



# PISA

## OECD Programme for International Student Assessment

A new, regular survey of 15-year-olds,  
assessing their preparedness for adult life

*Learning for living*





LE GOUVERNEMENT  
DU GRAND-DUCHÉ DE LUXEMBOURG  
Ministère de l'Éducation nationale  
et de la Formation professionnelle



# PISA 2006

Test results for the European School of  
Luxembourg

Bettina Böhm – Ulrich Keller



# Structure

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- PISA 2006 – An overview
- Sample tasks in science
- Mean performance of students in the EU
- Test results and student characteristics for the European School
- Perspectives on PISA 2009



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# PISA 2006

An overview

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# Background

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- PISA = **P**rogramme for **I**nternational **S**tudent **A**ssessment
  - Sponsored and created by the OECD together with participating countries
- Why PISA?
  - To compare students' performance to that of other countries
  - To understand why students achieve certain levels of performance
  - To ensure that students obtain basic skills



# Assessment areas

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- 3 key subject areas
  - Reading, math and science
- „Cross-curricular“ competencies
  - Motivation, attitudes towards learning, problem-solving, information and communication technology, learning strategies



# Framework: Literacy

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- Literacy = broad conception of knowledge and skills
- Is concerned with the capacity of students
  - To extrapolate from what they have learned, and to apply their knowledge in new settings
  - To analyse, reason and communicate effectively as they pose, solve and interpret problems in a variety of situations
- PISA does not measure the reproduction of narrowly defined subject-matter knowledge.



# Survey cycle

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- Conducted every 3 years
  - In each cycle, one of the three domains is examined in-depth
    - 2000: Reading
    - 2003: Math
    - 2006: Science
  - The two other domains become minor subjects of assessment
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# Student population


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- 15-year-old students
- Altogether around 400,000 students in 57 participating countries
- Randomly selected
  - Between 4,500 and 10,000 students per country
- Census in Luxembourg

# Test instruments

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<b>Students</b>	2 hour paper-and- pencil tasks	60% multiple choice items	30 min questionnaire
<b>School principals</b>	Questionnaire about their school		
<b>Parents</b>	Questionnaire about their child's science learning and their child's school		



# PISA 2006 - Outcomes

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- A profile of knowledge and skills among 15-year-olds
  - a detailed profile in science
  - an update for reading and mathematics
- Trend data
  - In reading and math
- Contextual indicators
  - Relating student performance to student and school characteristics

# PISA 2006 – Participating Countries

## OECD-Countries (30)

## OECD-Partner Countries (27)

Australia	Luxembourg	Argentina	Macao-China
Austria	Mexico	Azerbaijan	Montenegro
Belgium	Netherlands	Brazil	Qatar
Canada	New Zealand	Bulgaria	Romania
Czech Republic	Norway	Chile	Russian Federation
Denmark	Poland	Colombia	Serbia
Finland	Portugal	Croatia	Slovenia
France	Slovak Republic	Estonia	Taipei-China
Germany	Spain	Hong Kong-China	Thailand
Greece	Sweden	Indonesia	Tunisia
Hungary	Switzerland	Israel	Uruguay
Iceland	Turkey	Jordan	
Ireland	United Kingdom	Kyrgyzstan	
Italy	United States	Latvia	
Japan		Liechtenstein	
Korea		Lithuania	



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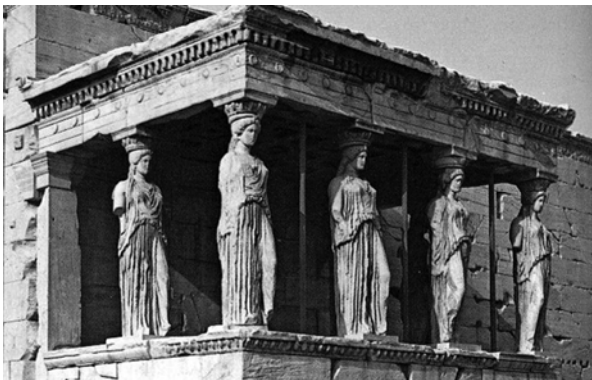
# PISA 2006

Sample tasks in science

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# Question „Acid Rain“

Below is a photo of statues called Caryatids that were built on the Acropolis in Athens more than 2500 years ago. The statues are made of a type of rock called marble. Marble is composed of calcium carbonate.



In 1980, the original statues were transferred inside the museum of the Acropolis and were replaced by replicas. The original statues were being eaten away by acid rain.

Experiment:

The effect of acid rain on marble can be modelled by placing chips of marble in vinegar overnight. Vinegar and acid rain have about the same acidity level. When a marble chip is placed in vinegar, bubbles of gas form. The mass of the dry marble chip can be found before and after the experiment.

Acid Rain Question 2:

A marble chip has a mass of 2.0 grams before being immersed in vinegar overnight. The chip is removed and dried the next day. What will the mass of the dried marble chip be?

- A: Less than 2.0 grams
- B: Exactly 2.0 grams
- C: Between 2.0 and 2.4 grams
- D: More than 2.4 grams

669

VI

V

607

IV

545

III

483

II

421

I

358

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Acid Rain Question 5:

Students who did this experiment also placed marble chips in pure (distilled) water overnight. Explain why the students included this step in their experiment.

Full Credit

669

VI

V

607

IV

545

Partial Credit

III

483

II

421

I

358

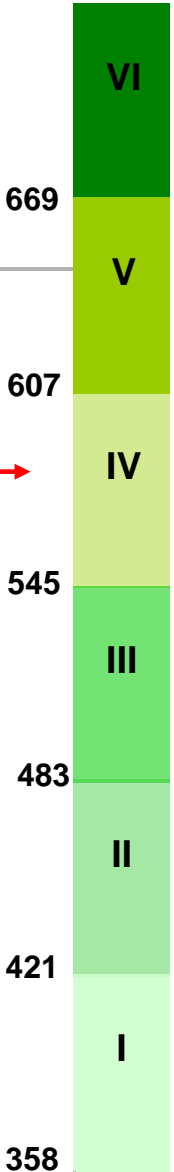
# Question „Physical Exercise“

Regular but moderate physical exercise is good for our health.



## Physical Exercise Question 5:

Why do you have to breathe more heavily when you're doing physical exercise than when your body is resting?







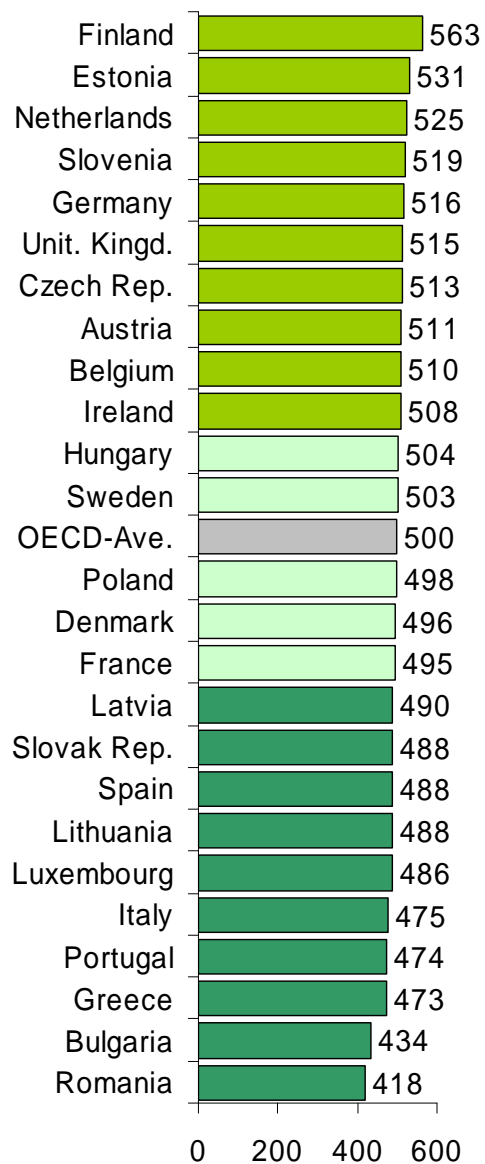
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# PISA 2006

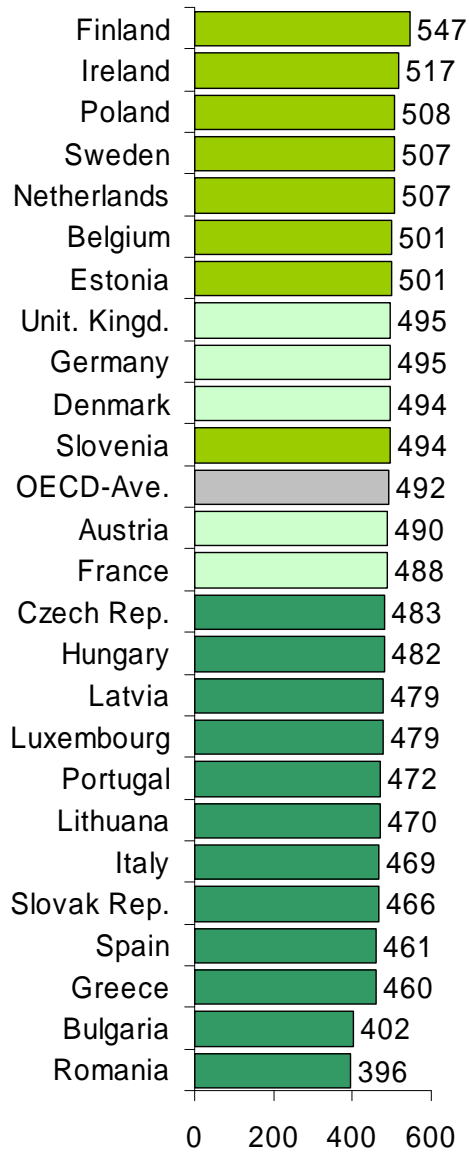
Mean performance of students in the  
European Union

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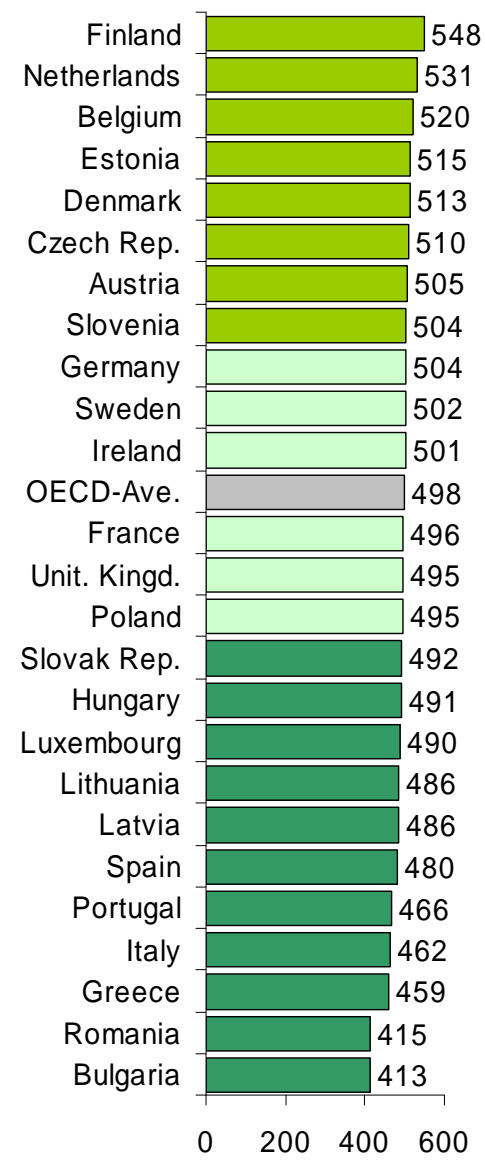
## Science



## Reading



## Mathematics



■ Above the OECD-Average

■ On the OECD-Average

■ Below the OECD-Average



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# PISA 2006

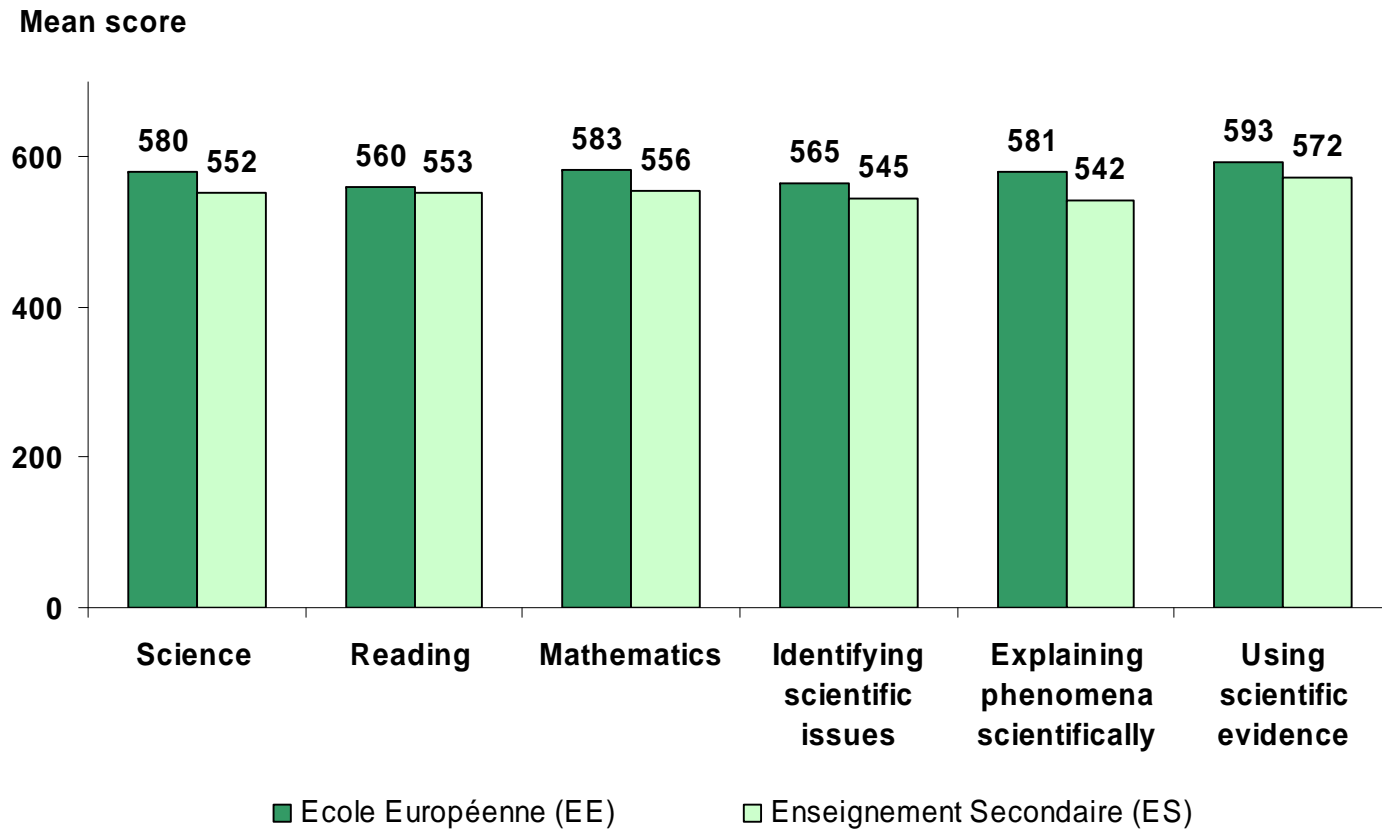
Test results for the European School

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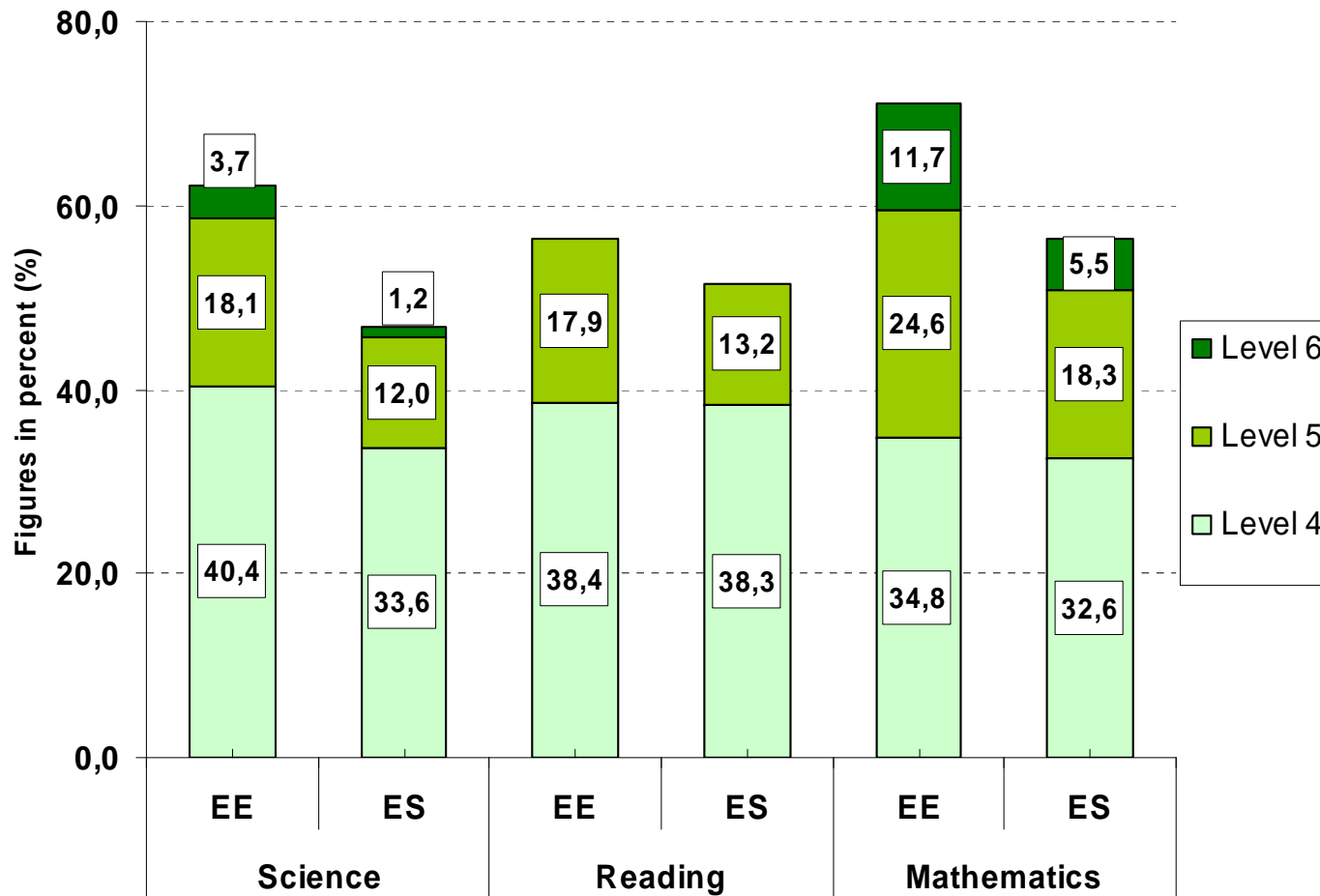
# Participants at EEL

	Number of Students	Percent girls	Mean SES* at the school	Students with migration background	Language spoken at home is test language	Test language		
	N	%		%	%	English %	French %	German %
L1	118	48	above average	89	75	30	51	19
L2	127	43	above average	93	3	56	36	8
Enseignement Secondaire (ES) = „lycées classiques“	1589	55		18	7	0	15	85

# Mean performance of students

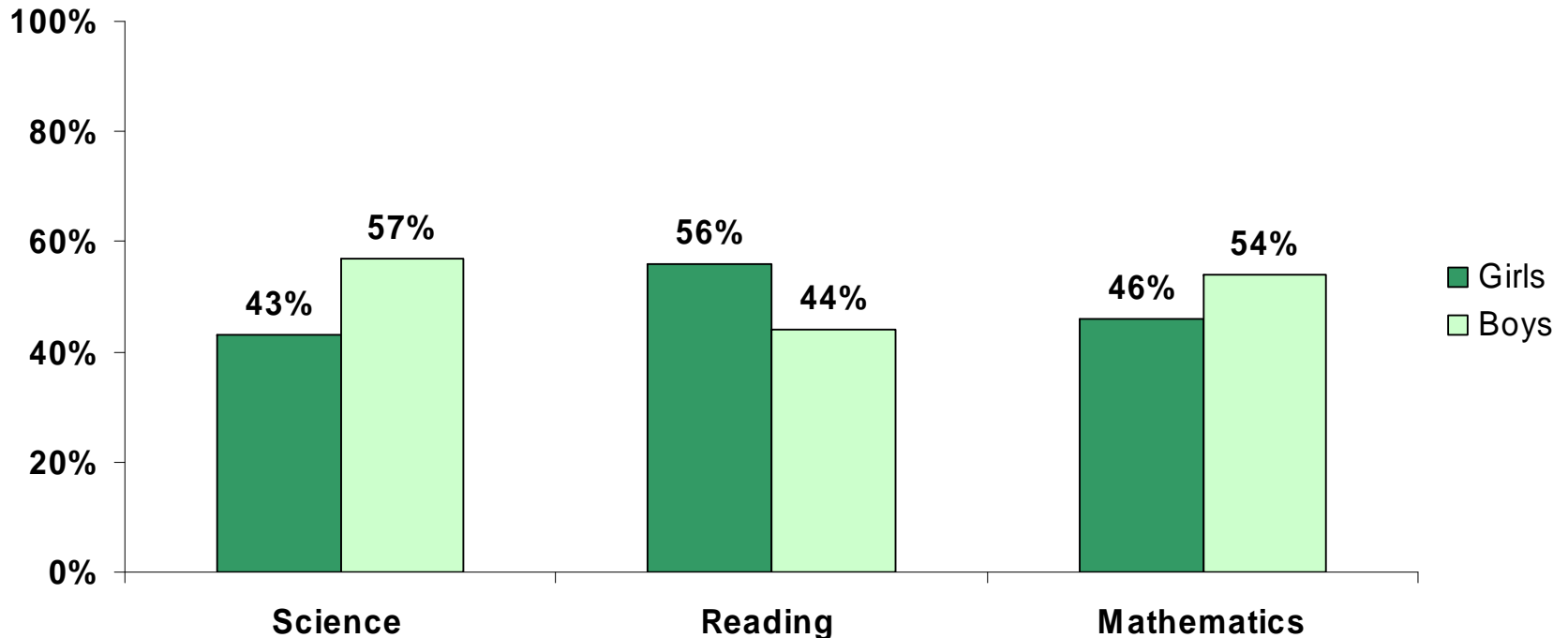


# Proficiency levels



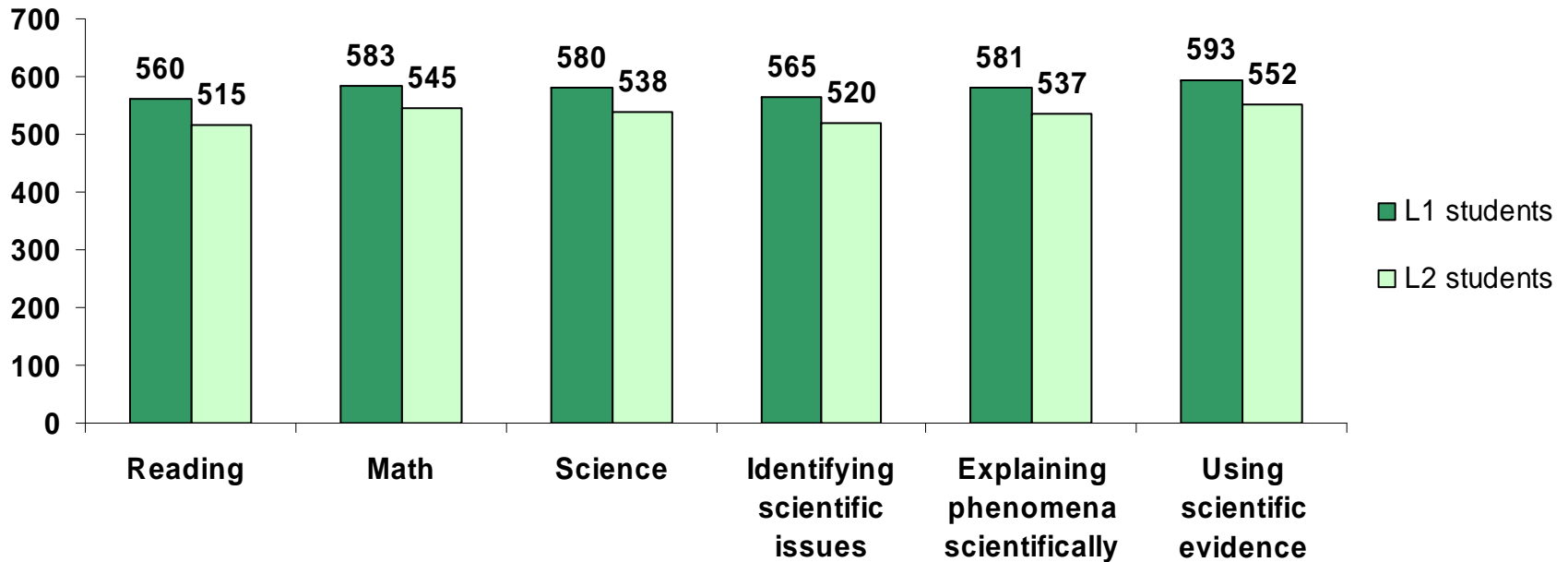
Science	Level 4: 559 – 633	Level 5: 633 – 708	Level 6: > 708 score points
Reading	Level 4: 553 – 626	Level 5: > 626 score points	
Mathematics	Level 4: 545 – 607	Level 5: 607 – 670	Level 6: > 670 score points

# High performing students by gender



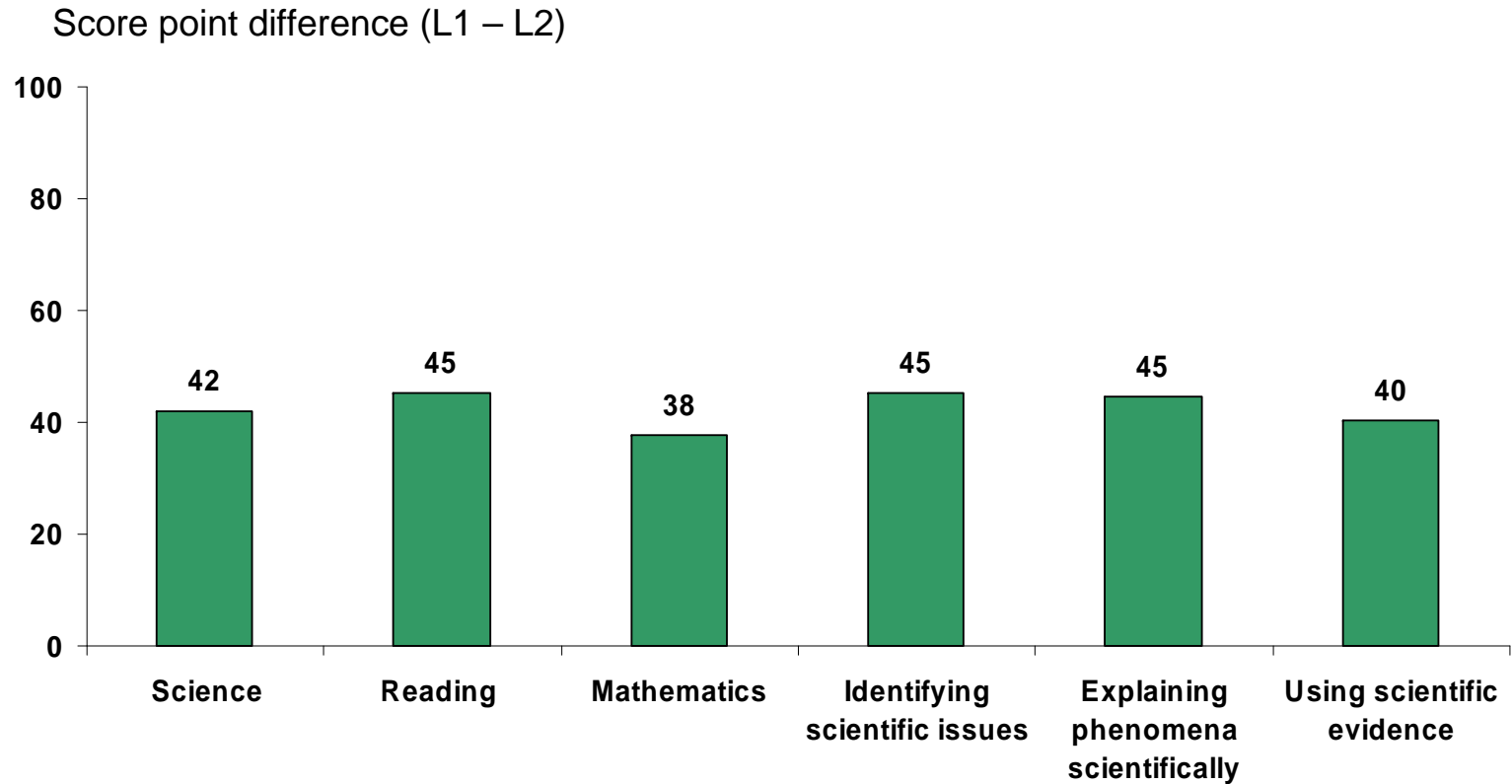
# Mean performance of students

Mean score





# Differences in mean scores



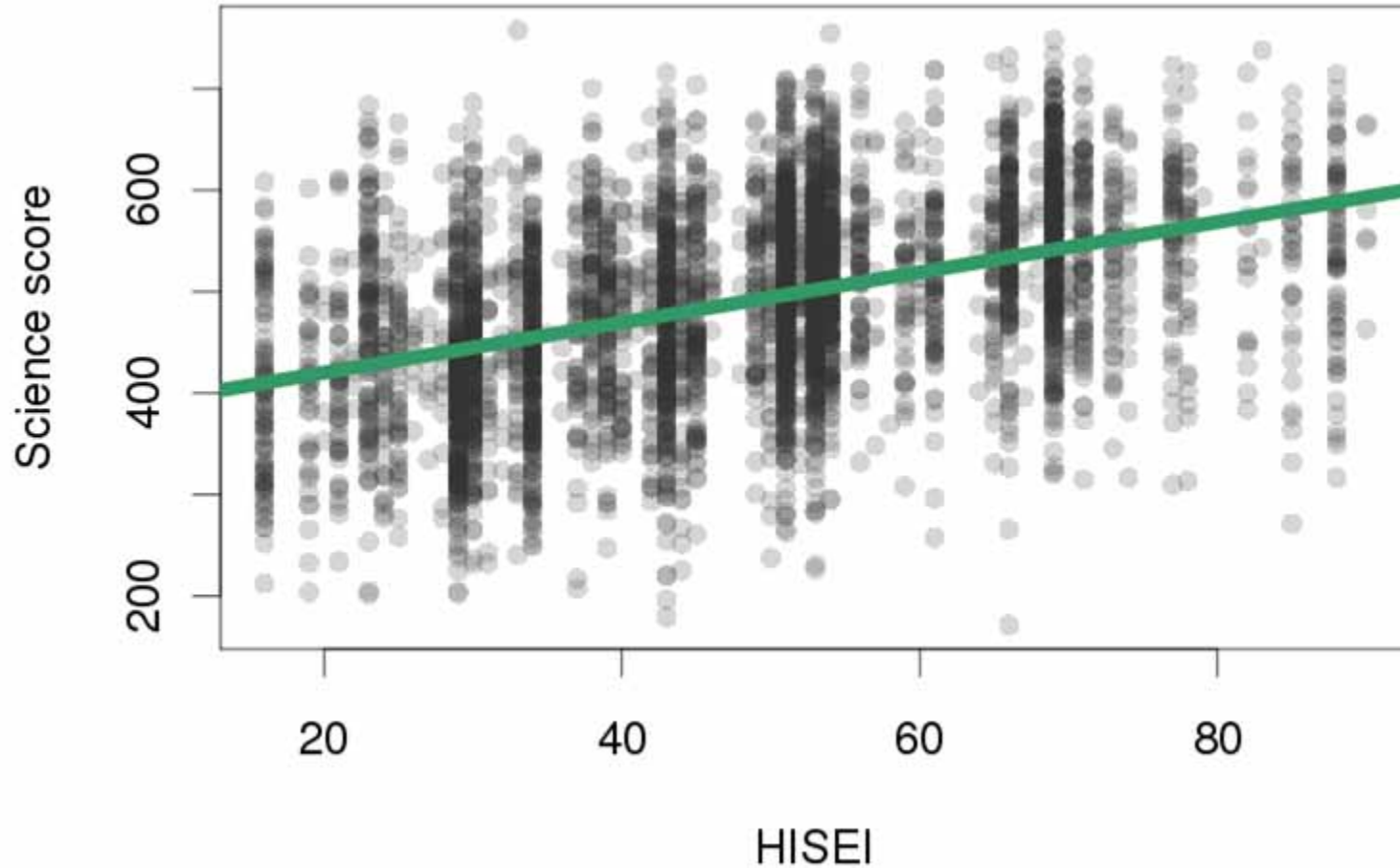
# The International Socio-Economic Index of Occupational Status (ISEI)

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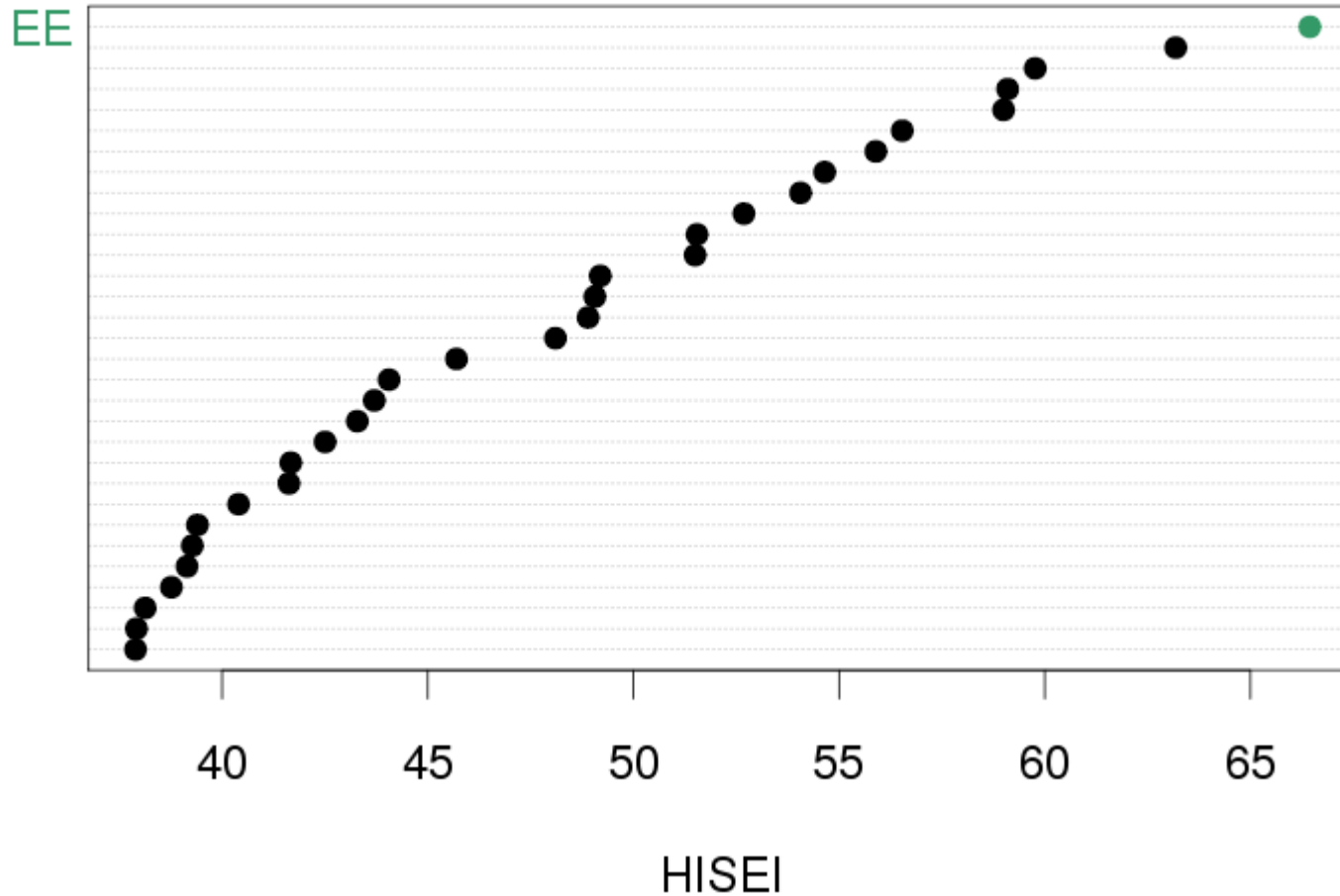
- Combines educational level and income associated with occupations
- Ranges from 16 (farm hands, cleaners, helpers) to 90 (judges); some other values:
  - Secondary school teachers: 69
  - Statisticians: 71
- HISEI: highest ISEI of parents

# HISEI and PISA science scores (correlation = .43)

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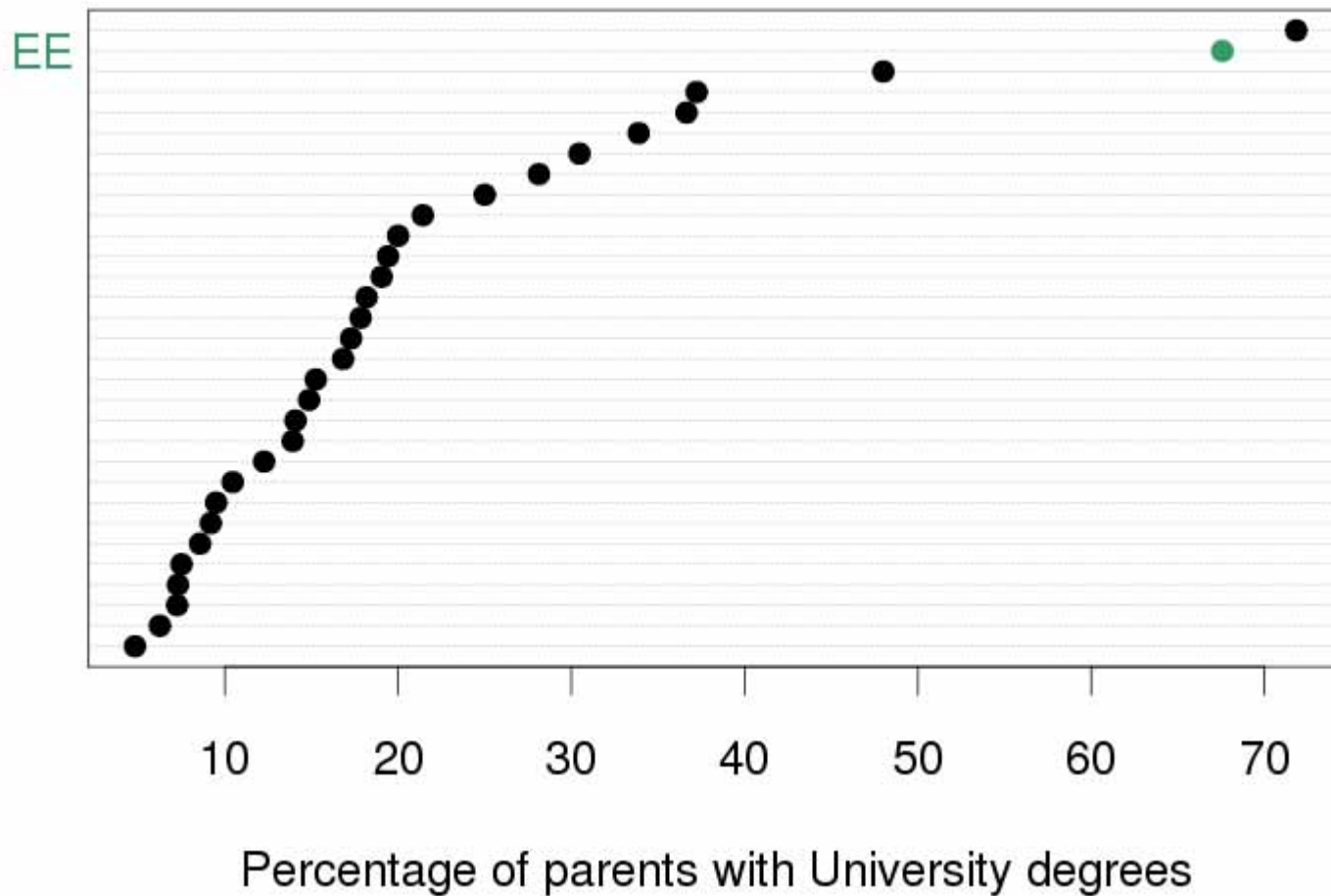


# Mean HISEI by school



# Percentage of parents with University degrees by school

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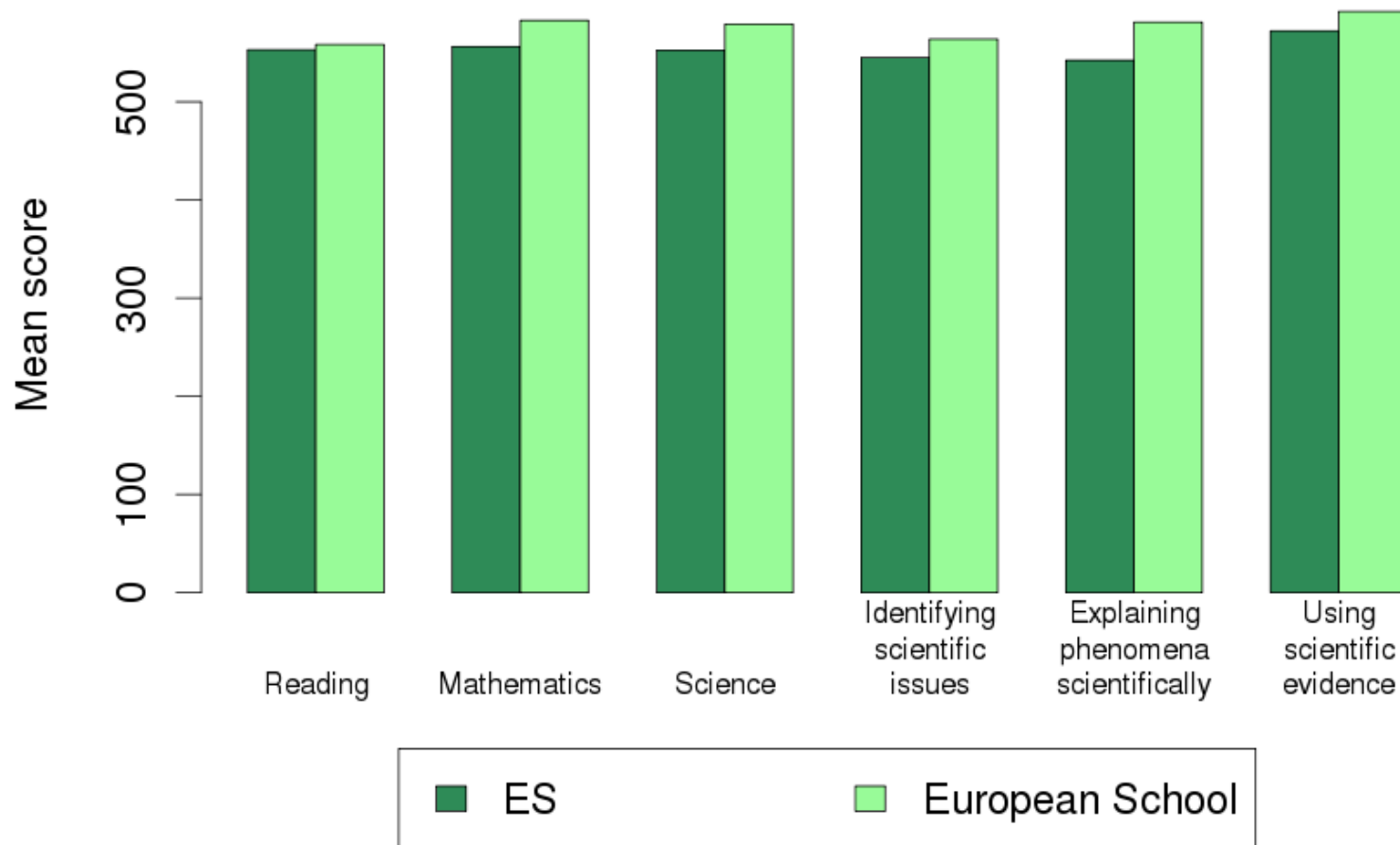
# Controlling for background variables

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1. Compute weights that reflect the ES students' similarity to the European School's students
2. Use the weights to compute *weighted means* for the ES students
3. Interpretations of the weighted means: expected mean of ES if parental education etc. were as high as in the European School

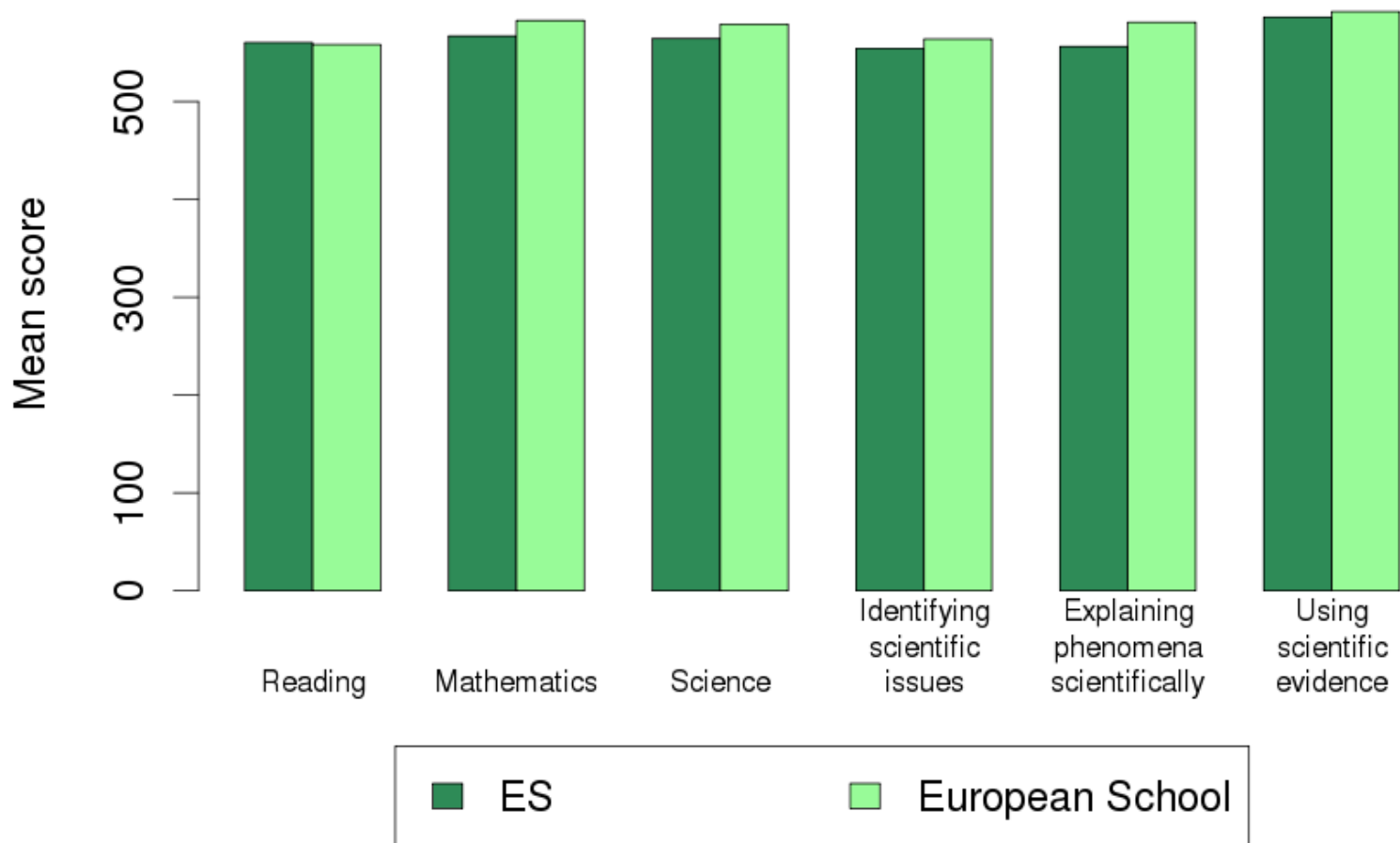
# Unweighted mean scores

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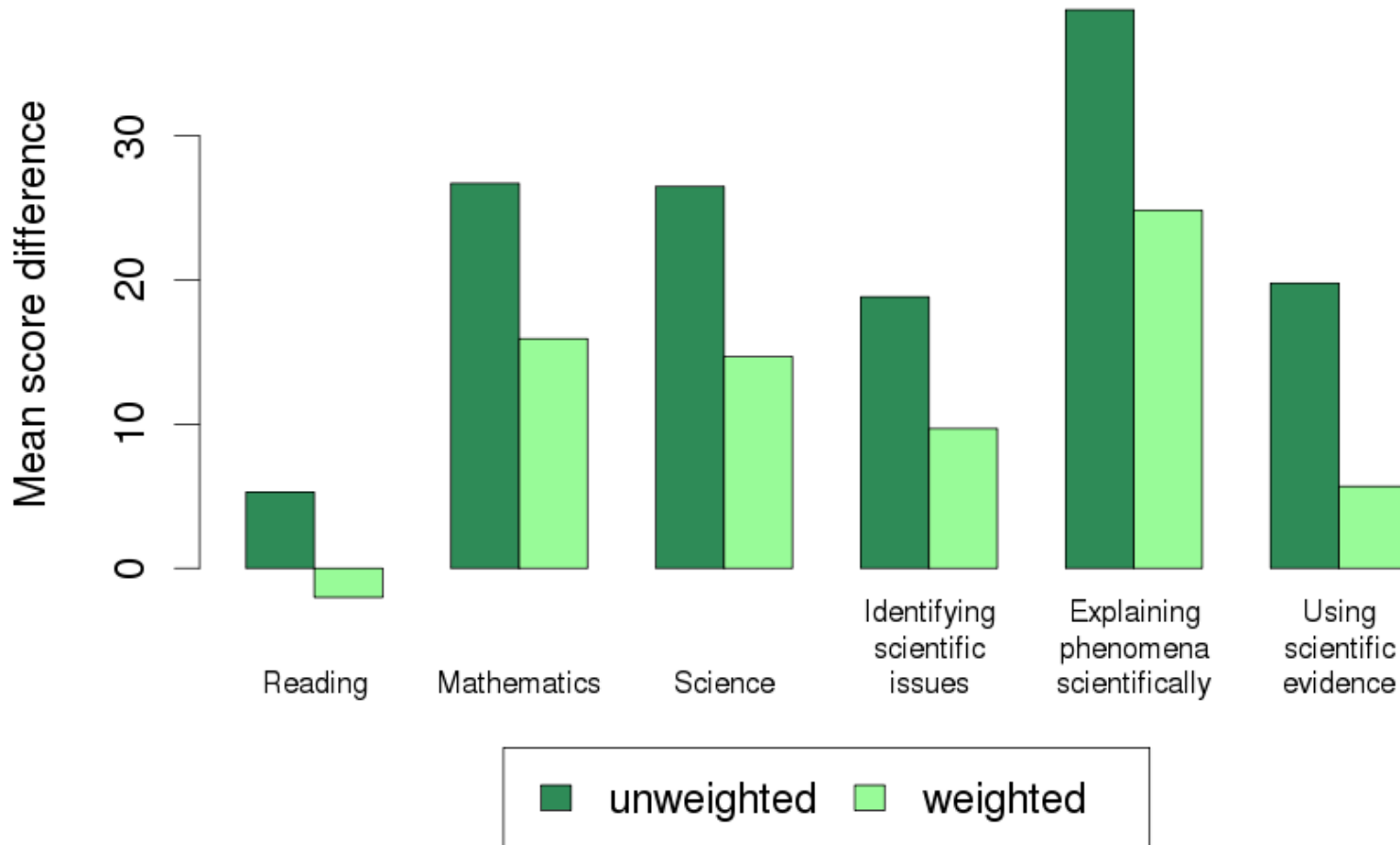
# Weighted mean scores

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# Unweighted and weighted differences between ES and European School



# Aspects of motivation in science

## Motivation in Science

General  
interest

“How much interest do you have in learning about the biology of plants?”

Enjoyment

“I generally have fun when I am learning science topics.”

Self-  
concept

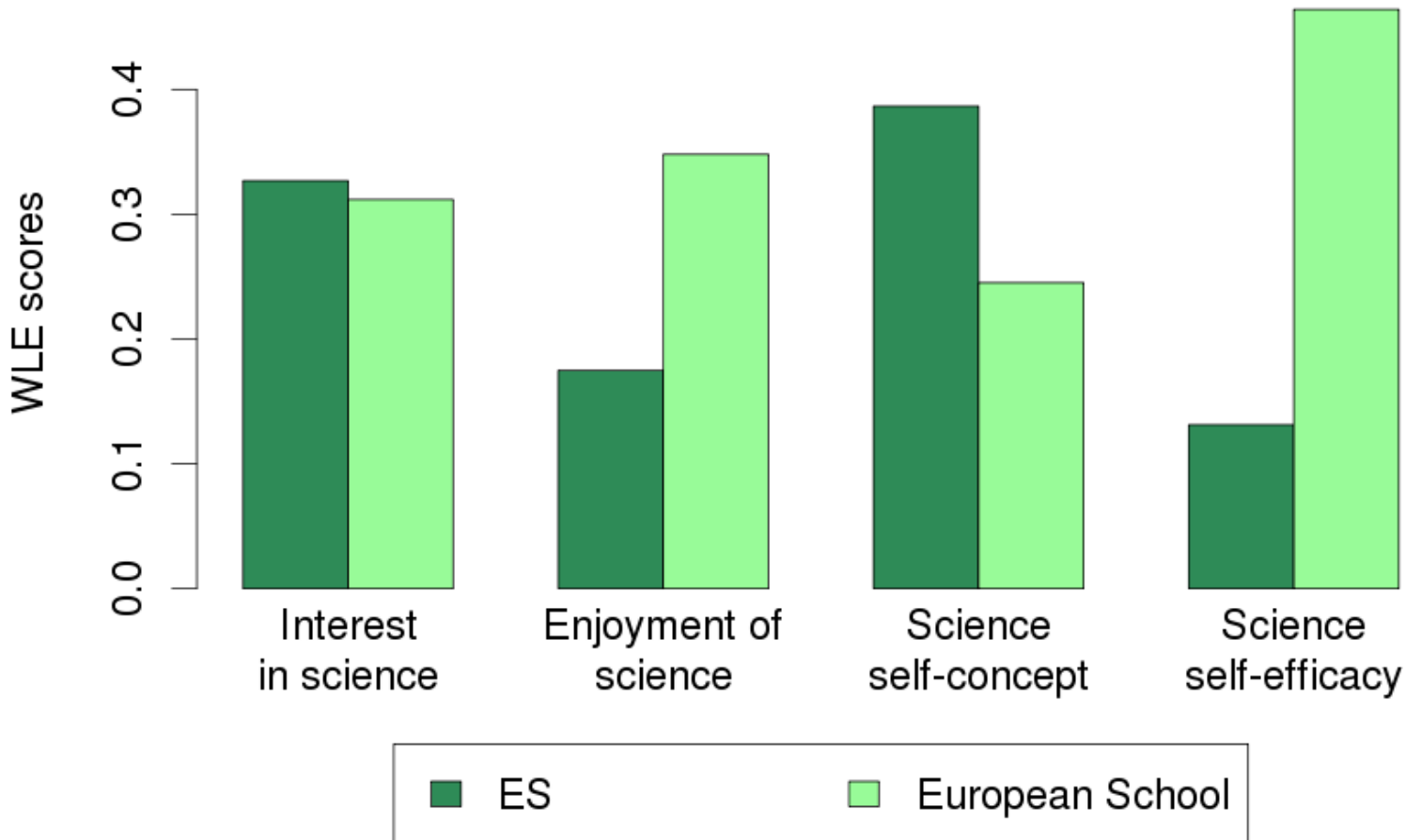
“I can easily understand new ideas in school science.”

Self-  
efficacy

“How easy would it be for you to perform the following task: Describe the role of antibiotics in the treatment of disease.”

# Science: Interest, enjoyment, self-concept and self-efficacy

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# Aspects of science teaching

## Science Teaching

Hands-on activity

“Students spend time in the laboratory doing practical experiments”

Interaction

“Students are given opportunities to explain their ideas”

Student investigation

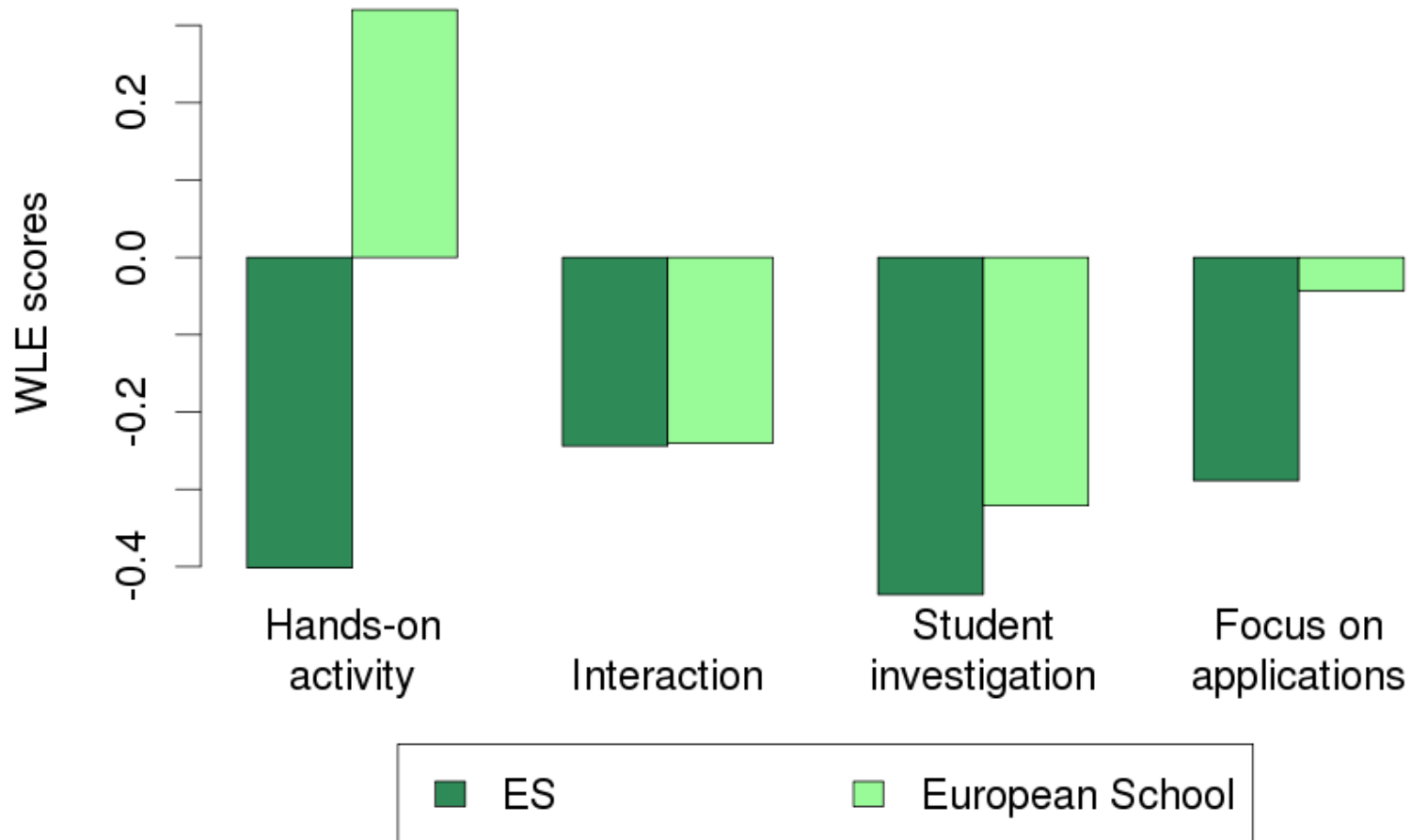
“Students are allowed to design their own experiments”

Focus on applications

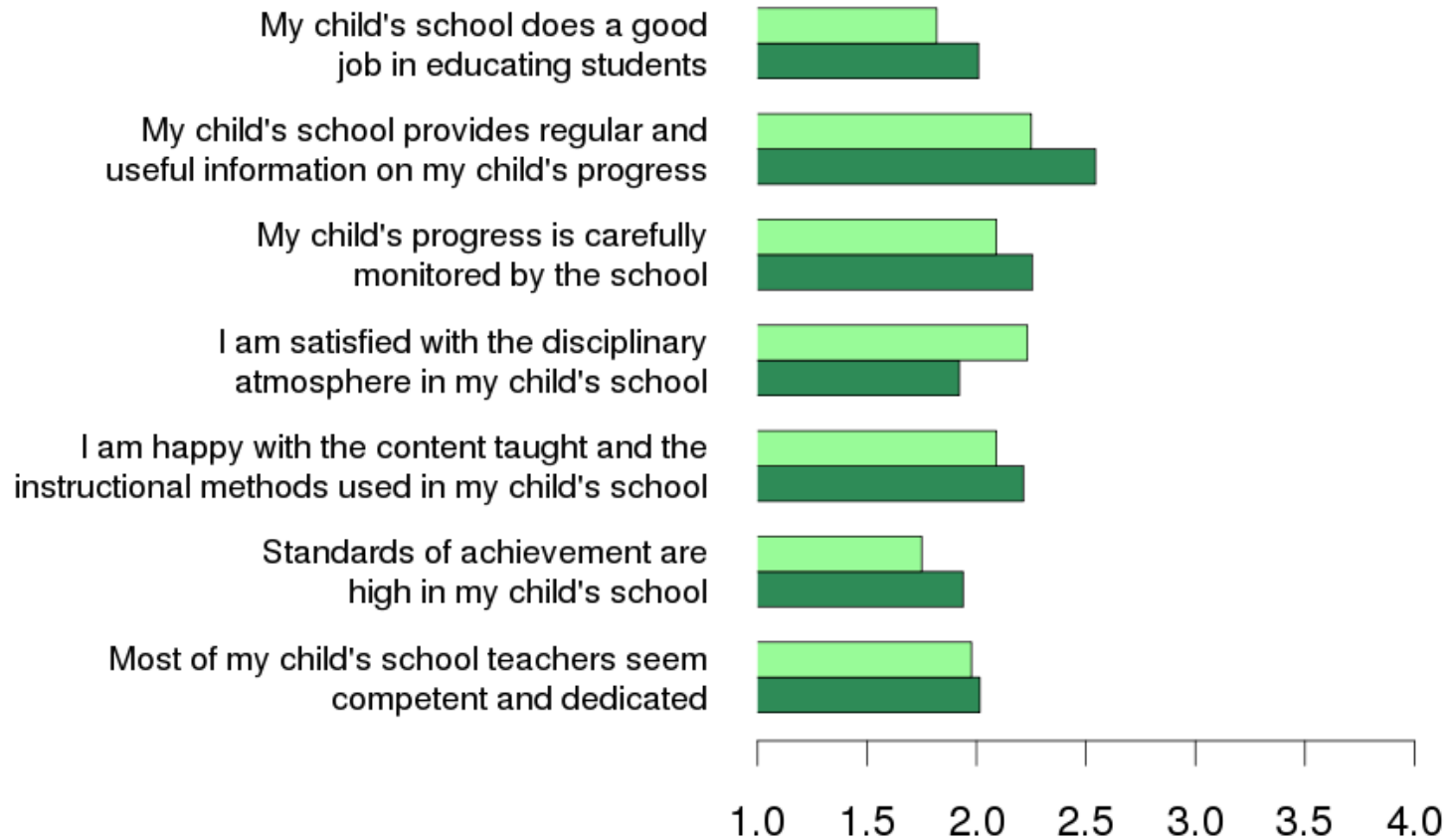
“The students are asked to apply a school science concept to everyday problems”

# Aspects of science teaching

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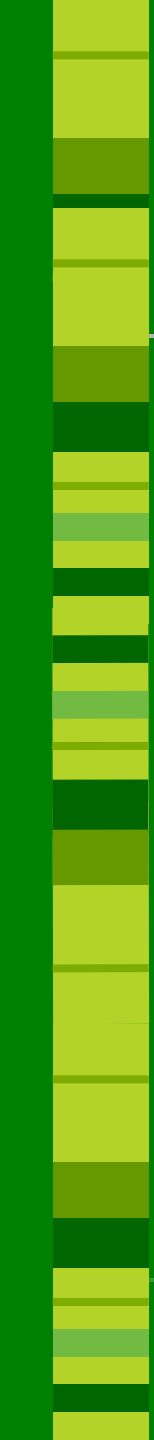


# Satisfaction of parents with the European School



ES

European School



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# PISA 2009

## Outlook

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# PISA 2009 - Outlook

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<b>Participating countries</b>	30 OECD-countries 37 Partner countries	New participants: e.g. Dubai, Singapore, Peru, Panama, Albania
<b>Age group</b>	Students born between 1 Jan 1993 and 31 Dec 1993	
<b>Assessment period</b>	20 April to 22 May 2009	
<b>Assessed domains</b>	Major domain:	Reading
	Minor domains:	Science and Mathematics
<b>Test languages</b>	French, German, English	
<b>Second-Day of Testing Option</b>	Aim: Assess students' multi-lingual competencies in French and German	





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Thank you very much for your attention!

PISA Online:  
[www.pisa.oecd.org](http://www.pisa.oecd.org)

Luxembourg's PISA 2006 report:  
[www.men.lu](http://www.men.lu),  
Search for "PISA"

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