

PISA

PISA 2022 Results

Factsheets

Germany



Germany

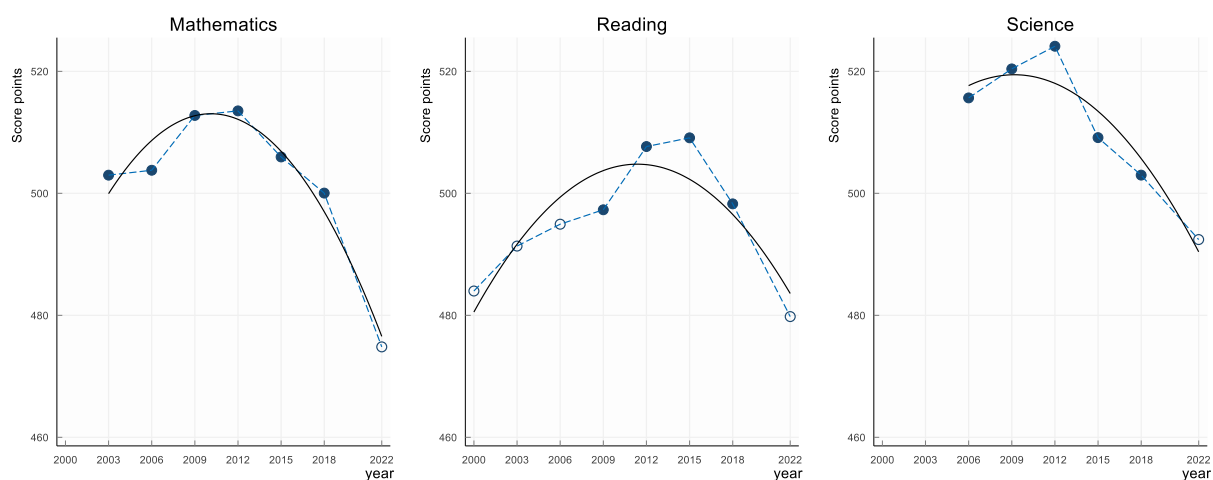
A German version of this Country Note is available at this [link](#).

The Programme for International Student Assessment (PISA) assesses the knowledge and skills of 15-year-old students in mathematics, reading and science. The tests explore how well students can solve complex problems, think critically and communicate effectively. This gives insights into how well education systems are preparing students for real life challenges and future success. Germany participated for the first time in PISA in 2000. By comparing results internationally, policy makers and educators in Germany can learn from other countries' policies and practices.

How well did 15-year-old students in Germany do on the test?

Trends in mathematics, reading and science performance

Figure 1. Trends in performance in mathematics, reading and science



Note: White dots indicate mean-performance estimates that are not statistically significantly above/below PISA 2022 estimates. Black lines indicate the best-fitting trend. An interactive version of this figure is available at <https://oecdch.art/a40de1dbaf/C074>.

Source: OECD, PISA 2022 Database, Tables I.B1.5.4, I.B1.5.5 and I.B1.5.6.

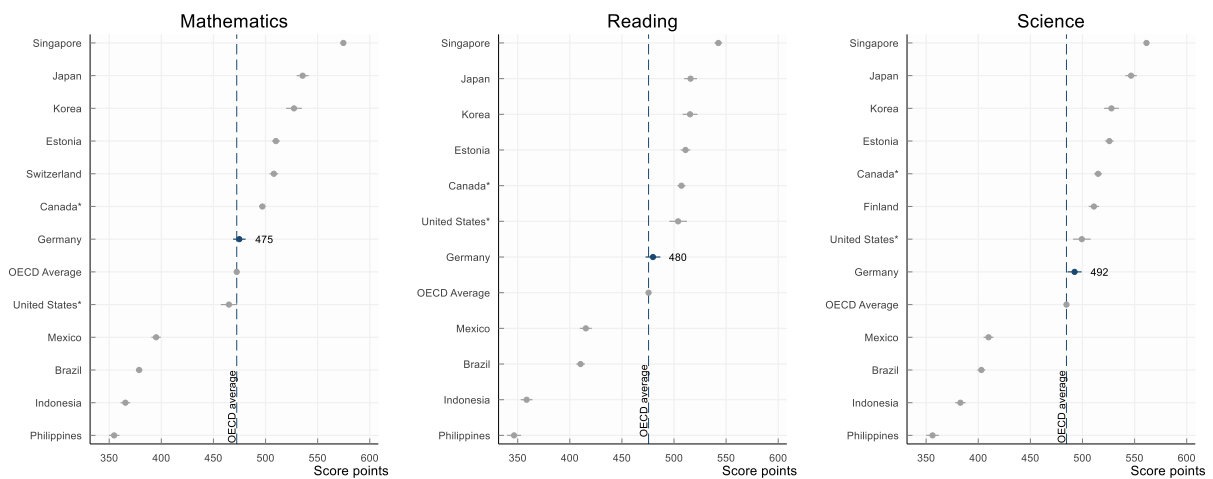
- Average 2022 results were down compared to 2018 in mathematics, reading and science.
- Overall, 2022 results are the lowest ever measured by PISA in all three subjects. The difference between 2018 and 2022 mean scores in mathematics and reading is about the same size as the typical gain that students make, around the age of 15, over an entire school year. But the steep decline in mean scores between 2018 and 2022 confirmed and reinforced a trend reversal that began earlier, around 2012 or 2015 (depending on the subject).

- Over the most recent period (2018 to 2022), the gap between the highest-scoring students (10% with the highest scores) and the weakest students (10% with the lowest scores) did not change significantly in mathematics, reading and science. In mathematics, performance dropped to a similar extent for both high- and low-achievers.
- Compared to 2012 the proportion of students scoring below a baseline level of proficiency (Level 2) increased by 12 percentage points in mathematics; by 11 percentage points in reading; and by 11 percentage points in science.

How does Germany compare?

Figure 2. Mean performance in mathematics, reading and science in PISA 2022

Germany, OECD average and selected comparison countries



Notes: Comparison countries include the six highest-performing countries in each subject and the five countries with the largest population of 15-year-old students.

Horizontal lines that extend beyond the markers represent a measure of uncertainty associated with mean estimates (the 95% confidence interval).

Source: OECD, PISA 2022 Database, Tables I.B1.2.1, I.B1.2.2 and I.B1.2.3.

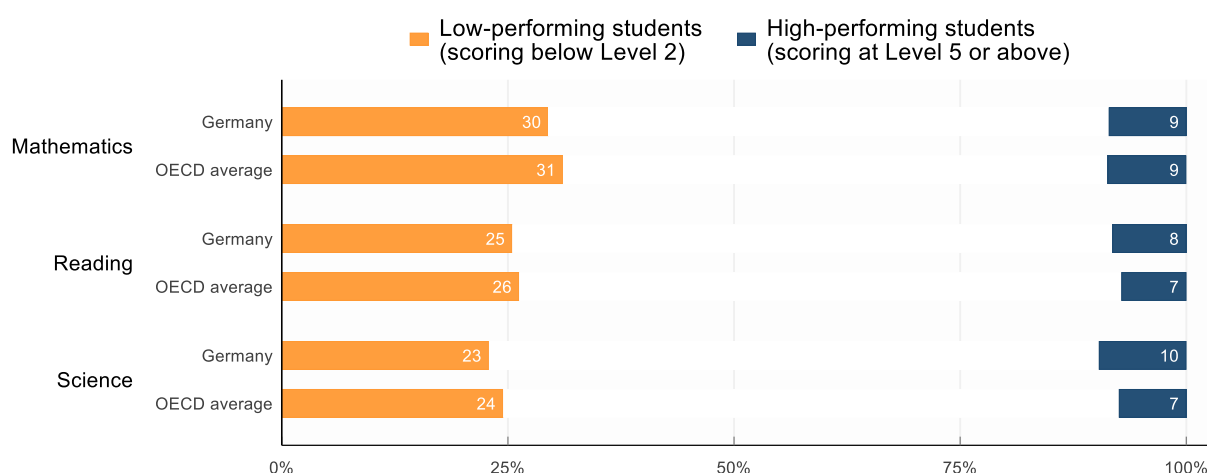
- Students in Germany scored close to the OECD average in mathematics and reading, and higher than the OECD average in science.
- A similar number of students in Germany, to the average across OECD countries, were top performers (Level 5 or 6) in at least one subject. At the same time a larger proportion of students than on average across OECD countries achieved a minimum level of proficiency (Level 2 or higher) in all three subjects.

What students know and can do in mathematics

- In Germany, 70% of students attained at least Level 2 proficiency in mathematics (OECD average: 69%). At a minimum, these students can interpret and recognize, without direct instructions, how a simple situation can be represented mathematically (e.g. comparing the total distance across two alternative routes, or converting prices into a different currency). Over 85% of students in Singapore, Macao (China), Japan, Hong Kong (China)*, Chinese Taipei and Estonia (in descending order of that share) performed at this level or above.

- Some 9% of students in Germany were top performers in mathematics, meaning that they attained Level 5 or 6 in the PISA mathematics test (OECD average: 9%). Six Asian countries and economies had the largest shares of students who did so: Singapore (41%), Chinese Taipei (32%), Macao (China) (29%), Hong Kong (China)* (27%), Japan (23%) and Korea (23%). At these levels, students can model complex situations mathematically, and can select, compare and evaluate appropriate problem-solving strategies for dealing with them. Only in 16 out of 81 countries and economies participating in PISA 2022 did more than 10% of students attain Level 5 or 6 proficiency.

Figure 3. Top performers and low-performing students in mathematics, reading and science



Note: Numbers inside the figure correspond to percentages.

Source: OECD, PISA 2022 Database, Tables I.B1.3.1, I.B1.3.2 and I.B1.3.3.

What students know and can do in reading

- Some 75% of students in Germany attained Level 2 or higher in reading (OECD average: 74%). At a minimum, these students can identify the main idea in a text of moderate length, find information based on explicit, though sometimes complex criteria, and can reflect on the purpose and form of texts when explicitly directed to do so. The share of 15-year-old students who attained minimum levels of proficiency in reading (Level 2 or higher) varied from 89% in Singapore to 8% in Cambodia.
- In Germany, 8% of students scored at Level 5 or higher in reading (OECD average: 7%). These students can comprehend lengthy texts, deal with concepts that are abstract or counterintuitive, and establish distinctions between fact and opinion, based on implicit cues pertaining to the content or source of the information.

What students know and can do in science

- Some 77% of students in Germany attained Level 2 or higher in science (OECD average: 76%). At a minimum, these students can recognize the correct explanation for familiar scientific phenomena and can use such knowledge to identify, in simple cases, whether a conclusion is valid based on the data provided.
- In Germany, 10% of students were top performers in science, meaning that they were proficient at Level 5 or 6 (OECD average: 7%). These students can creatively and autonomously apply their knowledge of and about science to a wide variety of situations, including unfamiliar ones.

A special edition of PISA

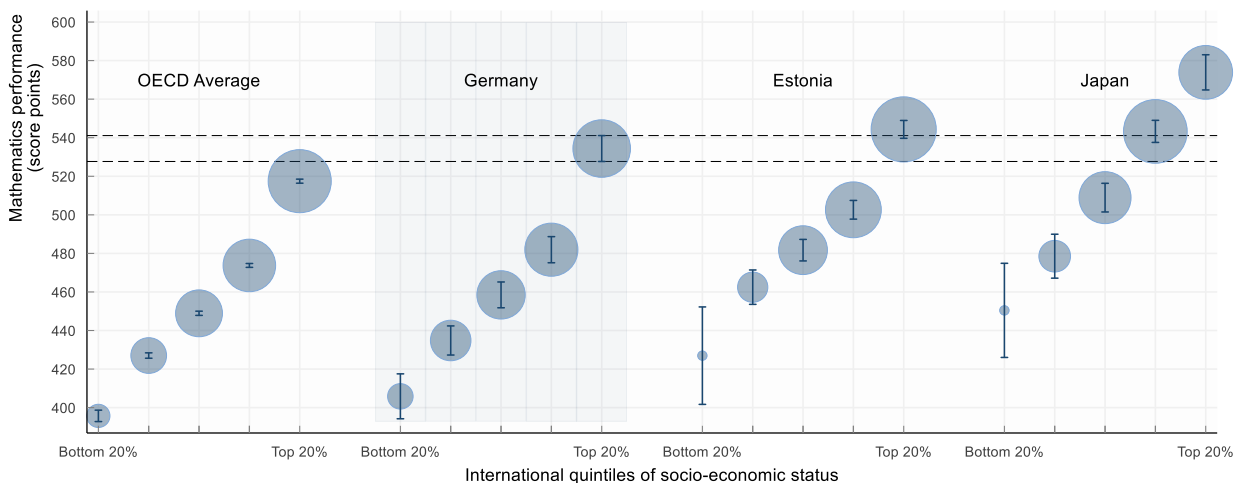
This PISA test was originally due to be conducted in 2021 but was delayed by one year because of the COVID-19 pandemic. The exceptional circumstances throughout this period, including lockdowns and school closures in many countries, led to occasional difficulties in collecting some data. While the vast majority of countries and economies met PISA's technical standards, a small number did not. A country or economy in this note with an asterisk (*) next to its name means that caution is required when interpreting estimates because one or more PISA sampling standards were not reached. Further information can be found in the Reader's Guide and in Annexes A2 and A4 of the main report.

In Germany, all data met the quality standards set by PISA and were considered fit for reporting.

Performance gaps within Germany

Socio-economic divides

Figure 4. Mean performance in mathematics, by international quintiles of socio-economic status



Note: The size of markers is proportional to the share of the student population within each quintile of socio-economic status (as determined by the PISA index of economic, social and cultural status, ESCS). Quintiles are defined at the international level, to include 20% of PISA participants in each quintile; within each national sample, the proportion can therefore differ from 20%.

Vertical bars that extend beyond the markers represent a measure of uncertainty associated with each estimate (the 95% confidence interval). Horizontal, dashed lines represent the uncertainty associated with the mean score of the largest group of students (as defined by international quintiles) within Germany.

Source: OECD, PISA 2022 Database, Tables I.B1.4.6 and I.B1.4.8.

- The PISA index of economic, social and cultural status is computed in such a way that all students taking the PISA test, regardless of the country where they live, can be placed on the same socio-economic scale. This means that it is possible to use this index to compare the performance of students of similar socio-economic background in different countries. In Germany, 31% of students (the largest share) were in the top international quintile of the socio-economic scale, meaning that they were among the most advantaged students who took the PISA test in 2022. Their average

score in mathematics was 534 score points; one of the highest for students of similar socio-economic background.

- The PISA index of economic, social and cultural status can also be used to order students from the most disadvantaged to the most advantaged within each country and economy, and to create four groups of students of equal size (each comprising 25% of the population of 15-year-old students in each country/economy). In Germany socio-economically advantaged students (the top 25% in terms of socio-economic status) outperformed disadvantaged students (the bottom 25%) by 111 score points in mathematics. This is larger than the average difference between the two groups (93 score points) across OECD countries.
- Between 2012 and 2022, the gap in mathematics performance between the top and the bottom 25% of students in terms of socio-economic status remained stable in Germany, as well as across OECD countries on average.
- Socio-economic status was a predictor of performance in mathematics in all PISA participating countries and economies. It accounted for 19% of the variation in mathematics performance in PISA 2022 in Germany (compared to 15% on average across OECD countries).
- Some 10% of disadvantaged students in Germany were able to score in the top quarter of mathematics performance. These students can be considered academically resilient because, despite their socio-economic disadvantage, they have attained educational excellence by comparison with students in their own country. On average across OECD countries, 10% of disadvantaged students scored in the top quarter of mathematics performance in their own countries.

Gender differences in performance

- Boys outperformed girls in mathematics by 11 score points; girls outperformed boys in reading by 19 score points in Germany. Globally, in mathematics, boys outperformed girls in 40 countries and economies, girls outperformed boys in another 17 countries or economies, and no significant difference was found in the remaining 24. In reading, girls, on average, scored above boys in all but two countries and economies that participated in PISA 2022 (79 out of 81).
- In Germany, the share of low performers is similar among boys (28%) and girls (31%) in mathematics; in reading, however, the share is larger among boys (22% of girls and 29% of boys scored below Level 2 in reading). When it comes to top performers, the share is larger among boys (10%) than among girls (7%) in mathematics; in reading, however, the share is larger among girls (9% of girls and 7% of boys scored at Level 5 or 6 in reading).
- Between 2012 and 2022, performance in mathematics declined to a similar extent among boys and girls in Germany.

Immigrant background and student performance

- Immigrant students are defined as students whose parents were born in a country/economy other than that where the student took the PISA test. Students with an immigrant background can be distinguished between first- and second-generation immigrants. First-generation immigrants are those who were also born outside the country of assessment; second-generation students are students born in the country of assessment but whose parent(s) were born outside the country of assessment.
- The share of immigrant students has increased in Germany to 26% in 2022 (13% in 2012). In 2022, 9% of 15-year-old students were first-generation immigrants, meaning that they were born in another country/economy, and their families moved to Germany only in recent years. Among these

first-generation immigrant students, 19% arrived in Germany at or before age 5; 20% arrived after age 12, and after completing the elementary grades in another education system.

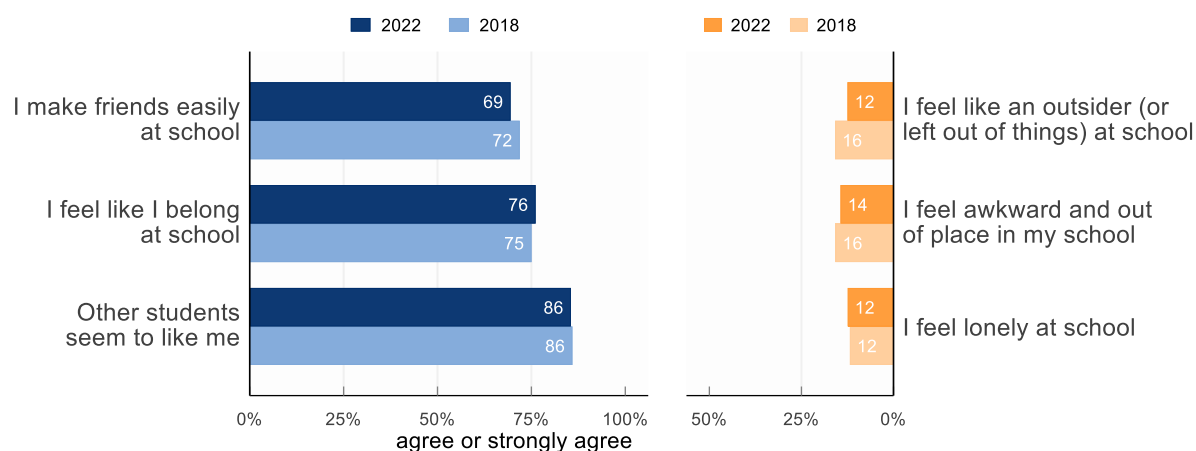
- Immigrant students in Germany tend to have a more disadvantaged socio-economic profile than non-immigrant students; while 25% of all students are considered socio-economically disadvantaged, the corresponding share among students with an immigrant background is 42%. Some 63% of immigrant students (and 5% of all remaining students) reported that the language they speak at home most of the time is different from the language in which they took the PISA assessment.
- In mathematics, the average difference in performance between immigrant and non-immigrant students was 59 score points in favour of non-immigrant students, a significant difference. After accounting for students' socio-economic profile, a significant difference of 32 score points in favour of non-immigrant students was observed.
- In reading, the average difference in performance between immigrant and non-immigrant students was 67 score points in favour of non-immigrant students, a significant difference. After accounting for students' socio-economic profile, a significant difference of 40 score points in favour of non-immigrant students was observed.

How is school life in Germany?

Students' sense of belonging at school and satisfaction with life

- In 2022, 69% of students in Germany reported that they make friends easily at school (OECD average: 76%) and 76% felt that they belong at school (OECD average: 75%). Meanwhile, 12% reported feeling lonely at school, and 12% like an outsider or left out of things at school (OECD average: 16% and 17%). Compared to 2018, students' sense of belonging at school did not change significantly in Germany.
- Students' satisfaction with life, more generally, declined in many countries and economies over recent years. In 2022, 22% of students in Germany reported that they were not satisfied with their lives: they rated their satisfaction with life between 0 and 4 on a scale ranging from 0 to 10. In 2018, fewer students were not satisfied with life (17%). On average across OECD countries, the proportion of students who are not satisfied with life increased from 11% in 2015 to 16% in 2018 and 18% in 2022.

Figure 5. Students' sense of belonging at school



Note: Numbers inside the figure correspond to percentages.

Source: OECD, PISA 2022 Database, Table II.B1.1.4.

Support and discipline in mathematics lessons

- In Germany, 60% of students reported that, in most mathematics lessons, the teacher shows an interest in every student's learning (OECD average: 63%), and 73% that the teacher gives extra help when students need it (OECD average: 70%). In 2012, the corresponding shares were 49% and 70%. Mathematics results in 2022 tended to decline less, on average, in education systems where more students reported that teachers give extra help when students need it, compared to ten years earlier.
- Many students study mathematics in a disciplinary climate that is not favourable to learning: in 2022, about 28% of students in Germany reported that they cannot work well in most or all lessons (OECD average: 23%); 38% of students do not listen to what the teacher says (OECD average: 30%); 28% of students get distracted using digital devices (OECD average: 30%); and 27% get distracted by other students who are using digital devices (OECD average: 25%). On average across OECD countries, students were less likely to report getting distracted using digital devices when the use of cell phones on school premises is banned.

Feeling safe at and around school

- PISA 2022 data show that in education systems where performance remained high and students' sense of belonging improved, students tended to feel safer and less exposed to bullying and other risks at their school.
- Some 21% of girls and 21% of boys reported being the victim of bullying acts at least a few times a month (OECD average: 20% of girls and 21% of boys). On average across OECD countries, fewer students were exposed to bullying in 2022 compared to 2018: for example, only 7% of students reported that other students spread nasty rumours about them in 2022, compared to 11% in 2018. In Germany, too, the corresponding proportions shrank (7% in 2022 compared to 10% in 2018).

Parental involvement in learning

- PISA data collected from school principals show that the percentage of parents who were involved in school and learning decreased substantially between 2018 and 2022 in many countries/economies. This was not the case in Germany. In 2022, 28% of students in Germany were in schools whose principal reported that during the previous academic year at least half of all families discussed their child's progress with a teacher on their own initiative (and 46% on the teacher's initiative). In 2018, the corresponding number was 30% (and 50%). Systems that had more positive trends in parental involvement between 2018 and 2022 (i.e. systems in which the share of parents who discussed their child's progress with a teacher on their own initiative shrank less) tended to show more stable or improved performance in mathematics.

Learning during COVID-related school closures

Questions on students' experiences during school closures were included at the end of the student questionnaire. As only 64% of students in Germany reached this last section, caution is advised in interpreting the results under "Learning during COVID-related school closures".

- In Germany, 71% of students reported that their school building was closed for more than three months due to COVID-19. On average across OECD countries, 51% of students experienced similarly long school closures. In education systems where performance remained high and students' sense of belonging improved, fewer students experienced longer school closures.
- During remote learning, 35% of students in Germany had problems at least once a week with understanding school assignments and 23% of students with finding someone who could help them with schoolwork (OECD averages: 34% and 24%). In education systems where performance remained high and students' sense of belonging improved, fewer students encountered problems during remote learning.
- Support for students' well-being was often limited when their schools were closed. In Germany, 48% of students reported that they were supported daily through live virtual classes on a video communication program. Only 9% of students reported that they were asked daily, by someone from the school, how they were feeling (OECD averages: 51% and 13%).
- If school buildings have to close again in the future, many students across the OECD feel confident about using digital technology for learning remotely but fewer students feel confident about taking responsibility for their own learning. Some 79% of students in Germany feel confident or very confident about using a video communication program and 59% of students feel confident or very confident about motivating themselves to do school work (OECD averages: 77% and 58%).

What else does PISA tell us?

Resources invested in education

- Expenditure on education is related to student performance only to a certain extent. Among the countries/economies whose cumulative expenditure per student, over all primary and secondary school years between the ages of 6 and 15, was under USD 75 000 (PPP) in 2019, higher expenditure on education was associated with higher scores in the PISA mathematics test. But this was not the case among countries/economies whose cumulative expenditure was greater than USD 75 000 (PPP). For this latter group of countries/economies, the ways in which financial resources are used seems to matter more for student performance than the level of investment in education. In Germany, the cumulative expenditure per student, over ten years of age between 6 and 15, was equivalent to about USD 121 100 (PPP).

- In about half of all countries/economies with comparable data, school principals in 2022 were more likely than their counterparts in 2018 to report a shortage of teaching staff. This was also the case in Germany. In 2022, 73% of students in Germany were in schools whose principal reported that the school's capacity to provide instruction is hindered by a lack of teaching staff (and 25%, by inadequate or poorly qualified teaching staff). In 2018, the corresponding proportions were 57% and 16%. In most countries/economies, students attending schools whose principal reported shortages of teaching staff scored lower in mathematics than students in schools whose principal reported fewer or no shortages of teaching staff.

How students progress through schooling

- When they sat the PISA test in 2022, 47% of 15-year-old students in Germany were enrolled in 10th grade.
- In Germany, 96% reported that they had attended pre-primary education for one year or more (OECD average: 94%). On average across OECD countries, students who had attended pre-primary education for one year or more scored higher in mathematics at the age of 15 than students who never attended or who had attended for less than one year, even after accounting for socio-economic factors.
- Some 19% of students in Germany reported that they had repeated a grade at least once (OECD average: 9%) after entering primary school. Grade repetition tends to be less prevalent in high performing systems.

School autonomy

- In Germany, 41% of students attended a school where principals had the main responsibility for hiring teachers (OECD average: 60%), and 55% were enrolled in a school where teachers had the main responsibility for choosing which learning materials are used (OECD average: 76%). Many high-performing school systems tend to entrust principals and teachers with these responsibilities.

Key features of PISA 2022

The content

- The PISA 2022 survey focused on mathematics, with reading and science as minor areas and creative thinking as the innovative area of assessment. PISA 2022 also included an assessment of young people's financial literacy, which was optional for countries and economies. Results for mathematics, reading and science are released on 5 December 2023 and results for creative thinking and financial literacy in 2024.

The students

- Some 690 000 students took the assessment in 2022, representing about 29 million 15-year-olds in the schools of the 81 participating countries and economies.
- In Germany, 6116 students, in 257 schools, completed the assessment in mathematics, reading or science, representing about 681 400 15-year-old students (an estimated 92% of the total population of 15-year-olds).

The assessment

- Students took two hour-long tests, each devoted to one subject. Different students were given different test questions and different combinations of subjects (e.g. mathematics followed by reading, or science followed by mathematics, etc.). Test items were a mixture of multiple-choice questions and questions requiring students to construct their own responses.
- Students also answered a background questionnaire, which took about 35 minutes to complete. The questionnaire sought information about the students themselves, their attitudes, dispositions and beliefs, their homes, and their school and learning experiences. School principals completed a questionnaire about school management, organisation, and the learning environment.
- Some countries/economies also distributed additional questionnaires, to students, parents and/or teachers, to elicit more information. The findings from these optional questionnaires are not covered by this note.

References

OECD (2023), PISA 2022 Results (Volume I): The State of Learning and Equity in Education, PISA, OECD Publishing, Paris, <https://doi.org/10.1787/53f23881-en>

OECD (2023), PISA 2022 Results (Volume II): Learning During – and From – Disruption, PISA, OECD Publishing, Paris, <https://doi.org/10.1787/a97db61c-en>

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For more information about PISA 2022 visit www.oecd.org/pisa

Explore, compare and visualise more data and analysis using <http://gpseducation.oecd.org>.

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