EXCELLENT
DESPITE THE DROP

PISA 15

FINLAND STILL TOP-RANKING COUNTRY BUT DROP IN SCORE POINTS SECOND HIGHEST

Finland's average score in scientific literacy has dropped by 32 score points relative to 2006, when the focus was last on science performance.

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The drop amounts to nearly one full academic year's performance.

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The PISA assessment shows that every year the basic skills in scientific literacy of over 6,000 students in Finland are inadequate. This increases the risk of coping with further studies and with the demands of modern working life.

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2006 **563**
2015 **531**

HIGHER PERCENTAGE OF POOR PERFORMERS:
2006 **4.1%**
2015 **11.5%**

LOWER PERCENTAGE OF TOP PERFORMERS:
2006 **20.9%**
2015 **14.3%**

The percentage of poor performers in science has nearly trebled and the number of top performers has dropped by close to one third.

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Over 65% of those whose proficiency in science is poor perform poorly in mathematics and reading. Of these, around two-thirds were boys.

OECD'S HIGHEST DIFFERENCE IN PERFORMANCE LEVELS BETWEEN BOYS AND GIRLS

Finland was the only country where girls were in the majority among the best performers. The decline in the performance of boys further increases the gender gap to the advantage of girls.

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The distribution in performance surpassed the OECD average (94 score points) for the first time.

REGIONAL EQUITY AT RISK

This is the first time that regional equity, Finland's bedrock in education, has started to show cracks. One of the things that Finland has been proud of is that it has been able to provide equal learning opportunities for students both in urban and rural areas. Now, however, the outcomes in metropolitan Helsinki differ significantly from those in the rest of the country, especially those in western and eastern Finland.

SOCIO-ECONOMIC IMPACT

The effects that parents' socio-economic background and occupation and family wealth have on student performance have grown in Finland while it has remained unchanged in other developed countries.

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In 2009 the impact of socio-economic background in Finland was still one of the smallest in the reference countries.

POOR MOTIVATION

Student motivation related to science was at best close to the OECD average in Finland.

COMMENDABLE PROFICIENCY ONCE AGAIN

The PISA 2015 results show that proficiency among students in Finland is still among the best in the OECD countries, even though the point scores have dropped significantly. The drop is partly explained by a record high score in the reference year of 2006, but the new study has revealed trends that are of some concern.

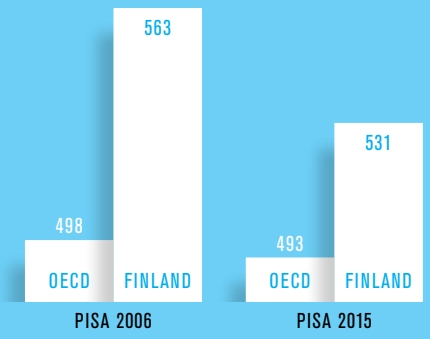
The mean score points in **SCIENTIFIC LITERACY** show that 15-year-olds in Finland ranked in third place among the OECD countries and in fifth place among all participating countries and economies. The best OECD performer was Japan. Singapore, Japan, Estonia and Taiwan ranked higher than Finland among all the countries and economies. The group of countries on a par with Finland consisted of Estonia, Taiwan, Macao (China), Canada and Vietnam. The results in all these countries were well over the OECD average. Scientific literacy in the other Nordic countries ranked substantially below Finland. However, the results in Denmark and Norway were higher than the OECD average and Sweden was in the same range as the average. Iceland was the only Nordic country to rank clearly below the OECD average.

Finnish students were still among the best in **READING LITERACY.** The level of proficiency in reading was by far the best in Singapore, followed by a group of fairly equal proficiency consisting of Hong Kong, Canada, Finland and Ireland. The best performer among Finland's neighbouring countries was Estonia, which came in sixth place, close behind the best five countries. Reading proficiency levels in the rest of the Nordic countries were much lower than in Finland, even though the mean scores in Norway, Sweden and Denmark exceeded the OECD average. The mean score in Iceland ranked below the OECD average.

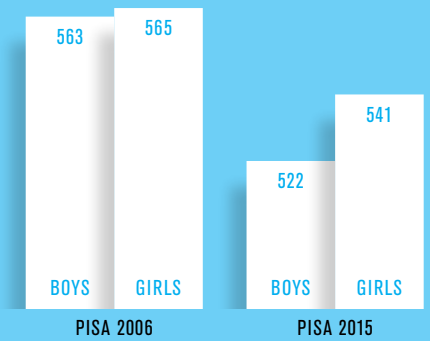
MATHEMATICAL LITERACY has remained unchanged in Finland, ranking among the OECD countries in shared seventh place together with Denmark. Japan, Korea, Switzerland, Estonia, Canada and the Netherlands ranked higher. Finland was in thirteenth place among all the participating countries and economies. There were seven Asian countries among the fifteen top countries and economies: Singapore, Hong Kong, Macao, Taiwan, Japan, the region consisting of Peking, Shanghai, Jiangsu and Guangdong, and Korea. The scores in the other Nordic countries were lower than in Finland and Denmark. The mean scores in Norway and Sweden exceeded the average for the OECD countries, though. Iceland, however, ranked below the OECD average.

Publication on the first results of the PISA 2015 assessment (in Finnish) : www.minedu.fi/pisa

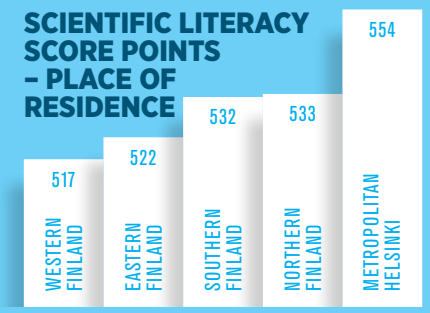
SCIENTIFIC LITERACY SCORE POINTS - MEAN



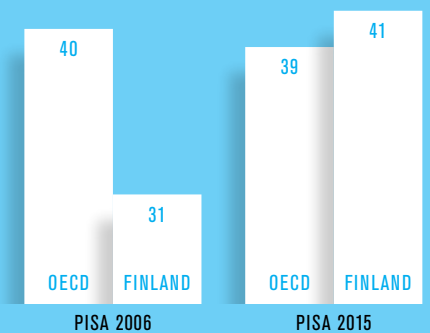
SCIENTIFIC LITERACY SCORE POINTS - BOYS AND GIRLS



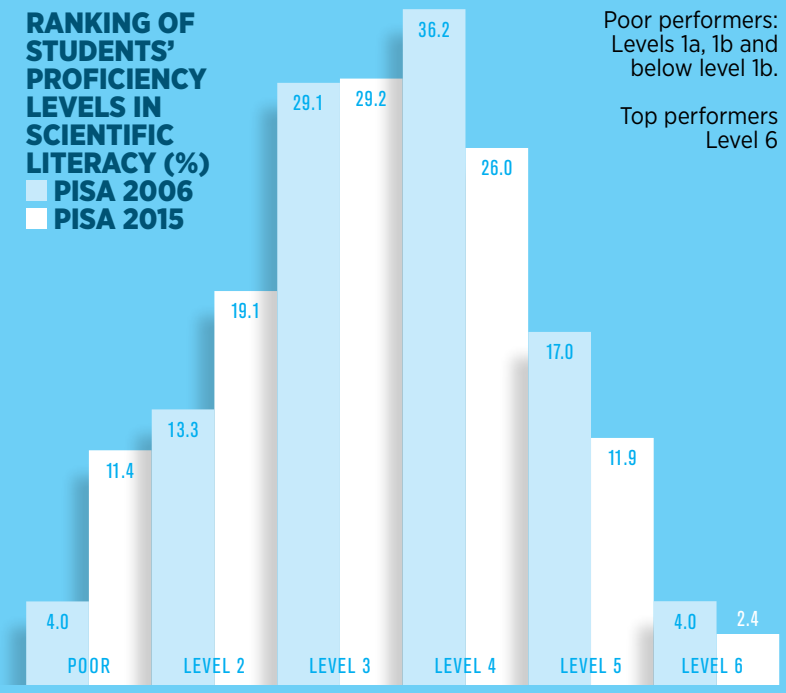
SCIENTIFIC LITERACY SCORE POINTS – PLACE OF RESIDENCE

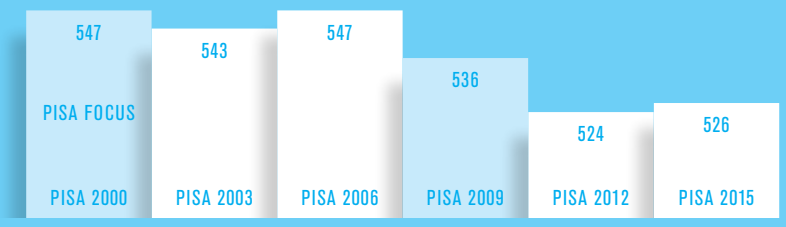


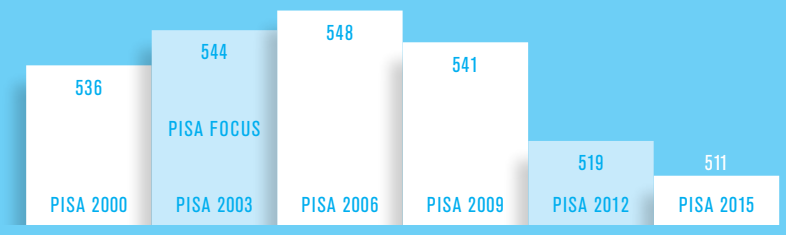
SCIENTIFIC LITERACY SCORE POINTS - EFFECT OF SOCIO-ECONOMIC BACKGROUND*

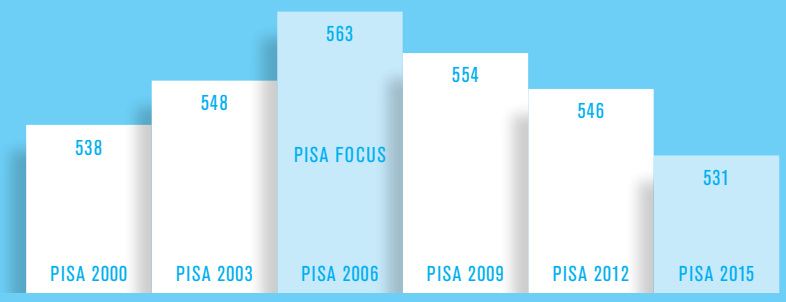


*WHEN THE ECONOMIC, SOCIAL AND CULTURAL STATUS (ESCS) INDEX RISES BY ONE STANDARD DEVIATION









GAP BETWEEN BOYS AND GIRLS LARGER THAN BEFORE

In the PISA 2015 international comparison on scientific literacy, boys were on average four point scores better than girls. In Finland, the gap between boys and girls, 19 score points higher for girls, was the widest in the OECD countries. Girls in Finland came second best among the girls in all the participating countries and economies after Singapore. In the comparisons among boys, Finnish boys ranked in tenth place. In Finland, 14% of boys and 8% of girls performed poorly. The equivalent average figures for the OECD countries were 24% for girls and 22% for boys. Finland was the only country where girls outperformed boys among the top performers. In Finland, girls outperformed boys in all areas of science competencies. Boys did best on average in the content category of physical systems, in content knowledge and in explaining

Understanding science more important than ever, because most problems in society are linked to its content and phonomena.

phenomena scientifically. Girls, instead, were equally proficient in all content, competency and process categories.

MINIMAL DIFFERENCES BETWEEN SCHOOLS BUT GROWING DISPARITIES BETWEEN DIFFERENT AREAS

Differences between schools are still minimal in Finland relative to the participating countries and economies. Variance in schools on the science scale was a mere 8% of the total score variation in the OECD countries. Iceland was the only country where this figure was even smaller. But the gap between the best and the weakest schools in Finland seems to have widened marginally relative to the 2006 PISA survey. However, in the vast majority of cases the between-school performance differences were so minimal that, taking into account the level of precision of the survey, they can be deemed insignificant.

The 2015 PISA study shows greater regional differences in Finland than ever before. The outcomes of students in metropolitan Helsinki were substantially higher than in the rest of the country in all content categories of the survey. The poorest outcomes were recorded in western and eastern Finland. Relative to the earlier surveys, outcomes have deteriorated the most in eastern Finland and in rural areas whereas the level of outcomes in metropolitan Helsinki has remained the same and even improved.

DIFFERENCES BETWEEN SWEDISH-SPEAKING AND FINNISH-SPEAKING SCHOOLS NARROWED DOWN

While the science scores in Finnish-speaking schools have fallen substantially, those in Swedish-speaking schools have remained virtually unchanged. In 2006, the score points (531) in Swedish-speaking schools were 43 points weaker than in Finnish-speaking schools, but in 2015 the score points (522) had shrunk to only 9 points lower than in Finnish-speaking schools (531). The difference is no longer statistically significant.

The score points in mathematics performance (520) in Swedish-speaking schools were the best in the Nordic countries and 10 points better than those of Finnish-speaking schools (510). In previous PISA surveys, the drop in performance appears to have ceased among Swedish-speaking students while it has continued to deteriorate among Finnish-speaking students. This means that Swedish-speaking students now outperform Finnish-speaking students in mathematics performance.

Score points in reading performance (506) among Swedish-speakers still lag behind Finnish-speakers (528) but the gap is now slightly narrower, mainly owing to a lower performance level among Finnish-speaking students. However, attention should focus especially on poor reading performance

among Swedish-speaking boys, as their performance is below the OECD average and substantially weaker than among Finnish-speaking students.

EFFECT OF SOCIO-ECONOMIC BACKGROUND STRONGER THAN BEFORE

The educational background and occupation of parents and family wealth (socio-economic background) are linked to science proficiency among students in all participating countries and economies. This was the first time ever in the PISA programme that this index was higher (41 points) in Finland than in the OECD countries on average (39 points). The OECD average has remained virtually unchanged over time whereas in Finland it has grown steadily. When the focus was last on scientific literacy in 2006, the index value in the relation between socio-economic background and science proficiency was 31 points in Finland. This was one of the smallest figures among the participating countries and economies.

The impact of socio-economic background on science proficiency was the greatest in countries such as France, Czech Republic, New Zealand, Hungary, Singapore, the Netherlands, and Belgium. The most equitable countries, instead, included Hong Kong, Iceland and Russia. Educational equity in the rest of the Nordic countries was better in Denmark and Norway than in Finland. Estonia also scored much better than Finland. Sweden, instead, fell behind Finland and was significantly below the OECD average.

The effect of the family's socio-economic background was also more transparent than before in the reading and mathematics proficiency of students in Finland. The average reading proficiency level has dropped the most in schools where there are many students from the lowest socio-economic backgrounds.

SCIENCE FAILS TO MOTIVATE

It has been generally recognised in the past decades that ever diminishing numbers of students are interested in starting a career in occupations that involve science. The imbalance between the genders in students of science has given rise to concern. The factors underlying competencies in science are numerous and interlinked. In this complex web, students' own motivation and attitudes are intertwined with the learning opportunities that the home and school afford and with the expectations and attitudes of parents and teachers.

Motivation to study science, valuing of science and degree of confidence in scientific knowledge were substantially below the OECD average in Finland or at best in the same range as the OECD average. However, there is a strong connection between factors related to motivation and attitudes and scientific literacy. In Finland, the most

determining factors were related to attitudes whereas in the OECD countries they were related to socio-economic background.

Motivation and knowledge form a self-perpetuating cycle, where motivation improves knowledge and knowledge fuels motivation. This is a cycle that should be achieved as early as possible and then be strengthened throughout the school years and academic studies. This is important not only from the viewpoint of personal development but also from that of the whole of society. The motivation and attitudes of young people in Finland, especially females, are reasons why mathematically and scientifically talented students fail to show interest in a career in these fields. This, in turn, has a bearing on the regular lamentations that the poor level of competencies among entrants in mathematics and science disciplines means that it is difficult to pursue and complete studies successfully.

AVERAGE SCORE POINTS IN SCIENTIFIC LITERACY

	POINTS	FINLAND*	OECD*	SD
SINGAPORE	556	+	+	104
JAPAN	538	+	+	93
ESTONIA	534		+	89
TAIWAN	532		+	100
FINLAND	531		+	96
MACAO (CHINA)	529		+	81
CANADA	528		+	92
VIETNAM	525		+	77
HONG KONG (CHINA)	523	-	+	81
PSJG (CHINA)	518	-	+	103
KOREA	516	-	+	95
NEW ZEALAND	513	-	+	104
SLOVENIA	513	-	+	95
AUSTRALIA	510	-	+	102
UNITED KINGDOM	509	-	+	100
GERMANY	509	-	+	99
NETHERLANDS	509	-	+	101
SWITZERLAND	506	-	+	100
IRELAND	503	-	+	89
BELGIUM	502	-	+	100
DENMARK	502	-	+	90
POLAND	501	-	+	91
PORTUGAL	501	-	+	92
NORWAY	498	-	+	96
UNITED STATES	496	-		99
AUSTRIA	495	-		97
FRANCE	495	-		102
SWEDEN	493	-		102
OECD COUNTRIES	493	-		94
CZECH REPUBLIC	493	-		95
SPAIN	493	-		88
LATVIA	490	-		82
RUSSIAN FEDERATION	487	-	-	82
LUXEMBOURG	483	-	-	100
ITALY	481	-	-	91
HUNGARY	477	-	-	96
LITHUANIA	475	-	-	91
CROATIA	475	-	-	89
BUENOS AIRES (ARG)	475	-	-	86
ICELAND	473	-	-	91
ISRAEL	467	-	-	106
MALTA	465	-	-	118
SLOVAKIA	461	-	-	99
GREECE	455	-	-	92
CHILE	447	-	-	86
BULGARIA	446	-	-	102
UNITED ARAB EMIRATES	437	-	-	99
URUGUAY	435	-	-	87
ROMANIA	435	-	-	79
CYPRUS	433	-	-	93
MOLDOVA	428	-	-	86
ALBANIA	427	-	-	78
TURKEY	425	-	-	79
TRINIDAD AND TOBAGO	425	-	-	94
THAILAND	421	-	-	78
COSTA RICA	420	-	-	70
QATAR	418	-	-	99
COLOMBIA	416	-	-	80
MEXICO	416	-	-	71
MONTENEGRO	411	-	-	85
GEORGIA	411	-	-	91
JORDAN	409	-	-	84
INDONESIA	403	-	-	68
BRAZIL	401	-	-	89
PERU	397	-	-	77
LEBANON	386	-	-	90
TUNISIA	386	-	-	65
MACEDONIA	384	-	-	85
KOSOVO	378	-	-	71
ALGERIA	376	-	-	69
DOMINICAN REPUBLIC	332	-	-	72

0 100 200 300 400 500

* +ABOVE -BELOW FINNISH/OECD AVERAGE | SD=STANDARD DEVIATION

PSJG = PEKING, SHANGHAI, JIANGSU, GUANGDONG | SOURCE: OECD, PISA 2015 DATABASE

ASSESSMENT

PISA 2015 is the sixth survey in the Programme for International Student Assessment (PISA) produced through the Organisation for Economic Co-operation and Development (OECD). PISA is a triennial survey which has been carried out since 2000, assessing learning outcomes in reading and mathematical and scientific literacy. The focus in the assessment rotates every assessment year. In 2006 and 2015 the focus was on scientific literacy. The focus area is assessed in detail while the other areas are looked at more briefly, mainly from the viewpoint of general developments in learning outcomes.

PISA 2015: This is the first time it was possible to assess developments in scientific literacy in a reliable way over a timespan of nearly a decade. Much of the science content in this survey is the same as in the PISA 2006 assessment. This makes it possible to examine trends in the different science content categories.

PISA SCIENTIFIC LITERACY ASSESSES COMPETENCIES NEEDED IN DAILY LIFE

Scientific literacy highlights, in a manner characteristic to PISA, the need to improve student proficiency and skills in using and interpreting science in all kinds of everyday situations. The PISA survey responds to this challenge by defining scientific literacy from four different angles. The context of each specific problem may range from the personal level of an individual to a level that encompasses the whole world. Three different types of competencies come into play when solving problems of a scientific nature, namely the ability to explain phenomena scientifically, to evaluate and design scientific enquiry and to interpret data and evidence scientifically. To be able to use these, the student must possess a sufficient level of proficiency and a specific attitudinal predisposition.

In order for the PISA scientific literacy test to measure comprehensively and reliably the students' ability to use and apply their scientific knowledge and skills, the range of tasks in the test must be wide and the situations must be as authentic as possible. This means that each question in the science test measures one scientific content category only: physical systems, living systems and earth and space. In Finland, these correspond to the in subject content of physics, chemistry, biology, health education and geography in the school curriculum.

In addition, each task belongs to one of the following cognitive processes: content knowledge (knowledge about the facts, concepts, ideas and theories related to the natural world, procedural knowledge (knowledge of the standard procedures that are the foundation of the diverse methods and practices used to establish scientific knowledge) and epistemic knowledge (an understanding of the rationale for the common practices of scientific enquiry, the status of the knowledge claims that are generated, and the meaning of foundational terms such as theory, hypothesis and data). A breakdown of the results is given in terms of overall results, and by content and process categories and by competencies.

BROAD AND COMPREHENSIVE SAMPLE

The target group used in the PISA 2015 assessment consisted of students who had reached or would reach the age of 15 in the course of the assessment year (i.e. those born between February 1999 and January 2000). The material was collected from 168 schools using uniform test arrangements. Altogether 6,431 students were randomly selected for the survey, and 93% of the sample students took part in the PISA test.

Owing to the nature of the sample, the likelihood of being selected for the PISA test varied from school to school, which may have resulted in a skewed sample composition relative to the basic population. This, along with potential distortions caused by non-response, was adjusted in the statistical analyses by using weighting coefficients from the sample for the schools and students. By using weighting coefficients, it was possible to reach an imputed situation in the sample that was comparable to the basic population. In the same context, it was verified that the outcomes related to the sample computed from the sample data could be compared both internationally and with earlier PISA data.

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