PISA IN FOCUS 15

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How "green" are today's 15-year-olds?

- Across OECD countries, around one in five students is consistently able to identify, explain and apply scientific concepts related to a variety of environmental topics. In Canada, Finland and Japan, over a third of 15-year-olds have high levels of environmental literacy.
- Students acquire most information about environmental issues from school, although only a minority of students learns about these issues in stand-alone environmental science courses.
- Schools are a crucial source of information on environmental issues for students. While in most countries only a minority of schools has courses dedicated to the environment, the issue is often discussed as part of other core curricula, and many schools offer out-of-school activities that focus on the environment.

In some countries a large proportion of students is knowledgeable about environmental issues…

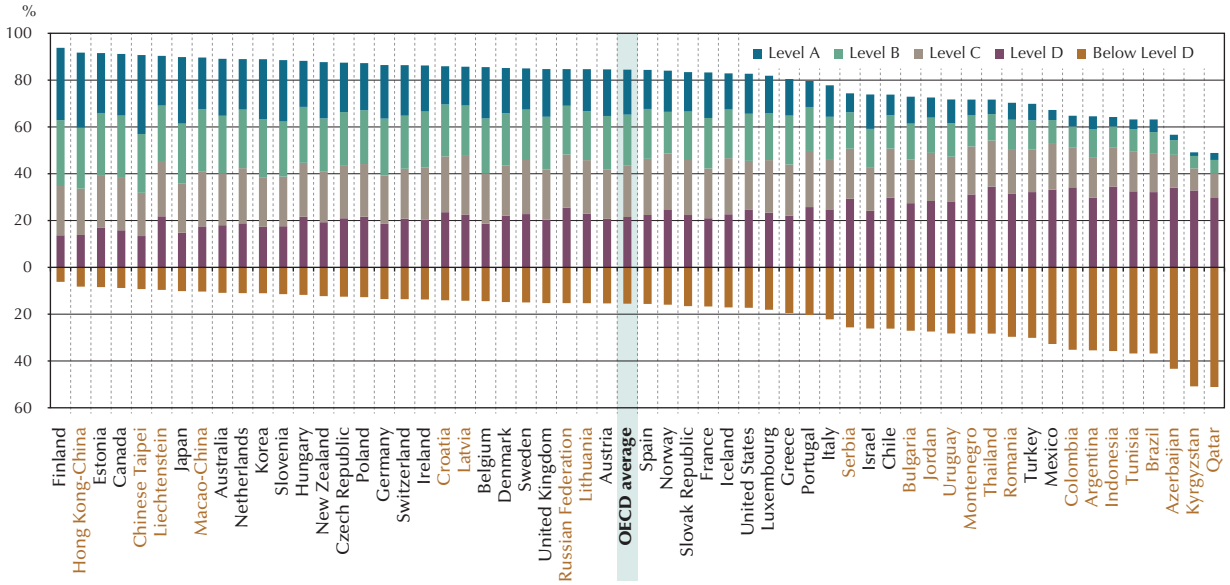
Today's students are growing up in a precarious natural environment. Climate change and the loss of biodiversity threaten the ecosystems that support life; a lack of clean water and sanitation imperils the health of hundreds of millions of people every day. While trained geoscientists, biologists and environmental scientists lead the way in shaping policies to reduce the impact of human activity on the global environment – and to have more equitable access to natural resources for all – informed citizens play an important role, too. Since individual actions have an impact on the environment, understanding scientific theories and being able to evaluate evidence can help people to make informed decisions about such daily choices as whether or not to leave the television on standby, what temperature to set the heat, and what kind of car to buy (or not). Learning about the environment early in a student's schooling can help to shape the way that person will interact with the environment as an adult.

How "green" are 15-year-olds? To what extent do they understand environmental issues? What are the sources of their information about the environment? And can they apply scientific principles and evidence to the world around them?

On average across OECD countries, 19% of 15-year-olds perform at the highest level of proficiency in environmental science on the PISA scale (Level A). At this level, students can consistently identify, explain and apply scientific knowledge related to a variety of environmental topics. They can link different information sources and explanations and use evidence from those sources to justify decisions about environmental issues. They clearly and consistently demonstrate advanced thinking and reasoning in science relevant to the environment. They can use this understanding to develop arguments in support of recommendations and decisions in both social and global situations. These highly proficient students represent a potential pool of well-informed, knowledgeable and analytically capable citizens. They could become the next generation of research scientists and innovators.

Among OECD countries, Canada, Estonia, Finland, Japan, Korea and Slovenia have particularly high proportions of students at this level. With few exceptions, between 15% and 31% of students in OECD countries perform at this highest level.

Percentage of students at each proficiency level on the environmental science performance scale



Students performing at proficiency Level A can consistently identify, explain and apply scientific knowledge related to a variety of environmental topics. They can link different information sources and explanations and use evidence from those sources to justify decisions about environmental issues. Students who perform below proficiency Level D have difficulties answering questions containing scientific information relevant to basic environmental phenomena or issues.

Note: Countries and economies are ranked in ascending order of the percentage of 15-year-olds below Level D.

Source: OECD, *PISA 2006 Database*.

...but in others, a large proportion of students is under-equipped to meet environmental challenges.

At the other end of the performance spectrum, a significant proportion of students cannot answer questions containing scientific information related to basic environmental phenomena or issues. These students score below the PISA baseline level of proficiency in environmental science (Level D). The proportion of 15-year-olds who perform poorly in environmental science is an important indicator of whether a country will have an adult population that has sufficient knowledge and understanding to respond to the environmental challenges of the future. Across OECD countries, an average of 16% of students perform below this baseline level of proficiency; in four OECD countries, 20% or more of students perform at this level. Meanwhile, more than half of all students in Kyrgyzstan and Qatar do not achieve the baseline level of proficiency. In contrast, in Canada, Estonia, Finland, Japan, the partner country Liechtenstein and the partner economies Chinese Taipei, Hong Kong-China and Macao-China, 10% or fewer of students perform below the baseline level of proficiency.

How is environmental science taught in school? Almost all students in OECD countries attend schools that teach environmental science as part of the science curriculum; only 2% of these students, on average, are in schools that do not. Greece and Japan are notable exceptions, where only 15% and 13% of students, respectively, are in schools whose principals reported that environmental science is not taught as part of the science curriculum. Across countries, only a minority of students attends schools where learning about environmental issues takes place in stand-alone courses on environmental topics. Most students acquire their knowledge about environmental science in courses in related subjects, such as natural science or geography.

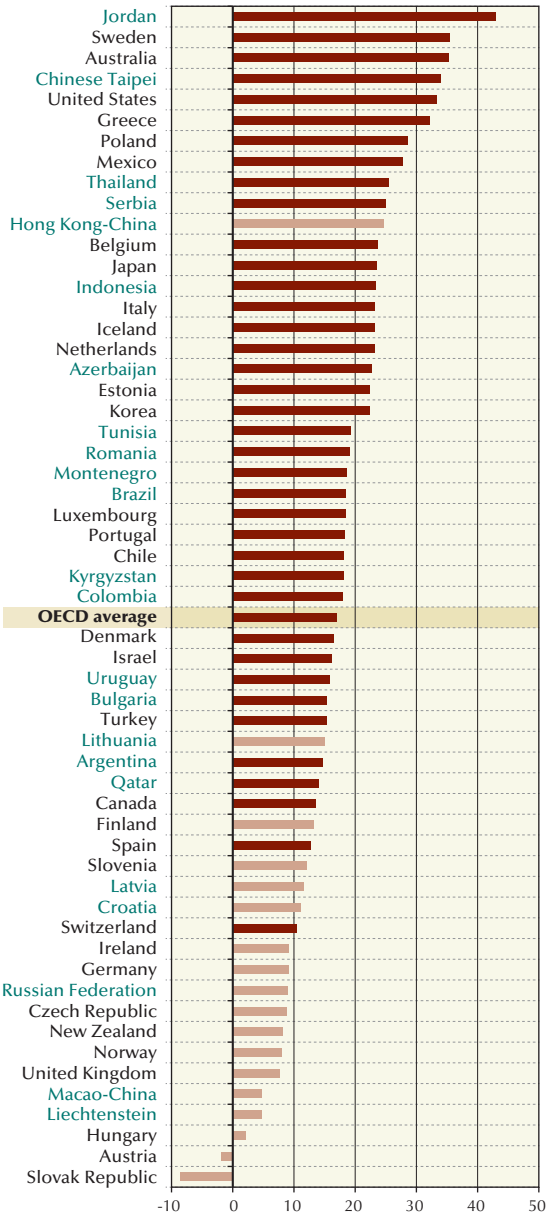
When the subject is the environment, teaching and learning methods are often innovative.

Increasingly, learning about the environment occurs outside the walls of the classroom. According to school principals, most 15-year-old students attend schools that use at least one out-of-classroom learning activity. Outdoor education is the activity most commonly reported, followed by trips to museums and science centres. On average, 77% of students in OECD countries attend schools that offer outdoor education, 75% are in schools that organise trips to museums, and 67% are in schools that conduct visits to science centres. However, the availability of such activities varies greatly across countries: in Japan, for example, 55% of students are in schools whose principal reported that none of these outside-school activities are made available to students, while in Portugal and the Slovak Republic, all schools offer at least one of these activities.

Classroom environment

Students who learn about the extinction of plants and animals at school do better in the PISA environmental science test.

Difference in PISA score points

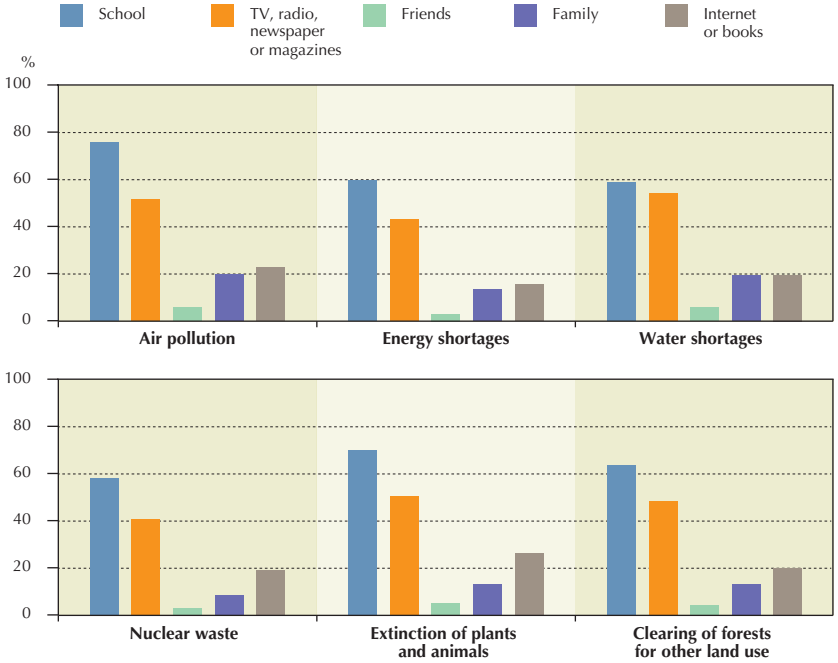


Note: Score-point differences take into account background variables. Statistically significant values are marked in a darker colour.

Source: OECD, *PISA 2006 Database*.

Schools play a pivotal role in building knowledge about such crucial environmental issues as air pollution, energy, extinction of plants and animals, deforestation, water shortages and nuclear waste. Students most often learn about these subjects in school. Higher-performing students also use the media and the Internet to broaden and deepen their knowledge. By building students' skills in environmental science and referring to the environment throughout the curriculum, schools can help to foster an interest in the subject that persists beyond the school gates and into adulthood.

Where do students get their information?



Source: OECD, *PISA 2006 Database*.

The bottom line: The actions of individuals have an impact on the environment. Students who learn about the environment at school are more knowledgeable about environmental issues and tend to seek more information about the environment from other sources, as well. Equipped with this knowledge, students are better prepared to make the difficult choices that will be required of them as they become adults in an increasingly threatened natural environment.

For more information

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See OECD (2009) *Green at Fifteen? How 15-year-olds Perform in Environmental Science and Geoscience in PISA 2006*, OECD Publishing.

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