



February 2016

Wellcome Trust: SET Development 2016

Qualitative Report

Background

- In 2009 and 2012 the Wellcome Trust undertook major surveys of the public's interest in, attitudes to and experience and knowledge of biomedical science and science education. Published as the 'Wellcome Trust Monitor', the aim was to provide a robust resource for academics, policy-makers and science communicators.
- The Trust is now planning to build on that work through the Science Education Tracker (SET) planned to be launched in January 2017. The SET will be a representative survey of young people in England in school years 10 to 13. It will explore young people's attitudes to science education, careers and aspirations.
- The objectives of this research were to explore young people's attitudes to a set of issues to feed in to SET questionnaire development. However we believe that the findings from the research have wider applicability and so this report is focused on these broader learnings.

Methodology

- 9 single sex face to face quads with students across England aged 14-18
- Key Stage 4 (KS4): split by interested in studying science post-GCSE / not interested in studying science post-GCSE
- Key Stage 5 (KS5) and FE College / vocational qualification (FE/VQ) students: split by studying science post-GCSE / not studying science post-GCSE
- 3 locations to gather a geographical and socio-economic spread
- Fieldwork: 27th January – 3rd February 2016 / 1.5 hours

Location	Stage	Gender	Science?
London	KS4	Male	Interested
	KS5	Female	Not studying
	FE / VQ	Male	Studying
Bradford	KS4	Female	Not interested
	KS5	Male	Studying
	FE / VQ	Female	Studying
Southend	KS4	Female	Interested
	KS5	Male	Studying
	FE / VQ	Female	Not studying

Science Capital

What is science capital and why is it important?

The concept of 'science capital' comes from the ASPIRES study run by King's College London published in 2013 which investigated the science and career aspirations of young people aged 10-14

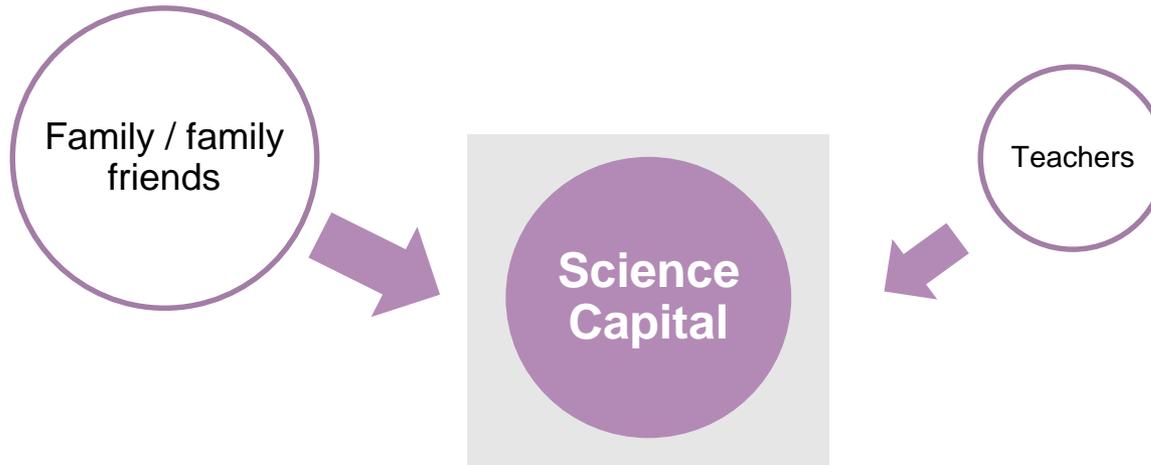
- It refers to a person's **science related qualifications, understanding and knowledge of science, interest in science, and social contacts in science-related fields**



KCL found that the higher a person's science capital, the more likely they are to study science post-16 and subsequently pursue a career in science. Therefore understanding a person's level of science capital can be used as an indicator to understand potential future engagement with science and science careers

Young people engaged with science are predominantly influenced by relationships with family members / family friends and, to an extent, teachers

Science capital is partly built through the types of influencers that young people are surrounded by. Family were the predominant influence for young people engaged with science. Teachers were a lesser influence, with young people reporting no other influences at all



There is a need to help young people understand significance of studying science and recognising ‘science’ in the real world

*“The medical staff who helped my Nan. She has vascular dementia, and I’ve seen how that’s changed her, and how bad things like Alzheimer’s can be, and I want to try and develop cures for stuff like that.” M. KS4.
London. Interested in science*

*My teacher shows how everything fits in biology, and how everything can be explained. I know that later on I might learn more about it, and it’ll give me the knowledge that I want and it will show me the path to some explanations I might need.” M. KS5.
Bradford. Studying science*

Family, both immediate and extended, plays a strong role in sparking interest in science

Family connections to science and any health experiences that families face spur conversations and interest in science among young people. These personal interactions make science relatable and relevant to young people and this increases their engagement with the subject

Work in scientific fields

Correlation between being engaged with science and family members who work in scientific fields e.g. medicine, astronomy, nutrition

Family circumstances

Such as illnesses or health conditions can spark an interest in science among young people seeking to understand it

- Leads to **discussions about scientific areas of interest** e.g. medical developments
- **Family appreciation and encouragement** of studying science qualifications

“My cousin works for NASA right now. I think that’s why I’m so interested in astronomy. He really interests me, he’s done really well for himself...He’s seen loads of things that he would never be able to see if it wasn’t for science and if it wasn’t for his interest in science.” F. FE. Bradford. Studying science

“Well, my aunty is a nurse but she actually became a nurse because her daughter has cystic fibrosis so she wanted to take better care of her. So, that really influenced me to learn more about nursing.” F. FE. Bradford. Studying science

Teachers can play an important role in engaging young people in science, particularly for those lacking in family influence

Teachers can build science capital through inspiring, nurturing and engaging students in science lessons, and providing an environment that brings relevance to the forefront of learning

Inspire

Bring science to life with experiments / real world examples and a sense of enthusiasm and passion to the classroom

Nurture

Are approachable, can instil confidence in students and tailor lessons to their needs

Engage

Offer context, experience and expertise to inspire students
i.e. enquiry based learning, especially if past industry experience

“Someone who’s been through the field before becoming a teacher and that they know their subjects well. My chemistry teacher worked in pharmaceuticals...So he understands the field a lot more. It’s interesting because it shows he has a bigger life outside of the classroom.”

M. KS5. Bradford. Studying science

Students appreciated it was hard for teachers to customise lessons to individuals’ needs. For example, students were **aware of different learning styles** (visual, auditory, kinaesthetic) and felt they had the potential to be useful but didn’t believe that teachers would be able to amend their teaching to individual needs so saw these as something to use on their own.

Teachers and awareness of personal learning styles *can* negatively impact on attitudes to science

The school environment can have a negative impact on perceptions of science and act as a barrier to engaging with science. Teachers; awareness of a students' natural inclination for science (or not); the nature of the curriculum and the importance placed on other subjects can influence how young people interact with science at school.



Teachers who don't inspire, nurture and engage **risk putting off pupils** studying science further, even if they showed signs of interest in science initially

"In my class we never really had a steady teacher. They kept switching. When we did get our final teacher the class was really unfocused...when I was younger I was more interested in science but I lost interested in the last year." F. KS5.
London. Not studying science



- Those interested in science mainly identify themselves as more 'logical' and those not interested as more 'creative' and this can sometimes be used as an excuse not to try
- Recognise **ability** in all subjects (including science) comes down to having a **natural aptitude for it** (i.e. logical vs creative), **enjoyment** of it and **willingness to work hard** at it
 - **Self-awareness** of whether they see themselves as 'good' at science or not
 - But **achievement** often rationalised as aptitude, e.g. not doing well in science because they are a 'creative'

How science is taught and the emphasis placed on other core subjects affects students attitude towards science



'School' science

- Seen as **rigid, theoretical** and **strictly follows the curriculum**
- Students largely **fail to see scientific relevance to other subjects** despite expressing interest in these e.g. photography, design and technology
- Science tends to become more interesting at A-level

"I feel quite bad for putting Science so far down, but people are right. It doesn't really have that much use in basic life."
M. KS5. Bradford. Studying science

"Unless you're going to be a nurse or midwife or something I don't think you need it [science]." F. FE. London. Studying science



English
Maths

• **English** is needed for developing **communication skills** and articulating effectively with **different kinds of people**

Science

• **Maths** is important for **understanding business** and **personal finance**

Other subjects

• **Science** is impressive and a **sign of cleverness** but **not necessary for a good job or every day life** (however, high importance placed on science in making a difference in the world, although this is outside their potential experience as they don't imagine themselves in a position to make a difference in this way)

The word *science* describes what is studied at school; ‘school’ science doesn’t have applicability to the wider world

Those not studying science, and even some studying science, are not making the link between school science and the science they think about outside school. Therefore they do not feel they are engaged with ‘science’ when asked, even though they may be thinking about scientific concepts outside of school (although rarely discussed)

‘School’
science

- The word ‘science’ is inextricably linked to science at school and experiences of learning science in the classroom



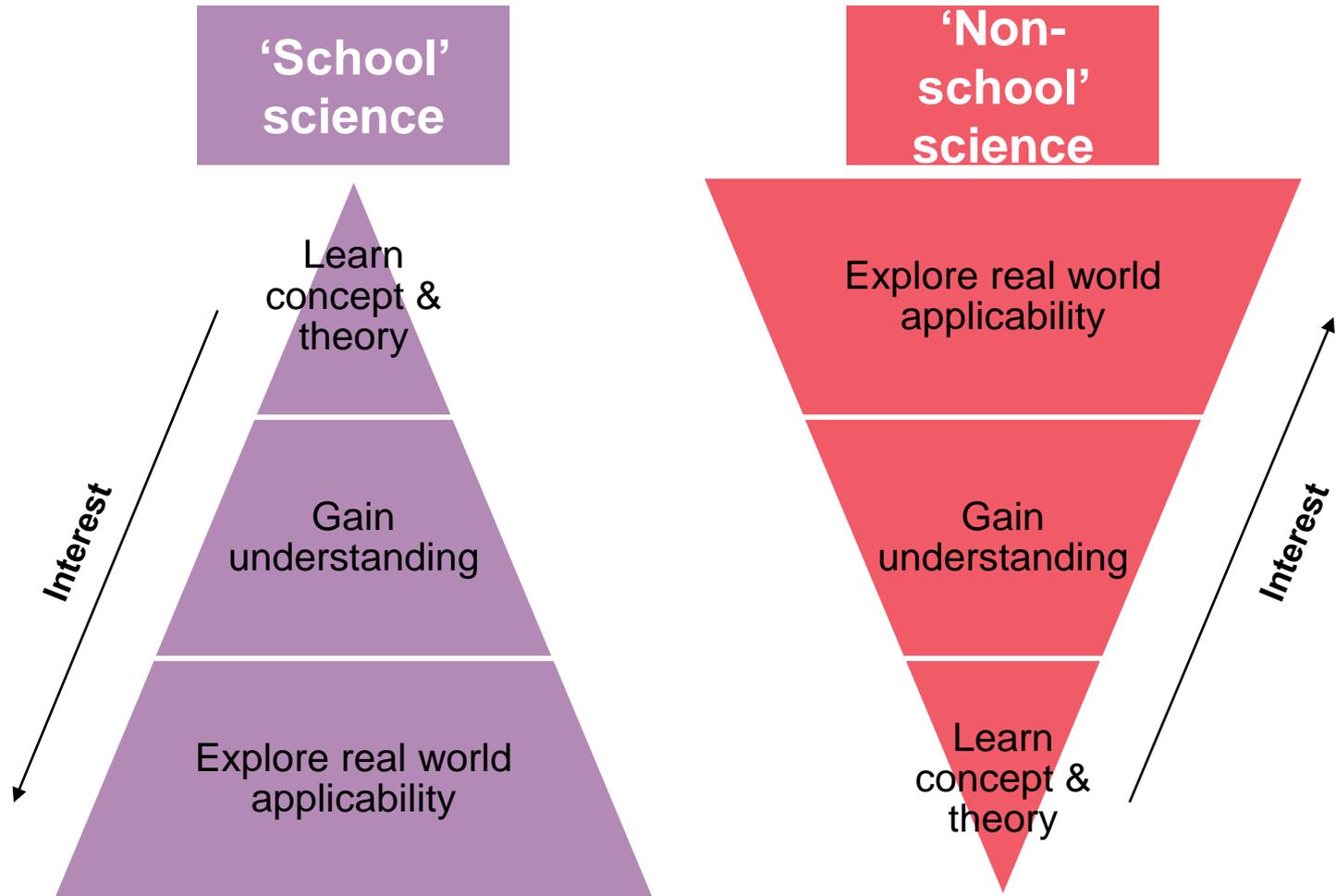
‘Non-
school’
science

- **No conscious link** made to science in the real world and that studied in school
- Can think about scientific concepts outside of school but they don’t think of this as ‘science’
- Even if interested / studying science they **don’t discuss it with friends** unless it applies to school work

*“I find it hard to sleep so I often go on YouTube and look at different ways, and now I’ve found a new breathing method. I thought it was silly but it works and I **think** that’s to do with science.”*
F. FE. London. Not studying science

The way that young people approach science in school vs. outside of school affects engagement in school

At school, science is taught from theory through to real world application. This can often be found to be un-inspiring and un-relatable. Outside of school, scientific concepts are explored from a real world perspective and led by interest



Real life applications

In day to day life, science is not really interrogated by young people

Students are generally not engaged with science in the news and, in situations where science is an integral part of the conversation such as when visiting the GP, girls are more likely to be questioning than boys



Science in the media

- **Not 'actively'** consuming science in the media – may read popular new stories and follow up on them e.g. Zika virus, 9th planet, but rarely seeking them out
- Not particularly **critical of news stories**, but those studying / interested in science wary that science can be simplified by media so might seek further understanding if of particular interest
- Generally less critical of sources, perhaps due to age

"With a lot of things they tend to dumb it down so much for the sort of general people, so that everybody can understand it. I'm quite critical of things like that." M. KS5. Bradford.

Studying science



Health and science

- Overall, confident in visiting doctors alone and will listen to their advice
- **Males don't question** doctors advice and trust doctors as the 'expert'
- **Females** are less likely to blindly trust doctors, can feel that they **aren't listened to** and often seek reassurance by checking symptoms online before visiting doctors e.g. NHS website

"If I have a problem...they do have a little symptoms thing where you can say what you've got and it will come up with a result and what you should do about it...sometimes it does say, 'Go to the doctors about it.' So, that's when I start thinking about maybe booking an appointment." F. FE. Bradford. Studying science

Not much thought is given to healthiness or the environmental impact of diet

Again, the applicability of any science learnt in school about health, diet or the environment is not applied to day to day life.



Most of the time, health or nutrition is **not a factor** taken into account when choosing what to eat or drink

- Generally young people choose what to eat during the day, and eat a cooked meal at home in the evening (prepared by someone else)
- Young people do recognise when they are making unhealthy decisions, but for the majority that does not deter them, e.g. skipping meals, eating fast food
- The minority that do think about eating healthily have a specific reason for doing so, e.g. playing a sport, having bad skin



Young people are **not knowledgeable** of the environmental impact of the food they eat

- There is some consideration of recycling packaging, but knowledge of environmental impact of food production and distribution is extremely low

"I don't think anyone's ever really told me about environmental impacts, because I can't think of what they would be." F. FE. London. Not studying science

"I won't eat breakfast which is really bad, but then as soon as I get home then I'm really hungry so I feel like I need to eat more than I really need. I feel really bad afterwards, but in that moment I just feel like I have to eat as much as I can." F. FE. Bradford. Not studying science

Careers

Careers advice from family can be extremely valuable, although it is limited to family's own careers

Role of family in careers guidance

Can play a key role in **providing information** and **guiding their choices**

- Can share **detailed** knowledge of the realities of **day to day of working life and career paths**, which is invaluable to young people as it provides a clear idea of whether the job is right for them
- **BUT** while this knowledge can be extremely useful, it is limited to family members' own experiences only

"My sister and aunty are both nurses. My aunty is a qualified nurse and my sister is in her last year of uni. I just find it really fascinating and something I would want to do."
F. FE. Bradford. Studying science

Implication that if a young person does not have any family contacts in science careers they are much less likely to have knowledge of what science careers exist and what they involve

"I go to my parents, we have discussions on what I want to do...they know what kind of pressure I can handle, they know more about me than anyone else."
M. FE. London. Studying science

"My brother works for a pharmaceutical company. He told me it's pretty interesting and it's not that difficult. He said you can go many ways, it's not just pharmaceutical, you can do other things with the degree."
M. FE. London. Studying science

"I go to my mum, to be honest. She helped me write my CV as well."
F. KS5. London. Not studying science

Careers advice received at school does little to educate young people about their career choices

Role of school in careers guidance

Careers advice received in school is extremely limited

- Most students have met with a careers advisor at school, but this is usually just a **one-off meeting** and the **knowledge gained from this is essentially poor**
- Careers advisors seen as unavailable and focused on **next steps of study** and not long-term career path, or just say ‘**do what you enjoy**’
- **Teachers don’t generally talk about careers** – but unless a teacher has experience of another career before they started teaching, students do not value their advice much anyway

“I met with the careers advisor once. It was only half an hour, we had to get back to lessons. She didn’t go much into it, just asked what subjects I was doing. She didn’t tell me about careers, only college”.

F. FE. Southend. Not studying science

“Teachers don’t talk to us about careers much...they generally don’t feel very helpful...it seems like a waste of time normally”.

M. KS5. Southend. Studying science

“Apart from applying to university they haven’t done much. We used to do careers lessons, but honestly I can’t say I’ve learned anything from them and they’re a big waste of time”.

F. KS5. London. Not studying science

Online resources are useful for finding out details of specific careers, but not for general searching

Role of online resources in careers guidance

Online sources are used but in a limited way depending on prior knowledge

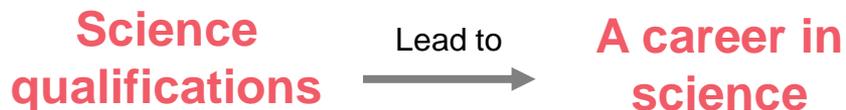
- Min. mention of **Prospects** or **National Careers Service**
- Only useful once you have a good idea of what you want to do - to find out qualifications needed and salary
- For those who don't know what sort of career they are interested in, online resources are not much help as it is **too overwhelming** to know where to start

“There’s a website called National Careers Service, and there are all the jobs out there...it tells you how much pay, how many people in the world are doing it, and...qualifications needed..”
M. KS4. London. Interested in science

“People will talk about ‘Oh, this job requires this’ but I don’t know where to start when I’m searching, because there’s no website that just explains everything. I guess you have to go to people who are in that sort of career, which might be difficult.”
M. KS4. London. Studying science

Those interested know about ‘typical science’ career paths but lack of knowledge about science’s role in ‘non science’ careers

Young people have an overarching belief that



- Those studying or planning to study science post-GCSE tend to have a **science career in mind** – often in medicine or engineering
- View it as a **linear progression**, much more so than any other core subjects – especially maths and English
- **Little awareness** of the applicability of science to non-science careers
 - Belief that science gives you **knowledge** and not transferable skills

“I just think having that science qualification really helps you if you want to go into a science job.”
F. FE. Bradford. Studying science

“It might seem quite a narrow field to go down, but if you have a passion for science then obviously a qualification will help you get into the field you’re interested in. In a broad sense, it might not help getting a random job, but if you have an aspiration to do something in a science workplace, then it’s really helpful.”
M. KS5. Southend. Studying science

“[If you had a science qualification post-GCSE] you could work in a pharmacy, or in something that’s got to do with medicine, chemicals, things like that.”
F. KS4. Bradford. Not studying science

As with careers information, there is a little targeted work experience being sought generally, except among those who require it for their chosen career path

Those who had carried out work experience:

- Had a **family / friend connection** who encouraged and helped organise it
- Was organised by **school or college**
- Part of a **university programme** to help get onto science course – ‘Realising Opportunities’
- Have a specific career in mind and **need experience to strengthen their chances** of getting onto a course for it e.g. nursing

Some STEM related work experience carried out (e.g. opticians, hospital, research) but even that is focused on more general ‘work’ skills and **provides little insight into what STEM careers involve as it is not recognised as a STEM experience**

“I’ve done work experience in an opticians. My mum sorted it out. I didn’t really do anything about eyes, I didn’t learn anything about that. I just worked on reception.” F. FE. Bradford. Studying science

“My brother’s friend’s girlfriend’s cousin works in Milton Keynes as a physiotherapist, and so through that connection I was able to do that.” M. FE. London. Studying science

Conclusions

Five key take-outs about young people and science

- **Family** are the biggest influence as to how young people perceive and interact with science
- **Teachers** are less of an influence but have the potential to have a real negative impact
- The language of science is **confusing**
 - Science at school is separate from science in the real world
 - And whilst some do think about science in the real world there is a lack of understanding that they are thinking about science
- There is **little engagement** with science or scientific concepts in **the real world**
- Belief that you study science purely for a **science career**
 - There is a lack of awareness of the **transferable skills** that can be gained from studying science
 - Science is **not** seen as **relevant or applicable** to other careers or even day to day life

Appendix

Objectives

- The over-arching objective of this research is to inform and refine the new question areas that will be covered by the SET, and to ensure it is fulfilling its research goals
- Topic areas covered in the research were:
 - **Teacher expertise** - How young people define a good or bad science teacher? Do young people aspire to be a science teacher? Where does science sit compared to English and Maths in terms of importance, and does this vary by age? What access to science textbooks and other resources is like
 - **Science capital** - What does science mean to young people? How is it used in their everyday life? Would they like a greater connection to science in their lives?
 - **Career routes** – What have young people learnt from their career advice? What are the perceived benefits and limitations of studying STEM subjects for their careers? What is the role of online resources and social media for careers advice? Have the young people sought out work experience in a STEM-related environment, and why were they successful or not in this?
 - **Learning** – Awareness of different learning styles e.g. visual, auditory or kinaesthetic, any preferences for these or success of using a particular style? To what extent is ability in science and maths perceived as being inherent vs. dependent on the effort put in?
 - **Food and drink** – How much control do young people have over the food and drink they consume at different ages, and in different settings?