Overview

The OECD's PISA 2006 assessment of the science competencies of 15-year-olds offers the first comprehensive international comparison of what students know about the environment and environment-related issues. This evidence comes at a time when global environmental challenges, such as climate change and biodiversity, have never been greater. Young people's knowledge, skills and attitudes in this area will be crucial in terms of the ability and willingness of a new generation to respond to these challenges.

PISA 2006 assessed the knowledge and skills of more than 400,000 students in 57 countries, and through questionnaires also collected a wealth of information about students and their views. The 2006 assessment focused on science and, as part of this, students were also given a range of tasks with an environmental context. The results can be used to consider the performance of students in environmental science and geoscience, alongside their attitudes to environmental issues and where their knowledge about these issues comes from. The survey also gives a rich profile of how students relate to various environmental issues, ranging from air pollution to water shortages.

Proficiency in environmental science and in geoscience were each rated at four levels. Students with the highest proficiency are at Level A; those with very basic proficiency are at Level D; some students do not show any measurable proficiency in these areas and are, therefore, below Level D.

BASIC PROFICIENCY AND ENVIRONMENTAL CITIZENSHIP

The number of students showing at least basic proficiency (Level D) indicates the extent to which education systems are giving young people at least some of the tools they will need as citizens to approach scientific and environmental issues. A basic understanding of such issues by voters, taxpayers and consumers would create crucial incentives for enterprises and public bodies to adopt environmentally-responsible behaviour.

Overall in OECD countries, the great majority of young people do have such proficiency, with an average of 84% reaching Level D in environmental science. Over 90% reach this level in Canada, Finland and in the partner countries and economies Chinese Taipei, Estonia, Hong Kong-China and Liechtenstein. However, in five OECD countries and most of the partner countries and economies, at least one in five students is below Level D.

While it is encouraging that the great majority of students in most countries are proficient at some level of environmental science and geoscience, proficiency is unevenly distributed across the population. Students from immigrant and more disadvantaged socio-economic backgrounds have, on average, significantly lower proficiency. Education systems need to do better if they wish to draw on the potential of all sections of society in relating to environmental questions as future citizens.

THE POOL OF HIGHLY PROFICIENT YOUNG PEOPLE

At the other end of the proficiency spectrum, 19% of students are proficient at Level A in environmental science and 14% in geoscience. This group of students can handle the most complex tasks and represents a pool of young people equipped with a high level of understanding of the environment, who may make a difference in helping to address environmental issues. While only a very small proportion of the population can be expected to become, specifically, environmental scientists, a much greater number will have jobs

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that interact with the environment, ranging from those involved in technological innovation to regulators and public officials. Ensuring that such knowledge workers and decision makers are proficient in addressing relevant scientific issues makes it more likely that environmental considerations are soundly addressed in the future.

The pool of highly proficient students varies significantly from one country to another. Most OECD countries have at least 15% of students proficient at Level A, but the figure is much higher, between one-quarter and just over one-third, in Canada, Finland, Japan, Korea and the partner countries and economies Chinese Taipei, Estonia, Hong Kong-China and Slovenia. This demonstrates to other countries that there is considerable scope for them to expand the pool of young people who are highly proficient in this area, and thus well positioned to contribute actively to the development of an environmentally sustainable economy.

There is also an indication in some countries that females are less likely to be active in this area than males, having lower levels of average performance in environmental science and thus being less likely to move towards environment-related careers. This is a potential pool of talent that could be tapped further.

ATTITUDES TO ENVIRONMENTAL CHALLENGES

Students across the world appear to be taking a strong interest in environmental issues, and to feel responsible for helping to improve environmental outcomes. All but a few say that they are familiar with basic issues such as pollution, while even on some more complex phenomena like the clearing of forests and its implications for land use, the great majority feel informed. Most students also say that they feel a strong sense of responsibility for the state of the environment, and that they would like others in their country to share such responsibility. An important reason for wanting such greater commitment is that most students are not at present optimistic about what the future will bring: only a minority forecast improvements in the environment in the next two decades.

High student interest in the environment reflects positively on education systems, especially considering that school is reported as the most common source of information about the environment. It appears that the importance of environmental issues to our future is being taken up by the next generation. However, students are not equally informed about all topics. For example, across OECD countries, only one student in three feels well informed about the use of genetically modified organisms. The PISA results allow each country to note which environmental issues its students appear to be engaged in, and which they may need to learn more about.

Student awareness of environmental issues tends to go hand in hand with their scientific knowledge and proficiency. Students who report the greatest familiarity with complex environmental phenomena tend also to have high levels of proficiency. The results do not prove that greater scientific knowledge directly leads to interest in the environment, or vice versa. However, an association between the two suggests that a joint emphasis of the curriculum on learning about why the environment matters and on building understanding of the scientific phenomena involved is possible. Moreover PISA also shows that students with lower performance in environmental science report greater optimism that the environment will improve in the future, suggesting that they may need more information about the environmental risks that lie ahead.

One encouraging finding is that students with more disadvantaged socio-economic status are no less likely to be committed to tackling environmental issues. This suggests that students from all backgrounds are taking an interest in environmental issues, and schools do not have to make extra efforts to persuade disadvantaged children that these issues are important, just to ensure that they do not fall behind in acquiring the knowledge and skills required to become proficient in addressing them.

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FROM WHERE DO STUDENTS GAIN THEIR KNOWLEDGE?

Students in PISA 2006 cite school as a place where they learn about the environment, more than any other source of such knowledge. The most common way in which they learn about the environment at school is in geography and science lessons which in the great majority of schools include environmentally-related topics. Many also include such topics in other subjects, and a minority have stand-alone lessons on environmental studies. Another source of environmental learning comes through trips and outdoor activities, but whereas these are common in some countries, they are relatively rare in others.

Outside school, the most common source of learning about the environment is through the media, followed by the Internet and books, and lastly family and friends. The evidence shows that higher performing students are more likely to combine information from school and the media, Internet and books to find out about the environment.

Thus, strong student interest and proficiency in addressing environmental issues is related with learning about science as well as with wide exposure to environmental questions across the curriculum and in extra-curricular activities, as well as through independent learning. Schools are well positioned to encourage this by incorporating environmental topics in various subject areas and in extra-curricular activities. They can also encourage students to take a wider interest in these topics outside school.

CREATING AN ENVIRONMENTALLY COMPETENT GENERATION

PISA 2006 shows a widespread level of engagement in environmental issues by 15-year-old students all over the world. The great majority can tackle environmental questions at least at some level, say they are familiar with and feel responsibility for key environmental issues and have had exposure to these issues in multiple ways at school and beyond. There remains, however, much scope for improving proficiency in this area, especially among students from disadvantaged backgrounds. The notion of competence in this area includes not just cognitive abilities but also motivational and behavioural factors. An environmentally competent generation of young people will need both to understand the science of the environment and to have the interest and willingness to address the problems that it raises. There is huge scope for education systems to help develop such competence.

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