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i n F o c u s

Are students ready to take on environmental challenges?

Programme for International Student Assessment



Are students ready to take on environmental challenges?

- Student performance in environmental science items did not improve between 2006 and 2015 in most countries/economies participating in PISA.
- In 20 out of 26 countries/economies with available data in PISA 2018, students had more difficulty identifying a short-term response to sea level rise caused by global warming than a long-term response.
- On average across countries/economies, about half of students are environmentally enthusiastic, i.e., they reported having the pro-environmental attitudes measured in PISA 2018 (environmental sense-of-purpose, environmental awareness, and self-efficacy in environmental understanding¹). By contrast, about 6% of students are environmentally indifferent, i.e., do not display any of the pro-environmental attitudes considered in PISA 2018.
- Environmentally enthusiastic students scored about 80 points higher in science than environmentally indifferent students, on average, after accounting for student socio-economic status.
- Students are more likely to take action for the environment when they have pro-environmental attitudes. However, the share of environmentally enthusiastic students who do not take part in environmental actions ranges from 22% to 70%, depending on the type of action.

Young people will experience the consequences of climate and environmental change more directly during their lifetime than any previous generation in recent history (Thiery et al., 2021^[1]). The newly released PISA report, *Are Students Ready to Take on Environmental Challenges?* (OECD, 2022^[2]), shows that countries and economies vary in how prepared their 15-year-old students are for the urgent environmental challenges that humanity is facing. This PISA in Focus summarises key results discussed in this report, which identifies education policies and practices that can help prepare students build an environmentally sustainable future.

Strengthen environmental knowledge and skills

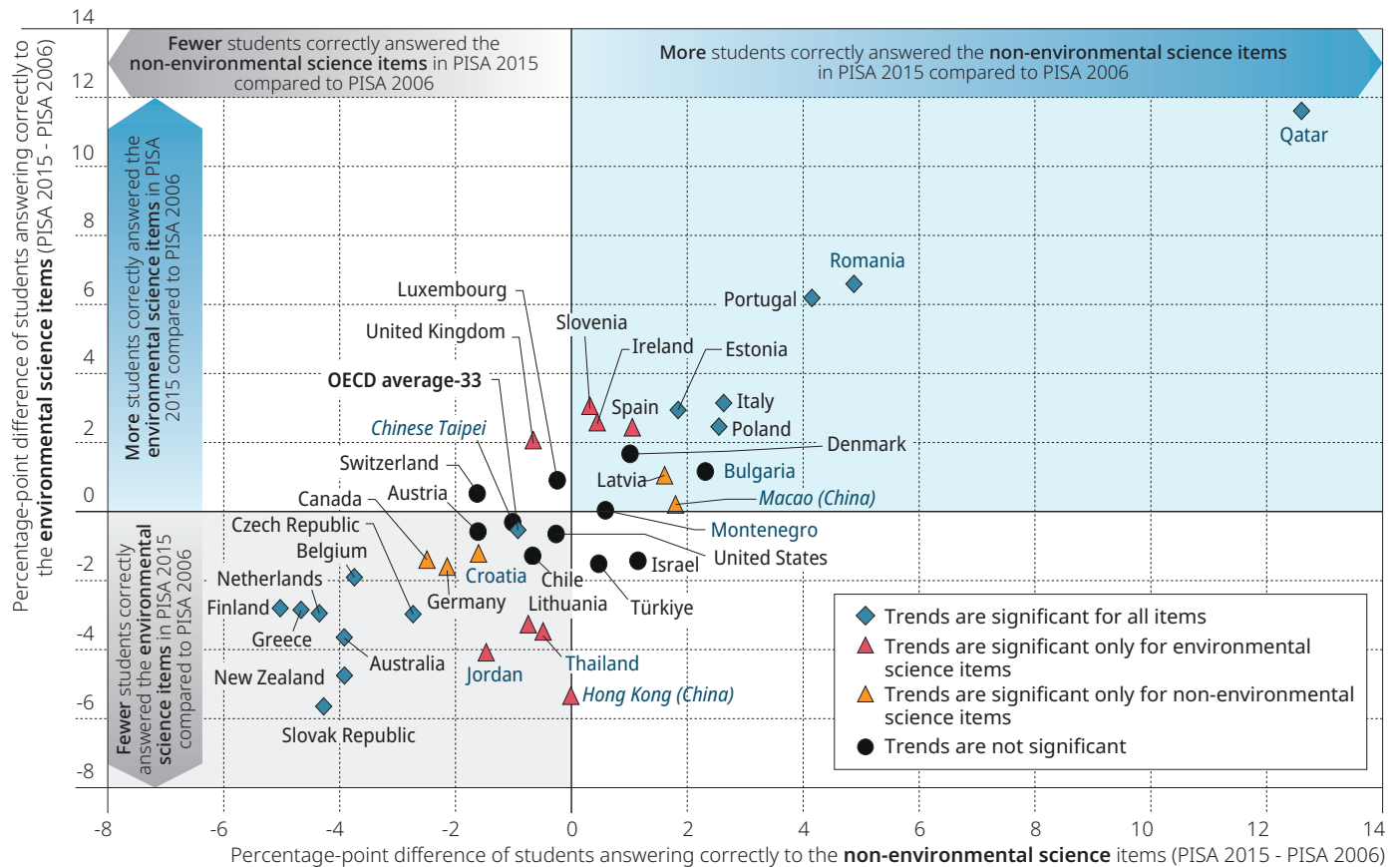
PISA data show that student knowledge of and skills in environmental issues varies markedly across countries and economies. Whereas in some countries/economies (Canada, Hong Kong [China], Scotland [United Kingdom], Singapore, Spain and Chinese Taipei) most students were able to respond correctly to a set of questions on environmental sustainability included in PISA 2018 on average,

in others only a minority of students were able to do so (Albania, Indonesia, Kazakhstan, Morocco, Panama and the Philippines).

Low performance is more pronounced among lower-income countries and economies (OECD, 2019^[3]), some of which are also the most vulnerable to disruptions caused by climate change (IPCC, 2022^[4]).

Furthermore, student performance in environmental science items has not improved over time. Between PISA 2006 and PISA 2015, the percentage of students who answered correctly on average across environmental science trend items decreased by 0.5 percentage point on average across OECD countries. Performance in environmental science improved the most in Portugal, Qatar and Romania, and declined the most in Hong Kong (China) and the Slovak Republic over this period. A similar moderate decline is also observed for non-environmental science items: the proportion of correct responses declined by 0.9 percentage points on average across the non-environmental science items that allow for performance to be compared on average across OECD countries.

Change between PISA 2006 and PISA 2015 in the percentage of students answering correctly environmental and non-environmental science items



Note: Only countries and economies that have comparable data between 2006 and 2015 are shown in this figure.

Source: OECD, PISA 2006 and PISA 2015 Databases, Table B.2.3.

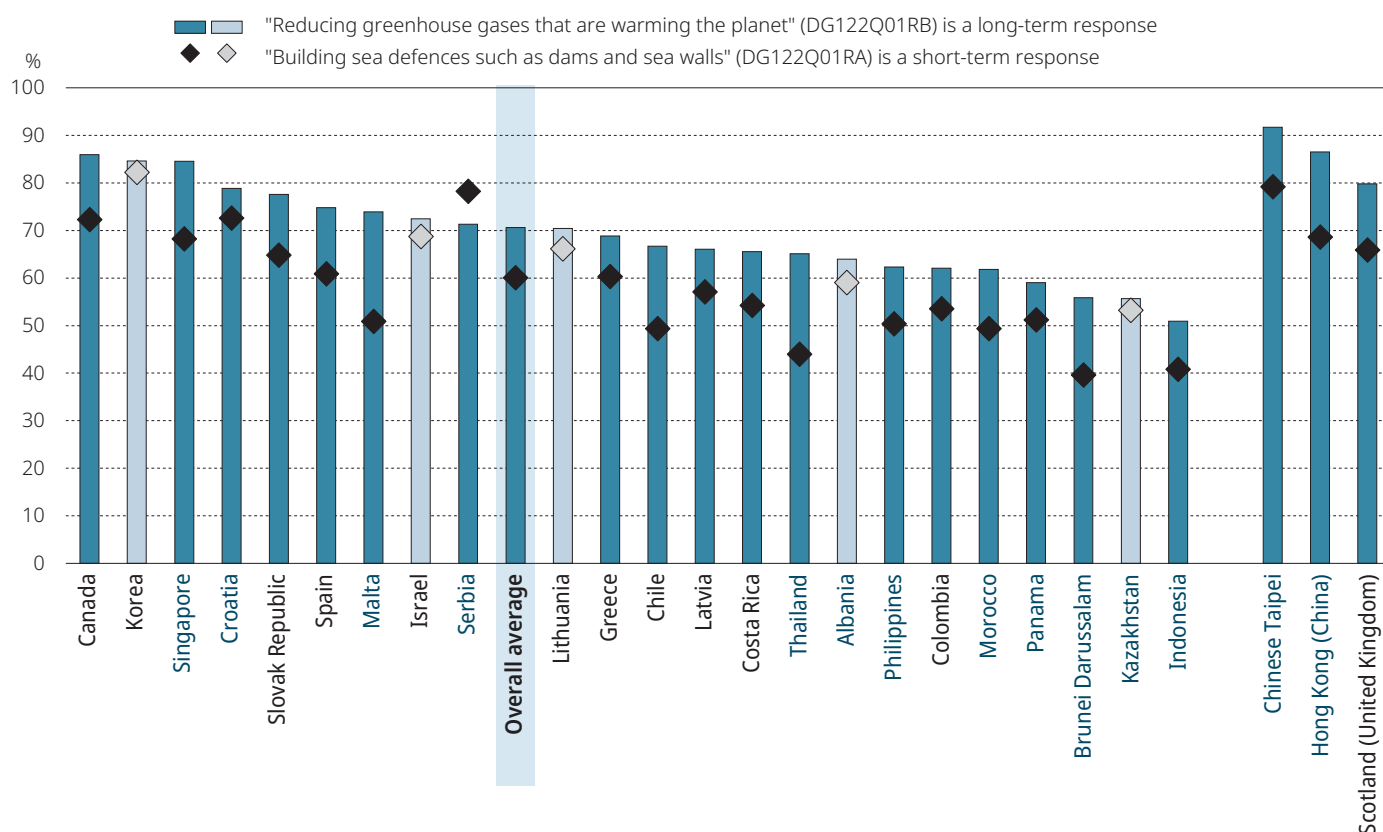
StatLink <https://stat.link/smne9>

One area educators could focus on is students' understanding of different responses to climate change. An analysis of the item "Rising sea levels", included in PISA 2018 in the optional Global Competence assessment, shows that it is common knowledge to 15-year-old students that reducing greenhouse gases is a long-term solution to global warming. However, in most countries and economies

participating in the assessment, a smaller share of students correctly identified that building sea defences as a short-term solution. This reveals a need for more complex and nuanced differentiation between combatting climate change and adaptation to its effects.

Example of environmental sustainability item: Rising sea levels

Percentage of students who correctly responded to the following sub-items of Rising sea levels



Note: Statistically significant differences between the percentage of students who correctly responded to item DG122Q01RA and those to item DG122Q01RB are shown in a darker tone.

Countries and economies are ranked in descending order of the percentage of students who correctly identified the sub-item DG122Q01RB as a long-term response.

Source: OECD, PISA 2018 Database, Table B.2.31.

StatLink <https://stat.link/2f1tev>

Foster pro-environmental attitudes and values at school

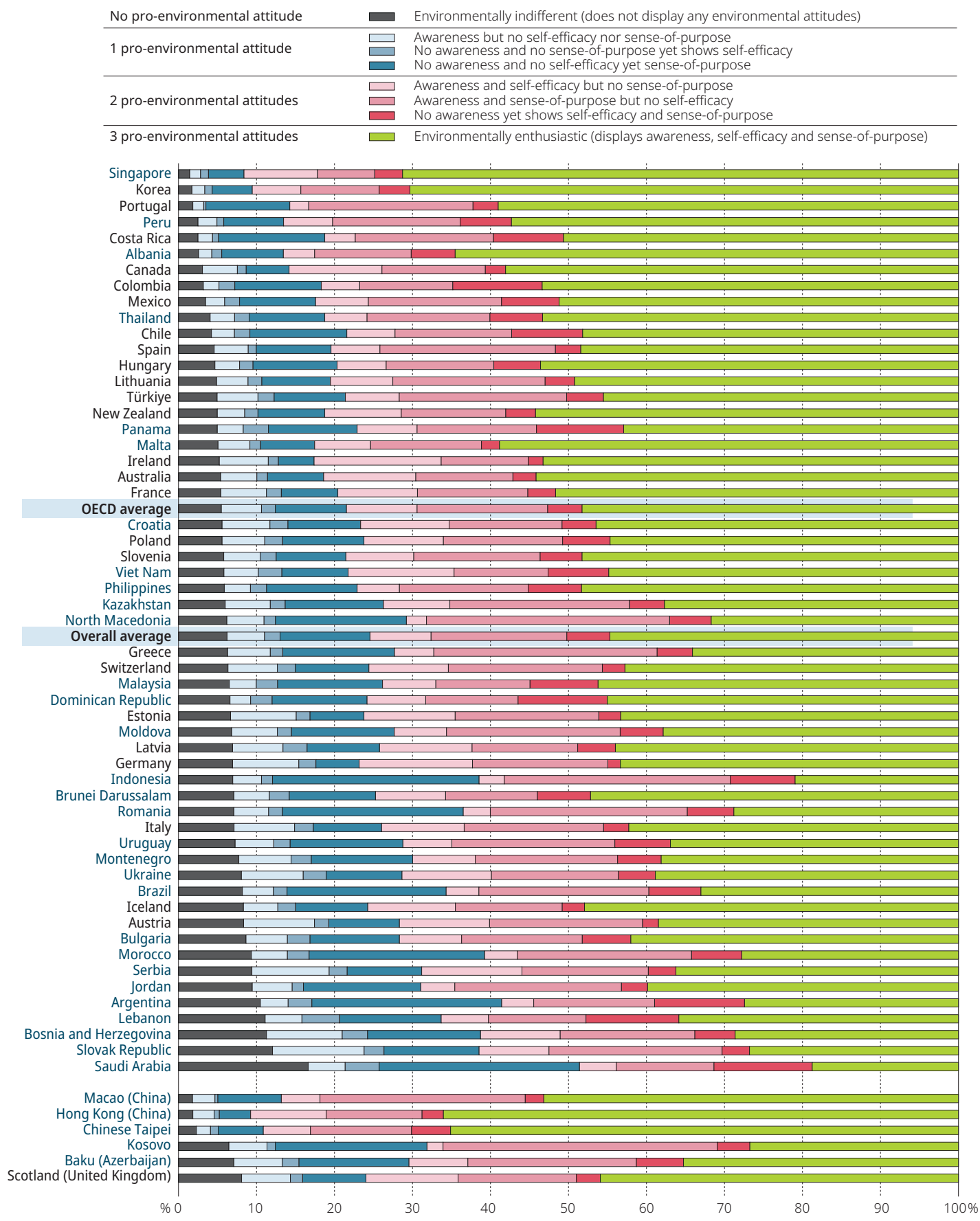
Pro-environmental attitudes are prevalent across countries and economies. Almost half of students in PISA 2018 are “environmentally enthusiastic”, meaning that they reported having a sense of stewardship of the planet, awareness of climate change and confidence in their environmental understanding on average across countries and economies. However, many students reported that looking after the global environment is not important for them (more than 30% of students in Austria, Bosnia and Herzegovina, Germany, Serbia, the Slovak Republic and Ukraine) and that they know little or have never heard of climate change and global warming (more than 40% of students in Argentina,

Indonesia, Lebanon, Morocco and Saudi Arabia). This shows that there is still room to boost adolescents’ environmental attitudes and values.

Pro-environmental attitudes and science proficiency tend to reinforce each other: students’ environmental science knowledge and skills, as measured by their performance in the PISA science test, are positively related to pro-environmental attitudes. Pro-environmental attitudes can foster curiosity and motivation for learning science; at the same time, scientific understanding of the environment lays the foundation for pro-environmental attitudes. In either case, quality science education for all students has the potential of improving the overall level of student proficiency in environmental science and student endorsement of pro-environmental attitudes.

Pro-environmental attitudes in PISA 2018

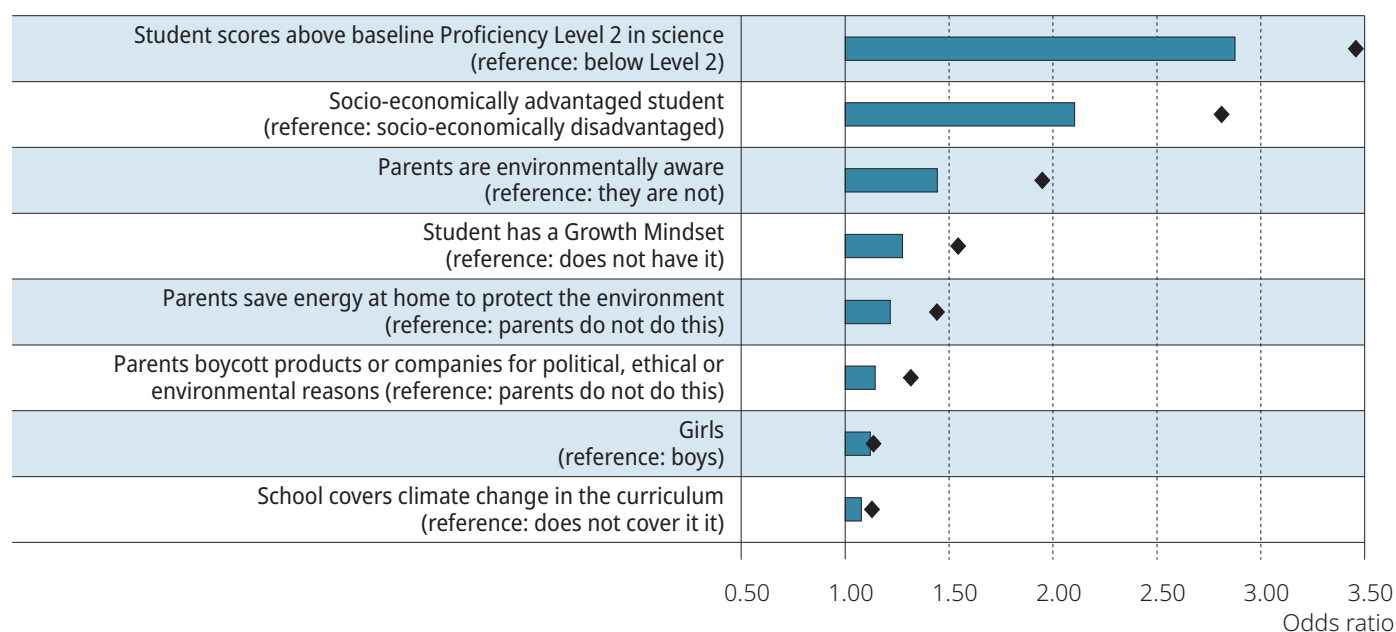
Percentage of students who display different combinations of environmental attitudes



Likelihood of being an environmentally enthusiastic student

Increased likelihood of being an environmentally enthusiastic student, by student characteristics, before and after accounting for other variables; Overall average

- ◆ Before accounting for other variables
- After accounting for other variables



Notes: All odds ratio are statistically significant.

Odds ratios "after accounting for other variables" come from a logistic regression that includes as predictors all variables shown in the figure. Student, school and parental characteristics are ranked in descending order of the odds ratio after accounting for other variables.

Source: OECD, PISA 2018 Database, Table B.3.24.

StatLink <https://stat.link/ve8xdn>

Foster responsible acting for the environment at and outside of school

Being prepared for today's environmental challenges also requires students to responsibly act on climate change. PISA 2018 collected data on students' reports on their involvements in five environmental actions. On average across countries/economies, about a fifth of students were "actively involved" in environmental actions (i.e., participated in four or five environmental actions) and a similar share of students were "entirely uninvolved" (i.e., did not participate in any of the five environmental actions considered in PISA 2018).

Pro-environmental attitudes are positively related to student involvement in environmental actions. Students with an environmental sense-of-purpose, in particular, are more likely to carry out different types of environmental actions. This is good news because, on average, some 8 out of 10 students reported that they care about the environment. But this sense-of-purpose is unevenly distributed in terms of socio-economics and gender: students who are

girls and/or socio-economically advantaged are more likely to have an environmental sense-of-purpose than those who are boys and/or socio-economically disadvantaged. More efforts are needed to target these groups.

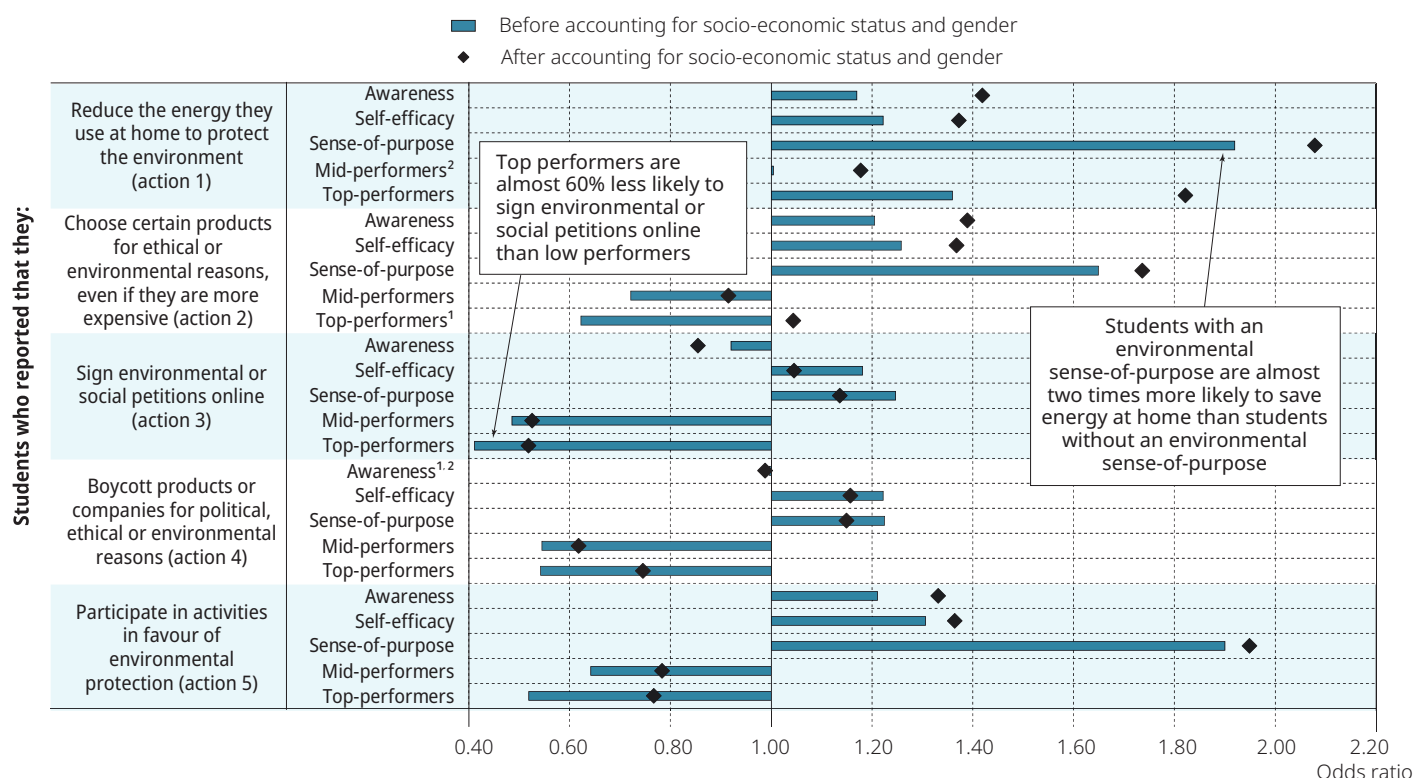
Environmental awareness and self-efficacy in environmental understanding also nudge students toward acting on climate change.

A worrying phenomenon called environmental misalignment occurs when students are enthusiastic about environmental issues but do not take action to protect the environment. The share of environmentally enthusiastic students who do not take part in environmental actions ranges from 22% (for those who do not save energy at home) to 70% (for those who do not boycott companies or products) on average across countries/economies.

Significantly, environmental misalignment is less likely to occur when students are in close contact with school peers or parents involved in environmental actions. This suggests that environmental education initiatives that target school communities as a whole and not just individuals are promising.

Student involvement in environmental actions, environmental attitudes and proficiency in science

Increased likelihood of students' involvement in environmental actions, by student pro-environmental attitudes proficiency in science, after accounting for socio-economic status and gender; Overall average



Note: The results shown in the figure account for students' socio-economic status and gender.

1. Odds ratio for before accounting for socio-economic status and gender is not statistically significant.

2. Odds ratio for after accounting for socio-economic status and gender is not statistically significant.

Source: OECD, PISA 2018 Database, Tables B.4.11 to B.4.15.

StatLink <https://stat.link/cqxuhm>

The bottom line

PISA data show varying levels of environmental knowledge and skills, attitudes and actions among 15-year-old students across countries/economies. Students need stronger scientific knowledge and skills in environmental issues than they currently have, especially in countries and economies where student performance in science tends to be lower. Better performers in science have, on average, more pro-environmental attitudes than lower-performing students, and students with pro-environmental attitudes are more likely to take part in actions that benefit the environment. If schools help students find an environmental sense-of-purpose, this can mobilise their knowledge and propel them into action. Environmental education initiatives that target school communities as a whole and not just individuals are promising.

Note

1. As defined in this report, students with an environmental sense-of-purpose are students who reported that looking after the global environment is important to them. Environmentally aware students are students who reported that they know something about or are very familiar with climate change and global warming. Students with self-efficacy in environmental understanding are students who reported that they could explain how carbon-dioxide emissions affect global climate change easily or with a bit of effort. Each of these pro-environmental attitudes were measured in PISA 2018 using a single questionnaire item. This means they are proxy measures that capture part of each construct but do not cover every aspect of it. For example, environmental awareness and self-efficacy use questions asking about climate change, but more robust measures might want to include topics such as bio-diversity loss, pollution, invasive species, genetic modification, etc. PISA will improve its measurement of pro-environmental attitudes in the context of the new PISA 2025 Science Framework, which will include “scientific identity” as a new dimension of the assessment (OECD, 2020_[5]).

For more information

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See:

- IPCC** (2022), *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. [4]
- OECD** (2022), *Are Students Ready to Take on Environmental Challenges?*, <https://doi.org/10.1787/8abe655c-en>. [2]
- OECD** (2020), *PISA 2024 Strategic Vision and Direction for Science*, <https://www.oecd.org/pisa/publications/PISA-2024-Science-Strategic-Vision-Proposal.pdf>. [5]
- OECD** (2019), *PISA 2018 Results (Volume I): What Students Know and Can Do*, PISA, OECD Publishing, Paris, <https://doi.org/10.1787/5f07c754-en>. [3]
- Thiery, W. et al.** (2021), “Intergenerational inequities in exposure to climate extremes”, *Science*, Vol. 374/6564, pp. 158-160, <https://doi.org/10.1126/science.abi7339>. [1]

PISA collects reliable and comparable data from participating countries and territories. Following OECD data regulations, a visual separation between countries and territories has been used in all charts to reduce the risk of data misinterpretation.

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