PISA Results and Implications for Case of the Republic of Korea

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III. Roles of PISA and Its Implication on Korea’s Education
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Introduction
Introduction
Organization of Educational Administration

Central Level
Ministry of Education

Great – Sphere Level
Metropolitan and Provincial Office of Education

Metropolitan (8)
Seoul, Pusan, Taegu, Incheon, Kwangju, Taejeon, Ulsan, Sejong

Provincial (9)
Gyunggi, Kangwon, Chungbuk, Chungnam, Chonbuk, Chonnam, Kyungbuk, Kyungnam, Jeju

Base Level
183 District Office of Education
Introduction
: Educational Research Institutions
Introduction of KICE

Established on January 1, 1998 under the KICE Act

Government-funded educational research institution

Goal

- To contribute to the qualitative improvement of primary and secondary education and the nation’s educational development through the research,
- development and implementation of curriculum and educational evaluations.

Research carried out by KICE covers

- the National Curriculum and educational evaluation,
- the improvement of teaching and learning techniques,
- development and authorization of textbooks, and
- the implementation of national-level educational testing.
Introduction

PISA administration in Korea

Korea’s Student Assessment Framework

National
- NAEA
- CSAT

Metropolitan/Provincial offices of education
- Learning Diagnostic Test
- Pre-CSAT

International
- IEA: TIMSS, ICILS
- OECD: PISA

Student assessment within schools
Introduction

Student Assessment at the International Level

- **PISA**: The OECD Programme for International Student Assessment
- **TIMSS**: Trends in International Mathematics and Science Study
- **ICILS**: International Computer and Information Literacy Study
### Key Characteristics

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Aims to provide participating countries with a chance to investigate students’ performance in cognitive domains and educational backgrounds which influence student achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>15 years old</td>
</tr>
<tr>
<td>Cycle</td>
<td>3 years</td>
</tr>
</tbody>
</table>
| Assessment Instrument    | **Test**  
Reading, Mathematics, Science, Problem Solving  
**Questionnaire**  
Student, School, Parents, Teacher |
| Assessment Mode          | Paper-based Assessment (PBA), Computer-based Assessment (CBA) |
Cooperation framework for implementing PISA

Successful implementation Procedure

1. List of Sampled Schools
2. Sending Official document for cooperation in PISA
3. Forwarding official document for implementation of PISA

Introduction
## Introduction

### Sampling

<table>
<thead>
<tr>
<th>School</th>
<th>Students</th>
<th>Ratio (%)</th>
<th>Excluded from</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Special Education School</td>
<td></td>
</tr>
<tr>
<td>Middle School</td>
<td>57,895</td>
<td>8.7</td>
<td>1227</td>
<td>59.0</td>
</tr>
<tr>
<td>High School</td>
<td>611,153</td>
<td>91.3</td>
<td>854</td>
<td>41.0</td>
</tr>
<tr>
<td>International School</td>
<td></td>
<td></td>
<td>972</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>669,048</td>
<td>100.0</td>
<td>2081</td>
<td>100.0</td>
</tr>
<tr>
<td>Total (Grade 7 and up)</td>
<td>669,048</td>
<td>-</td>
<td>3,053</td>
<td></td>
</tr>
</tbody>
</table>

- **Total Population**: 672,101
### PISA Assessment Domains participated

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjects assessed (Main Domain)</td>
<td>Reading Mathematics Science</td>
<td>Reading Mathematics Science</td>
<td>Reading Mathematics Science</td>
<td>Reading Mathematics Science</td>
<td>Reading Mathematics Science</td>
</tr>
<tr>
<td>Questionnaires</td>
<td>Approaches to learning, engagement with Reading</td>
<td>Approaches to learning, attitudes to Mathematics</td>
<td>Approaches to learning, attitudes to Science</td>
<td>Approaches to learning, attitudes to Reading</td>
<td>Approaches to learning, attitudes to Mathematics</td>
</tr>
<tr>
<td>Computer Based Assessment</td>
<td></td>
<td></td>
<td>CBAS</td>
<td>DRA</td>
<td>CBAPS CBAM DRA</td>
</tr>
</tbody>
</table>
The Main Results of PISA
### The Main Results of PISA

#### Trends of Korean Students in PISA

<table>
<thead>
<tr>
<th>Domain</th>
<th>PISA 2000 (43 countries)</th>
<th>PISA 2003 (41 countries)</th>
<th>PISA 2006 (57 countries)</th>
<th>PISA 2009 (75 countries)</th>
<th>PISA 2012 (65 countries)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>Mean score: 525</td>
<td>Mean score: 534</td>
<td>Mean score: 556</td>
<td>Mean score: 539</td>
<td>Mean score: 536</td>
</tr>
<tr>
<td></td>
<td>Rank: 7</td>
<td>Rank: 2</td>
<td>Rank: 1</td>
<td>Rank: 2~4</td>
<td>Rank: 3~5</td>
</tr>
<tr>
<td>Math</td>
<td>Mean score: 547</td>
<td>Mean score: 542</td>
<td>Mean score: 547</td>
<td>Mean score: 546</td>
<td>Mean score: 554</td>
</tr>
<tr>
<td></td>
<td>Rank: 3</td>
<td>Rank: 3</td>
<td>Rank: 1~4</td>
<td>Rank: 3~6</td>
<td>Rank: 3~5</td>
</tr>
<tr>
<td>Science</td>
<td>Mean score: 552</td>
<td>Mean score: 538</td>
<td>Mean score: 522</td>
<td>Mean score: 538</td>
<td>Mean score: 538</td>
</tr>
<tr>
<td></td>
<td>Rank: 1</td>
<td>Rank: 4</td>
<td>Rank: 7~13</td>
<td>Rank: 4~7</td>
<td>Rank: 5~8</td>
</tr>
</tbody>
</table>
The Main Results of PISA - CBAM

PISA 2012 Results: Computer-Based Assessment in Mathematics

Singapore: 566
Shanghai-China: 562
Korea: 553
HongKong-China: 550
Macao-China: 543
Japan: 539
Chinese Taipei: 537
Canada: 523
Estonia: 516
Belgium: 511
The Main Results of PISA

Main results of PISA

PISA: Reading by Proficiency Level

<table>
<thead>
<tr>
<th>Level 1 and Below</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>PISA 2000</td>
<td>5.7</td>
<td>18.6</td>
<td>38.8</td>
<td>31.1</td>
<td>5.7</td>
</tr>
<tr>
<td>PISA 2003</td>
<td>6.8</td>
<td>16.8</td>
<td>33.6</td>
<td>30.8</td>
<td>6.8</td>
</tr>
<tr>
<td>PISA 2006</td>
<td>5.7</td>
<td>12.6</td>
<td>27.2</td>
<td>32.7</td>
<td>5.7</td>
</tr>
<tr>
<td>PISA 2009</td>
<td>5.8</td>
<td>15.4</td>
<td>33.0</td>
<td>32.9</td>
<td>5.8</td>
</tr>
<tr>
<td>PISA 2012</td>
<td>7.6</td>
<td>16.4</td>
<td>30.8</td>
<td>31.0</td>
<td>7.6</td>
</tr>
</tbody>
</table>
The Main Results of PISA

Main results of PISA

Mathematics literacy by Proficiency Level

<table>
<thead>
<tr>
<th>Level 1 and below</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>PISA 2003</td>
<td>9.6</td>
<td>16.6</td>
<td>25.0</td>
<td>24.1</td>
<td>8.1</td>
</tr>
<tr>
<td>PISA 2006</td>
<td>8.8</td>
<td>15.2</td>
<td>23.5</td>
<td>23.5</td>
<td>25.5</td>
</tr>
<tr>
<td>PISA 2009</td>
<td>8.1</td>
<td>15.6</td>
<td>24.4</td>
<td>26.3</td>
<td>17.7</td>
</tr>
<tr>
<td>PISA 2012</td>
<td>9.1</td>
<td>14.7</td>
<td>21.4</td>
<td>23.9</td>
<td>18.8</td>
</tr>
</tbody>
</table>
The Main Results of PISA

Main results of PISA

Science literacy by Proficiency Level

<table>
<thead>
<tr>
<th>Year</th>
<th>Level 1 and below</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>PISA 2006</td>
<td>11.2</td>
<td>25.5</td>
<td>31.8</td>
<td>21.2</td>
<td>9.2</td>
<td>1.1</td>
</tr>
<tr>
<td>PISA 2009</td>
<td>6.3</td>
<td>18.5</td>
<td>33.1</td>
<td>11.2</td>
<td>6.7</td>
<td>1.1</td>
</tr>
<tr>
<td>PISA 2012</td>
<td>6.7</td>
<td>18.0</td>
<td>33.6</td>
<td>21.2</td>
<td>10.6</td>
<td>1.1</td>
</tr>
</tbody>
</table>

PISA 2006

PISA 2009

PISA 2012
The Main Results of PISA – Trends in Reading by Gender

- **PISA 2003**
  - Males: 525
  - Females: 547
  - Difference: 22 points

- **PISA 2006**
  - Males: 539
  - Females: 574
  - Difference: 35 points

- **PISA 2009**
  - Males: 523
  - Females: 558
  - Difference: 35 points

- **PISA 2012**
  - Males: 525
  - Females: 548
  - Difference: 23 points

- **PISA 2012**
  - Males: 552
  - Females: 559
  - Difference: 7 points
The Main Results of PISA – Trends in Math by Gender

- **PISA 2003**: 552 (24 point*)
- **PISA 2006**: 552 (9 point)
- **PISA 2009**: 548 (4 point)
- **PISA 2012**: 562 (18 point)

*Note: The asterisk indicates a notable difference.
The Main Results of PISA – Trends in Science by Gender

- **PISA 2003**: 561 (boys), 541 (girls)
- **PISA 2006**: 546 (boys), 527 (girls) (18 point increase)
- **PISA 2009**: 537 (boys), 539 (girls) (2 point increase)
- **PISA 2012**: 539 (boys), 539 (girls) (0 point increase)
The main results of PISA – Mean Score for PISA 2009 DRA

Index of Reading Enjoyment

<table>
<thead>
<tr>
<th>Country</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea</td>
<td>0.13</td>
</tr>
<tr>
<td>Japan</td>
<td>0.2</td>
</tr>
<tr>
<td>Hong Kong-China</td>
<td>0.32</td>
</tr>
<tr>
<td>Shanghai-China</td>
<td>0.49</td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td>0.57</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.29</td>
</tr>
</tbody>
</table>
# The Main Results of TIMSS

## Key Characteristics

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Utilizing the basic data for establishing the educational policies of participating countries that affect the achievement of educationally coherent information linked to achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>4th graders &amp; 8th graders</td>
</tr>
<tr>
<td>Cycle</td>
<td>4 years (TIMSS 1995 is first assessment)</td>
</tr>
<tr>
<td>Assessment Instrument</td>
<td>Test</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>Student, School, Parent, Teacher, Curriculum</td>
</tr>
<tr>
<td>Assessment Mode</td>
<td>Paper-based Assessment (PBA)</td>
</tr>
</tbody>
</table>
The Main Results of TIMSS

Trends of Korean Students in TIMSS

Both math & science achievement of TIMSS 2011 increased from TIMSS 1995

Mathematics & science achievement tend to be increased
Feedback to Schools: leaflet, Reports, Seminar...
Roles of PISA and Its Implication on Korea’s Education
PISA & TIMSS are not a high stakes assessment of a big influence in Korean society. Korea has generally achieved good results from international assessment such as PISA & TIMSS, so that its effect did not lead to an extensive educational reform.

**BUT**

Korea has reflected the results on establishment of educational policies or improvement of the national curriculum in various ways. For example, decreased science performance in PISA 2006 has an impact of conducting a policy to strengthen science education.
Perceptions on PISA participation

- Getting harder to get the agreements from parents, teachers and schools
- We do provide the letter to make parents understand why we need to join the PISA project.
- Since PISA 2000, we do not have any of replacements of schools.

Educational policy makers are the major audience for PISA data.

- Any kinds of reports have not been directly provided to students.
(1) National-Level Assessments

- National Diagnostic Assessment of Basic Competency (NDABC, since 2002)
- National Assessment of Education Achievement (NAEA)
- College Scholastic Ability Test (CSAT)

- Data-driven decision making
- Evidence-based policy making
Countries and economies are ranked in descending order of the percentage of students who are in schools where 30% or more of students are low performers in mathematics.

Source: OECD, PISA 2012 Database, Table 4.2.
(2) After-School Programs

Implemented in 99.9% of schools (MOE, 2015)

- 66.9% students are participating on average

<table>
<thead>
<tr>
<th></th>
<th>Primary</th>
<th>Middle</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>71.2%</td>
<td>54.7%</td>
<td>71.2%</td>
</tr>
</tbody>
</table>

- Subject-based 53.6%; Extra-curricular 46.3%
- For both advanced and supplementary courses
Roles of PISA and Its Implication on Korea’s Education

Some Reasons for High Performance

(3) Teacher Education

- Teaching Profession in Korea
  - A stable job with a good social image
  - A good salary package with an excellent pension

- 4-Year Pre-Service Program
  - National University of Education(Primary)
  - College of Education(Secondary)
Youth indicates Secondary School Teacher as the most desired job

- 6,500 respondents showed high preference on the job which is stable, well-paying, and offers a good working environment (NYPI, 2010)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Job Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Secondary School Teacher</td>
</tr>
<tr>
<td>2</td>
<td>Musician</td>
</tr>
<tr>
<td>3</td>
<td>Fashion Designer</td>
</tr>
<tr>
<td>4</td>
<td>Doctor</td>
</tr>
<tr>
<td>5</td>
<td>Primary School Teacher</td>
</tr>
<tr>
<td>6</td>
<td>Nurse</td>
</tr>
<tr>
<td>7</td>
<td>Police officer</td>
</tr>
<tr>
<td>8</td>
<td>Entertainer and Sports Manager</td>
</tr>
<tr>
<td>9</td>
<td>Mechanic Engineer</td>
</tr>
<tr>
<td>10</td>
<td>Kindergarten Teacher</td>
</tr>
</tbody>
</table>

2015

<table>
<thead>
<tr>
<th>Rank</th>
<th>Elementary School</th>
<th>Middle School</th>
<th>High School</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boy</td>
<td>Girl</td>
<td>Boy</td>
</tr>
<tr>
<td>1</td>
<td>Athlete</td>
<td>Teacher</td>
<td>Teacher</td>
</tr>
<tr>
<td>2</td>
<td>Scientist</td>
<td>Entertainer</td>
<td>Doctor</td>
</tr>
<tr>
<td>3</td>
<td>Doctor</td>
<td>Chef</td>
<td>Athlete</td>
</tr>
</tbody>
</table>
Some Reasons for High Performance

(4) Socio-Cultural Backgrounds

Fertility Rate

<table>
<thead>
<tr>
<th>Year</th>
<th>Fertility Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>1.66</td>
</tr>
<tr>
<td>1990</td>
<td>1.57</td>
</tr>
<tr>
<td>1995</td>
<td>1.63</td>
</tr>
<tr>
<td>2000</td>
<td>1.47</td>
</tr>
<tr>
<td>2005</td>
<td>1.08</td>
</tr>
<tr>
<td>2010</td>
<td>1.23</td>
</tr>
<tr>
<td>2014</td>
<td>1.21</td>
</tr>
</tbody>
</table>

Korean Statistical Information Service: KOSIS

Decrease/Disappearance of Gender Inequity
(5) Supporting system for low-performing schools

- Schools for Improvement (SFI)
  - Administrative and financial supports are provided by designating schools where below-basic students are concentrated
  - Differentiated Support based on school size
Outcomes of “School For Improvement” Policy (2009 ~ 2012)
A common opinion from PISA is that proportions of top performers are relatively small despite the high average performance [Upward equalization].

Policies for supporting low performing schools (‘School for Improvement’) have been actively implemented: e.g., identifying successfully turnaround schools.

Compared with other countries, educational programs and policies for excellence such as offering AP courses, early advancement in grades, differentiated curriculums and specialized programs for high achievers and gifted students were relatively insufficient.
Since 2000, a more female-friendly science and mathematics curriculum has been gradually introduced.

- Female scientists or engineers were introduced
- More gender-neutral language was used in textbooks

The NAEA has developed to monitor how girls and boys acquire skills differently.

Providing new mathematics and science textbooks that are more comprehensible and more interesting to students.

Using teaching methods that encourage experimenting and inquiry-oriented science education.
Challenges 3: Index of Affective characteristics in PISA

- **Reading (2009)**
  - Lower affective properties such as reading enjoyment, the diversity of reading materials

- **Mathematics (2012)**
  - Lower affective properties such as interest / Self-concept / Self-confidence / Self-efficacy / Motivation / Anxiety

- **Science (2006)**
  - Lower affective properties such as interest / self-concept / Motivation
PISA/TIMSS survey on Korean students’ low interest in math

→ Math education enhancement plan (MOE, 2012)
  : Math that raises thinking abilities, and is learned easily with interest

→ Second math education comprehensive plan (MOE, 2015)
  : Strengthen student participation and enjoyment of learning, and build a support system of transnational math education by strengthening process-based evaluation

Increase mathematical thinking abilities and student interest by reforming the math curriculum (MOE, 2008)

Apply definition of PISA’s mathematical literacy and math evaluation framework in the 2015 liberal arts and science integrated math subject curriculum (Kyung Mi Park et al., 2014)
PISA Result: Korean students displayed low affective achievement in interest and self-confidence for science

→ Execute STEAM (Science, Technology, Engineering, Arts and Mathematics) as an alternative science education

→ Apply STEAM in the plan of raising, supporting science and technology human resource (MOE, 2012)
Thank you very much!

Further Information
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