divergent from one region to another. Figure 5 illustrates this divergence in Brazil, where 16% of the students achieved the top levels of mathematics achievement in the south and only 7% in the north-east.

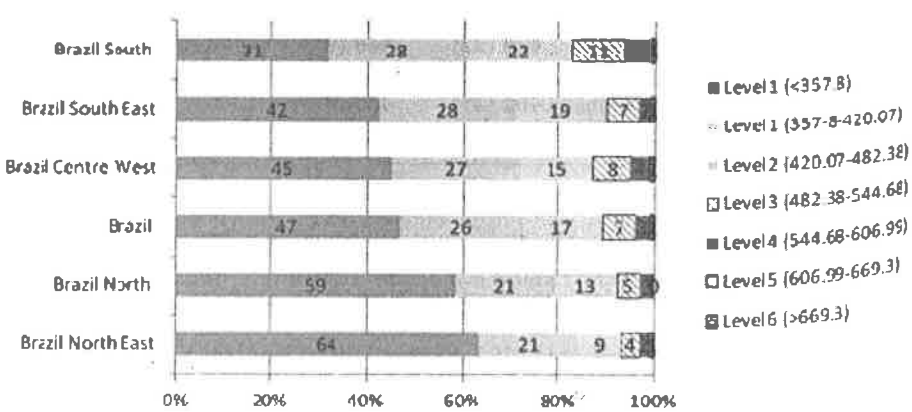

Figure 5. Percentage of students by mathematics proficiency level in regions of Brazil.
Source: OECD (2010).

Figure 6 illustrates this divergenc
average for PISA 2009 was 475;
Moscow at 546. Tables IV and V i
and compare the scores of variou
science (Table V) against the score
top-performing 'nations' in the wo
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parts of the US school system is as

Scale score	Grade 4
	Hong Kong-Ch. (607)
600	Singapore (599)
590	
580	Ch. Taipei (576)
	MA-USA (572)
570	Japan (568)
560	*MN-USA (554)*
550	Kazakhstan (549)
	Russian Fed. (544)
	England-UK (541)
540	Latvia (537)
	Netherlands (535)
530	Lithuania (530)
	USA (529)
	Germany (525)
	Denmark (523)
520	Quebec-Ca. (519)
	Australia (516)
	Ontario-Ca. (512)
510	Hungary (510)
	Italy (507)
	Br. Columbia-Ca., Alberta-Ca.,
	Austria (505)
	Sweden (503)
	Slovenia (502)
500	Armenia, *TIMSS Scale Avg. (50*
	Slovak Rep. (496)
	Scotland-UK (494)
	New Zealand (492)
490	Czech Rep. (486)
480	Norway (473)

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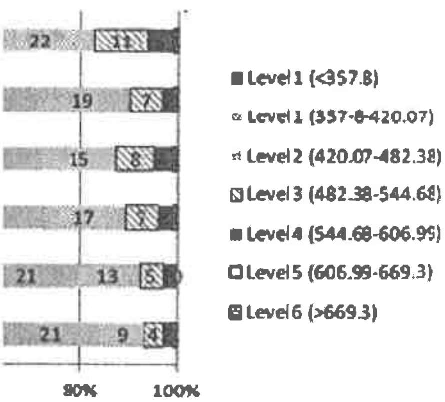

:s proficiency level in regions of Brazil.

Figure 6 illustrates this divergence in the Russian Federation. The Russian average for PISA 2009 was 475; but this varied from Yakutia at 419 to Moscow at 546. Tables IV and V illustrate this principle in the United States and compare the scores of various states in mathematics (Table IV) and science (Table V) against the scores of various nations. On both measures the top-performing 'nations' in the world – among them Singapore, Hong Kong and Taipei – also include Minnesota and Massachusetts. This suggests that parts of the US school system is as competitive as the best in the world.

Scale score	Grade 4	Grade 8
	Hong Kong-Ch. (607)	
600	Singapore (599)	Ch. Taipei (598)
		Rep. of Korea (597)
		Singapore (593)
590		
580	Ch. Taipei (576)	Hong Kong-Ch. (572)
	MA-USA (572)	
570	Japan (568)	Japan (570)
560	*MN-USA (554)*	
550	Kazakhstan (549)	*MA-USA (547)*
	Russian Fed. (544)	
	England-UK (541)	
540	Latvia (537)	*MN-USA (532)*
	Netherlands (535)	
530	Lithuania (530)	Quebec-Ca. (528)
	USA (529)	
	Germany (525)	
	Denmark (523)	
520	Quebec-Ca. (519)	Ontario-Ca., Hungary (517)
	Australia (516)	England-UK (513)
	Ontario-Ca. (512)	Russian Fed. (512)
510	Hungary (510)	Br. Columbia-Ca. (509)
	Italy (507)	*USA (508)*
	Br. Columbia-Ca., Alberta-Ca.,	Lithuania (506)
	Austria (505)	Czech Rep. (504)
	Sweden (503)	Slovenia (501)
	Slovenia (502)	
500	Armenia, *TIMSS Scale Avg. (500)*	*TIMSS Scale Avg. (500)*
	Slovak Rep. (496)	Armenia (499)
	Scotland-UK (494)	Basque Country-Sp. (499)
	New Zealand (492)	Australia (496)
		Sweden (491)
490	Czech Rep. (486)	Malta (488), Scotland-UK (487)
		Serbia (486)
480	Norway (473)	Italy (480)
		Malaysia (474)

470	Ukraine (469)	Norway (469)
	Dubai-UAE (444)	Cyprus (465)
	Georgia (438)	Bulgaria (464)
	Islamic Rep. of Iran (402)	Israel (463)
	Algeria (378)	Ukraine (462)
	Colombia (355)	Romania, Dubai-UAE (461)
	Morocco (341)	Bosnia and Herzegovina (456)
	El Salvador (330)	Lebanon (449)
	Tunisia (327)	Thailand (441)
	Kuwait (316)	Turkey (432)
	Qatar (296)	Jordan (427)
	Yemen (224)	Tunisia (420)
		Georgia (410)
		Islamic Rep. of Iran (403)
		Bahrain (398)
		Indonesia (397)
		Syrian Arab Rep. (395)
		Egypt (391)
		Algeria (387)
		Morocco (381)
		Colombia (380)
		Oman (372)
		Palestinian Nat'l Auth. (367)
		Botswana (364)
		Kuwait (354)
		El Salvador (340)
		Saudi Arabia (329)
		Ghana (309)
		Qatar (307)

Scores above 501 are above the international average; scores from 491 to 500 are not measurably different from the international average; scores below 490 are below the international average.

Note: Countries are listed by estimated average scores. Figure is not a scaled representation of countries' scores. International/OECD average scores and US scores are presented in italics. While the formulation and construction of assessment scales are the same across the TIMSS, PIRLS, and PISA, the content represented by the scale scores is not the same across different ages within a subject domain.
Source: http://nces.ed.gov/surveys/international/reports/2011-mrs.asp#mathematics

Table IV. Mathematics results by country and US state (International Association for the Evaluation of Educational Achievement [IEA], 2007).

Figure 6. Results by region in Russia (P

orway (469)
yprus (465)
ılgaria (464)
rael (463)
kraine (462)
ɔmania, Dubai-UAE (461)
ɔsnia and Herzegovina (456)
ebanon (449)
hailand (441)
urkey (432)
rdan (427)
unisia (420)
eorgia (410)
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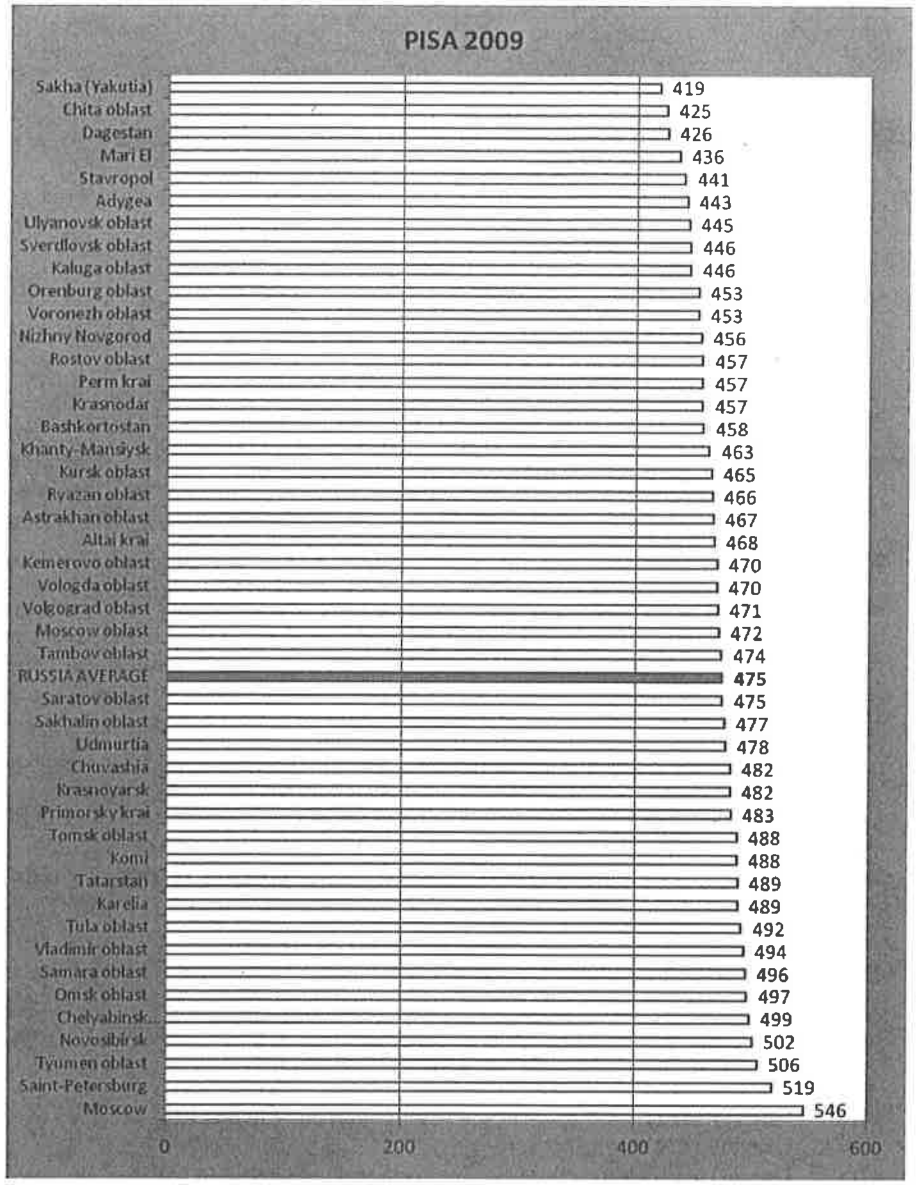

Figure 6. Results by region in Russia (PISA 2009).

Scale score	Grade 4	Grade 8
600		
590	Singapore (587)	
580	*MA-USA (571)*	
570		Singapore (567) Ch. Taipei (561)
560	Ch. Taipei (557) Hong Kong-Ch. (554) *MN-USA (551)*	*MA-USA (556)* Japan (554) Rep. of Korea (553) England-UK (542)
550	Japan (548) Russian Fed. (546) Alberta-Ca. (543) Latvia, England-UK (542)	
540	*USA (539)* Br. Columbia-Ca. (537) Hungary, Ontario-Ca. (536) Italy (535) Kazakhstan (533)	Hungary, Czech Rep. (539) *MN-USA (539)* Slovenia (538)
530	Germany (528) Australia (527) Slovak Rep., Austria (526), Sweden (525) Netherlands (523)	Hong Kong-Ch., Russian Fed. (530) Ontario-Ca., Br. Columbia-Ca. (526)
520	Slovenia (518) Denmark, Quebec-Ca. (517) Czech Rep. (515), Lithuania (514)	*USA (520)* Lithuania (519) Australia (515) Sweden (511)
510	New Zealand (504)	Quebec-Ca. (507)
500	Scotland-UK, *TIMSS Scale Avg. (500)*	*TIMSS Scale Avg. (500)* Basque Country-Sp. (498) Scotland-UK (496) Italy (495)
490	Armenia (484)	Dubai-UAE (489) Armenia (488) Norway (487) Ukraine (485) Jordan (482)
480	Norway (477) Ukraine (474)	Malaysia, Thailand (471)
470 and below	Dubai-UAE (460) Islamic Rep. of Iran (436) Georgia (418) Colombia (400) El Salvador (390) Algeria (354)	Serbia, Bulgaria (470) Israel (468) Bahrain (467) Bosnia and Herz. (466) Romania (462) Islamic Rep. of Iran (459)

Kuwait (348)
Tunisia (318)
Morocco (297)
Qatar (294)
Yemen (197)

Scores above 510 are above the internat
measurably different from the internatio
international average.

Note: Countries are listed by estimated a
representation of countries' scores. Inter
are presented in bold font. While the for
scales are the same across the TIMSS, F
the scale scores is not the same across di
Source: http://nces.ed.gov/surveys/i
mrs.asp#mathematics

Table V. Science results by country and

Table VI illustrates this principle in
states' proficiency in mathematics a
same or similar proficiency levels. I
level similar to Australia, Denmark
other hand, Tennessee, my own sta
Croatia, Greece, Israel, Russia an
system in the United States, accor
Columbia. The Washington, DC le
of Mexico, Thailand and Kazakhstan

Grade 8

Singapore (567)
Ch. Taipei (561)
MA-USA (556)
Japan (554)
Rep. of Korea (553)
England-UK (542)

Hungary, Czech Rep. (539)
MN-USA (539)
Slovenia (538)

Hong Kong-Ch., Russian Fed. (530)
Ontario-Ca., Br. Columbia-Ca.
(526)

USA (520)
Lithuania (519)
Australia (515)
Sweden (511)
Quebec-Ca. (507)
TIMSS Scale Avg. (500)
Basque Country-Sp. (498)
Scotland-UK (496)
taly (495)
Dubai-UAE (489)
Armenia (488)
Norway (487)
Ukraine (485)
ordan (482)
Malaysia, Thailand (471)

Serbia, Bulgaria (470)
srael (468)
Bahrain (467)
Bosnia and Herz. (466)
Romania (462)
slamic Rep. of Iran (459)

Kuwait (348)
Tunisia (318)
Morocco (297)
Qatar (294)
Yemen (197)

Malta (457)
Turkey (454)
Syrian Arab Rep., Cyprus (452),
Tunisia (445)
Indonesia (427)
Oman (423)
Georgia (421)
Kuwait (418)
Columbia (417)
Lebanon (414)
Egypt, Algeria (408)
Palestinian Nat'l Auth. (404)
Saudi Arabia (403)
Morocco (402)
El Salvador (387)
Botswana (355)
Qatar (319)
Ghana (303)

Scores above 510 are above the international average; scores from 491 to 509 are not measurably different from the international average; scores below 490 are below the international average.

Note: Countries are listed by estimated average scores. Figure is not a scaled representation of countries' scores. International/OECD average scores and US scores are presented in bold font. While the formulation and construction of assessment scales are the same across the TIMSS, PIRLS, and PISA, the content represented by the scale scores is not the same across different ages within a subject domain.
Source: http://nces.ed.gov/surveys/international/reports/2011-mrs.asp#mathematics

Table V. Science results by country and US state (TIMSS 2007).

Table VI illustrates this principle in all the American states. This table shows states' proficiency in mathematics and compares them with nations with the same or similar proficiency levels. For instance, Vermont had a proficiency level similar to Australia, Denmark, Estonia, France and Germany. On the other hand, Tennessee, my own state, had proficiency levels comparable to Croatia, Greece, Israel, Russia and Turkey. The most inefficient school system in the United States, according to this criterion, is the District of Columbia. The Washington, DC level of proficiency was equivalent to that of Mexico, Thailand and Kazakhstan.

State	Percent proficient	Significantly outperformed by*	Countries with similar percentages of proficient students
1 Massachusetts	50.7	6	Canada, Japan, Netherlands, New Zealand, Switzerland
2 Minnesota	43.1	11	Australia, Belgium, France, Germany, Netherlands
3 Vermont	41.4	14	Australia, Denmark, Estonia, France, Germany
4 North Dakota	41.0	16	Denmark, Estonia, France, Iceland
5 New Jersey	40.4	14	Australia, Austria, Denmark, France, Germany
6 Kansas	40.2	16	Austria, Denmark, Estonia, France, Slovenia
7 South Dakota	39.1	16	Austria, Denmark, France, Hungary, Sweden
8 Pennsylvania	38.3	16	Austria, Denmark, France, Hungary, Sweden
9 New Hampshire	37.9	18	Austria, Denmark, France, Hungary, Sweden
10 Montana	37.6	18	Austria, France, Hungary, Poland, Sweden
11 Virginia	37.5	17	Czech Rep, France, Hungary, Poland, Sweden
12 Colorado	37.4	18	Czech Rep, France, Hungary, Poland, UK
13 Wisconsin	37.0	18	Czech Rep, France, Poland, Portugal, UK
14 Maryland	36.5	18	Czech Rep, France, Hungary, Poland, UK
15 Wyoming	36.0	18	Czech Rep, France, Poland, Portugal, UK
16 Washington	35.9	19	Czech Rep, France, Hungary, Poland, UK
17 Ohio	35.4	18	Czech Rep, France, Poland, Portugal, UK
18 Iowa	35.2	19	Czech Rep, France, Poland, Portugal, UK
19 Indiana	35.1	19	Czech Rep, France, Poland, Portugal, UK
20 Oregon	34.8	20	Czech Rep, Hungary, Poland, Portugal, UK
21 Connecticut	34.7	19	France, Poland, Portugal, Spain, UK
22 Texas	34.7	21	Czech Rep, Hungary, Poland, Portugal, UK
23 Nebraska	34.6		
24 North Carolina	34.5		
25 Maine	34.1		
26 Idaho	34.1		
27 Utah	32.4		
28 Alaska	32.2		
United States	*32.2*		
29 South Carolina	31.9		
30 Delaware	31.3		
31 Illinois	30.8		
32 New York	30.2		
33 Missouri	29.9		
34 Michigan	28.9		
35 Rhode Island	27.7		
36 Florida	27.4		
37 Kentucky	27.3		
38 Arizona	26.3		
39 Georgia	24.7		
40 Arkansas	24.4		
41 California	23.9		
42 Tennessee	23.1		
43 Nevada	23.0		
44 Oklahoma	21.3		
45 Hawaii	21.2		
46 Louisiana	19.0		
47 West Virginia	18.5		
48 Alabama	18.2		
49 New Mexico	17.4		
50 Mississippi	13.6		

Countries with similar percentages of proficient students
Canada, Japan, Netherlands, New Zealand, Switzerland
Australia, Belgium, France, Germany, Netherlands
Australia, Denmark, Estonia, France, Germany
Denmark, Estonia, France, Iceland
Australia, Austria, Denmark, France, Germany
Austria, Denmark, Estonia, France, Slovenia
Austria, Denmark, France, Hungary, Sweden
Austria, Denmark, France, Hungary, Sweden
Austria, Denmark, France, Hungary, Sweden
Austria, France, Hungary, Poland, Sweden
Czech Rep, France, Hungary, Poland, Sweden
Czech Rep, France, Hungary, Poland, UK
Czech Rep, France, Poland, Portugal, UK
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Czech Rep, France, Poland, Portugal, UK
Czech Rep, Hungary, Poland, Portugal, UK
France, Poland, Portugal, Spain, UK
Czech Rep, Hungary, Poland, Portugal, UK

23 Nebraska	34.6	20	Czech Rep, Hungary, Poland, Portugal, UK
24 North Carolina	34.5	21	Czech Rep, Hungary, Poland, Portugal, UK
25 Maine	34.1	22	Czech Rep, Hungary, Poland, Portugal, UK
26 Idaho	34.1	22	Czech Rep, Hungary, Poland, Portugal, UK
27 Utah	32.4	26	Italy, Poland, Portugal, Spain, UK
28 Alaska	32.2	26	Italy, Poland, Portugal, Spain, UK
United States	*32.2*	*22*	*Italy, Latvia, Poland, Spain, UK*
29 South Carolina	31.9	26	Italy, Poland, Portugal, Spain, UK
30 Delaware	31.3	28	Hungary, Italy, Portugal, Spain, UK
31 Illinois	30.8	27	Czech Rep, Italy, Portugal, Spain, UK
32 New York	30.2	28	Hungary, Italy, Portugal, Spain, UK
33 Missouri	29.9	28	Hungary, Italy, Portugal, Spain, UK
34 Michigan	28.9	30	Ireland, Italy, Lithuania, Portugal, Spain
35 Rhode Island	27.7	34	Latvia, Lithuania
36 Florida	27.4	34	Greece, Latvia, Lithuania
37 Kentucky	27.3	34	Latvia, Lithuania
38 Arizona	26.3	34	Greece, Latvia, Lithuania
39 Georgia	24.7	35	Greece, Latvia, Russia
40 Arkansas	24.4	35	Croatia, Greece, Israel, Latvia, Russia
41 California	23.9	36	Greece, Russia
42 Tennessee	23.1	36	Croatia, Greece, Israel, Russia, Turkey
43 Nevada	23.0	36	Croatia, Greece, Israel, Russia
44 Oklahoma	21.3	36	Croatia, Greece, Israel, Russia, Turkey
45 Hawaii	21.2	38	Croatia, Israel, Russia, Turkey
46 Louisiana	19.0	39	Bulgaria, Croatia, Israel, Serbia, Turkey
47 West Virginia	18.5	41	Bulgaria, Turkey
48 Alabama	18.2	39	Bulgaria, Croatia, Israel, Serbia, Turkey
49 New Mexico	17.4	41	Bulgaria, Serbia, Turkey
50 Mississippi	13.6	43	Bulgaria, Trinidad and Tobago, Uruguay

51 District of Columbia	8.0	48	Kazakhstan, Mexico, Thailand

*Number of countries whose percentage of proficient students was significantly higher statistically.
Note: Lists of countries performing at levels that cannot be distinguished statistically are limited to those five with the largest population.

Table VI. Percentage of students proficient in math by state and countries with similar proficiency levels. Source: Peterson et al (2011).

Time Devoted to Studying Using Private Tutors

Most studies of education efficiency include time on task within the classroom, hours in the school day, and scheduled school days/year. These are important indicators of effort, but are increasingly inadequate. Their inadequacy is particularly relevant when considering comparisons with countries in south and east Asia.

The typical student in Asia attends several types of schools simultaneously. Such students attend government-run public schools from which the data pertaining to time on task usually derive, but they also attend 'cram schools' on a regular basis. These cram schools are referred to as 'shadow education'. In Japan the cram schools are called 'Juku'; in Korea they are called 'Hogwans'. In general these schools are not managed according to modern styles of teaching; on the contrary, they are there to reinforce rules, principles, formulae and information. They are cram schools in the literal sense. In Korea, for instance, 88% of the elementary students and 61% of the students in general high schools receive private tutoring in cram schools (Kim, 2010, p. 302). A Korean family which earns between US$6000 and 7000/month typically allocates 6.3% (US$440/high school student/month) to private tutoring (Korean Statistical Information Service, 2011). The financial burden on households, the stress on children, and the implications for social inequality have long been recognized and have been subject to considerable research (Heyneman, 2010; Lee & Jang, 2010). In India, approximately 72% of the older primary school students and 52% of the secondary school students receive private tutoring (Ngai & Cheung, 2010). Although it is difficult to research effectively, the portion of students in China who receive private tutoring in math was 28.8% and in English, 29.3% (Zhang, 2011). Other estimates have been made for South America (Mattos, 2007), Europe (Ireson, 2004, Bray, 2011) and the United States (Mattos, 2007). Private tutoring is so common that economists have begun to estimate its fiscal impact. By one estimate, for instance, private tutoring in South Korea increased from 0.34% of gross domestic product (GDP) in 1977 to 2.3% of GDP in 2003, an amount equivalent to 50% of the public expenditure on education (Kim, 2007). The Korean Education Development Institute (KEDI) reports that 84% of the parents in Korea state that private tutoring is a significant economic burden (KEDI, 2003). Some have

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pronounced. The ratio of time/PI
American students. In essence, the
efficient than the Korean school sy

	Math	In-school instructional time for math (hours per week)
Korea	552	4.1
United States	472	3.7
	Math	Out-of-school instruction time for math (hours per week)
Korea	552	2.1
United States	472	0.3

Note: Math scores are from PISA 200
a tutor and attending out-of-school cla

Table VII. Mathematical literacy and tim
Source: OECD Programme for Intern

Table VIII continues this same
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commented that private tutoring relegates South Korea, among other countries, to a low level of efficiency within the OECD member states (Gundlach & Woessmann, 2001; Kim, 2002). Others have commented on the distortions to higher education selection (Park, 1996), and the fact that memorization of material has a low impact on productivity (Paik, 2000).

We were interested in the degree to which private tutoring might affect Korea's PISA efficiency. The PISA questionnaire asked students about time/week spent in private tutoring. We have added this time to the amount of time in formal school and have compared Korea with the United States.

Table VII illustrates this comparison between the United States and Korea by showing the learning time devoted to studying math in both countries. Korean students report spending 86% more time studying math out of school than American students (2.1 hours/ week as opposed to 0.3 hours/week). While the ratio of time in formal schooling to the PISA score is very close between the two countries (3.54 vs. 3.78), when one adds the time spent studying mathematics outside of formal schooling, the differences are pronounced. The ratio of time/PISA score is 2.46 for Korean vs. 3.27 for American students. In essence, the American school system is one third more efficient than the Korean school system.

	Math	In-school instructional time for math (hours per week)	Instructional weeks in years	Total hours	Ratio of score to time
Korea	552	4.1	35.6	145.9	3.78
United States	472	3.7	36.0	133.2	3.54
	Math	**Out-of-school instruction time for math (hours per week)**	**In-school + out-of-school instruction**	**Total hours**	**Ratio of score to time**
Korea	552	2.1	6.3	224.3	2.46
United States	472	0.3	4.0	144.0	3.27

Note: Math scores are from PISA 2003. Out-of-school activities include working with a tutor and attending out-of-school classes.

Table VII. Mathematical literacy and time studying math.
Source: OECD Programme for International Student Assessment, 2004, Table 5.14.

Table VIII continues this same illustration using the total time studying across all subjects, not only mathematics. The total time Korean students spend studying is about one third more than in the United States. The level of their PISA scores is indeed higher, but the ratio of time/PISA score is considerably different. The ratio for Korea is 0.44, and for the United States it is 0.57. By this account – that is, by comparison with the total time spent studying in private tutoring as well as in school – the American system is about 30% more efficient than the Korean system.

	Math	In-school instructional time for all subjects (hours per week)	Instructional weeks in years	Total hours	Ratio of score to time
Korea	552	30.3	35.6	1078.7	0.51
United States	472	22.2	36.0	799.2	0.59
	Math	**Out-of-school instructional time for all subjects (hours per week)**	**In-school + out of school instruction**	**Total hours**	**Ratio of score to time**
Korea	552	5.1	35.4	1260.4	0.44
United States	472	0.7	22.9	824.4	0:57

Note: Math scores are from PISA 2003. Out-of-school activities include working with a tutor and attending out-of-school classes.

Table VIII. Mathematical literacy and total time studying.
Source: OECD Programme for International Student Assessment, 2004, Table 5.14.

Implications

For twenty years a common refrain about American education has been that it is inferior to the public school systems in Asia (Stevenson & Stigler, 1992; Stigler & Hiebert, 1999). The problem is that this has ignored the fact that the typical youth in Asia receives only a portion of his or her achievement from the public school system and that test scores in particular are influenced by the quality and intensity of the cram schools. But the refrain of inferiority to school systems in Asia is not only inaccurate scientifically; it is pernicious in another way too. It ignores the fact that the image of their school systems held by local citizens in Japan, Korea and parts of China is one of low quality, not high quality. Instead of crowing about international superiority on international tests of academic achievement, local authorities, parents and the academic community adamantly condemn the quality of their systems.

Adolescence in Asia typically involves cramming scientific and mathematical facts. Studying is treated as a full-time profession in which students are asked to study 80-100 hours/week at home, in school, with tutors and in cram schools. The process has generated problems of depression, suicide, bullying and personality disorder (Lee & Larsen, 2000,

Stankov, 2010; Kong, 2011). Hig
with lower confidence and a disl
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p. 198). Yang agrees and points
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An article in *Yonhapnews* reports
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Even for those who succes
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> Most of the [students] are di
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.6	1078.7	0.51
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4	1260.4	0.44
9	824.4	0.57

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disorder (Lee & Larsen, 2000,

Stankov, 2010; Kong, 2011). High exposure to private tutoring is associated with lower confidence and a dislike of academic work (Kong, 2011). Choi suggests that there 'is a negative influence of shadow education on the way of learning and creativity among high school students' (Choi, 2012). Yun suggests that in Korea, 'overheated shadow education drops the interests of learners and therefore decreases learners' self learning ability' (Yun, 2006, p. 198). Yang agrees and points out that 'as stress from shadow education increases academic motivation decreases. And as the burden on time and mentality among factors of stress from shadow education increases, internal satisfaction decreases ... and problem behavior increases' (Yang, 2011, p. 2). An article in *Yonhapnews* reports on a study which shows that students in cram schools or with private tutors depend on their tutors for what and how to learn, and cannot plan their own study in detail. They accept learning contents meaninglessly and passively and become other-person-led learners without explicit learning goals (*Yonhapnews*, 2007).

Even for those who successfully pass their examinations and enter a university, depression and meaninglessness continue. Unlike the United States, Britain or Canada, scores on university selection examinations in Asia determine not only which university they are allowed to enter, but also which program of study they can take. This is detrimental to their higher education experience. Cho points out the following:

> Most of the [students] are dissatisfied with their universities or departments since they have not chosen them according to their desires but according to their scores ... the years of preparing for the examination under extreme tension and stress also make the winners extremely passive and dull. Many of them have difficulties adjusting to university life ... Courses in liberal arts and social sciences that require analytical and critical thinking confuse and frustrate them endlessly. They are particularly annoyed by questions which do not have definite answers. (Cho, 1995, p. 155)

As Tucker (2011, 2012) has explained, performance among Asian school children stems from a culturally narrow concentration on simplistic indicators of math and science as indicators of success. So damaging has this process become that people in these countries are searching for a way to escape and often look to the United States as having a more balanced way to raise children and adolescents.

They are probably right. While Asians look longingly at the educational and personal effects of a typical American adolescence, Americans are rarely aware of the negative effects on personality development of an adolescence narrowly devoted to math and science scores. Were Americans more aware of these effects, they might look with less jealousy at the success of Asia's PISA scores.

While it is true that many American school systems are in desperate need of repair, it is also true that some school systems in the United States are superb. Furthermore, many Americans emerge from the process of adolescence with deep labor-market experience and a sense of autonomy and personal independence which the typical youth in Asian countries do not have.

Summary

In comparing ourselves with other countries, we must keep in mind that the indicators of our envy – high scores in math and science – were not acquired in a vacuum, but rather through a different culture with many faults obvious to local populations but not to outsiders. American schools systems are not uniformly poor or inefficient. American students tend to perform better on some types of tests than others; some American states perform well on all tests; and in terms of time spent studying, school systems in the United States may be considerably more efficient than they are made out to be. Americans need to be more careful not to import the 'terror' of a shadow-education adolescence typical of Asia. Americans need to be more circumspect when criticizing their own education policies as if the deficits were so uniform and the virtues so insignificant.

Acknowledgement

Support of the George W. Bush Institute is gratefully acknowledged; however the views and opinions in this chapter are those of the author alone.

Notes

[1] Efficiency of a school system is defined here in a straightforward way, as output (e.g. test scores) per unit of input (e.g. per pupil expenditure). While such indicators do not tell the whole story of the quality of a nation's school system, they can highlight discrepancies and problems in need of attention.

[2] Data and tables have drawn on unpublished papers from three graduate students: Bommi Lee (2012) 'Efficiency and Effectiveness in Education Across Countries: what should be measured?'; Yunkuyung Min (2012) 'States' Variation in International Students' Assessment: case of the US and Brazil'; and Jeongwoo Lee (2012) 'An Attempt to reinterpret student learning outcomes: a cross-national comparison'.

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CHAPTER 14

Policy Respon: Comparative I

ALEXANDER W. WI

ABSTRACT Responses to inter
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