generationeXt

Roche

A shortfall in science

The UK's life sciences industry at risk as teens turn away from science

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Introduction

Richard Erwin

General Manager,
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According to STEM Learning, the largest provider of STEM education and careers support in the UK, 89% of Science, Technology, Engineering and Mathematics (STEM) businesses are struggling to recruit, with a current shortfall of 173,000 skilled workers.

Now consider that the number of STEM roles are expected to double in the next 10 years[1]. And now combine this challenge with the UK undergoing a time of significant change – politically, economically and socially.

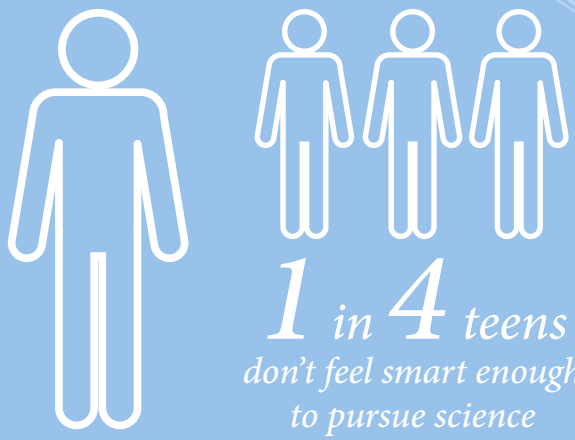
The UK Life Sciences sector is world-renowned. This nation is awash with pioneers when it comes to cutting edge science, with no fewer than 10 Nobel Laureate winners over the past 10 years alone[2]. But the harsh reality is that the UK's position as a world leader in science innovation is at risk if the field cannot attract new talent from our schools and universities.

Science underpins some of the greatest developments and discoveries in history, from penicillin to putting mankind on the moon. But what does the future look like for the UK's science sector if the next generation is not pursuing science? Where will that leave the hundreds of organisations based here, struggling to recruit the talent and skills they require to grow their business? Where will that leave the UK against other countries where a far higher percentage of children pursue science?

To try and better understand the reasons students in the UK are not pursuing science as a career, we undertook some research, polling 2,000 teenagers aged between 14 to 18. The results are worrying.

Many children enjoy science however, 1 in 4 teens don't feel smart enough to study science. The question is how can we build on this to ensure the fun isn't taken away?

Whilst the majority of them enjoy science, they are feeling discouraged pursuing it as a career because "they don't feel smart enough" or "it's not interesting". Dig deeper and we find discrepancies between genders and between teens from different household incomes.



1. STEM Learning
2. https://en.wikipedia.org/wiki/List_of_Nobel_laureates_by_country#United_Kingdom

We have a duty to ensure the next generation is not a lost generation

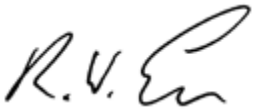
For this report we also spoke with experts from the ASPIRES study at the UCL Institute of Education in order to understand whether the findings of our survey are widespread.

We have a duty to ensure the next generation is not a lost generation. Working together, businesses like Roche, the government and the education sector, have a duty to ensure young adults realise their full potential.

We have a duty to ensure students recognise their abilities: that (despite what they think) they are smart enough and that careers in science can be enjoyable and highly rewarding. We have a duty to give the leaders, scientists, academics and innovators of the future a sense of purpose and a sense of hope.

Here at Roche, we are working hard with schools and charities to engage with the next generation and motivate and inspire them about careers in science. We run workshops in our offices so teenagers can come in and see how 'exciting' science can be. Last year, we launched our Roche Scholars Programme with the charity In2Science to address the education gap that exists between the richest and poorest in society, and supports young people from low income backgrounds to become the innovators and pioneers of the future.

Things aren't going to change overnight. But by working together, we can ensure that every child regardless of their background, gender or race realises their full potential and pursues the career of their dreams.



Richard Erwin
General Manager

Potential shortfall in future scientists could leave the UK in a science black hole

> *77% of respondents enjoy science classes*

We recently undertook research which revealed that the UK is facing a major black hole in science, running the risk of falling behind the rest of the world.

Two thousand teenagers aged between 14 to 18 were surveyed about their career thoughts and aspirations and to discover, what, if anything, is holding them back in pursuing a career in science.

The good news is that the research revealed that three quarters of respondents (77%) said they enjoy science classes. And enjoyment is a far greater factor in choosing a subject for further education compared to remuneration, with 60% saying they would pursue further education in a subject they enjoy. This is compared to just 27% pursuing further education in an area that would potentially earn them the most money.

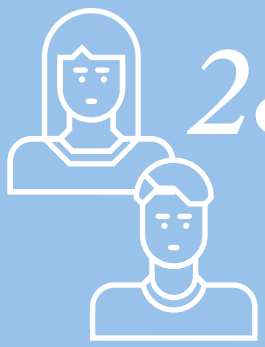
Complexities exist

When it comes to converting this enjoyment into a possible career, the findings show some uncomfortable results, and it seems enjoyment alone is not enough to inspire teens to consider a potential career in the discipline. The reasons for this huge fall in interest seem to be complex. Only one in 20 students expressed an interest in jobs in the field of science, such as medicine, research and pharmaceuticals.

When asked why this was, one in four (25%) said they didn't feel smart enough, almost a quarter (24%) said they weren't interested and 19% said they didn't want to work in a lab.

The gender split

The figures reveal some stark differences between males and females. A staggering 29% of girls reveal they don't feel smart enough to continue to study science beyond school compared to 20% of boys. And 28% of females said they're not interested in science versus 18% of boys. This is despite a high percentage in both genders admitting that science classes are fun (81% of boys and 72% of girls).



28% *of females are not interested in Science*

18% *of males are not interested in Science*

81% of boys and 72% of girls admit that science classes are fun

The role of money

Household income also seems to play a part in attitudes towards careers in science, with a higher percentage of students from household incomes of £125k or more saying they enjoy science classes (91%) compared to those from household incomes of £100k or less (76%). Teenagers from higher household income families (£125k+) are almost four times as likely to pursue a career in science than those from the lowest household income families (under £15k).

Dishearteningly, whilst 12% of children from higher household incomes (£125k+) said they didn't feel smart enough to pursue science, this number increases considerably when looking at how teens from lower income households (under £24k) feel – 29%.

When asked what could be put in place to encourage them to continue to study or progress in a scientific field, teens cited a few options. Almost a third (30%) said knowing more about the careers involved would help and a further quarter (25%) said work experience as well as more information generally would also potentially help change their minds. Nineteen percent also said knowing more people in science would help.

Pursuing Science

Looking at those interested in pursuing science as a career option, encouragingly over half (53%) said studying science will pave the way for a better future. Forty-seven percent felt science would lead to a good career and 41% felt science would ensure the 'opportunities for their future would be endless'.

By far the single biggest influence on these students' lives are their parents with a third (33%) stating it's mums and dads who are encouraging them to pursue science. As you'd expect teachers also play a significant role here with 30% citing that teachers have influenced them to pursue science.

Embracing their passions and doing something they love is possible

Life after sixth form

University is the most popular option for teenagers preparing for life after sixth form with 47% planning to go to university. Apprenticeships are also gaining popularity with 17% considering that option whilst just 14% are planning to get a job immediately. For those not planning to go to university, the biggest reason was the potential debt with 30% saying 'the debt isn't worth it' and 27% admitting they 'couldn't afford to go'. A further 24% don't feel smart enough. Unsurprisingly finance plays a bigger factor for students from lower income households.

What next?

Our research reveals a worrying state of play for the UK's science sector. Put simply, the sector which according to the UK's Life Sciences Council is worth over £70 billion to the economy, is at risk unless something is done to ensure there are skills and talent coming through from the next generation.

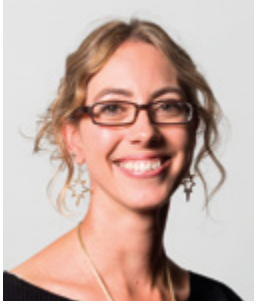
It's essential that children from more disadvantaged communities or minority groups are given the same access to education and careers as their peers to ensure a level playing field. The recently introduced Gatsby Careers Benchmark will at least try and ensure students have regular interactions with employers. Meeting and speaking with role models is important to understand how a subject at school can develop into a potential career opportunity. Whilst not every child has a role model at home, at least through schools and employers, children can get access to people in a wide variety of roles and be inspired by them. Finance also shouldn't be a barrier to further education with support made available to those who need it the most.

Fundamentally, students need to see that the enjoyment they experience in their science classes can continue right through to their career. Embracing their passions and doing something they love is possible. But this can only happen if we, the current employers, the government and educators, take on the responsibility to help the next generation achieve this. It's our duty.

About the Roche Research

Research based on a survey of 2,000 teenagers aged 14 to 18, based in the UK by MRS accredited agency, Atomik Research. Research undertaken in March 2019.

The ASPIRES study: what can be done to help more young people see science as 'for me'?



Professor Louise Archer

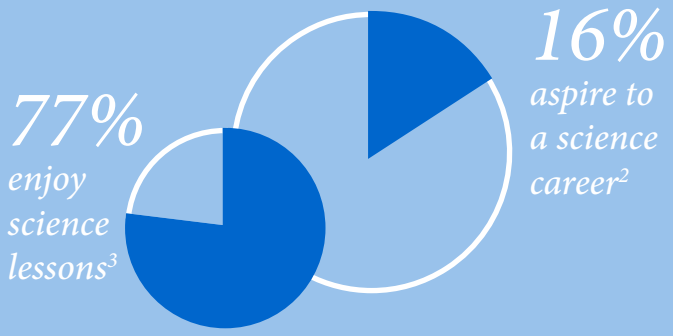
Karl Mannheim Professor of Sociology of Education, UCL Institute of Education

The latest findings from Roche are a reminder that the UK could soon be facing a shortage of scientists.

During a period when jobs in science in the UK are expected to grow at double the rate of other occupations[1], efforts must be made to understand what can be done to boost the number of young people considering pursuing science post-16 and to promote wider public scientific literacy.

The ASPIRES research study[2], based at UCL Institute of Education, has been working since 2009 to understand what shapes young people's science and career aspirations. The study, now in its tenth year, has tracked a cohort of young people from age 10-19 in order to assess how their experiences of science – inside and outside of the classroom – influence their attitudes and aspirations. To date, over 40,000 young people have been surveyed for the study, and its researchers have conducted over 650 in-depth interviews with 60+ students and parents.

As Roche also found, research from ASPIRES shows that the majority of young people find school science interesting, but only a small percentage (about 16%) aspire to a science career - a proportion that does not vary significantly from age 10 to 18. This raises questions about whether initiatives aimed at making science 'fun' can really have an impact upon boosting science aspirations.



It is not just the number of young people aspiring to science that is of concern – the ASPIRES study also draws attention to persistent issues of inequality in terms of who aspires to science, or not. For instance, ASPIRES found that the students who are least likely to express science aspirations are female, white, from lower income communities and/or are in the lowest sets for science at school.

1. https://www.edfenergy.com/sites/default/files/jobs-of-the-future.pdf
2. www.ucl.ac.uk/ioe-aspires
3. 2,000 teenagers aged 14 to 18 and based in the UK surveyed by MRS accredited agency, Atomik Research. Research undertaken in March 2019.

"People don't really expect girls to be that smart"
15 year old girl - ASPIRES study

Conversely, those most likely to aspire to science careers tend to be boys and those from more socially advantaged communities, particularly with family members who have science qualifications and/or careers. To help explain these patterns we developed the concept of 'science capital'[4]. Science capital can be imagined like a 'holdall' or bag, containing all the science-related knowledge, attitudes, experiences and resources that you acquire through life. People with higher levels of science capital are more likely to have a science identity and aspire to work in science.

As Roche's research found, many young people don't feel clever enough to be a scientists and ASPIRES longitudinal analyses show that the proportion of students agreeing with the statement 'I could be a good scientist one day' decreased as they got older. Part of the reason why many young people do not see science as 'for me' is because of popular perceptions of science and scientists; 79% of the 13-18 year olds we surveyed agreed or strongly agreed that scientists are brainy. This 'brainy' image is often linked with masculinity – especially in the case of the physical sciences; one 15 year old interviewed for ASPIRES went as far as to say that it would be 'weird' for a girl to take Physics at A level, because people 'don't really expect girls to be that smart'.

The current school system may also be contributing to this issue; ASPIRES research with Year 11 students in England found that socially disadvantaged students are less likely to study Triple Science at GCSE. Triple Science[5] is also overwhelmingly seen as the route for those who are 'clever' and 'sciency', both by those taking it and those taking alternative options. Our interviews showed that this left Double Science and Science BTEC students feeling inferior, especially in schools which threaten to 'bump down' Triple Science students to Double Science if they fail to achieve the top grades.

Our research over the last ten years has shown that there are multiple barriers to young people aspiring to science, and that there is no single 'fix' guaranteed to increase and widen participation.

4. www.ucl.ac.uk/ioe-sciencecapital
5. https://www.ucl.ac.uk/ioe/sites/ioe/files/aspires_2_triple_science_policy_briefing.pdf

We first recommend that science outreach programmes shift their focus from 'increasing interest' in science to 'building science capital' in young people in order to develop their science aspirations (see the Science Capital Teaching Approach[6] for more information). More work must also be done to address the perceptions and image of scientists, especially to increase uptake by students from currently underrepresented groups. Finally, as the current system of Triple Science in England leaves many feeling that they are not clever enough to pursue science, we ask whether the implementation of a common science qualification for all will fairly address the Science skills gap?

About Professor Louise Archer

Professor Louise Archer

Karl Mannheim Professor of Sociology of Education, UCL Institute of Education

Professor Louise Archer is the Karl Mannheim Professor of Sociology of Education at the UCL Institute of Education (IOE), and is co-chair of the IOE's Centre for Sociology of Education and Equity. Her research focuses on educational identities and inequalities, and has most recently looked into inequalities in science participation. Archer is director of a number of large national projects looking at young people's science participation, including the ten year **ASPIRES** study (a mixed methods longitudinal tracking of students' science and career aspirations from age 10-19); the **Enterprising Science** project (a five year research and development project focusing on students from socially disadvantaged communities), and the **Youth Equity & STEM** project (a four year, UK-US project, focusing on youth equity in informal educational settings, of which Archer is the UK director).

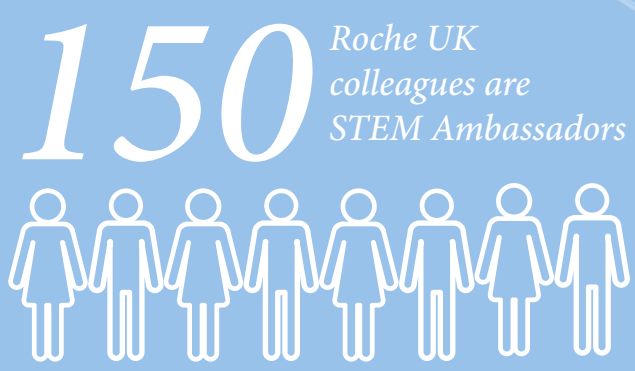
The ASPIRES 2 study is funded by the UK's Economic and Social Research Council (research grant number: ES/L002841/2).

6. http://bit.ly/SCTeach

GenerationeXt

Roche is inspiring the next generation of Scientists with its GenerationeXt initiative, a programme of activity that aims to inspire and motivate students to pursue a career in Science, Technology, Engineering and Mathematics (STEM). Through a series of interactive workshops and classes, the programme aims to show the next generation how exciting and rewarding a career in STEM can be whilst giving them the potential to change the world.

There are around 150 colleagues from Roche in the UK signed up to be STEM Ambassadors. These ambassadors help to bridge the gap between businesses and schools. Their role is to engage with students and demonstrate the world of opportunities that a career in STEM can bring. Colleagues go into schools and run science classes or talk about their careers, bringing the idea of a career in STEM subjects to life.



Roche GenerationeXt

We host dedicated STEM related events on-site at Welwyn Garden City including a one day event called GenerationeXt. You can watch highlights of our last GenerationeXt day **here**.

We also host a three-day work experience event at our site in Welwyn Garden City which is open to students in Year 12. We aim to demonstrate what it's like working in the healthcare sector along with workshops on employability skills and UCAS applications.

In2Science

Roche also works with charity In2Science on the Roche Scholars Programme, helping kids from disadvantaged backgrounds pursue a career in Science.

On the Scholars Programme, students are given access to a range of workshops and employability sessions as well as a mentor to help them prepare for life after sixth form.

550 students

have attended or been supported by GenerationeXt and the Roche Scholars Programme

For further information about our GenerationeXt and Roche Scholars Programme please email: **Welwyn.stem@roche.com**

About Roche

Founded in 1896, Roche continues to search for better ways to prevent, diagnose and treat diseases and make a sustainable contribution to society. We have one mission: to do now what patients need next.

We believe that good health is incredibly precious, but also complex, because every person is unique. We are working to advance the concept of 'personalised healthcare' – to transform people's lives by delivering care tailored to each individual – helping to prevent, diagnose and treat illnesses more effectively.

Twenty nine medicines developed by Roche are included in the World Health Organisation Model Lists of Essential Medicines, among them life-saving antibiotics, antimalarials and cancer medicines.

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29 medicines

medicines developed by Roche are included in the WHO Model Lists of Essential Medicines

We have had a presence in the UK since 1908, operating across three main businesses:

- Our pharmaceutical business in the UK is one of our most important global centres for researching and developing medicines, as well as marketing these medicines once they have been developed.
- We lead the UK in providing a broad and cutting-edge portfolio of tests and technology to prevent, diagnose and manage diseases.
- We provide diabetes management solutions and services to improve the lives of people living with diabetes.

More than 700,000 people benefited from our medicines in the UK in 2017

Roche facts

- In 2017 Roche invested £388m in UK R&D and conducted 181 clinical trials
- More than 519 million Roche diagnostic tests were carried out, and more than 700,000 people benefited from our medicines in the UK during 2017.
- We contributed £1.2 billion in UK GDP and supported 16,600 UK jobs.
- Since 2012, Roche has reduced its impact on the UK environment, reducing CO^2 emissions per employee by 35%.
- Our approach to diversity, inclusion and collaboration was recognised in our UK Top Employer certification.
- We entered The Sunday Times 100 Best Companies To Work For list in 2019.

We have extraordinary people making all this happen. We are the largest biotechnology company in the world. In the UK, we employ more than 2,100 people of 53 different nationalities across our pharmaceutical, diagnostic and diabetes care divisions, with a further 40+ employees working in our diagnostics division in Ireland.

The UK plays an important role in the global research and development (R&D) network for Roche. This includes research at our campus in Welwyn Garden City, as well as clinical trials carried out by external research organisations and collaborations with academic institutions and other partners.

As a result of our continued investment in R&D across the globe, we supply 581 different diagnostic tests to the UK, and since 2010, we have delivered eight new medicines, found new ways to use existing medicines across 12 different disease areas, and developed 10 new treatments to help people manage their diabetes.

For more information: **www.roche.co.uk**