Executive Summary

School success is possible for socio-economically disadvantaged students; in fact, resilient students are a common feature in some educational systems.

The proportion of disadvantaged students that are successful varies considerably across educational systems. In some education systems, like in Australia, Canada, Finland, Japan, Korea, New Zealand and Portugal close to half of disadvantaged students exceed an internationally comparable benchmark and can be considered successful from an international perspective.

A within-country perspective is best suited for analysing policies, school and student characteristics associated with student resilience. When looking at disadvantaged students that are succesful within countries, resilient students' performance is high even when compared to their more advantaged peers. On average, most resilient students in OECD countries are strong performers, achieving proficiency Level 4 in the PISA science scale (which has 6 Levels). Students performing at Levels 5 and 6 are considered top performers. In partner countries and economies the vast majority of resilient students achieve at least Level 2, the baseline level, in the PISA science scale. Thus, it is possible to find disadvantaged students, who despite the odds against them, become resilient and succeed at school. These young people show that it is possible for disadvantaged students to excel in PISA.

Taking more science courses benefits disadvantaged students even more than it does their more advantaged peers. Therefore, exposing disadvantaged students to science learning at school might help close performance gaps.

Disadvantaged students in many countries spend little time learning science in regular lessons at school. On average, across OECD countries, disadvantaged students spent 20% less time learning science at school than their more advantaged peers. While relatively advantaged students spend more than three hours on regular science lessons at school per week, disadvantaged students spend about two hours and a half. For example, in Belgium, Luxembourg, the Netherlands, the Slovak Republic and Switzerland disadvantaged students spend less than two hours a week in regular lessons at schools learning science.

Among disadvantaged students, resilient students – who beat the odds and succeed at school – spend more time learning science at school than disadvantaged low achievers. Differences are especially pronounced in France, Germany, and the Netherlands, where resilient students spend at least one hour and 45 minutes more than disadvantaged low achievers learning science at school per week. In the Netherlands, on average disadvantaged low achievers spend less than one hour and 15 minutes a week learning science at school, the lowest average across OECD countries.

In general, time spent learning science is one of the correlates of better performance that benefits the most disadvantaged students. An extra hour of regular science classes increases the likelihood of being resilient in all OECD countries (except Denmark, Iceland, Portugal, and Mexico). Across OECD countries, on average, the odds of being resilient for disadvantaged students who spend an extra hour a week learning science at school are 1.27 times greater than the odds of disadvantaged students who do not have that opportunity to learn science at school, after accounting for a host of student and school background factors, approaches to learning and school policies.

How to get more disadvantaged students further exposed to science at school varies across countries. For example, in some countries, it may mean ensuring that more disadvantaged students participate in compulsory science courses. In countries like Australia, Germany, the Netherlands, the United Kingdom, Sweden or the United States, with large relative differences (more than 8 percentage points) between the proportion of disadvantaged and more advantaged students taking compulsory courses in science, the differences in performance between those taking science courses and those that do not are also large. For example, in the United States across the board attending a science course is associated with a relatively modest increase in performance of about 15 score points on the PISA science scale, but for disadvantaged students that advantage almost triples, to more than 40 score points. In Australia, the odds of being resilient for disadvantaged students who take part in compulsory science course are four times greater than the odds of being resilient for disadvantaged students who do not take part on these courses, even after accounting for student and school background factors.

If science is important to success later in life and the betterment of society, then disadvantaged students need to be exposed to science in school. All else equal, policies geared to this goal will help improve equity in educational outcomes and boost average performance.

Positive approaches to learning are also key predictors of student resilience, but policies to help bridge the performance gap in this area need to target disadvantaged students.

Focusing on disadvantaged students, the evidence in PISA reveals that resilient students are engaged and confident learners who enjoy learning science and display a series of positive attitudes towards learning science. Resilient students are more motivated, more engaged and more self-confident than their disadvantaged low-achieving peers. For example, across OECD countries, on average, self-confident disadvantaged students are 1.95 times more likely to be resilient than disadvantaged students who are not so self-confident, even after accounting for a host of student and school background factors, including how many hours they spend learning science at school per week.

Yet, an analysis of the relationship between these factors and performance in a broader context suggests that correlates of achievement such as self-confidence, engagement and other approaches to learning are less beneficial for disadvantaged students than for their more advantaged peers. For example, among more advantaged students in the United Kingdom those who express a high level of instrumental motivation and are interested to learn science achieve more than 20 PISA score points than those who are less motivated and interested in science. This positive relation is only half as strong for disadvantaged students. In Germany, the positive association between performance and a high level of instrumental motivation to learn science that is apparent for advantaged students disappears among disadvantaged students. In New Zealand high self-concept means an increase of almost 40 PISA score points among relatively advantaged students, however this positive relation is half as strong among disadvantaged students.

It is therefore possible that policies aimed at raising student attitudes or engagement with science will not help bridge and may even widen the achievement gap between disadvantaged students and their more advantaged peers. From an equity perspective, targeted policies to disadvantaged students aimed at fostering positive approaches to learning, such as building student confidence are better suited than untargeted policies in these areas. More advantaged students probably enjoy a supportive household environment that makes their confidence and other positive approaches to learning more effective. The evidence shows disadvantaged students do not enjoy this extra boost on positive approaches to learning.