

PISA 2006 – First results

PISA 2006 (Programme for International Student Assessment) was conducted among 398,750 randomly chosen students, who represented some 32 million 15-year-olds in 57 countries. In Finland, altogether 155 schools participated; 144 Finnish-language and 11 Swedish-language schools. A total of 5,265 students were selected to take part and the final survey population included 4,714, which makes 90% of the original random sample.

The main focus of PISA 2006 was on scientific literacy. The other subject areas were reading and mathematics. In order to analyse science knowledge, PISA distinguishes between context, competencies, knowledge and attitudes. The context means the life situations in which students encounter scientific and technological phenomena. In these contexts the student needs three competencies:

- 1) *Identifying scientific issues*
- 2) *Explaining phenomena scientifically*
- 3) *Using scientific evidence.*

The different knowledge domains influencing these are:

- 1) *the student's knowledge of science and*
- 2) *the student's knowledge about science.*

Other influencing factors are the student's beliefs and attitudes:

- 1) *the student's support for scientific enquiry*
- 2) *the student's attitude to science-based reasoning*
- 3) *the student's understanding of his/her own responsibility for sustainable development and their optimism regarding it.*

Finnish students' science literacy best in the world

Finnish students aged 15 have the best science knowledge and skills in the world. The mean performance in Finland is significantly better than in any other country participating in PISA. At the same time Finland's score is the best result ever achieved in any subject area in any of the PISA surveys.

The top OECD countries in science are Canada, Japan and New Zealand. The best PISA partner countries are Hong Kong-China, Chinese Taipei and Estonia. Apart from Finland, Sweden was the only Nordic country to attain an above-average rating in science. Denmark, Iceland and Norway were below the OECD mean.

Finnish students were rated the best in all the three science competencies surveyed. Finland's mean performance was significantly better than that of any other participating country. The best science competency for Finnish students was "*Using scientific evidence*", in which they performed 23 score points better than their counterparts in the second best country, Japan. In "*Identifying scientific issues*", Finland scored 555, which is 19 points better than the score of New Zealand, which came second. Similarly, Finnish students performed best in "*Explaining phenomena scientifically*", achieving a score of 566, which was 17 score points better than the second best score of Hong Kong-China.

Best median scores in different aspects of science knowledge and skills

Identifying scientific issues	Explaining phenomena scientifically	Using scientific evidence
1. Finland 555	1. Finland 566	1. Finland 567
2. New Zealand 536	2. Hong Kong-China (China) 549	2. Japan 544
3. Australia 535	3. Taipei (China) 545	3. Hong Kong-China (China) and Canada 542
4. Netherlands 533	4. Estonia 541	4. Korea 538
5. Canada 532	5. Canada 531	5. New Zealand 537

Top countries in science 2000-2006

2000	2003	2006
1. Korea 552	1. Finland and Japan 548	1. Finland 563
2. Japan 550	2. Hong Kong-China (China)* 539	2. Hong Kong-China (China) 542
3. Finland 538	3. Korea 538	3. Canada 534
4. UK 532	4. Australia, Liechtenstein and Macao (Kiina)* 525	4. Taipei (China)* 532
5. Canada 529	5. Netherlands 524	5. Estonia* and Japan 531

*First-time participant

Science is appreciated

Students' general appreciation of science was measured by means of five statements:

- Science is important for helping to understand the natural world.
- Advances in science and technology usually improve people's living conditions.
- Science is valuable to society.
- Advances in science and technology usually help to improve the economy.
- Advances in science and technology usually bring social benefits.

A large proportion of the participating students said they appreciate science. This phenomenon was found in all the countries. Up to 93% of students

in the OECD countries were of the opinion that advances in science and technology improve people's living conditions. The figure for Finnish students was nearly the same.

In the same way, the role of science in helping us to understand the world around us was recognised: the average rate was 92% in the OECD as a whole and 96% for Finnish students, who particularly stressed the role and benefit of science for society. The rate for those who considered science to benefit society was 80% in the OECD and 93% for Finnish students.

On the other hand, Finnish students did not appreciate science in economic terms as highly (84%) as the OECD average (87%).

Appreciation of science in the OECD countries and in Finland

Agreement rates in percentages	OECD	Finland	difference
Advances in science and technology usually improve people's living conditions	93	94	1
Science is important for helping to understand the natural world	92	96	4
Advances in science and technology usually help to improve the economy	87	84	-3
Science is valuable to society	80	93	13
Advances in science and technology usually bring social benefits	75	89	14

Finland's performance in reading still of the highest order

Finnish students fared very well when reading skills were measured. Only Korea achieved a better result. The score of Finnish students has remained nearly the same since PISA 2000. The change over time for Finland is the

smallest among all the participating countries: the difference in score points between the measuring is not statistically significant.

Top countries in reading 2000–2006

2000	2003	2006
1. Finland 546	1. Finland 543	1. Korea 556
2. Canada 534	2. Korea 534	2. Finland 547
3. New Zealand 529	3. Canada 528	3. Hong Kong-Ch. 536
4. Australia 528	4. Australia and Liechtenstein 525	4. Canada 527
5. Ireland 527	5. New Zealand 522	5. New Zealand 521

Top mathematics countries maintained their high level

Finnish students still have solid mathematics competencies. Finland came second among all the

countries after Chinese Taipei. The mean performance of Finns rose by four score points from 2003.

Top countries in mathematics 2000–2006

2000	2003	2006
1. Japan 557	1. Hong Kong-Ch.* 550	1. Taipei (Kiina)* 549
2. Korea 547	2. Finland 544	2. Finland 548
3. New Zealand 537	3. Korea 542	3. Hong Kong-Ch. and Korea 547
4. Finland 536	4. Netherlands 538	4. Netherlands 531
5. Australia and Canada 533	5. Liechtenstein 536	5. Switzerland 530

*First-time participant

Knowledge and competence on a broad basis in Finland

Finnish students performed again well in all the subject areas studied in PISA 2006. As regards students' performance in science, reading and mathematics, some 95% of Finnish students reach

the baseline level (Level 2) in all the competencies. This is a higher rate than in any other participating country. However, this means that in Finland, too, five per cent of students do not have baseline skills.

Gender differences in knowledge and skills

VI In 2006 there were no significant differences in the science competencies of Finnish girls and boys. The gender difference narrowed further from previous measurements, being now only two score points.

In Finland boys have the same level of reading skills as in 2003, but girls improved their performance by seven score points. Girls are better in reading than boys. The gender difference grew in Finland from 44

to 51 score points, which is the same as in the first measuring round in 2000 and the second largest in all the OECD countries in 2006.

Boys still do better in mathematics than girls. The gender difference is now 12 score points, which is five points more than in PISA 2003. Finnish boys improved their score by six points and girls by two points.

What do the results tell us about Finnish education?

Finnish students' performance in science, mathematics and reading is among the best in the world. Their success is based on the performance of all students. Our good performers are as good as or better than students in other countries. Finnish students meet best the baseline requirements which, according to the OECD, are needed to do well in modern society: 95% of them have these baseline competencies in all the subject areas studied, from reading to mathematics and science. The OECD rate in all the subject areas

is around 80%.

Differences in the performance of Finnish schools are very small. In Finland student performance is not dependent on the school or the region where they get their education. In principle, the expected learning outcome is the same all over Finland. All this is achieved with average costs and even smaller numbers of lesson hours than the OECD average. The Finnish education system is not only egalitarian, but also very cost-effective.

Performance of Finnish students in PISA 2000–2006

	Reading	Mathematics	Science	Problem-solving
2000	1.	4.	3.	Not studied
2003	1.	2.	1. (shared)	2. (shared)
2006	2.	2.	1.	Not studied

Main focus areas in green

Theoretical framework

The Programme for International Student Assessment measures every three years young people's knowledge and skills in reading, mathematics and science. The main focus of the first (PISA 2000) was reading and in the second (PISA 2003) mathematics, while this latest, PISA 2006, focused on science.

In PISA the science "literacy" means young people's ability to use scientific knowledge and skills in different areas and in different life situations. PISA 2006 also studied students' beliefs and attitudes towards scientific issues and towards scientific thinking and reasoning. Another aspect studied was the students' understanding of their responsibility for sustainable development and their optimism as to their chances of influencing it.

The aim in PISA is to assess how well students master knowledge and skills necessary for life in future society, for the development of working life, and for the quality of life. The primary focus is not on how well they have mastered curricular contents and attained objectives and but how well they can apply their knowledge and skills in real life situations.

Every PISA has a specific theoretical framework, which sets out exhaustively what is studied and what methods are used. A full presentation of the PISA 2006 framework can be found in the publication *Assessing Scientific, Reading and Mathematical Literacy – A Framework for PISA 2006* at www.pisa.oecd.org.



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<http://www.minedu.fi/OPM/Koulutus/artikkelit/pisa-tutkimus/index.html?lang=en>

<http://www.pisa2006.helsinki.fi>