Network Connections

Math & Science Collaborative

Carnegie Science Center
February 10, 2011

Update on Latest in Math and Science

- International Reports
- National Reports
- State Level Reports
- Local Collaborations

PISA– Released December 2010

- The **Programme for International Student Assessment** is an internationally standardized assessment administered to 15-year-olds.
- It is coordinated by Organization for Economic Co-operation and Development (OECD) to improve educational policies.
- PISA aims at testing literacy in reading, mathematics, and science.

International Update: PISA

http://www.pisa.oecd.org/pages/0,2987,en_32252351_32235731_1_1_1_1_1,00.html

PISA– Released December 2010

PISA measures the competencies students have acquired in and outside of school and can **apply** to problems with real-world contexts.

- *Are students well prepared for future challenges?*
- *Can they analyze, reason, and communicate effectively?*
- *Do they have the capacity to continue learning throughout life?*

PISA– Released December 2010

Each PISA administration focuses on one of the three competence fields, but the two others are tested as well.

- Science in 2006
- Reading in 2009.

The typical PISA item makes more complex cognitive demands on the student than the typical item from the Trends in Mathematics and Science Study (TIMSS) or the National Assessment of Educational Progress (NAEP).

International Update: PISA

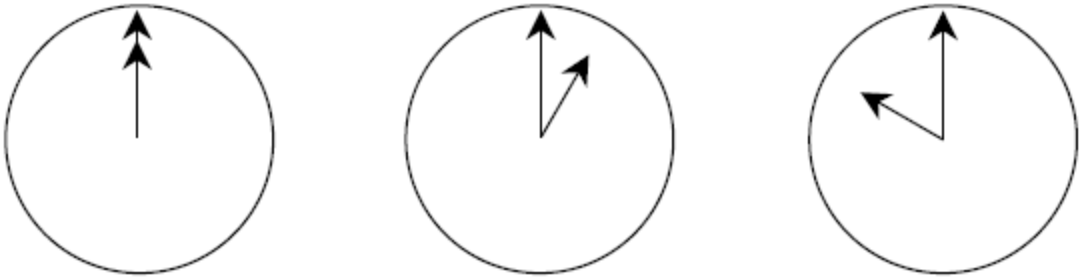
In PISA, a situation may be presented and several questions asked about it. Although some items are multiple-choice, the majority required a constructed response, for which partial credit may be given.

International Update: PISA

INTERNET RELAY CHAT

Mark (from Sydney, Australia) and Hans (from Berlin, Germany) often communicate with each other using "chat" on the Internet. They have to log on to the Internet at the same time to be able to chat.

To find a suitable time to chat, Mark looked up a chart of world times and found the



Greenwich 12 Midnight | Berlin 1:00 AM | Sydney 10:00 AM

following:

Item 1: INTERNET RELAY CHAT

At 7:00 PM in Sydney, what time is it in Berlin?

Percent Correct
United States: 45.7
OECD: 53.7

International Update: PISA

Item 2: INTERNET RELAY CHAT

Mark and Hans are not able to chat between 9:00 AM and 4:30 PM their local time, as they have to go to school. Also, from 11:00 PM till 7:00 AM their local time they won't be able to chat because they will be sleeping.

When would be a good time for Mark and Hans to chat? Write the local times in the table.

Place	Time
Sydney	
Berlin	

Percent Correct
United States: 28.0
OECD: 28.8

International Update: PISA

Tests are typically administered to between 4,500 and 10,000 students in each country.

More than 400 000 students from 57 countries making up close to 90% of the world economy took part in PISA 2009.

The mean score is 500.

2009 PISA results in Mathematics

At 487, the United States was below the average.

■ Figure I.3.11 ■

Where countries rank in mathematics performance

Statistically significantly **above** the OECD average
Not statistically significantly different from the OECD average
Statistically significantly **below** the OECD average

	Mathematics					
			Range of rank			
			OECD countries		All countries/economies	
	Mean Score	S.E.	Upper rank	Lower rank	Upper rank	Lower rank
Shanghai-China	600	(2.8)			1	1
Singapore	562	(1.4)			2	2
Hong Kong-China	555	(2.7)			3	4
Korea	546	(4.0)	1	2	3	6
Chinese Taipei	543	(3.4)			4	7
Finland	541	(2.2)	1	3	4	7
Liechtenstein	536	(4.1)			5	9
Switzerland	534	(3.3)	2	4	6	9
Japan	529	(3.3)	3	6	8	12
Canada	527	(1.6)	4	6	9	12
Netherlands	526	(4.7)	3	7	8	13
Macao-China	525	(0.9)			10	12
New Zealand	519	(2.3)	6	8	12	14
Belgium	515	(2.3)	7	11	13	17
Australia	514	(2.5)	7	11	13	17
Germany	513	(2.9)	8	12	13	17
Estonia	512	(2.6)	8	11	14	17
Iceland	507	(1.4)	11	13	17	19
Denmark	503	(2.6)	12	16	18	21
Slovenia	501	(1.2)	13	15	19	21
Norway	498	(2.4)	13	20	19	26
France	497	(3.1)	13	22	19	28
Slovak Republic	497	(3.1)	13	22	19	28
Austria	496	(2.7)	14	22	20	28
Poland	495	(2.8)	15	24	21	29
Sweden	494	(2.9)	15	24	21	30
Czech Republic	493	(2.8)	16	25	22	31
United Kingdom	492	(2.4)	17	25	23	31
Hungary	490	(3.5)	18	28	23	34
Luxembourg	489	(1.2)	22	26	28	33
United States	487	(3.6)	21	29	26	36
Ireland	487	(2.5)	22	29	28	35
Portugal	487	(2.9)	22	29	28	36
Spain	483	(2.1)	26	29	32	36
Italy	483	(1.9)	26	29	32	36
Latvia	482	(3.1)			32	37
Lithuania	477	(2.6)			36	38
Russian Federation	468	(3.3)			38	39
Greece	466	(3.9)	30	30	38	40
Croatia	460	(3.1)			39	40
Dubai (UAE)	453	(1.1)			41	42
Israel	447	(3.3)	31	32	42	44
Turkey	445	(4.4)	31	32	41	44
Serbia	442	(2.9)			42	44
Azerbaijan	431	(2.8)			45	47
Bulgaria	428	(5.9)			45	51
Romania	427	(3.4)			45	49
Uruguay	427	(2.6)			45	49
Chile	421	(3.1)	33	34	47	51
Thailand	419	(3.2)			48	52
Mexico	419	(1.8)	33	34	49	51
Trinidad and Tobago	414	(1.3)			51	52
Kazakhstan	405	(3.0)			53	54
Montenegro	403	(2.0)			53	54
Argentina	388	(4.1)			55	58
Jordan	387	(3.7)			55	58
Brazil	386	(2.4)			55	58
Colombia	381	(3.2)			56	59
Albania	377	(4.0)			57	61
Tunisia	371	(3.0)			59	63
Indonesia	371	(3.7)			59	63
Qatar	368	(0.7)			61	63
Peru	365	(4.0)			61	64
Panama	360	(5.2)			62	64
Kyrgyzstan	331	(2.9)			65	65

Source: OECD, *PISA 2009 Database*.
StatLink http://dx.doi.org/10.1787/888932343152

In 2006 the mean score for the United States in mathematics was 474, also statistically significantly below the average.

International Update: PISA

The PISA science literacy test asks students to apply their science knowledge to solve problems set in various real-world contexts.
To solve the problems students must activate a number of science competencies as well as a broad range of science content knowledge.

2009 PISA results in Science

At 502, the United States is not statistically significantly different from the OECD average.

Figure I.3.22

Where countries rank in science performance

Statistically significantly **above** the OECD average
Not statistically significantly different from the OECD average
Statistically significantly **below** the OECD average

	Science					
			Range of rank			
			OECD countries		All countries/economies	
	Mean Score	S.E.	Upper rank	Lower rank	Upper rank	Lower rank
Shanghai-China	575	(2.3)			1	1
Finland	554	(2.3)	1	1	2	3
Hong Kong-China	549	(2.8)			2	3
Singapore	542	(1.4)			4	6
Japan	539	(3.4)	2	3	4	6
Korea	538	(3.4)	2	4	4	7
New Zealand	532	(2.6)	3	6	6	9
Canada	529	(1.6)	4	7	7	10
Estonia	528	(2.7)	4	8	7	11
Australia	527	(2.5)	4	8	7	11
Netherlands	522	(5.4)	4	11	7	16
Chinese Taipei	520	(2.6)			11	15
Germany	520	(2.8)	7	10	10	15
Liechtenstein	520	(3.4)			10	16
Switzerland	517	(2.8)	8	12	12	17
United Kingdom	514	(2.5)	9	13	14	19
Slovenia	512	(1.1)	10	13	16	19
Macao-China	511	(1.0)			16	19
Poland	508	(2.4)	12	16	17	22
Ireland	508	(3.3)	11	17	16	23
Belgium	507	(2.5)	12	17	18	24
Hungary	503	(3.1)	13	21	19	27
United States	502	(3.6)	13	22	19	29
Czech Republic	500	(3.0)	15	23	21	29
Norway	500	(2.6)	16	23	21	29
Denmark	499	(2.5)	16	23	22	30
France	498	(3.6)	16	25	22	33
Iceland	496	(1.4)	20	25	26	32
Sweden	495	(2.7)	19	26	25	34
Austria	494	(3.2)	19	28	25	36
Latvia	494	(3.1)			25	35
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Slovak Republic	490	(3.0)	23	29	29	37
Italy	489	(1.8)	25	28	32	37
Spain	488	(2.1)	25	29	32	37
Croatia	486	(2.8)			33	39
Luxembourg	484	(1.2)	28	29	37	39
Russian Federation	478	(3.3)			38	40
Greece	470	(4.0)	30	30	39	41
Dubai (UAE)	466	(1.2)			40	41
Israel	455	(3.1)	31	32	42	43
Turkey	454	(3.6)	31	33	42	44
Chile	447	(2.9)	32	33	43	45
Serbia	443	(2.4)			44	46
Bulgaria	439	(5.9)			44	47
Romania	428	(3.4)			47	49
Uruguay	427	(2.6)			47	49
Thailand	425	(3.0)			47	49
Mexico	416	(1.8)	34	34	50	51
Jordan	415	(3.5)			50	52
Trinidad and Tobago	410	(1.2)			51	53
Brazil	405	(2.4)			52	56
Colombia	402	(3.6)			53	58
Montenegro	401	(2.0)			54	58
Argentina	401	(4.6)			53	59
Tunisia	401	(2.7)			53	58
Kazakhstan	400	(3.1)			53	58
Albania	391	(3.9)			58	60
Indonesia	383	(3.8)			59	62
Qatar	379	(0.9)			60	62
Panama	376	(5.7)			60	64
Azerbaijan	373	(3.1)			62	64
Peru	369	(3.5)			62	64
Kyrgyzstan	330	(2.9)			65	65

Source: OECD, *PISA 29 Database*.
StatLink http://dx.doi.org/10.1787/888932343152

The USA 2009 score was a significant **improvement** over the 2006 score of 489 which was well below average.

Update : National Level

- NAEP Math Results
- NAEP Science Results
- “Conceptual Framework to Guide the Development of Next Generation Standards for K-12 Science Education”

NAEP Math Results

Trend data is available:

- Mathematics scores up since 2007 at grade 8, but unchanged at grade 4
- Gaps persist despite gains for some student groups.
- Grade 8 showed gains for all subgroups.

Great website to explore more deeply.

NAEP Math Results

- National Assessment of Educational Progress in Mathematics

- NAEP - Mathematics 2009: Index

NAEP Science Results

New framework focuses on knowing science processes – being able to explain reasoning. It tests capacity to do science rather than to recall memorized isolated facts.

- Using inquiry
- Using scientific design
- Using scientific reasoning

Consequently, there is no trend data available—only current performance.

NAEP Science Results

- NAEP - 2009 Science: The Nation's Report Card

NSRC Conceptual Framework

- "Conceptual Framework to Guide the Development of Next Generation Standards for K-12 Science Education"
- http://www7.nationalacademies.org/bose/Standards_Framework_Homepage.html

Update: National Initiatives

Today's Session A. Intensified Algebra

- A comprehensive program for Underprepared Algebra Students in Double-Period Classes
- Dr. Diane Briars presenting program today for *Dana Center* and *Agile Mind*.

- *Journal* pp. 36-37 detail national research project underway.

Update: National Research

Today's Session D. Regional Educational Lab Mid-Atlantic features practice guides on:

- *Word Problems*
- *Fractions*

- *Journal* pp. 70-71 detail additional assistance with national research available from this resource.

Update on National and State Initiatives
Common **Core Academic Standards**

NGA Common Core Standards in Mathematics

- PA State Board adopted them in the summer.
- PDE will facilitate a 3 year transition.
- *Journal* – pp. 40-42 detail information.

Today:

- Sessions B & C: Math Core Academic Standards
- Keynote: Phil Daro speaking about Math Common Core standards.

Update: State Level
State Board Annual Report

On January 19, the **Second Annual Report of the State Board of Education** was released.

The theme of this year's report was "Forward, Together" to emphasize a commitment over the past year to advance measures that will improve the equity of academic expectations statewide.

http://www.eplc.org/notebook2011/StateBoardofEducationAnnua%20Report2011.pdf

Update: State Level

PDE Representatives here today

- Session F: Bill Bertrand
  - "Putting the TE in STEM"
  - *MSC Journal* p.67.
- Session H: Patti Vathis
  - "Reading to Learn the Content"

“Where are the Jobs in Pittsburgh?” December 2010

- TRWIB Supply-Demand Study
- Analysis of thousands of on-line job postings
- Key findings:
  - Majority offer wages above recommended family sustaining wage level ($28,500)
  - More than 60% require more than a high school diploma but less than a college degree

“Where are the Jobs in Pittsburgh?” December 2010

Key findings:

Almost 50% are concentrated in 5 clusters

1. Management occupations
2. Computer and mathematical occupations
3. Sales and related occupations
4. Office and administrative support occupations
5. Healthcare practitioners and technical occupations

Regional Collaboration

Math Science Partnership was awarded by PDE.

- 2 IHE Partners: Carlow University & SVC
- School year builds regional PLCs focusing on the big ideas to be captured in the Keystone Exams.

Session F. focuses on PLCs.

New 10-day Summer Institutes are available.

- Information is in Interact folders.
- Register by March 15, 2011.

Regional Collaboration

Western PA Writing Project provided scholarships for math and science fellows to participate in their summer experience

Session H. Fellows share their lessons learned to help you integrate effective written communication in math and science teaching and learning.

Regional Collaboration

Session D features Richard Duschl of Penn State University, researcher in formative student assessment in science and our Oct. Keynoter.

MSC is partnering with Pgh Supercomputing Center to integrate computer-based modeling into the classroom.

MSC is working with the Pittsburgh Tissue Engineering Institute on potential partnership.

Regional Collaboration

MSC is partnering with Technology Council on planning for a STEM Summit.

- Possibly August 31st
- Audience would be district administrators, board members, and business leaders .
- MSC Steering Council generated some ideas. Share your thoughts about speakers, topics on your Interact Form.

Public Awareness Campaign

- Still working to secure sponsoring partners for TV campaign
- Watch for date of launch
- Possible launch at STEM Summit in August…
- Share your thoughts at Interact Time

Look Inside Program for Morning

9 Breakout Sessions from 9:15 to noon

- Your name tag has a color-coded dot.
- Program names room location.
  - SportsWorks (A-B-C-D)
  - Third Floor: Kitchen Theatre, Overlook, Classrooms 1&2 and 4 & 5
  - Science Stage (here)
- Data sheets will circulate. Your signature is for sign-in AND verifying personal data.
- Mid-morning break will be set by facilitator.

Preview of Program for Afternoon

- Lunch is available for purchase in CSC café (Additional seating available in breakout rooms.)
- Resource Fair Listing – 16 tables (Upper Lobby) Available at Lunch AND between Keynote and Interact!
- Keynote will be here at 1 PM.

Preview of Program for Afternoon

INTERACT is in Breakout Session Rooms.

- Locations are shown on back of program.
- Team Folders will be available in rooms.
- Autograph Sign-in Sheet.
- Answer questions on INTERACT form.
- Explore summer pd opportunities.
- Turn in copy of Interact form and folder to MSC staff.

Evaluation

- Complete for each session through the day.
- Make notes for reporting to your team
- Provide feedback to us!
- Please complete top section & Overview

PLEASE turn in before leaving today.

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