



## “Make it more relevant and practical”

Young people’s vision for school science in England



## What is the issue?

School science matters and there are many reasons for wanting to improve young people’s experiences of, and engagement with, school science. It is generally agreed that more needs to be done to increase and/or widen participation in science once it is no longer compulsory [1]. Similarly, there is a broad consensus that all young people need to be equipped with science, technology, engineering and maths (STEM)-related knowledge, understanding and literacy to enable their active citizenship within a changing world [2], which involves being able to make informed decisions around topics such as health and the environment [3].

There are many reasons why these goals matter – from the principles of social justice to a desire to secure the future supply of STEM workers and professionals to meet societal and global needs. Importantly, the proposed causes of, and solutions to, such issues are often grounded within young people’s experiences of school science.

This report brings the voices of young people to bear on these ongoing challenges. To help invigorate thinking and debate, the report sets out young people’s ideas for how school science could be improved and then draws on these insights to make recommendations for science education policy and practice.



## The ASPIRES study evidence base

- The ASPIRES study is a 13-year, England-based longitudinal research project that explores young people’s science aspirations and trajectories, and the factors that shape them (including family, school, careers education, social identities, and inequalities).
- Phase 1 (2009-2013) tracked the development of young people’s science and career aspirations from age 10 to 14; phase 2 (2013-2018) followed young people from age 14 to 19 and phase 3 (2020-2023) examines age 20 to 23. Across the three phases, we conducted over 740 interviews with young people and their parents, and collected over 47,600 survey responses from young people. Survey and interview samples were broadly representative of young people in England, in terms of gender identity, socioeconomic status and ethnic background.
- This report draws on data from phase 3 (ASPIRES 3), following the young people’s lives into adulthood and employment, and their reflections back on their school science experiences. Specifically, findings are reported from 7,635 survey responses from 21 and 22-year-olds (completed between May and August 2021) and 50 interviews conducted with 20 and 21-year-olds who have been interviewed since the age of 10 (carried out between May and September 2020).
- The following sections report on data from multiple-choice<sup>1</sup> and open-ended<sup>2</sup> questions on the survey, and in-depth interview responses<sup>3</sup> in which young people were asked how their experience of school science could have been improved.



<sup>1</sup> The multiple-choice question asked, “Reflecting back on your school science education as a whole, would you have liked any of these?”. Young people were able to select from a list of 12 options, ticking all options that applied to them. Multiple-choice options were informed by in-depth interviews conducted a year earlier. They were further revised during piloting of the survey to reflect commonly given suggestions for improving school science and options considered of interest to education policy and practice. The report draws on responses from 7,595 young people who answered this question.

<sup>2</sup> The open-ended question asked, “How could your experience of school science have been improved?”. The report draws on responses from 6,528 young people who answered this question.

<sup>3</sup> The interview question particularly relevant to this report was, “What would you have liked from your science education?”.

## The case for change

- Many young people reported positive views of science. For instance, 54% of survey respondents agreed that it is important to know about science in daily life and 64% agreed that their parents thought it was important for them to learn science at school. As one of the interview participants explained:

*“I just understand the world a bit better because of science. I feel like there are things you need to know that you wouldn’t know unless you are taught science. It’s such an important subject.”*

White, middle-class woman, non-STEM graduate

- However, only around two fifths (39%) of young people said that they had enjoyed school science, and 20% felt that school had put them off science.

*“I feel like if the teacher’s unenthusiastic then you’re not interested and then you just hate science, which is kind of what happened with me... I think if I’d had a really enthusiastic teacher, I would’ve been much more likely to have done it further.”*

White, working-class woman, non-STEM student

- While, as noted above, 54% of young people agreed it is important to know about science in daily life, only a quarter of young people agreed that the science they learned at school has been useful in their everyday lives, and a third said that school science had not provided them with any useful knowledge and skills for the workplace at all. As one interviewee explained:

*“A lot of what I learn scientifically at school is fascinating, but for me, I can’t see a use. Maybe I’m just blind; maybe I am using all these things, but apart from knowing in a quiz that table salt is sodium chloride, I don’t see many other practical uses.”*

White, middle-class man, non-STEM graduate





- In response to the question, “How could your experience of school science have been improved?”, the vast majority of young people identified areas for change – **only 5% felt that no improvements were needed.**

Our analysis showed that young people who are working in or studying STEM were as likely to call for at least one change to school science as their non-STEM peers, suggesting that even those who continue with STEM feel valuable improvements could be made.



Table 1 summarises data from the multiple-choice survey responses on the key changes that young people felt would have improved their own experience of school science education\*. The improvements are grouped into themes, showing the percentage of survey participants identifying each of the options.

**Table 1: Summary of percentages of young people on the survey agreeing that they would like specific changes to school science (N=7,595)**

Improvements	Percentage wanting this change	Specific changes that young people would have liked to improve their experience of school science
<b>Science curriculum relevance</b> 	<b>72%</b>	A curriculum more related to my everyday life More links to personal health and wellbeing More on climate change and how to protect the environment Less abstract concepts and examples A contemporary and inclusive curriculum* A curriculum that is relevant to jobs in, and beyond, science*
<b>Practical &amp; problem-based learning</b> 	<b>59%</b>	More practicals and experiments More problem-based learning
<b>Less exam pressure</b> 	<b>52%</b>	Less exam pressure
<b>Better teachers</b> 	<b>41%</b>	Better teachers and/or more specialist teachers
<b>Other</b>	<b>1%</b>	Various

\*In addition to the areas from the multiple-choice questions, analysis of the 6,528 young people who provided responses to the open-ended survey questions, together with the 50 young people who were interviewed, identified a further two areas of curriculum relevance: a contemporary and inclusive curriculum, and a curriculum that is relevant to jobs in, and beyond, science.

## Young people’s vision for school science

Bringing together analysis of the young people’s multiple-choice survey responses, open-ended survey responses and interviews, we identified four key areas of improvements for school science.



### Improvement #1:

## Make the science curriculum more relevant

### Headline

- **72% of young people** said that they would have liked their school science curriculum to have been more relevant – that is, less abstract and more grounded in contemporary life and societal issues.

### Trends

Young people who wanted a more relevant science curriculum were more likely to:

- be women
- be from more socioeconomically privileged areas<sup>4</sup>
- have taken A Level science
- not be studying or working in STEM fields

## What did young people mean by a relevant science curriculum?

- Among those who said they would have liked a more relevant curriculum, there was fairly balanced support across the different types of relevance specified by the multiple-choice question. The most popular response was for science content to be more closely related to “**my everyday life**”, followed by more links to **personal health and wellbeing** and more on **climate change and how to protect the environment**. The three interpretations of relevance from the multiple-choice question were also clearly borne out in the open-ended survey responses and interview data.
- Coding of the open-ended survey responses and the interviews identified two further areas of relevance that young people wanted: **a contemporary and inclusive science curriculum** and a curriculum that is **relevant to jobs in, and beyond, science**.

Typical open-ended survey responses calling for a curriculum that is **more relevant to young people’s everyday life** included:

**“More real-life science that can be applied to everyday life.”**

White woman, IMD 4, studying STEM

**“Learn more interesting topics that will directly affect us.”**

Asian woman, IMD 2, studying subject allied to STEM

**“...more [explanation] about why what you’re learning is useful within the real world after leaving school and how it can affect/impact your life.”**

White woman, IMD 2, working in non-STEM industry

**“It could have been made more relevant to the real world.”**

White woman, IMD 1, not in education or employment (NEET)

Many interview participants explained in detail that they wanted science education to engage with contemporary issues that relate to everyday life. They also wanted school science to convey the importance and utility of curriculum content in order to engage young people. Typical interview responses included:

**“[School science lessons should highlight] things that impact you in your everyday life... instead of just learning about this abstract idea outside of what it means to you. Just explain why you need it.”**

White, middle-class woman, non-STEM undergraduate

**“I think making [biology] more geared towards what you actually experience. So I think they should [...] definitely focus on more of the biomedical stuff, because I think that’s a lot more useful... I understand that you have to learn about plants and trees, but I think that’s the thing that puts people off biology...”**

Asian, middle-class woman, STEM graduate

As illustrated by the above quotes, some young people identified particular science topics as being “not relevant” to everyday life (such as “plants and trees”) that others might consider as being related to, or a part of, the everyday world. Hence we suggest that it may not always be the specific content that is experienced as being (ir)relevant, but rather it is the way science content and concepts are introduced, contextualised and discussed in classrooms that mediates perceptions of relevance.

The second area of relevance was a curriculum with more links to **personal health and wellbeing**. Typical open-ended survey responses included:

**“More applicability for everyday situations (e.g., understanding why a healthy diet is needed, in detail).”**

White man, IMD 5, STEM graduate

**“Learn about things that are more relevant and current, such as diseases, rather than other stuff that will not be used in the future unless you become a specialist in that particular thing.”**

White woman, IMD 4, working in non-STEM industry

<sup>4</sup> Privilege refers to individuals with higher English Index of Multiple Deprivation (IMD) quintiles. IMD was calculated using survey respondents’ postcodes matched to 2019 Office for National Statistics (ONS) data. The 1st quintile, IMD 1, represents the least privileged young people, and IMD 5 represents the most privileged young people.



**“More day-to-day science-related themes. Your own health, signs of disease and common illnesses and how to treat them or manage them yourself.”**

White man, IMD 4, working in STEM industry

**“Be more realistic, teach about the body more: illness, basically more biology – what we will need in the real world.”**

White woman, IMD 3, working in non-STEM industry

The third area of relevance was the importance of a curriculum that included more on **climate change and how to protect the environment**. Typical open-ended responses on this topic included:

**“More applicable to modern challenges (with the environment etc.)”**

White, non-binary young person, IMD 1, working in non-STEM industry

**“To be taught more about the issues in the environment instead of about atoms and stuff that doesn’t make much difference to my life by knowing.”**

White woman, IMD 4, non-STEM student

**“Learn more information about how we can save our planet/environment.”**

White woman, IMD 2, working in non-STEM industry

**“Learning more about environmental issues and the way we affect the world every day – focusing on the topic of sustainability with children from an early age.”**

White woman, IMD 3, working in STEM-allied industry

Similarly, interview participants described the importance of school science focusing more on climate change and the environment. One participant recounted how a particular topic, which highlighted the social concerns of fracking, had stuck with her much more than other science lessons:

**“We did a project about the dangers of fracking in communities and whether it should be a good thing or a bad thing. That kind of stuff really stuck with me, like applying it to social issues, I guess you’d say. That stuck with me a lot more than actual... not actual science, but [...] equations and stuff, I guess.”**

White, middle-class woman, non-STEM undergraduate



A fourth area of relevance was identified in the open-ended survey responses and the interviews, in which young people called for a more **contemporary and inclusive curriculum**, including more up-to-date science and more diverse representations of scientists. Typical open-ended responses on this topic included:

**“More critical thinking, decolonialised, more science relevant to everyday life.”**

White woman, IMD 2, NEET

**“More knowledge of what is actually going on now, rather than the past.”**

Mixed-ethnicity woman, IMD 1, NEET

**“More real-life experiences, to gain more knowledge on how science is used today.”**

White woman, IMD 4, working in non-STEM industry

**“I think if they showed more POC [people of colour], WOC [women of colour] and amazing feats behind science and why it’s helped people, I would’ve probably been interested in science.”**

Middle Eastern woman, IMD 4, non-STEM postgraduate student

In the interviews, young people were critical of their experiences of “outdated” school science and narrow representations of who has historically been involved in science. As one young woman put it, the science she learned at school was largely focused on “quite old discoveries” and convey the idea that “scientists were all just white men”:

**“I guess at school, the things you get taught about, they are quite old discoveries, and that is more from when scientists were all just white men. Maybe some special effort [is needed] to make sure that people know that anyone can go into science. So yeah, take an example like people from all backgrounds that have made really important discoveries.”**

White, middle-class woman, STEM undergraduate

**“[The curriculum needs to include] more recent studies ...more recent issues and discoveries and vaccinations, just to be more educated on things that you hear about on the news [...] all the amazing stuff they do in labs now that they don’t really tell you about at school.”**

White, middle-class woman, medical-related undergraduate



The fifth area identified by young people within the open-ended survey responses and interviews was a **curriculum that is relevant to careers both in, and beyond, science**. Typical responses from the open-ended survey question included:

**“Link [science] to careers and how it can be used in the future.”**

White woman, IMD 4, non-STEM postgraduate student

**“I think [school science] could be improved by seeing what type of science is used in more normal day-to-day jobs.”**

White man, IMD 1, working in STEM

**“Knowledge of how [science] is used in jobs/the real world – why it is important.”**

White woman, IMD 4, non-STEM graduate, working in non-STEM industry

**“Given exposure to jobs that use science without being a scientist.”**

White man, IMD 4, STEM-allied graduate working in STEM-allied industry

**“Having people that have science-related jobs that aren’t necessarily scientists (e.g., engineers etc.) come and talk to us about career opportunities and how the role and science cross-over.”**

White woman, IMD 2, working in non-STEM industry

### Why do young people want a more relevant science curriculum?

Analysis of the data showed that young people felt that a more relevant curriculum would have supported their engagement with science. Participants suggested that making science lessons more relevant to everyday life and applying science to social issues would help make content more engaging and memorable. A typical open-ended survey response was:

**“[School science] could be related more to real-world experiences, to show how science is very relevant in everyday life and therefore make learning more interesting/engaging.”**

Asian woman, IMD 4, studying medicine

One interviewee suggested that letting young people ask more questions that aren’t currently on the curriculum would increase classroom engagement:

**“A massive thing at school was ‘why am I going to need to know this?’ So I feel that if it’s more geared around ‘What do you want to know?’, then [young people] are going to be more engaged with it, no matter what, because they’re like, ‘Oh, you know what, I actually do want to know this’, so they will actually pay attention and learn. So even if it’s just one lesson a week, just whether you get to ask any questions about science that you have – I think that would really engage kids more.”**

White, middle-class woman, non-STEM graduate



## Improvement #2: Increase practical and problem-based science learning

### Headline

- Almost **60% of young people** of young people indicated that they would have liked a greater focus on practical and experimental science at school.

### Trends

Young people who wanted more practical and problem-based science learning were more likely to:

- have attended comprehensive schools
- have taken A Level science
- be studying or working in STEM fields

There were no gender, ethnic and socioeconomic background trends, suggesting a broad base of support for more practical science.

### What did young people mean by more practical/experimental and problem-based learning in science?

- Typical open-ended responses called for: “more practicals” and “more experiments”. These themes were also borne out strongly and consistently in the interviews.
- However, young people also underlined that they did not just want ‘more’ but also better-quality practical and experimental learning, such as:

**“More useful experiments, with reasons as to why we were doing them.”**

White woman, IMD 5, non-STEM postgraduate student

- In addition, widespread calls were made for increased resourcing of practical science in many schools. For instance, respondents on the survey called for “better equipment”, “having better labs” and “more funding for better experiments”. Several participants reflected on the negative implications of insufficient resources:

**“The equipment we had was old and often damaged/outdated, this hindered some practicals.”**

White man, IMD 4, non-STEM student

**“I think I liked all the practical work; I felt that it was easier to understand things... even if it was just a demonstration from teachers. But then again, our GCSE and A Level practicals were quite stressful, mainly because of the lack of equipment – especially chemistry. They almost teach you to hate practical work because most of it is just queueing up to use equipment.”**

White, middle-class woman, STEM undergraduate

- One young person suggested that a radical overhaul is needed (“re-doing all of the science curriculum”), suggesting that science teaching could be fundamentally organised around real-world problems and problem-solving:

**“You could have something like ‘How can we solve these problems?’. So you could have all these different problems... for physics it could be, ‘How are we going to do nuclear fusion?’, ‘How are we going to make a car?’. I think what I’m trying to say is it should have been much more engaging and trying to get you to work out the answer, rather than just teaching you a bunch of answers. I think that would have been really cool.”**

White, middle-class woman, STEM undergraduate

### Why do young people want more practical and problem-based science learning?

- Across the open-ended survey responses and interviews, young people conveyed how practical, experimental and problem-based learning supported their enjoyment, engagement and understanding in science. Typical responses included:

**“I really enjoyed the practical side of things and felt they made the content for exams more ingrained in my memory, so maybe more practicals to demonstrate the things we are learning.”**

White woman, IMD 4, STEM-allied postgraduate student

**“I enjoyed the practical sessions more, where we would learn about the structural integrity of things like aluminium by putting gallium on top of it and working hands-on with the stuff. I was definitely more of a practical learner that way.”**

White woman, working-class, STEM apprentice

**“[If] you’re shown how the reaction happens in real life, it would have been much more enjoyable and people would learn a lot more than you just telling them, ‘Well this reacts with this, it will do this’.”**

White, working-class man, non-STEM employee

- As another young woman explained, young people felt that they learned a lot more from doing an experiment “rather than watching a video of someone else doing the thing.” White, middle-class woman, working in non-STEM industry.



### Improvement #3:

## Reduce exam pressure and broaden forms of assessment

### Headline

- **Over half of the young people (52%)** called for less exam pressure.

### Trends

Young people who wanted less exam pressure were more likely to:

- be women and non-binary people
- have taken A Level science

### What did young people mean by reducing exam pressure?

- Young people highlighted wider concerns with exam focus within the education system, explaining that the education system encourages a culture of ‘teaching to the test’, in which deeper understanding is often overlooked. Typical open-ended survey responses suggested improvements could be made by:

**“Learning about relevant topics and [varied] science topics, rather than key strategies to pass exams.”**

White woman, IMD 5, studying STEM

**“Less focus on exams and more on learning and understanding.”**

White woman, IMD 5, non-STEM graduate

**“More focus on what and why, rather than ‘you need this to pass your exams’.”**

White woman, IMD 2, STEM-allied graduate, working in STEM-allied industry

**“Teaching was done to get a grade, therefore people didn’t necessarily have a proper understanding of what happened.”**

White man, IMD 5, STEM graduate, working in STEM industry

- Exam pressures were also affecting young people’s mental health and wellbeing. Young people spoke about how school science could be improved:

**“Fewer exams – there were so many, it stressed me out.”**

White woman, IMD 5, working in STEM-allied industry

**“I feel like a lot of students are getting so stressed out about studying, exams and things. And I think beforehand, like even my mum’s time, I feel like they had it a bit easier. Not even easier – I think they weren’t that pressured.”**

Asian, middle-class women, studying STEM at university





- Through the open-ended responses and interviews, many young people also called for a move away from assessment based solely on final, written exams and called instead for more coursework and assessed practical work. Typical open-ended responses included:

**“...more coursework-oriented assignments.”**

White man, IMD 3, non-STEM postgraduate student

**“More practical-based tests than written.”**

White woman, IMD 4, non-STEM graduate, working in non-STEM industry

**“Less focus on examinations – take practical work and coursework back into account for grading.”**

White woman, IMD 4, working in non-STEM industry

- As one young woman explained, many young people felt that the current system did not support them to apply their science knowledge and learn in meaningful ways. Instead, she articulated a vision for school science to:

**“...give you that freedom to think outside the box and to apply your knowledge. I feel like at school you don’t really apply your knowledge. I think you just memorise facts and regurgitate it out... it’s not a really nice system when I think about it.”**

Asian, middle-class woman, STEM undergraduate

## Why do young people want less exam pressure?

Young people felt that the intense exam pressure and ‘teaching to the test’ diminished interest and passion for a subject, and hindered engagement and learning. As the following participants explained:

**“As with all subjects, science in school was almost entirely about teaching just enough to pass the exam. Work was dry, with little apparent relevance to the outside world – we spent days learning how to rattle off what salts would be produced by a reaction without ever really being told what they were used for. As a result, I could not really connect it to any other information and found it hard to remember. A shame, as the teachers were all more than qualified to do that.”**

White man, IMD 2, non-STEM graduate, working in STEM-allied industry

**“[You’re told to] ‘memorise this pattern’... if you memorise this book for example, then you’ll pass your exam. I feel like that’s a shame. You’re taught all this interesting stuff throughout the year, but when it comes to it, it’s just ‘learn that book back to front and you’re fine’.”**

Asian man, middle-class, STEM undergraduate

**“Every time I’ve come close to enjoying a subject, it has been ruined by the fact I have to do an exam on it at the end. Science is really interesting, and there are lots of cool, nerdy things about science [but] education sometimes just gets bogged down by the fact that we need to be assessed at the end of it.”**

White, middle-class man, non-STEM undergraduate





## Improvement #4: “Better teachers”

### Headline

- **41% of young people** on the survey identified that they would have liked “better teachers and/or more specialist teachers”.

### Trends

Young people who indicated that they would have liked better and/or more specialist teachers were more likely to:

- be women
- be from the second-most deprived IMD quintile
- have attended comprehensive schools
- be studying or working in STEM fields

### What did young people mean by “better teachers”?

- Through the open-ended responses and interviews, young people explained that by “better teachers” they meant knowledgeable, passionate subject specialists who stay in post, and teachers who care about, and include, all students.

In the open-ended survey responses, young people identified the importance and value of **having specialist, knowledgeable and passionate teachers**. Typically, young people explained that their experience of school science would have been improved by:

*“Being taught by teachers who were specialist teachers and teachers who actually care.”*

White woman, IMD 1, working in non-STEM industry

*“Teachers who wanted to be there, who were interested in being there and wanted to teach. Teachers who wouldn’t just give you a textbook and give answers.”*

White man, IMD 3, working in STEM-allied industry

*“First of all, please employ teachers that actually want to teach. Secondly, teachers should be more supportive, please.”*

Black woman, IMD 1, STEM student

*“A more passionate teacher.”*

White woman, IMD 3, STEM graduate, working in non-STEM field

*“More enthusiastic teachers.”*

White woman, IMD 5, non-STEM student

*“Teachers who were passionate about science and their job.”*

White woman, IMD 4, STEM-allied graduate, working in non-STEM field

This point was also emphasised in the interviews. One young woman discussed sensing that her teachers weren’t confident teaching science:

*“I think maybe that can also come down to teaching because some teachers aren’t that confident in teaching science, and I think that really does come across when you’re teaching it.”*

Asian, middle-class women, studying STEM at university

Young people also drew attention to the importance of **science teacher retention and consistency** in science teaching, such as wanting:

*“Teachers who were passionate and constant – we had a lot of substitutes who didn’t seem to know what they were doing, so many did not care.”*

White woman, IMD 2, STEM-allied graduate, working in STEM field

*“Consistent science teachers instead of having several different ones every year.”*

White women, IMD 4, non-STEM graduate, working in non-STEM field

*“Not having a new teacher all the time.”*

White woman, IMD 3, STEM-allied graduate, working in STEM-allied industry

*“Less staff turnover!! This had a massive impact on the quality of science lessons and quality of teaching in general.”*

White woman, IMD 4, non-STEM student



These experiences echo wider concerns about science teacher recruitment and retention that have been expressed by many science education policymakers and professional bodies<sup>5</sup>, and which, data suggests, are particularly acute issues in urban schools [4].

The open-ended survey responses drew attention to the importance, for young people, of **teachers who care about students and are inclusive**. There were numerous calls for science teachers to be more “caring”, “nicer”, “more encouraging” and “more supportive”. Typical responses included:

**“Better teachers who cared about my education.”**

White woman, IMD 2, STEM graduate and STEM-allied apprentice

**“For the teachers to actually care about the students, not just their [results].”**

White young person (gender not specified), IMD 2, NEET

**“Having teachers who cared about the children who were struggling in the subject.”**

Young woman of colour, IMD 4, STEM-allied graduate

**“If my teacher had been better trained and had cared about the pupils and the grades they were to receive. I had to work ten times as hard because my teacher couldn’t care less about us at school.”**

White man, IMD 4, working in non-STEM industry

**“Have teachers that believed in me more.”**

White woman, IMD 5, non-STEM apprentice

In terms of inclusive practice, young people called for changes such as:

**“Making [science] more accessible for less academic children.”**

White woman, IMD 1, non-STEM student

**“A teacher who helped the ones who struggled.”**

White man, IMD 3, working in non-STEM industry

**“A pledge against sexism in science teaching/research.”**

White woman, IMD 5, non-STEM postgraduate student

**“Better acknowledgment of home situations.”**

White woman, IMD 1, working in non-STEM industry



<sup>5</sup> The Department for Education has spent significant time and resources trying to recruit and retain more subject specialists in STEM disciplines since 2011. Sutton Trust reported in 2017 that science specialist teaching suffers from a recruitment problem, failing to attract science graduates to teaching in English secondary schools [4] [5].

This point was also reiterated through the interviews, for instance:

**“I think teaching matters. I think if I had different teachers who were less focused on the really intelligent students... you can feel like you can only do science if you’re clever, which again keeps people away from studying it.”**

White, working-class woman studying social science at university

A number of young people also drew attention to how practices such as setting (where students are taught in fixed attainment-based groups) ran counter to inclusive teaching practice, echoing concerns that have been expressed in the wider literature [6]. As one young person explained, school science teaching could be made more caring and inclusive by:

**“Removing the set mentality – I feel it’s very damaging to people’s engagement in the subject if your teachers clearly don’t think you are capable.”**

White woman, IMD 4, postgraduate STEM student

**“Not having teachers look down on you because you were in a lower set.”**

White woman, IMD 1, working in non-STEM industry

### Why do young people want “better teachers”?

Young people in the interview cohort explained in detail how they felt that their experiences of science and STEM teachers had influenced their experiences of school science, their learning, confidence in the subject and their science trajectories. As the following young women who went on to complete STEM degrees explained, they felt “fortunate” to have had “well-trained, passionate”, supportive science teachers who helped reinforce their science trajectory:

**“I was fortunate that I often had science teachers who were well-trained, passionate, and helped me when I struggled. I presume that without these teachers supporting me I would not have felt as passionate about science. Ensuring that all science teachers are well trained, enthusiastic and willing to support and help their students would improve general school science experiences.”**

White woman, IMD 2, STEM graduate, working in STEM

**“I think, as with any school subject, teachers are the most vital role in the entire process. A fun, intelligent, personable teacher will make even the most dull topics at least a bit of fun, whereas a dull, unmotivated teacher will suck the life out of any lesson they give. While, luckily, the majority of my teachers fell into the good category, I think a teacher’s ability to relate to, and interact with, younger people is almost more important than their intelligence.”**

White man, IMD 3, STEM graduate, currently NEET.



## Suggestions for policy and practice

Building on the insights offered by young people, we make the following suggestions to help inform further improvements to science education in England.

### 1. Delivering a more relevant science curriculum

To respond to young people’s calls for improving the relevance of science education, we suggest that there would be value in:

- Supporting teachers to further draw out the relevance of the existing science curriculum in relation to students’ identities, careers (within and beyond science) and broader lives, and to make more explicit links to contemporary issues<sup>6</sup>.
- Ensuring that young people are meaningfully involved in any future curriculum review and reform.

### 2. Improving high-quality practical and inquiry-based learning in school science

To respond to young people’s calls for more practical, experimental and problem-based school science, we suggest that policymakers and practitioners might usefully:

- Review how best to support and enhance the role and place of high-quality inquiry using practical (experimental) science within classroom learning<sup>7</sup>.
- Consider how to focus additional support for practical science, particularly within comprehensive schools that serve the least privileged young people in society.

We are not only advocating for more opportunities for young people to engage in practical science inquiry in schools, but for approaches to practical and inquiry-based work to be high-quality, effective, relevant and meaningful [10].

<sup>6</sup> The Science Capital Teaching Approach is one example of an approach for supporting teachers to connect the science content within any curriculum to the lives of diverse students. Evidence from trials of the approach showed significant increases in young people’s sense of engagement and connection with science, and their aspirations to continue with one or more sciences at A level [7] [8].

<sup>7</sup> These suggestions are particularly relevant in the wake of the controversial analysis of PISA 2015 data that led to reductions in school science practical/experimental work in many countries [9].

### 3. Rethinking the wider context of learning and assessment

We recognise the challenge of responding to young people’s desire for ‘less exam pressure’, given the wider context of high-stakes national examinations and the dominance of summative testing within the English education system. Addressing these concerns would require changes that are beyond the remit of most science education practitioners and policymakers. However, the young people’s views provide a helpful prompt to consider:

- Reviewing the opportunities and costs of the current high-stakes education system in England and undertaking exploratory comparative work with other national systems that take more formative approaches.
- Exploring ways to help mitigate and manage the negative impact of exam pressure on young people’s experience of school science – for instance, conveying the relevance of science knowledge and skills beyond high-stakes test scores, and supporting students’ mental health.

### 4. Supporting science teachers

Concerns about the knowledge, quality, specialism and retention of science teachers are not new nor only voiced by young people [11] – and our findings show that these concerns remain highly pertinent. There is a need for continuing acquisition of subject knowledge and pedagogical skills by science teachers<sup>8</sup>. However, young people’s responses also made clear that they want to experience equitable and caring science teaching. We suggest that possibilities for initial teacher education and/or professional development might include:

- Continuing to encourage and incentivise STEM subject-specialist graduates to enter teaching and support and extend initiatives that develop disciplinary specialisms among school science.
- Continuing to develop ways to support science teachers and safeguard their wellbeing in order to help counteract attrition, particularly within schools serving less privileged communities.
- Supporting teachers to inspire deep and wide learning, as well as subject passion.
- Supporting teachers to teach in ways that are equitable, inclusive and can meaningfully connect science learning with young people’s identities, lives and futures. This would involve building capacity among science teachers for caring teaching, drawing on the principles of inclusive pedagogy and critical professional reflection [13] [14].

<sup>8</sup> Evidence shows that high-quality professional development also improves teacher retention [12].



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## Further Information

For more information on the ASPIRES 3 project, visit <http://ucl.ac.uk/ioe-aspires>

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