The Education in Korea: what does it look like?

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Contents

I. Korean education at glance

    Korea in general

    Educational system

    Educational achievement

II. Characteristics of high performers

    What makes Korean education strong?

    Implications to be strong performers by PISA 2012

III. Pedagogic ideas from Korea

    Pre-school teacher preparation system

    Professional development

    Teachers' salary

    Teaching and learning in the classroom

IV. Challenges

Korea in general

What Koreans know about Sweden

Sweden sent medical troops during the Korean war: longest stay 1950-1957

Thanks Sweden to help us during the Korean war

Swedish pop ABBA

Safety match from Jönköping

City of the matches

Swedish match

JONAS JONASSON

요나스 요나손 장편소설 임호경 옮김

창문 넘어 도망친
100세 노인

열린책들

Popular Swedish novel

Korea Geography

as of 2012

Republic of Korea	
Area	99,720 ㎢
Population	50M
GDP	1,449B$ (26th in the world) 1,675B$ (8th in trading)
GDP per capita	23,679$
Major industries	Semi conductors automobiles Mobile phone Oil chemistry Steel Shipbuilding

http://aprodash.tistory.com/56

http://prudential.tistory.com/229

About Korean Culture: sports

Korean Supporters
World Cup 2004

‼ ‼‼
Dae han min guk

Korean stream

https://www.youtube.com/watch?v=9bZkp7q19f0

PSY
Gangnam Style

Korean pop

Figure Queen
Kim Yun-A

About Korean Food

Kimchi

Pork BBQ
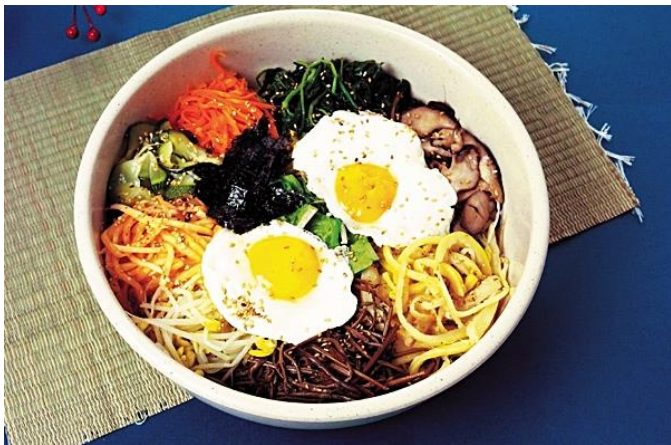
Bibimbop

Course menu

Hangul (Korean Alphabets) Phonetic

- 10 vowels

  ㅏ ㅑ ㅓ ㅕ ㅗ ㅛ ㅜ ㅠ ㅡ ㅣ

- 14 consonants

  ㄱ ㄴ ㄷ ㄹ ㅁ ㅂ ㅅ ㅇ ㅈ ㅊ ㅍ ㅋ ㅌ ㅎ

내 이름은 이옥화입니다

Hangul requires less cognitive load for number processing
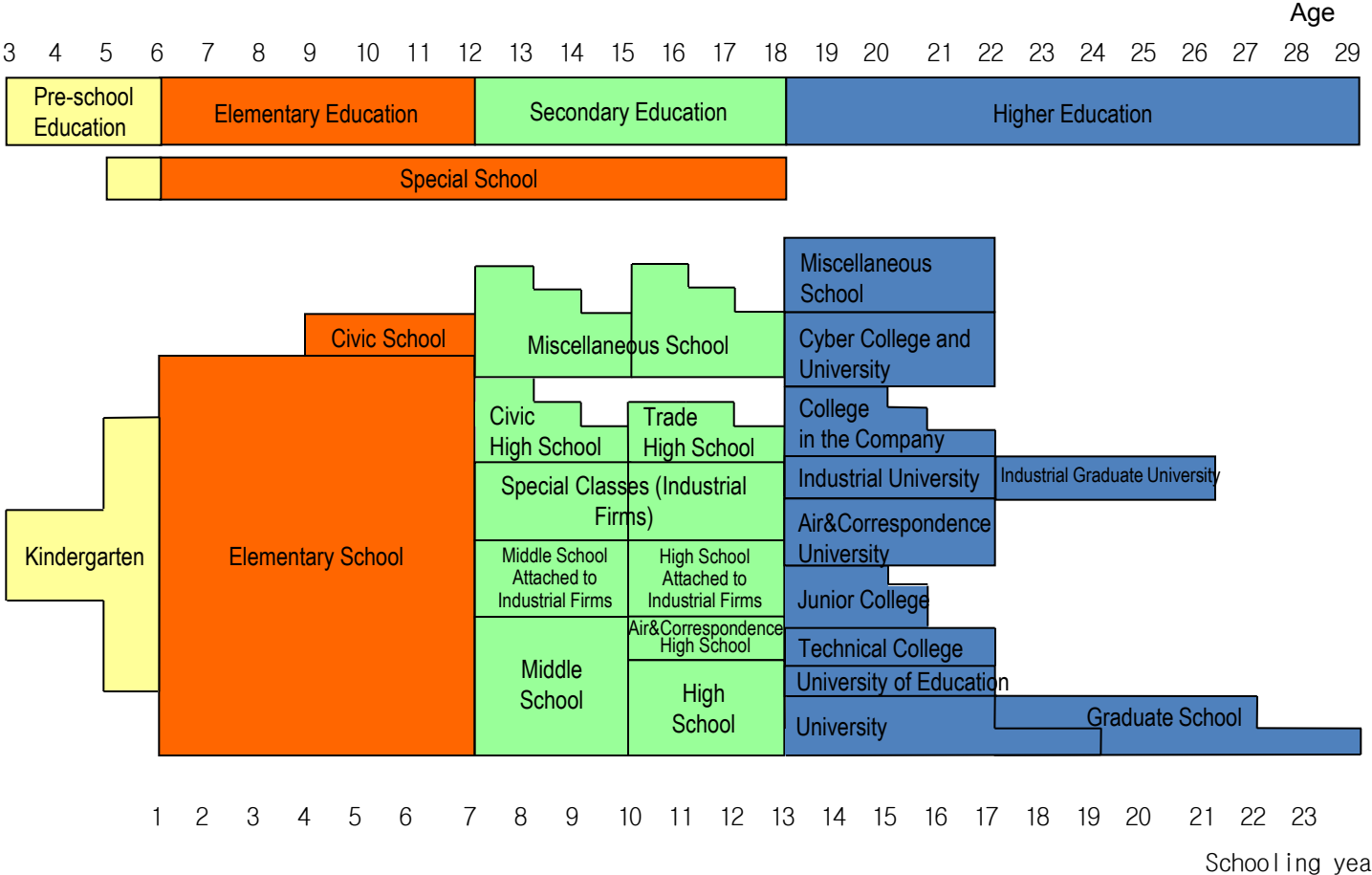
- Il   ee   sam   sa   oh   yuk   chil   pal   ku   sip
  1,   2,   3,   4,   5,   6,   7,   8,   9,   10
- Sip il   sip ee   sip sam   sip sa
    11,   12,   13,   14

- One   two   three   four   five   six
- Eleven twelve thirteen fourteen fifteen sixteen

Korean Education

- School system
- Curriculum
- Educational organization
- Educational finance
- Educational climate

School System

National curriculum

- Curriculum with flexibility of implementation at school levels
- 10 core(required) subjects (1-10 grades)
  - Long common core learning
- Flexible selective subjects (11-12 grades)
  - Late selection for types of schools (or tracks) at 10th or 11th grade
  - Even then, students can change the track when they select higher edu. or career path later

Textbooks

- **Textbooks**
  - Type I: Government copy righted (subjects in few demands which publishers can not make profit from)
  - Type II: Local government copy righted (mostly)
  - Type III: Qualified books by local government (local demands implemented)
- **Digital textbook**
  - As a part of Smart Education policy
  - Cost included when purchasing printed textbooks
- **Teachers' guide book along with textbooks**

Educational organizations

- ## National level: Ministry of education
  - Headed by vice prime minister
  - Appointed by the President
  - Covers policies related to all educations (higher ed, life long learning, informal edu, etc)

- ## Local level: Local Office of Education
  - Headed by superintendent elected by local citizens
  - Service duty: four year
  - Primary & secondary education

Achievements in international tests

- TIMSS (Trends in International Mathematics and Science Study) by IEA
  - Every four years
  - 2 cohort groups: 9, 13 years
  - 2011('conducted in '10.12): 9,000 students(primary 4th graders 150schools, 8th graders 150 middle schools)

year	countries	math	science
1995	40	3	4
1999	38	2	5
2003	46	2	3
2007	50	2	4
2011	64	-	-

Achievements in international tests

- PISA (Programme for International Student Assessment) by OECD
  - Every three years
  - 15 years old (9th and 10th graders)
  - '09.5: 5,123 students (high school 137, middle school 20)

year	countries	reading	math	science
2000	31	6	2	1
2003	40	2	3	4
2006	57	1	1-4	7-13
	OECD	1	1-2	5-9
2009	65	2-4	3-6	4-7
	OECD	1-2	1-2	2-4

Programme for International Student Assessment (2012)[14]
(OECD members as of the time of the study in boldface)

Maths			Sciences			Reading		
1	Shanghai, China	613	1	Shanghai, China	580	1	Shanghai, China	570
2	Singapore	573	2	Hong Kong, China	555	2	Hong Kong, China	545
3	Hong Kong, China	561	3	Singapore	551	3	Singapore	542
4	Taiwan	560	4	**Japan**	547	4	**Japan**	538
5	Korea	554	5	**Finland**	545	5	Korea	536
6	Macau, China	538	6	**Estonia**	541	6	**Finland**	524
7	**Japan**	536	7	Korea	538	7	Taiwan	523
8	Liechtenstein	535	8	Vietnam	528	8	**Canada**	523
9	**Switzerland**	531	9	**Poland**	526	9	**Ireland**	523
10	**Netherlands**	523	10	Liechtenstein	525	10	**Poland**	518
11	**Estonia**	521	11	**Canada**	525	11	Liechtenstein	516
12	**Finland**	519	12	**Germany**	524	12	**Estonia**	516
13	**Canada**	518	13	Taiwan	523	13	**Australia**	512
14	**Poland**	518	14	**Netherlands**	522	14	**New Zealand**	512
15	**Belgium**	515	15	**Ireland**	522	15	**Netherlands**	511
16	**Germany**	514	16	Macau, China	521	16	Macau, China	509
17	Vietnam	511	17	**Australia**	521	17	**Switzerland**	509
18	**Austria**	506	18	**New Zealand**	516	18	**Belgium**	509
19	**Australia**	504	19	**Switzerland**	515	19	**Germany**	508
20	**Ireland**	501	20	**Slovenia**	514	20	Vietnam	508
21	**Slovenia**	501	21	**United Kingdom**	514	21	**France**	505
22	**Denmark**	500	22	**Czech Republic**	508	22	**Norway**	504
23	**New Zealand**	500	23	**Austria**	506	23	**United Kingdom**	499

PISA Digital Reading Assessment DRA (2009)

- 157 schools (1,488 students)
- Hyper media based evaluation
- 19 countries participated:
- Korea 1 (568), NZ 2 (537): big gap

II. Characteristics of high performers

- What makes Korean education strong?
- Implications to be strong performers: PISA 2012

What makes Korean education strong?

- High educational participation
- Educational welfare
- Educational equity
- Student attitude
- Homogeneous st's background
- More time to learn High expectation
- Diverse learning opportunities
- Competent teachers

Educational participation

Successful completion rate for high school   (unit: %)

level	High school			General program			Vocational program		
	total	M	F	total	M	F	total	M	F
Korea	95	94	96	97	96	97	90	89	90
OECD average	72	68	76	76	73	80	64	61	67

Successful completion rate means (high school graduates / high school entrants 3 years ago)*100

Higher education entry rate

- 78% entry rate for higher education school age
- 66% completion rate for 25-34 years
- Upper secondary education, general or vocational, is becoming the norm

levels	2yr colleges			Four year and masters' program			Graduate (Ph.D.)		
	total	M	F	total	M	F	total	M	F
Korea	**36**	**33**	**39**	**69**	**68**	**69**	**3.1**	**3.6**	**2.5**
OECD Ave.	**18**	**17**	**20**	**58**	**52**	**65**	**2.6**	**2.7**	**2.6**

주: 순입학률 = (해당 연령별 고등교육 입학자 수/해당 연령별 인구)*100

Educational welfare

- Schools turned into whole care center from educational institutes
  - Free warm meals
  - All day child care service
- Safe schools
  - Preventing school violence and crime
  - Safety facilities and school petrol
- Class teacher for every classes
  - Primarily responsible for students in the class
  - Students' behavior, punctuality, truants
  - Provide necessities
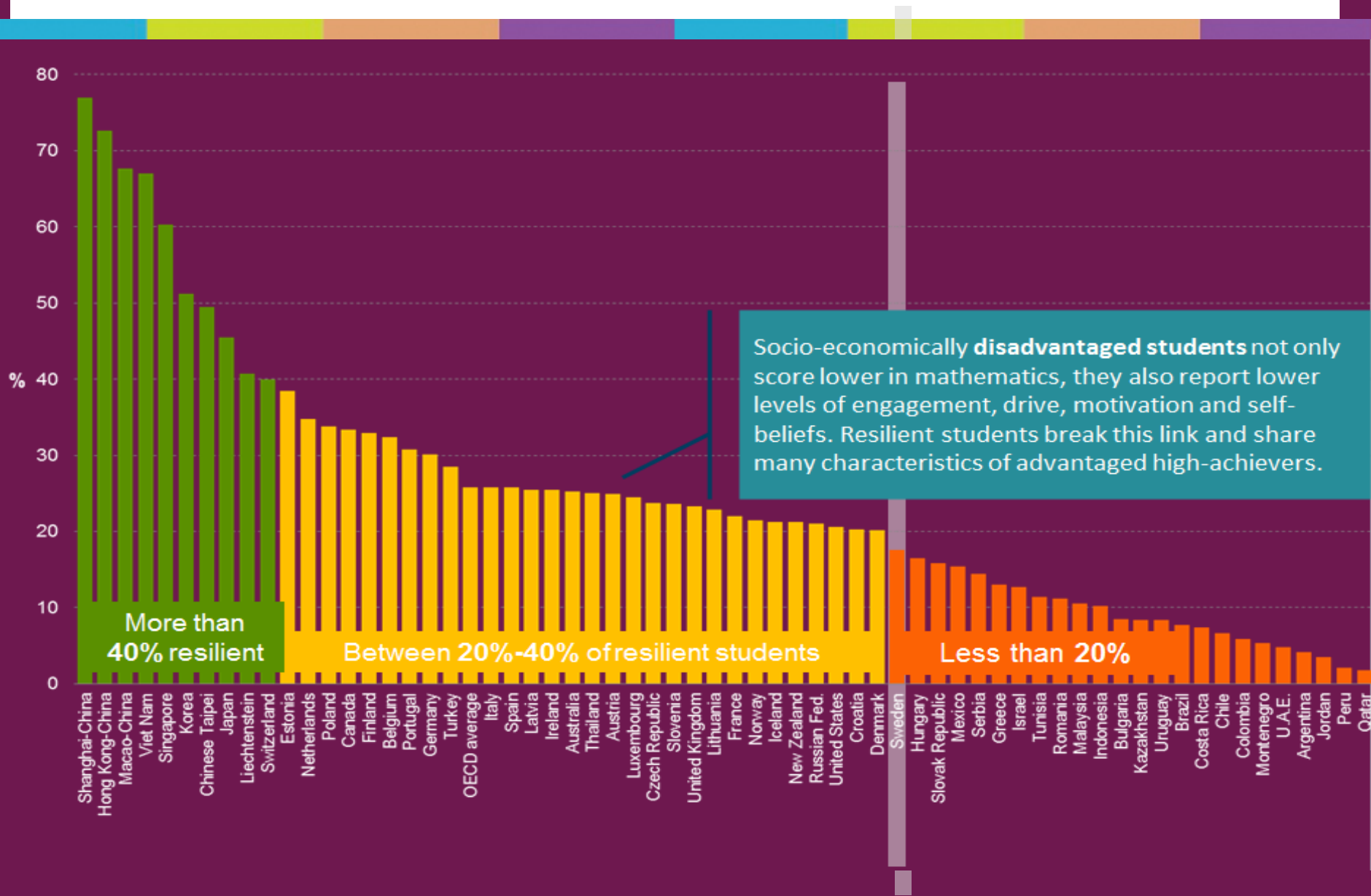
Educational equity

- To minimize the educational gap
- Support for
  - Special education
  - After school education
  - More budget and incentives to rural areas

- Quality education for all
  - EBS free video
  - Policies to support disadvantaged schools

Students attitude

- Attitude toward academic results: self responsible
  - Educational failure is due to my lack of hard work
  - Not due to my external elements
  - Perceived self-responsibility for the results

- High percentage of resilient students
  - Relatively high percentage

Resilient students

Socio-economically **disadvantaged students** not only score lower in mathematics, they also report lower levels of engagement, drive, motivation and self-beliefs. Resilient students break this link and share many characteristics of advantaged high-achievers.

More than **40% resilient**

Between **20%-40%** of resilient students

Less than **20%**

Self efficacy: students have stronger beliefs in their abilities perform better in mathematics

$R^2 = 0.36$

Homogeneous st's background

- Few students with different background
  - Students with immigration background are growing
  - But still less than 10%
- One standardized language: Korean
- Not high cost to create common ground of understanding culture

Approach to heterogeneity

▪ Parents' and teachers' expect all children can achieve

▪ A commitment to education and the belief that competencies can be learned

– Universal educational standards and personalization as the approach to heterogeneity in the students

– …as opposed to a belief that students have different destinations to be met with different expectations, and selection/stratification as the approach to heterogeneity
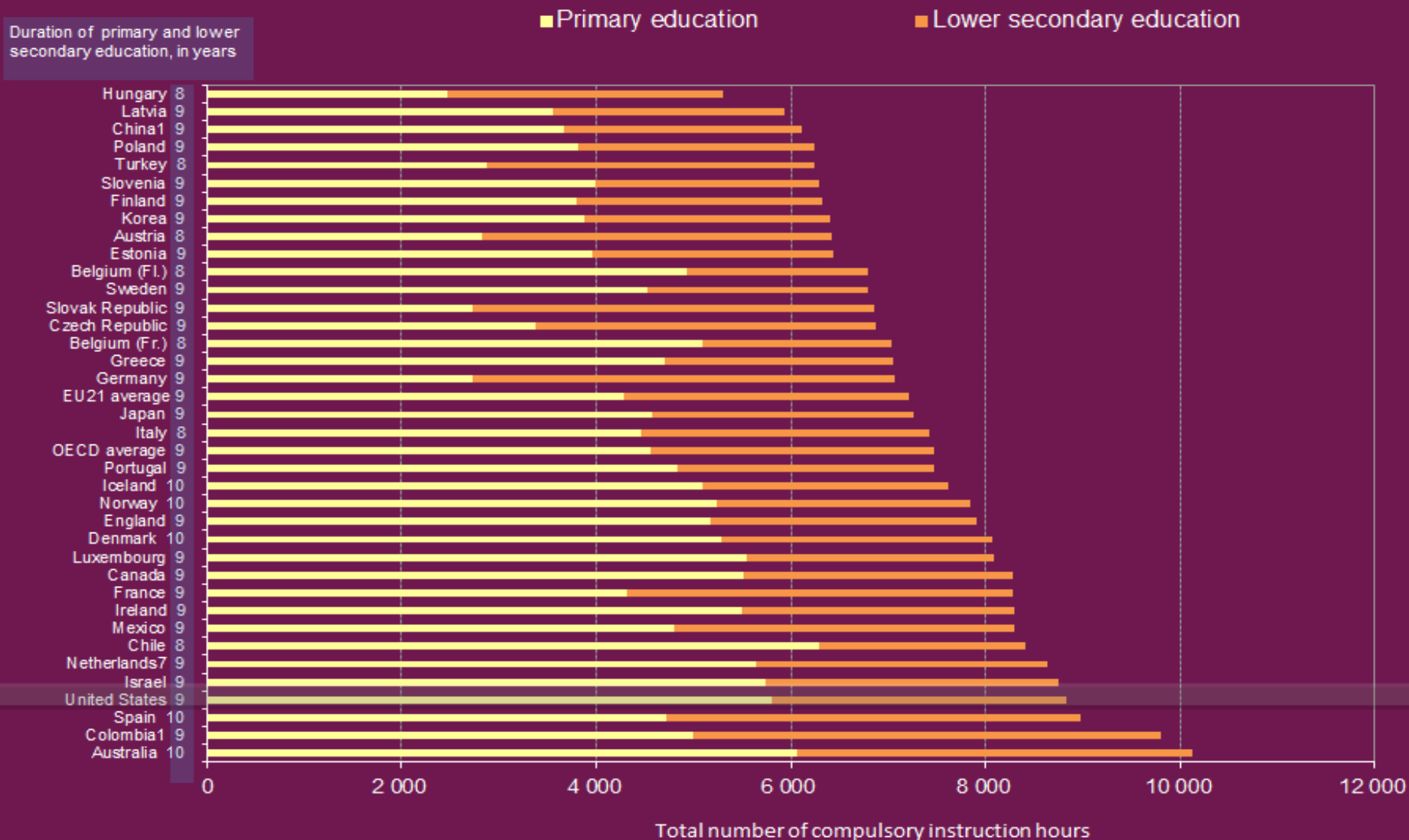
Grouping by ability

- In countries where grouping students by ability or behavior is more widespread, students are less likely to feel that learning mathematics is useful (PISA 2012 result, OECD, 2014)

- Korea has relatively big class size

- Ironically due to the less resources of instructional materials and instructors, individualized learning by ability groups is not practiced widely

More time to learn (formal & informal)

- More input in learning time leads to high output

- Long school days provide more opportunity for learning more
  - First class from 8:30
  - Upper high school students can continue to stay school until 10:00PM on voluntary basis
  - 2/3 students participate in after school programs

- After school, students attend private tutoring (cram schools)

Students in OECD countries receive an average of 7 475 compulsory hours of instruction during their primary and lower secondary education

Compulsory instruction time in general education (2014)

Duration of primary and lower secondary education, in years

■ Primary education   ■ Lower secondary education

Country	Years
Hungary	8
Latvia	9
China1	9
Poland	9
Turkey	8
Slovenia	9
Finland	9
Korea	9
Austria	8
Estonia	9
Belgium (Fl.)	8
Sweden	9
Slovak Republic	9
Czech Republic	9
Belgium (Fr.)	8
Greece	9
Germany	9
EU21 average	9
Japan	9
Italy	8
OECD average	9
Portugal	9
Iceland	10
Norway	10
England	9
Denmark	10
Luxembourg	9
Canada	9
France	9
Ireland	9
Mexico	9
Chile	8
Netherlands7	9
Israel	9
United States	9
Spain	10
Colombia1	9
Australia	10

Total number of compulsory instruction hours

High expectation

- Educating all students in all subjects in all grades
  - Working hard is respected and valued
  - Most students are expected to finish academic work successfully

- Standardized test introduced

  - Basic academic skills diagnosed, monitored

- Rigorous college preparatory academics
  - Highest university entry rate in the world
  - Strong private educational institute

National Assessment of Achievement

- Annual test for secondary schools
- Upper secondary school
    - 11th graders
    - Math, Korean, English
- Lower secondary school
    - 9th graders
    - Math, Korean, English, science, social science
- To diagnose students achievement level
    - Under achieving schools: supplementary knowledge by lectures, teaching materials
    - High achieving schools: use resources for their own project

National Assessment of Achievement

http://www.kice.re.kr/board.do?page=1&boardConfigNo=112&menuNo=372

Diverse learning opportunities

- ICT enriched environment
  - Technology embedded classrooms
  - Technology to students
- Diverse opportunities for educational participation
  - After school programs
  - Supports disadvantaged students
- Character education
  - Emotion, ethics, affective domain education emphasized
- Diverse practical skill building
  - Linking the real world to the classroom

Classroom enhanced with technology

Teachers' competence

- Highly talented students can get in college of education
- Highly competitive exam to have a teaching position
- Teaching is possible with bachelor's degree
  - But more than 50% teachers have Master
  - A few have ph.D.
- Frequent PD to promote their competencies

Competencies for skillful teachers

- Safe and stimulating learning climate
- Efficient classroom management
- Clarity of instruction
- Activating learning
- Teaching and learning strategies
- Adaptive teaching

Ridwan Maulana, Michelle Helms-Lorenz and Wim van de Grift , 2014
Paper under review

National teacher evaluation

- National teacher evaluation since 2010
  - With the students & parents participation
    - Need to open one class video to the public
    - Correlated with the satisfaction of sts & parents
- Teachers with poor results: supplementary training
- Teachers with high performance:
  - personal research or education at universities or related institutions
  - Mater teacher
  - Leading position for the open principal recruitment

Implications to be strong performers: PISA 2012 (OECD, 2014)

- Feasibility vs impact on outcome
- Schools make difference for equity
- Money makes difference
- Quality assurance and school improvement'
- Governance matters
- PISA implications

Feasibility vs impact on outcome
: PISA 2012 (OECD, 2014)

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

High impact on outcomes

Must haves

Commitment to universal achievement

Quick wins

Capacity
at point of delivery

Resources
where they yield most

Gateways, instructional
systems

Coherence

A learning system
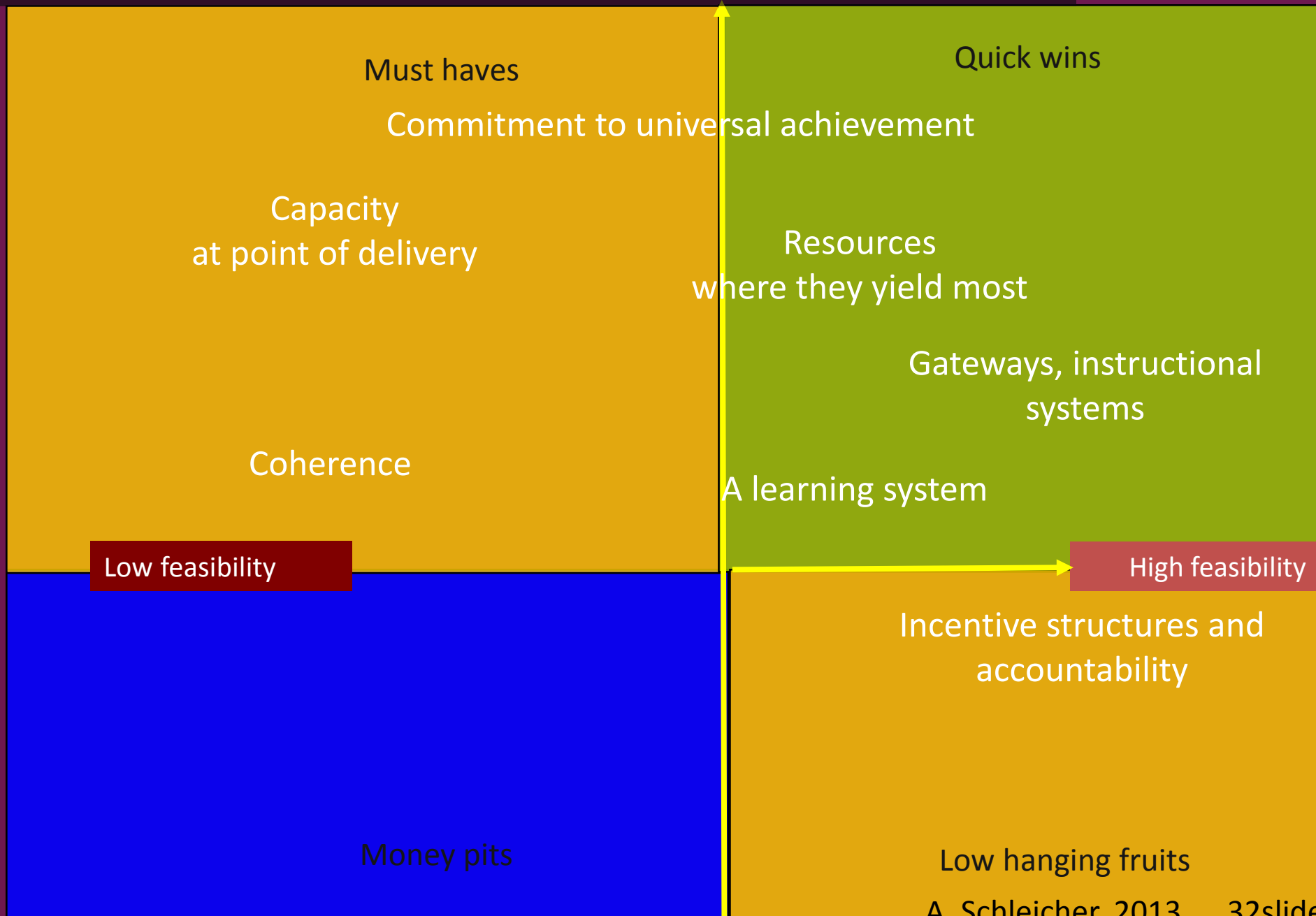
Low feasibility

High feasibility

Incentive structures and
accountability

Money pits

Low hanging fruits

Low impact on outcomes

Schools make a difference for equity
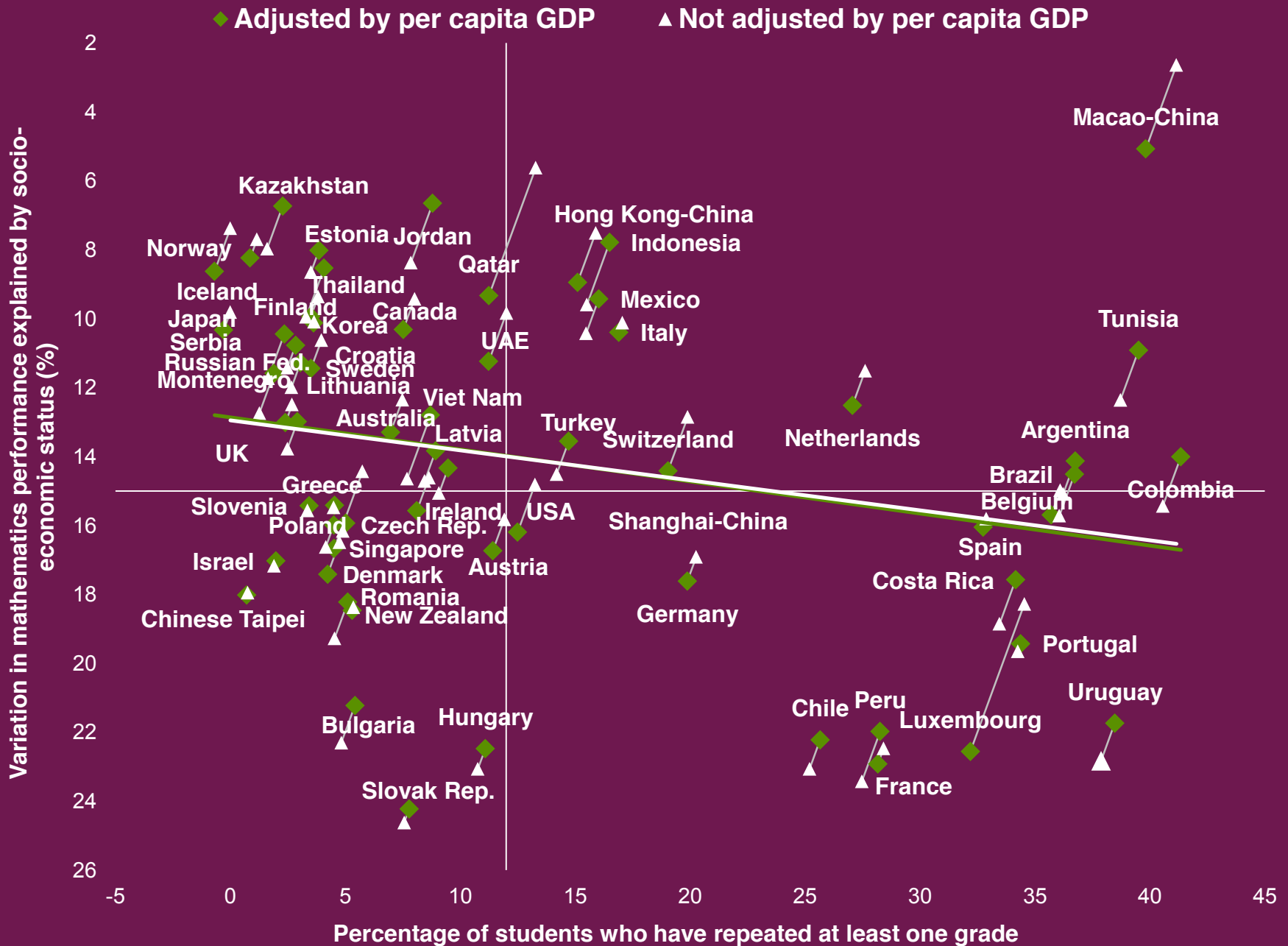
- **Grade repetition** is negatively related to equity
- Grade repetition is an expensive policy

- **Stratification** in school systems (e.g. grade repetition and selecting students at a young age for different "tracks" or types of schools) is negatively related to equity
- Students in highly stratified systems tend to be less motivated than those in less-stratified systems

Grade repetition is negatively related to equity

Fig IV.1.4

◆ Adjusted by per capita GDP   ▲ Not adjusted by per capita GDP

Variation in mathematics performance explained by socio-economic status (%)

Percentage of students who have repeated at least one grade

Countries labeled: Macao-China, Kazakhstan, Norway, Estonia, Jordan, Hong Kong-China, Indonesia, Iceland, Qatar, Thailand, Tunisia, Japan, Finland, Canada, Mexico, Serbia, Korea, Italy, Russian Fed., Croatia, UAE, Montenegro, Sweden, Lithuania, Viet Nam, Turkey, Netherlands, Argentina, Australia, UK, Latvia, Switzerland, Brazil, Greece, Colombia, Slovenia, Ireland, USA, Belgium, Poland, Czech Rep., Shanghai-China, Spain, Israel, Singapore, Austria, Costa Rica, Denmark, Chinese Taipei, Romania, Germany, Portugal, New Zealand, Uruguay, Chile, Peru, Luxembourg, Bulgaria, Hungary, France, Slovak Rep.

Money makes a difference

- Money can effect on limited outcome
- Among high-income countries, high-performers pay teachers more
- In many countries, more advantaged than disadvantaged students attend after-school lessons

Spending per student from the age of 6 to 15 and mathematics performance in PISA 2012

Fig IV.1.8

Mathematics performance (score points)

◆ Cumulative expenditure per student less than USD 50 000

● Cumulative expenditure per student USD 50 000 or more

Shanghai-China

Singapore

Korea

Japan

Switzerland

Poland
Finland
Netherlands

Estonia
Canada

Germany
Belgium
Austria

Czech Republic

New Zealand
Slovenia
Australia

Latvia
France
Ireland
Denmark

Portugal
Iceland
UK
Norway
Luxembourg

Lithuania

Croatia
Slovak Republic
Italy

Hungary
Israel
Spain
Sweden United States

Viet Nam

Turkey

Thailand
Bulgaria

Malaysia
Chile

Mexico
Montenegro

Uruguay

Tunisia Brazil

Jordan

Colombia

Peru

R² = 0.01

R² = 0.37

Average spending per student from the age of 6 to 15 (USD, PPPs)

Contribution of various factors to upper secondary teacher compensation costs, per student as a percentage of GDP per capita (2004)
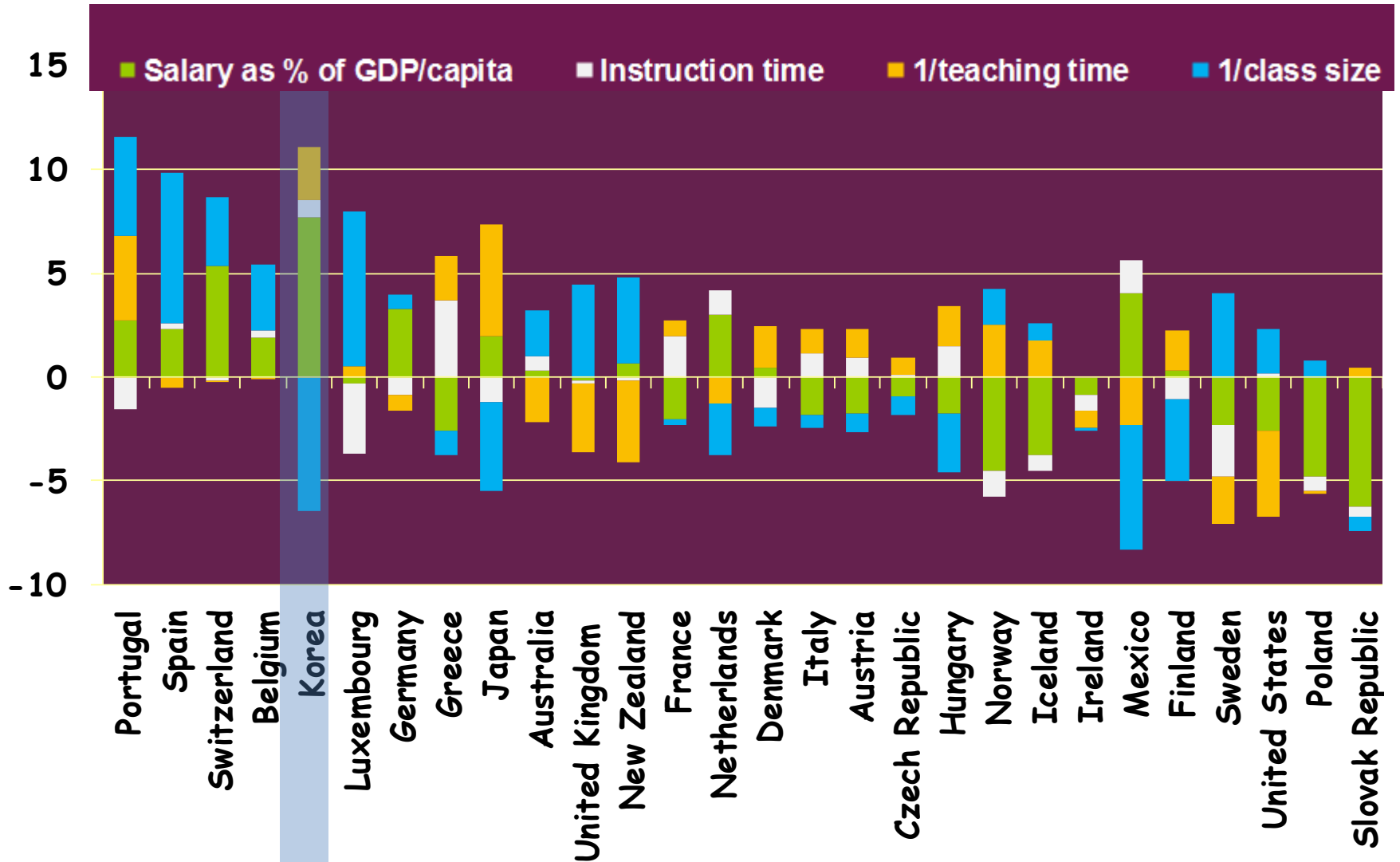
Quality assurance and school improvement

Percentage of students in schools whose principal reported that their schools have the following for quality assurance and improvement:

Legend: Shanghai-China, OECD average

Categories (top to bottom):
- Implementation of a standardised policy for mathematics (i.e. school curriculum with shared…
- Regular consultation with one or more experts over a period of at least six months with the aim of…
- Teacher mentoring
- Written feedback from students (e.g. regarding lessons, teachers or resources)
- External evaluation
- Internal evaluation/self-evaluation
- Systematic recording of data, including teacher and student attendance and graduation rates, test results…
- Written specification of student-performance standards
- Written specification of the school's curriculum and educational goals

X-axis: 0, 50, %, 100, 150

Governance matters

- Schools with more **autonomy over curricula and assessments** tend to perform better than schools with less autonomy where they are part of school systems with more accountability arrangements and greater teacher-principal collaboration in school management

PISA implications: What it all means

	Student inclusion	
Average education systems		High performers
Some students learn at high levels		**All** students need to learn at high levels

Curriculum, instruction and assessment

Routine cognitive skills, rote learning	Learning to learn, complex ways of thinking, ways of working

Teacher quality

Few years more than secondary	High-level professional knowledge workers

Work organisation

'Tayloristic', hierarchical	Flat, collegial

Accountability

Primarily to authorities	Primarily to peers and stakeholders

III. Pedagogic ideas from Korea

- Pre-school teacher preparation system
- Professional development
- Teachers' salary
- Teaching and learning in the classroom
  - State control over curricula, grades
  - Smart Education
  - Free Semester

Why teaching is an attractive job in Korea?

Talented young people, stay long in profession

- Freedom in work
  - Decision power over instructions in classroom
- Flexible time
  - Long vacation, shorter working hours
- Relatively well paid
- Excellent fringe benefit: good pension
- Social respect
- Stable government job: guaranteed to work till retirement age (62yrs)

Pre-school teacher preparation system

Selecting student for education major

- Two types of teacher preparation
  - For primary school teachers: univ. of education
  - For secondary school teachers: university, college of education
- Student selection for education major
  - quality in – quality out model
  - Top students can get admission
  - Highly competitive in most of universities
- Top 15% students from other colleges can get in

Education for four years: theory and practice

- Theory
  - Knowledge of subject domain
  - Pedagogy of domain: curriculum, instruction, evaluation, class management, etc.
- Practice
  - Two weeks school visit in junior year
  - One month practicum in senior year
- Teaching license of 2nd degree upon graduation
- High entry to get a teaching position

Professional development

- PD is required for all teachers
- Teachers need to prove PD attainment periodically
- Government supports teachers PD financially and administratively
- Promotion requires PD
  - Head teachers
  - Vice principals
  - Principals
  - Administrative position at governments
  - From 2nd degree license to 1 degree license promotion

Types of PD

Required vs selective

- Required PD
  - Induction to new teachers
  - Promotion
  - New policy orientation
  - New license
- Selective PD
  - To enhance teaching quality
  - Subject domain, specific topics
  - By same subject teachers, voluntary group of teachers

Organizations for PD

- National level: for principals, newly pointed officers, administrators

- Local level: majority PD

- University level: new license, degree promotion

- Special organizations: arts, special areas

- On line vs off line PD

    http://ttis.edunet4u.net/edutts/view.board?data_grp=1&data_div=13&data_cd=7d9df684d266645b5fe195f4e66ba43f

Teachers' salaries

【at Public schools(2012)】

levels		Beginner Annual salary	15 yrs Annual salary	Maximum Annual Salary
Primary	Korea	28,591	50,145	79,631(37yrs)
	OECD ave.	29,411	39,024	46,909 (24yrs)
Lower secondary	Korea	28,485	50,040	79,526
	OECD ave.	30,735	40,570	48,938
Upper secondary	Korea	28,485	50,040	79,526
	OECD ave.	32,255	42,861	51,658

2012 PPP currency rate 1$ -= 913.35 won

Maximum salary: Korea 37 years, OECD 24 years

Ratio of teachers' salary to earnings for full-time, full-year workers with tertiary education aged 25-64 (2011 or latest available year)

Ratio

1.5

1.0

0.5

0.0

Spain, Korea, Luxembourg, Portugal, New Zealand, Canada, Germany, Finland, Israel, England, Australia, Denmark, Belgium (Fl.), OECD average, EU21 average, Netherlands, Belgium (Fr.), Ireland, Sweden, Slovenia, France, Scotland, Poland, Chile, Norway, United States, Estonia, Austria, Italy, Hungary, Czech Republic, Iceland, Slovak Republic
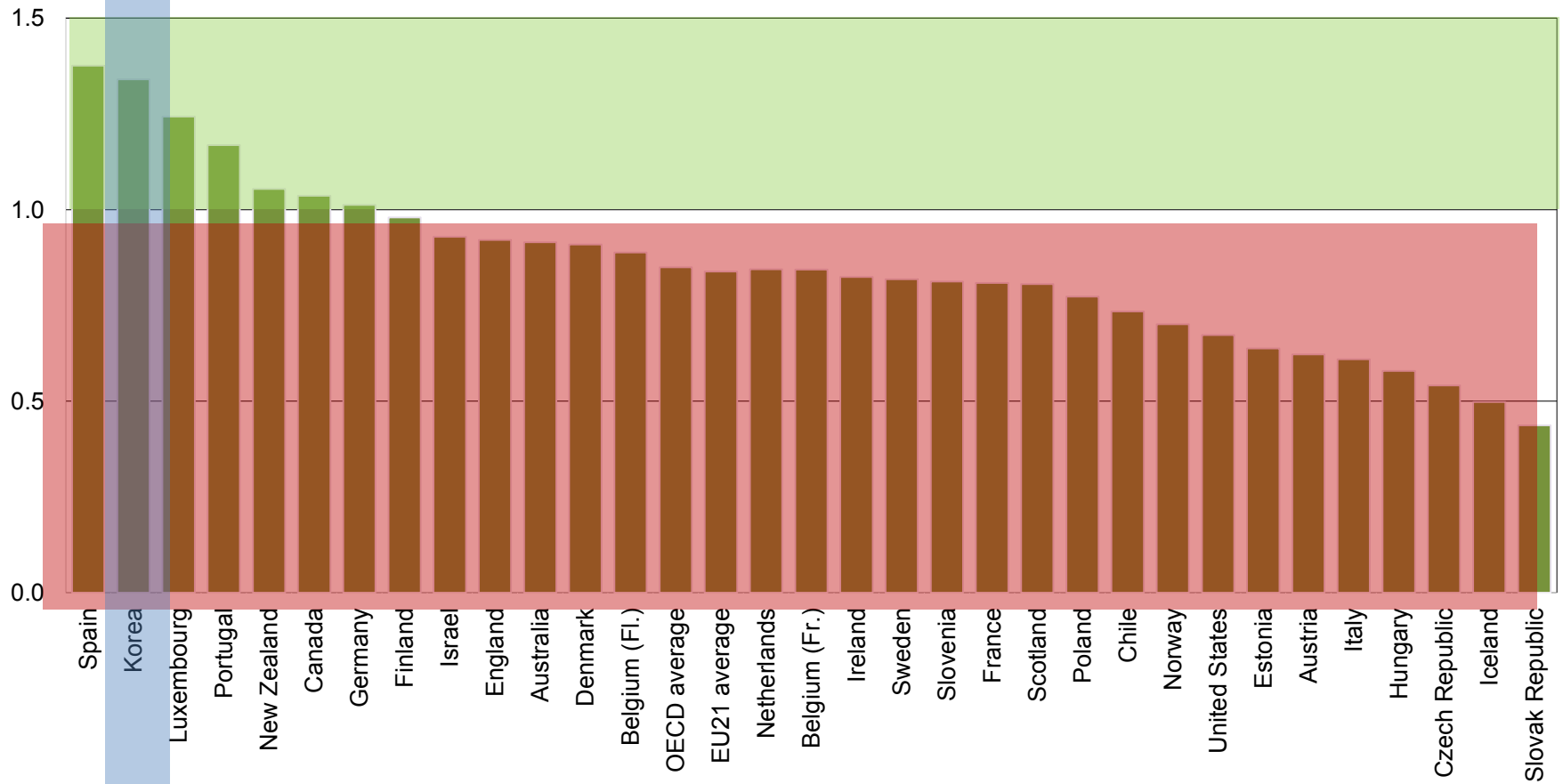
Budget for Education

(1 trillion won)   (Percent)
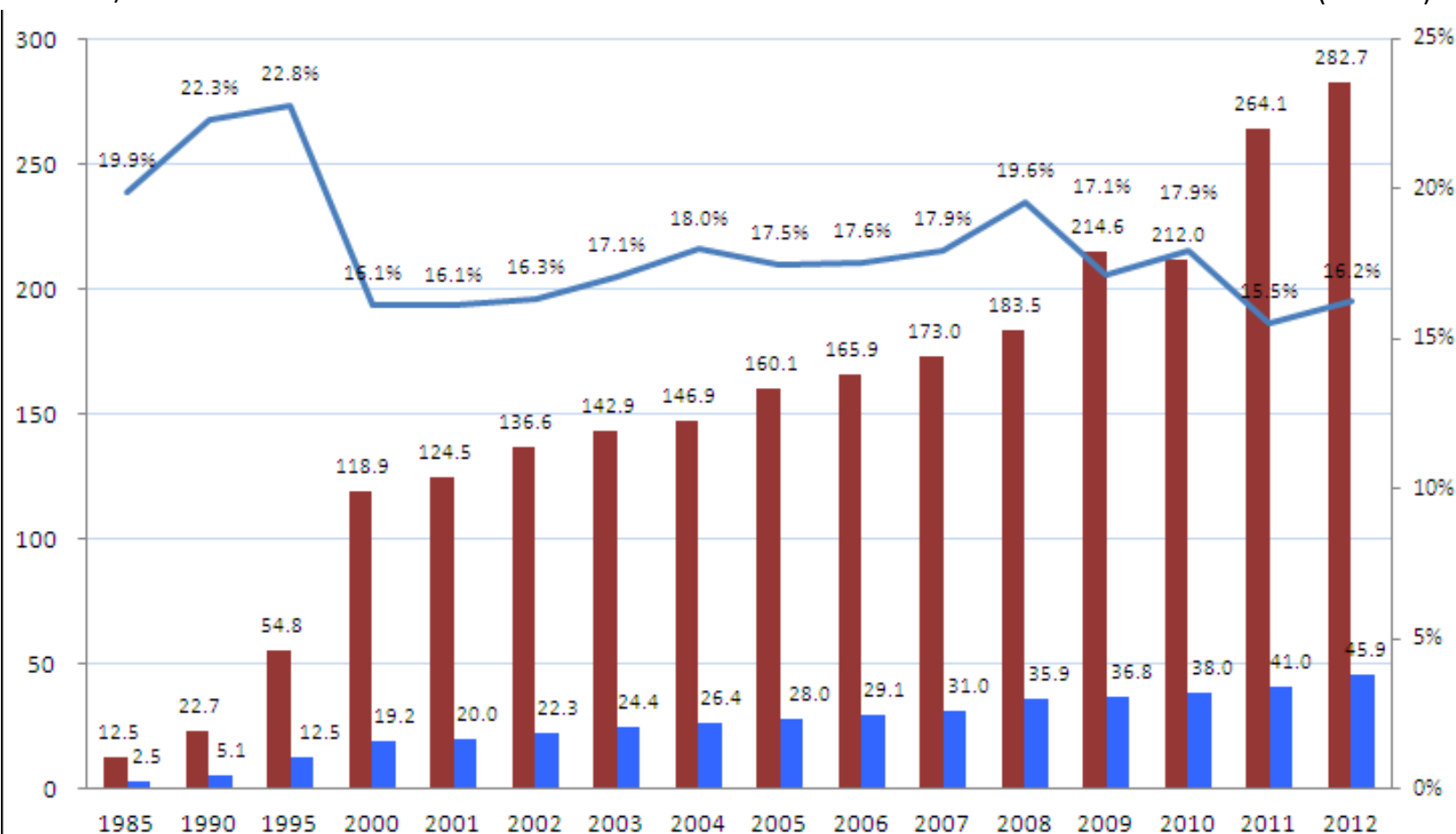
The Government's budget   Ministry of Education's budget   : Ministry of Education's budget rate compared to the Government's budget

Educational Finance   as of 2012

- ## One year budget
  - 4.90 % of the GDP

    7.6% of the GDP including informal education

    growing yearly

	2000	2005	2011
Korea	6.1	6.7	7.6
OECD	5.4	5.7	6.1

  - 16.2 % of total Government budget

- ## Expenditure
  - Elementary and secondary education: 72.03%
  - Higher education: 19.1%

Teaching and learning in the classroom

- State control over curricula, grades
- Smart Education
- Free Semester

Governance over curricula, grades

- National educational informational system NEIS
  - Due to the high competition to enter the elite university
  - Students' academic performance records are sensitive
  - Performance based portfolio

- For more flexibility to schools, major projects undertaken
  - Smart Education
  - Free Semester

Teaching hours (primary & lower secondary) less than 7000 hours

OECD average 7751 hours

Number of intended instruction hours in public institutions (2011)
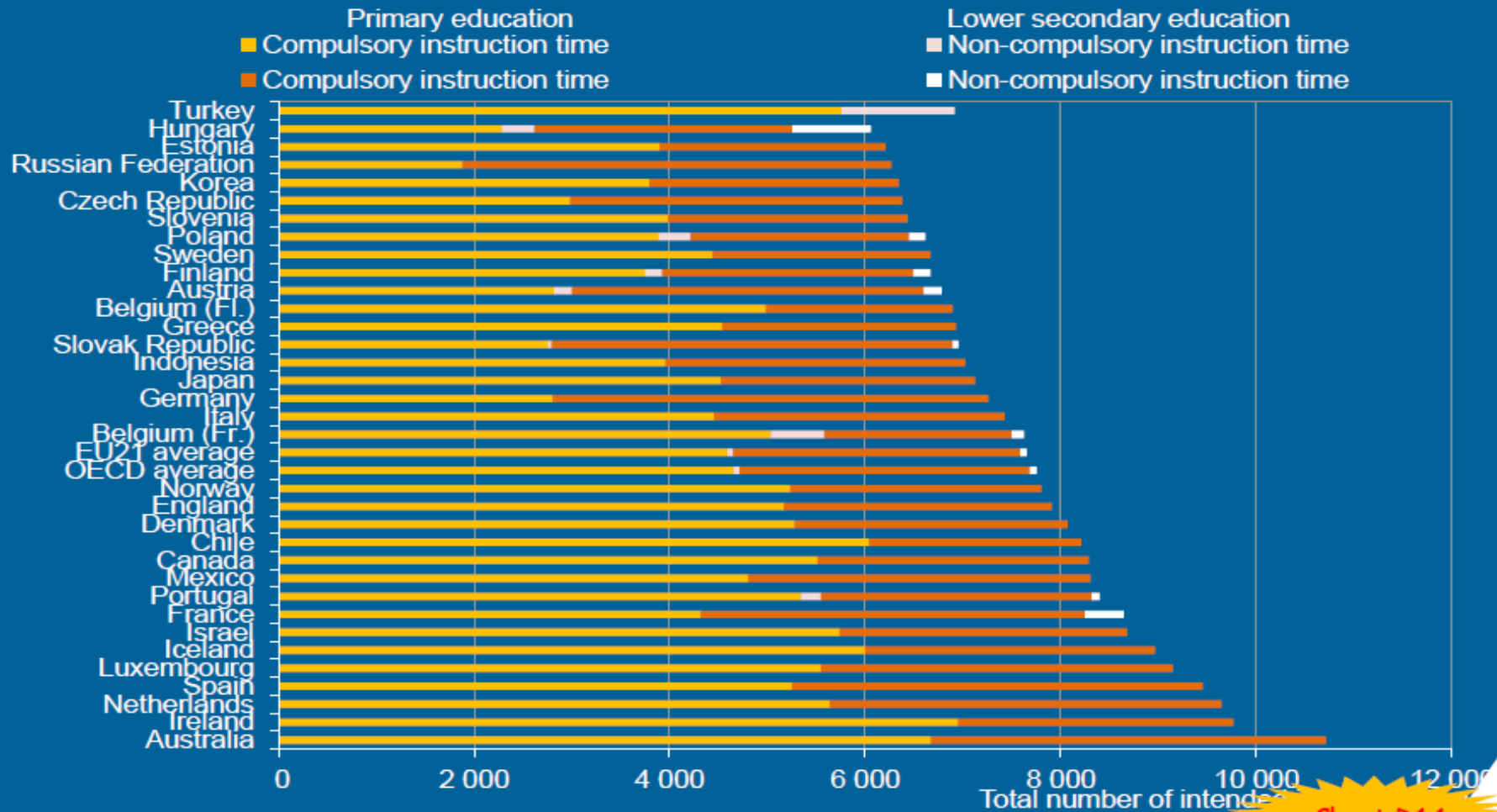
Chart D1.1

Quiz

- This technology is the worst tool that men have invented
- This tool makes you not to use your memory

Plato

Smart education (2011)

SMART education is the smart learning environment to promote education 3.0 SMART education is to innovate

- Learning contents
- Pedagogy
- Evaluation
- Learning community
- Educational culture

SMART Education : 5 Projects

Educational Contents
Development & Application of Digital Textbook

- Phased Development of DT

- Development & Application Smart Learning

- Modification of law & regulations for DT

Instructional Method & Evaluation
Activating online class & evaluation

- Activating & promoting online class

- Building online system for learning diagnosis & prescription

Educational Environment
Copyright of edu-contents & building safe environment

- Activating the use of contents for public purpose

- Strengthening IT ethical education to solve dysfunction

Strengthening Teachers' SMART Education Competency

- Developing & Implementing SMART education training
- Advancing SMART education training environment
- Developing & arranging manpower for SMART education

SMART Education

Building the foundation of Cloud Education Service

- Building infrastructure of SMART Education School
- Creating Open market of educational contents
- Developing the standard platform for SMART education

Digital textbook development

Purpose

To explore the effects of digital textbooks on achievement, problem solving skills, and self-directed learning, to measure students' and teachers' satisfaction with digital textbooks

To analyze how to use digital textbooks in teaching and learning activities and how to facilitate various interactions

Quantitative R : October 24, 2011 ~ February 24, 2012
Qualitative Research : December 2011

2008 DT → 2009 DT → 2010 DT → 2011 DT
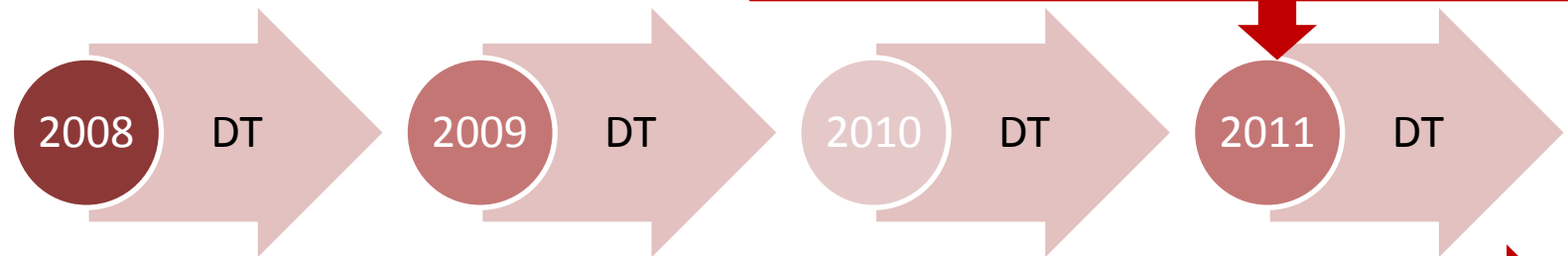
Conducting previous studies regarding the effectiveness of digital textbooks from 2008

※ Reference : Kim, H. S. et al. (2012), The Study on Measurement of the Effects of Digital Textbook in 2011, CR 2012-2.

Digital Textbook(DT)

DT changes not only textbooks, classrooms, teachers and students but also schools and other educational environments

Free semester (2013)

- Purpose: opportunities for students to explore their dream and talent to develop 21st century competencies
  - creativity, character building, social skills and self-directive learning skills
- Method
  - exempted from regular mid-term and end of the term examination
  - flexible curriculum & career exploration
  - student-centered activities

Curriculum redesign for free semester

- **Improvement of teaching method**
  - To encourage student participation through various activities
- **Common curriculum (**1-4 morning classes)
  - Subject: Core achievement
  - criteria-based redesign
  - Korean·English·Math: problem solving, communication, debate etc
  - Social studies·Science: experiment, project-based learning etc
- **Selective curriculum (**5-7 afternoon classes)
  - Focusing on students' interest and strength
  - Career-exploration model
  - Club activity model
  - Art & sports model
  - Optional

IV. Challenges

- Equity can not be sacrificed for excellence
    - Equity provides the growth of quantity
    - Quantity provides the room for quality
- Prioritize budget spending
    - Political decision
    - Social consensus over priority
- Best of the past vs the best of the future

Prioritize budget

- Countries spend their money differently on schools…
  - …and many high-performing school systems prioritise the quality of teachers over the size of classes.
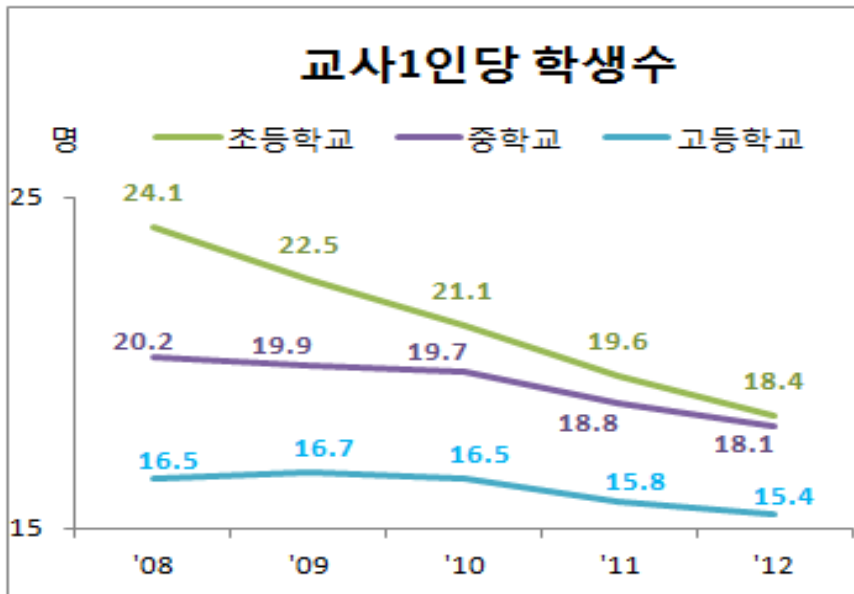
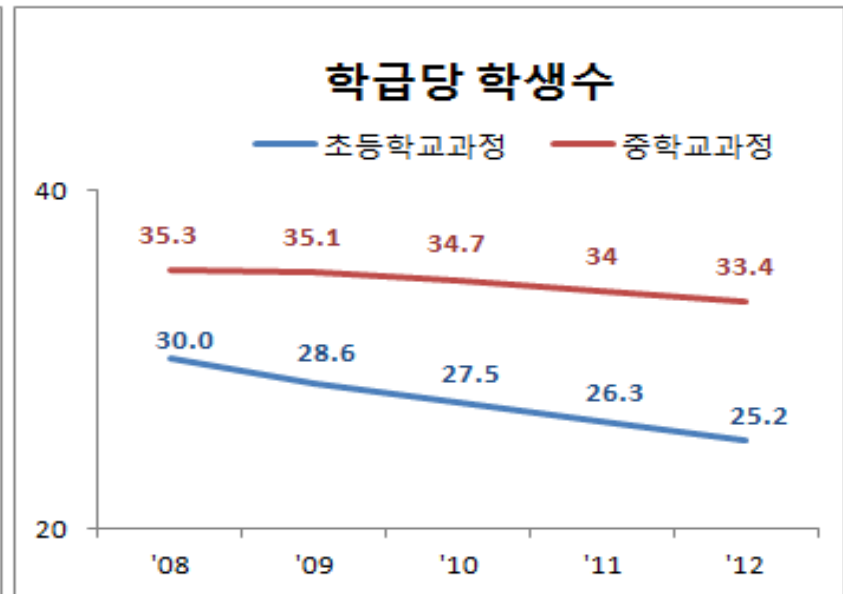# Teacher support vs educational climate

Students per staff

Primary 18.4(15.3), Lower secondary 15.4(13.5), Upper secondary 15.4(13.8)

Over OECD average

Students per staff

교사1인당 학생수

명 ― 초등학교 ― 중학교 ― 고등학교

24.1 22.5 21.1 19.6 18.4
20.2 19.9 19.7 18.8 18.1
16.5 16.7 16.5 15.8 15.4

'08 '09 '10 '11 '12

Class size

학급당 학생수

― 초등학교과정 ― 중학교과정

35.3 35.1 34.7 34 33.4
30.0 28.6 27.5 26.3 25.2

'08 '09 '10 '11 '12

Best of the past , best of the future

- The recipe for the success in the past
  - Competition, Standardization, Frequent Testing, and Privatization
  - In other words, motivation, high goal setting, mastery learning, and diversity

- The recipe for the success in the future
  - Educational reform that can truly cultivate creative, entrepreneurial and globally competent citizens needed in the 21st century

Without data, you are just another person with an opinion

- Schleicher, A. (2013) "PISA 2012: Evaluating school systems to improve education", OECD

- OECD (2013) " Education at a glance 2013: OECD indicators, Key findings"

- Education at a Glance 2014, OECD www.oecd.org/eag/eag2014

- Ridwan Maulana, Michelle Helms-Lorenz and Wim van de Grift (2014), "Development and evaluation of a questionnaire measuring pre-service teachers' teaching behaviour: A Rasch modelling approach"

  Paper under review