

# Sheffield Hallam University

## PISA: Stories of Science

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# PISA: Stories of Science

A couple of weeks ago the results of the latest [PISA global education survey](#) were released. The PISA survey happens every three years, and measures the skills and knowledge of 28 million 15-year-olds across the world in science, mathematics, reading, problem solving and financial literacy. PISA is seen as a vital measure of education policy. Each set of results prompts a flurry of reports comparing the positions of various countries, and – in the UK at least – bemoaning or congratulating (depending on political stance) the failure or success of educational policy. It is due to PISA, for example, that Finland and Singapore are held up as exemplars of education, and the aim of moving up the PISA tables often drives government investment worldwide in education strategy. Sheffield Institute of Education colleagues contributed to the discussion, with [Sam Twiselton](#), [David Owen](#) and [Mark Boylan](#) discussing issues of teacher education and how the East Asian countries stay at the top of the tables.

It's notable that the PISA science tests receive relatively little attention in the press. As science educators, we'd like to see as much attention paid to science as to mathematics and the relative performances of different countries. Science education is important for reasons which we hope need no rehearsing: science is essential to the economy, vital for sustainable global development, key to understanding the world, and fascinating!

We think the PISA science tests are interesting and engaging compared to many assessments. You can try sample questions [here](#). Meanwhile, the stories in the results are fascinating: they reveal students' enthusiasm for science, their attitudes towards scientific careers and the approaches of their teachers. There are lessons about what we do well and what could be improved. We look here at just three examples.

Firstly, there are positive messages about science teaching in the UK. Students in the UK enjoy science more than in other countries, with only three countries reporting a greater increase in enjoyment since 2006. Relatively high proportions of students (around 30%) expect to move into a career in science, and this is the same for girls and boys. Indeed, in the UK there is no gender gap in test performance in science. It seems that in this country we teach science in ways which support the learning and engagement of *all* students. This is something we should be proud of. Of course, we can still improve: when asked what type of scientific career they expected to pursue, gender stereotypes revealed themselves. Twice as many boys pictured themselves moving into a career in engineering and three times as many girls imagined a career in healthcare. As Jill Collins said in her recent [blog](#), we still need to open young people's eyes to non-stereotyped ideas about careers in science.

Next, a worldwide story about the value of 'science capital': a term used to capture the idea of the everyday knowledge, attitudes and experiences of science that can be gained from families, schools and society. Research carried out by King's College, London has shown that the more science capital a young person has, the more likely they are to aspire to further study and careers in science. This year's PISA tests support this: students in schools which provide extra-curricular activities such as science clubs and competitions are much more likely to expect to work in a science-related career. Interestingly, they also perform significantly higher in science. These findings suggest that increasing science capital not only increases career aspirations but may also improve attainment. This surely provides an

impetus for governments worldwide to ensure increased funding for schools to raise science capital through science clubs, competitions and trips.

Finally, we turn to the role of inquiry in science teaching, the PISA result which has attracted the most attention in the science education community. Inquiry-led approaches are those in which students design, carry out and evaluate practical investigations and experiments. In the UK we pride ourselves on the amount of inquiry-led science we use. We see the development of scientific skills through inquiry as a vital part of learning science, and governments worldwide turn to us for help in improving their teachers' inquiry-led approaches to science.

However, this year's PISA results show a correlation between more inquiry-led approaches and lower performance in science. But this does not suggest to us that we should stop using inquiry, since inquiry-based practices are at the heart of what it means to be a scientist. Indeed, PISA also shows that inquiry has a positive relationship with students' understanding of scientific processes and to the likelihood of students expecting to move into a career in science. We believe that the PISA results indicate that, again, there is work to be done. On the one hand, high performing systems, which tend to focus on test results, need to find ways of improving their students' engagement in science and their scientific skills without compromising their achievement. On the other hand, lower performing systems, which use inquiry-led approaches to boost their students' engagement, need to develop ways of improving their students' scientific knowledge.

Our stories are just a sample of the challenges raised by this year's PISA results in science education. They show that there is more to be done in improving gender equality, in raising science capital and in ensuring that inquiry-led science leads to high attainment. Our organisations have long histories of developing new approaches to science teaching and supporting teachers' professional learning. We need to hold tight to what we believe is effective, and we need to gather more evidence to test our beliefs. To achieve this we will continue to work in partnership, with each other and with science educators from around the world, especially teachers and students, since they are the people who really understand what works in their classrooms.

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