Science beyond the classroom

Experiments in Engagement:

Research into engagement activities with young people from disadvantaged backgrounds

April 2014

wellcome trust

Platypus research

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Preface

In 2011 the Wellcome Trust commissioned two reports to review informal science learning opportunities outside school in the UK; to understand what informal science learning opportunities exist, who is engaging with them and what impact these activities have on young people's interest in science and future opportunities.

These reports identified that young people from low socio-economic status (SES) families are less likely to have access to informal science learning opportunities, which places them at an educational and, in the long term, economic disadvantage. The Wellcome Trust therefore identified a need to conduct a literature review of what is known about how young people from low SES families engage with activities, especially those relating to science. This led to further research with such young people, and some influential people around them, to establish how best to engage with these young people. The results of these two reports have been pulled together into a practically-oriented summary, which includes recommendations for applying this learning to informal science engagement.

This paper presents the findings of the primary research conducted with young people from low SES families in the UK.

Contents

Background

The Wellcome Trust has a clear vision:

> *"To bring about extraordinary improvements in human and animal health."*

Central to this vision is the belief that everyone, of every age and background, should be able to experience and enjoy science and that young people should be inspired and engaged with science in order to continue developing the next generation of brightest minds.

As well as formal science classes in school, the Wellcome Trust believes that engaging young people in informal science learning opportunities such as museums, science centres, broadcasting, performance and gaming plays a vital role in this process. In fact, the Wellcome Trust has invested almost £150 million in the last 15 years into many activities and organisations to support science learning.

In 2011 the Wellcome Trust commissioned two reports to review informal science learning opportunities outside school in the UK; to understand what informal science learning opportunities exist, who is engaging with them and what impact these activities have on young people's interest in science and future opportunities.

These reports identified that young people from low socio-economic status (SES) families are less likely to have access to informal science learning opportunities, which places them at an educational and, in the long term, economic disadvantage. The Wellcome Trust therefore identified a need to conduct further research with low SES families to establish how these young people can be best engaged with.

This piece of research therefore draws on the experiences of young people from low SES families across the whole spectrum of activities they engage with, to establish what attracted them to take part, what the perceived benefits are and how this can be applied to informal science learning.

Objectives

The overall objective of the work is to:

- Increase engagement in informal science learning opportunities amongst young people from low SES families

In order to achieve this, the following research objectives were identified:

- To explore the lives of young people from low SES families; their lifestyles, attitudes and aspirations
- To establish who and what the key influencers are in the lives of these young people
- To understand what activities and cultural offerings these young people are engaging with
- To establish what influences their choice of activities and establish what barriers they face in engaging with them
- To explore attitudes to science in both formal and informal learning settings
- To identify any barriers to engaging with informal science offerings
- To identify how to:
    - Improve access to informal science learning opportunities for young people from low SES families
    - Develop strategies for engaging and communicating with them

Methodology

A face-to-face qualitative approach was used to gain in-depth and detailed feedback on the lifestyle, attitudes and behaviours of young people from low SES families, as well as generate ideas for how young people could be engaged with informal science in the future.

Interviews were conducted with three audiences:

- Young people aged 9 to 19 years
- Teachers and youth workers
- Parents

All fieldwork took place between December 2013 and February 2014.

Research locations

Interviews were conducted in four locations to provide a spread across the UK and also a mix of city and semi-rural locations:

- South – London (Tower Hamlets, Islington)
- Midlands – Birmingham
- North – Barnsley, West Yorkshire (semi-rural)
- Scotland – Glasgow

These locations were chosen based on 2011 data compiled for the Campaign to End Child Poverty (Hirsch and Beckhelling, 2011), identifying areas in the UK with high levels of child poverty.

The locations of Tower Hamlets and Barnsley were specifically chosen based on Ofsted free school meals (FSM) pupil attainment data[1] at GCSE from 2007 to 2012 in their report Unseen children: access and achievement 20 years on (Ofsted, 2013).

This report identified that in 2012, Tower Hamlets was the local authority with the highest proportion of FSM (54 per cent) but was in the top three local authorities for GCSE pupil attainment. Tower Hamlets was also one of the most improved local authorities for pupil attainment between 2007 and 2012. This location was therefore chosen as it may provide evidence of how young people can succeed despite their low SES status.

By contrast, whilst Barnsley had made a marked improvement from 2007 when it was the poorest performing local authority for GCSE pupil attainment, in 2012 it still remained in the bottom three. This location was therefore chosen as it may provide evidence of the challenges still faced by young people from low SES families living in this area.

[1] Pupil attainment measured by the percentage of FSM pupils achieving 5 GCSEs A* to C including English and Mathematics.

Approach – Young People

Mini groups and triads of around 1–1.5 hours were conducted with young people across all locations. Respondents were aged 9 to 19 years old and males and females were interviewed in separate groups. The only exception to this was the session at Barnardos in London, where just one male and one female were interviewed, as some respondents were unable to attend.

Interviews took part on school premises or in the premises of the youth organisation. This approach was taken for two reasons. First, to ensure the young people who took part were in familiar surroundings, so felt more comfortable. Second, to increase the success of recruitment and attendance at the groups as they took place in a location that the young people were already attending. Schools and organisations were free-found and recruited in-house by Platypus Research.

For each group, we aimed for six young people to attend, however for some groups there were more and for others there were less.

Approach – School teachers/organisation staff

A depth interview of 30 to 45 minutes was conducted with a member of staff at each school/organisation. The staff were responsible for the welfare of the young people in some way, such as pastoral staff, teachers, heads of year, youth group leaders or care workers.

Approach – Parents

Six face-to-face interviews were conducted with parents, three in Birmingham and three in Batley. Four of the interviews were triads with three mums (two in each location), where the lead mum was recruited and asked to bring along two friends with children in the same age group. The remaining two interviews were with a mother and father together. All respondents were recruited free-find using specialist qualitative recruiters.

Sample

Young People

16 group discussions were conducted and we spoke to 93 young people in total, broken down as follows:

Secondary – 12 groups, 67 respondents

Age	Number of Groups	Gender	Organisation	Location
12–14	4	Girls Girls Boys Boys	School Organisation School Organisation	Barnsley Birmingham London Glasgow
15–16	3	Girls Boys Boys	School School Organisation	Glasgow Birmingham Barnsley
17–19	5	Girls Girls Girls Boys Boys	School Organisation Organisation School Organisation	London London Glasgow Glasgow London
TOTAL	**12**	**Girls x 6** **Boys x 6**	**School x 6** **Organisation x 6**	**London x 4** **Birmingham x 2** **Barnsley x 2** **Glasgow x 4**

Two of the sessions were conducted with vulnerable/looked after children via Barnardos.

Primary – 4 groups, 26 respondents (all aged 9–11)

Gender	Number of Groups	Organisation	Location
Girls	2	School Organisation	Barnsley London
Boys	2	School Organisation	London Barnsley
TOTAL	**4**	**School x 2** **Organisation x2**	**London x 2** **Barnsley x 2**

School teachers/organisation staff

A total of 16 interviews were conducted as follows:

- Secondary – 12 interviews; 6 x teachers and 6 x youth group workers
- Primary – 4 interviews; 2 x teachers and 2 x youth group workers.

Parents

The sample structure for the parents' interviews was as follows:

Batley

- Interview 1; Mums triad, all with daughter aged 12–14 years
- Interview 2; Mum and dad with daughter aged 17–19 years
- Interview 3; Mums triad, all with son aged 15–16 years

Birmingham

- Interview 1; Mums triad, all with daughter aged 15–16 years
- Interview 2; Mum and dad with son aged 12–14 years
- Interview 3; Mums triad, all with son aged 17–19 years

Attitudes to science

Initial reactions to the subject of science varied widely.

A minority clearly enjoy science and reacted enthusiastically when asked about what it means to them.

"It makes me feel bubbly, I don't know why!" (Girl aged 11)

"I like science, especially my teacher." (Boy aged 13)

"It makes me feel excited!" (Boy aged 12)

Love it

The reactions of primary age children to the word 'science' were generally more enthusiastic, with more energy, excitement and innocence. Their exposure to science as a subject tended to be less regular and structured at this age and teachers spoke of trying to excite and engage the children in science.

"They were boiling sugar and had lab coats on – they were very excited." (Primary school teacher)

Hate it

However, for some the word 'science' brought about very negative and closed responses. Some young people were unable to articulate why they didn't like science, but expressed a feeling that they don't 'get it'.

"It's stupid. I just don't like it." (Boy aged 17)

"I'm not interested. You need to know it in a way, but I don't find it interesting at all. I find it boring." (Boy aged 16)

"It's dull, proper dull." (Girl aged 14)

"I don't like it because I don't know the words they use." (Girl aged 11)

Many had mixed views

Many young people had quite mixed views about science, finding some parts interesting and others less so.

"I wrote half and half. It depends what you are doing." (Girl aged 12)

"I like Biology, Physics, if you are doing space. It depends what type of topic you are doing, some of it is boring." (Girl aged 13)

"I don't really like science to be honest, I don't enjoy it really. I like the practicals though." (Boy aged 15)

"I'm in the middle. It depends on what kind of subject, I like the effects of stuff. I like the solar system and stuff like that." (Boy aged 16)

The word 'science' can be divisive

Given the diverse reactions of young people, it appears using the word 'science' can be quite divisive and potentially off-putting. In fact, although some young people discussed things that they found interesting that were related to science, or mentioned science-related careers they might like to follow, they seemed initially not able to make the connection between these and the word 'science'.

"I want to be a doctor but I don't like science, that's so weird!" (Girl aged 11)

"I've never seen a scientist in my life! I've got a doctor in my family but not, like, a scientist*." (Boy aged 15)*

Most would eventually reveal some science that interested them

Even the most negative of young people would, after extended discussion, reveal some aspect of science they were really interested in.

For example, one 18-year-old girl was very negative about science and hadn't enjoyed science at school. She did sometimes visit museums, but said she only went there for her younger brothers and sisters and didn't enjoy anything about them. However, almost at the end of the discussion she revealed that she would love to understand "how everything got here".

Another 19-year-old boy described how he had not enjoyed science at school, but found out through his own personal experiences that he actually had a keen interest in healthcare.

"In school I was never interested in science, I never thought in a million years that I would be studying science at a higher level. I failed science at GCSE. Trouble is, they wanted to teach me the curriculum. I was being taught things I wasn't interested in." (Boy aged 19)

Most saw that science has a value

Most of the young people could see that science has value, even if it wasn't something they said they enjoyed or understood well.

"It's everywhere… everything is something to do with science." (Girl aged 18)

"Science is like life. Science is hard and life is hard. You get new things in life, you get new things in science. The reason I say that science is life is that the way the building is made is science, the way the chairs are made. Everything you see around yourself is based on some law related to science or something... Maybe in some years' time all these things will change all because of science. It's like life moves on, it never stops." (Boy aged 17)

"The future does depend on science." (Girl aged 13)

Associations with science

Words associated with 'science'

Once prompted, the words most often associated with 'what science means to me' were generally positive (see figure below). However, young people often favoured naming or descriptive words (experiments, space, Biology, DNA, Chemistry) rather than using emotional words (confusing, interesting, boring, exciting, happy) which tell us how science makes them feel. This perhaps reflects the lack of engagement with the subject or a general emotional disassociation with the word 'science'.

Words used to describe what science is – most often mentioned (in order)[2]

Experiments most strongly associated

'Experiments' by far had the strongest association with 'science' and was often mentioned spontaneously as well as when prompted. Practical lessons were enjoyed by all the young people and they preferred actually doing the experiments themselves rather than watching someone else.

"Experiments... doesn't experiments kind of sum up everything?" (Boy aged 13)

"I don't really like science to be honest, but I love *experiments!" (Girl aged 11)*

"I like experiments. Chemistry. Bunsen burners!" (Boy aged 12)

"They do enjoy the practical aspects of the subject. I've got a 2nd year science class at the moment and I've got one wee girl that asks me at the start of every period 'Are we doing an experiment today?'"(Secondary school teacher)

[2] Word clouds do not attribute statistical significance; they only represent frequency. The font size of a word is proportional to how frequently the word was used in reply to the question.

‘Experiments’ also seems to encompass many of the other associations which young people viewed positively around science: explosions, cause and effect, asking questions and finding answers. Explosions or impactful experiments were recognised by both the young people and teachers to be particularly engaging.

“I like things to be explosive, go bang!” (Boy aged 13)

“Anything hands on, anything with a wow factor, loud, noisy, flashy. That kind of real in-your-face science.” (Primary school teacher)

“They like anything that explodes anything with bright lights and flashes.” (Secondary school teacher)

School subjects strongly associated

The school environment often makes up the vast majority of young people’s exposure to science and it is therefore perhaps unsurprising that the traditional school subjects of Biology, Chemistry and Physics were also strongly associated. Topics within these subjects were also indicated: DNA, formulas, brain, evolution.

Space

It is interesting that ‘space’ has strong associations with science for young people and is on a par with the core subjects taught in school. This perhaps reflects current space orientated programming on television from programmes such as *Stargazing Live*[3] which aired a short time before the interviews took place.

“I love space. I’m, sort of, like, a geek, when it comes to space.” (Girl aged 12)

“I love space… we know a way to remember the planets!” (Girl aged 11)

Other associations

‘Important’ and ‘the future’ were other words often chosen to describe what science is. Some young people also saw science as a subject that is constantly changing and evolving.

“Science is a subject where you can never reach the top. They always find new things and even if you climb from one branch to another you can’t stop because they always find something new.” (Boy aged 17)

“There’s no end to science. You can only get better, like the more you do it the better you get. You cannot reach the top because there are always things to be learnt.” (Boy aged 16)

Negative associations

However, given the mixed views of science, ‘confusing’ and ‘boring’ were the negative associations most often mentioned. The sense of constant change and that nothing is

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[3] *Stargazing Live* is a British live television programme on astronomy in 2011. The fourth series was broadcast between 7 and 9 January 2014. The series is primarily presented by scientist Brian Cox and comedian and amateur astronomer Dara Ó Briain.

permanent contributed to the feelings of confusion. The language and words used in science were seen by some as complicated which again added to the confusion and also made the subject ‘boring’.

“I don’t like formulas, learning words, complex words.” (Girl aged 13)

Science is not…

Generally, science was not described as ‘glamourous’ nor was it associated with celebrities for most. Awareness of Professor Brian Cox was mixed. Generally the young people didn’t recognise him, but some secondary students could make the connection once it was explained. Primary school students tended to have less awareness. Interestingly, young people in Glasgow reacted quite negatively to Professor Brian Cox, saying they didn’t like his voice/accent.

It is positive that young people did not tend to associate the most negative words with science; pointless, silly, evil, not useful, harmful and lies were rarely mentioned.

Evidence of gender stereotyping

However, there was some evidence of gender stereotyping amongst both boys and girls, which we discuss in more detail in the next section. Also, few of the young people said science was ‘for me’, reflecting their overall mixed or negative feelings about science.

Influences on attitudes to science

It is clear there are a number of different factors which can have an effect on the attitudes of young people to science.

Gender

Gender differences in attitudes to science were expressed. Words such as ‘fun’, ‘exciting’ and ‘explosive’ were more often mentioned by boys than by girls, whilst more girls mentioned ‘confusing’.

When asked specifically about whether science was ‘for boys’ or ‘for girls’ some felt that it comes more naturally and is sometimes more tailored to boys, however this tended to be amongst young people from Asian backgrounds.

“It’s for both, but mostly boys. Certain parts of it boys will be more interested in.” (Girl aged 10)

“I think boys understand it better than girls.” (Girl aged 11)

“I have some guy friends who suck eggs at some things but at science they are a whizz. It makes me really angry because I don’t know what to do and they know everything.” (Girl aged 14)

Some of the Asian boys also indicated that science is ‘for boys’ in the word associations task. This gender bias is perhaps linked to the more traditional roles that males and females have in these communities.

Age

Primary school children and younger secondary school children tended to react more enthusiastically than those in the later stages of secondary school and beyond. Some young people admitted that they had been more interested in science when they were younger.

“It’s exciting when you are little but when you are older it’s not as interesting.” (Girl aged 16)

This change seems to be heavily driven by the experiences of learning about science in school, which are discussed next.

School environment

It is clear that the associations of young people with science are mainly driven by their experiences around formal learning of science in school.

Primary school science

Teachers expressed a concern that attitudes to science were formulated at quite an early age and that poor educational experiences in primary or early secondary school could mean that young people are permanently turned off from science.

Some secondary school teachers spoke of the lack of focus on science in primary schools, due to a combination of lack of resources and because primary schools are not currently assessed on science performance. This results in a lack of pupil understanding and preparation for science in secondary school.

Secondary school science

The more purposeful and structured studying of science in later secondary school also appears, for some, to erode the wonder, excitement and enthusiasm present in many children in primary school.

"When I was in Years 7 and 8 we dissected so many things but in Year 10 it's just boring. It's just work, work, work, work. Tests, books, you revise that, you do a test, books again. Even the practicals lead to a test!" (Girl aged 14)

Lack of practical resources

For some schools, the lack of practical work was not due to a lack of desire on the part of the teachers or school, but due to a combination of a lack of funding for practical work or trips and also a lack of knowledge or time to develop simple experiments and supporting resources to conduct in school.

"That's the main issue with science. We can do the curriculum, but when we try to make it interesting and do things that are novel and practical, money is the issue. We don't have enough equipment for all the students, so it might be just a demo at the front. " (Secondary school teacher)

"The cost for field trips is prohibitive. Even if we get grants it isn't enough to cover the transport as well as the activity. If the activity is free we can do these things." (Secondary school teacher)

Poor foundation skills

Lack of skills in other areas such as maths was also mentioned by one secondary school teacher as potentially turning young people off science in secondary school.

"Personally, from a Chemistry teacher's point of view, they don't like calculations. Anything that involves calculations is probably a bit of a turn-off for them in the younger years. By the time they get to Highers their level of maths has improved quite significantly so they feel a wee bit more comfortable in actually applying the maths to Chemistry. That's one barrier they do have when they are in 2nd or 3rd year, if they do any kinds of calculations that involves things they haven't done in maths it's quite difficult to introduce it." (Secondary school teacher)

Positive science experiences

Some schools clearly had a focus on science and worked hard to provide their students with good science experiences. In particular, one secondary school in London was involved in the government's Faraday[4] project and had received a huge amount of investment into their science facilities.

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[4] Project Faraday was a major research and design project to radically rethink how science is taught in schools and develop designs for new science facilities in UK schools, which commenced in 2006. The project was funded by the UK Government's Department for Education and Skills (DfES) (now called the Department for Education - DfE).

"We are a Science Faraday school. £15 million has been spent on our science department and Brian Cox is a patron of our science department. Across the road is a DNA research centre which is shared with Queen Mary's University. In Year 7, once a fortnight the entire Tuesday would be spent on science. A lot of our 6th form students are interested in science and are moving on to university studying science." (Secondary school teacher)

Links with other schools and external science organisations were also an important aspect of the experiences offered to students by these schools. Some secondary schools were partnering with their local feeder primary schools, providing science training for teachers and experiences for the students. One primary school worked closely with a local secondary school to enable their students to conduct experiments that they do not have the resources to perform themselves.

"We work a lot with local secondary schools and have started a project with IAMS to take Year 4s to do experiments. We can do experiments here but nothing like there. Nothing as exciting as using a bunsen burner! We do as much as we can in school and if we don't have the facilities in school we join up with others. It's not just all literacy and maths!" (Primary school teacher)

Some secondary schools were also linking with other colleges and universities to provide students with science experiences. However, one teacher expressed frustration, as in his experience, the universities often provide sessions that are no different than what can be offered in school. Furthermore, building links with universities can be difficult and they are often personal links with individual lecturers rather than links with the university or faculty in general, so if an individual leaves the university, the link is gone.

Other events included speakers from universities, council technical resource services, scientists from different branches of science and careers days where representatives tell them about the different careers available in science.

Whilst no organisation would turn down the opportunity to provide their young people with new experiences, the relationships which were perceived to be the most beneficial by teachers and youth workers were those that were long-term.

"It would have to be a long-term thing, not just a one-off thing, because you can come in for one event and it's forgotten about in a few months. If it's ongoing, annual, termly and the children get to know it really well, it becomes part of their school experience and they talk about it at home and remember it. They talk about it at home with parents and then it becomes not scary, is not new, is not different. We can make relationships but it's sustaining relationships and setting up annual, regular things, those are the successes." (Primary school teacher)

Science clubs

Some of the schools also offered science clubs after school or during lunchtime. The purpose and audience for these clubs varied. For example, one school had recently set up a science club which was available 'by invitation only' to students showing a particular interest in science. In another school, the sessions were designed to be hands on and exciting and were popular with Year 7 and 8 students.

"We run a STEM club which is attended by over 70 pupils after school. It's very popular and successful and at the end of the year the Year 7s run a club for the Year 6s. They run the activities because they have done them themselves." (Secondary school teacher)

Role of the science teacher

As well as the school's approach to and facilities for science, the quality of the science teacher themselves has an important role to play in the attitudes of young people to science.

"I think if I had a better teacher I would have found it fun." (Girl aged 14)

"I like science, especially my teacher." (Boy aged 14)

"Teachers need to smile, it makes it better." (Girl aged 10)

A boring teaching style was mentioned by students as a barrier to enjoying science and some expressed dislike of learning the words, taking notes and reading lots of text.

"They go into too much detail." (Boy aged 13)

"Writing stuff is just boring really." (Boy aged 16)

"I hate text books, just looking and writing information." (Girl aged 13)

A minority didn't mind reading texts or writing in science lessons, but young people across the board enjoyed the practical elements of science. Doing rather than watching was preferred by most, although some said they would also be happy to watch others do experiments.

"I like doing practicals, I don't like writing a lot but I like doing practicals. Doing it yourself rather than watching." (Boy aged 15)

"It's fun to do experiments." (Boy aged 12)

"When we are doing practicals it's mostly just the teacher doing the practical and we just sit there watching, wanting to do it." (Girl aged 13)

"Once we did an experiment and that's the only best lesson! Normally it's just talking." (Girl aged 14)

Parental attitudes to science

Teachers reported that Asian communities appear to have a positive bias towards science as a subject, as it was seen as a means of their children getting a good, professional job. Some of the young people from Asian backgrounds aspired to jobs in science, in particular being a medical doctor.

"My sister, she's going to be a doctor. One of us needs to be a doctor. In Bengali families there's a thing that someone should be a doctor!" (Boy aged 18)

One secondary school teacher described how the Asian parents in the community would react positively to activities involving science:

"As a subject, science is off on the right foot anyway. As a subject, to say to parents 'we want to do something involving science' then you are on to a winner. They place value on science because there is a good job at the end of it. Again, it's a cultural thing."
(Secondary school teacher)

Religious beliefs

For some young people, their religious beliefs had an impact on their attitudes to science, and this was mentioned by some of the Muslim girls. Some parts of science, such as theories on the beginnings of the solar system and evolution, presented a difficult contradiction versus their religious beliefs. Whilst this did not appear to have put them off science per se, it did make some of them more sceptical about it.

"Sometimes I, kind of, hate science because science is not always the answer for everything. That's what I believe anyway. Sometimes that's just the way it is." (Girl aged 12)

"The Big Bang Theory – we don't believe in that because we are Muslims." (Girl aged 13)

"I guess that's a cultural thing. Religion. Some people think the world started like that but some people think otherwise." (Girl aged 14)

Engaging with informal science

Experience of informal science

For the most part, reactions to 'science' focused on school and formal science learning. A minority of young people did spontaneously mention school visits to science museums such as the Natural History Museum in London, the Science Museum in London, the Thinktank science museum in Birmingham and the Riverside Museum in Glasgow, but generally young people only mentioned these when specifically asked about museum visiting.

Visiting informal science or cultural offerings

Amongst young people, reactions to visiting informal science or cultural offerings such as museums was mixed. Some spoke in a quite excited and animated way about their visits to these offerings, whilst others were clearly negative. Negative reactions were more common amongst older teenagers from around age 15 upwards.

Visiting with school

All the young people had been to informal science offerings with school. These school trips appeared to be more common in primary and early secondary school. However, young people described how these trips were much less common once they reached Year 10 and started studying for GCSEs. Although not explicitly mentioned by the young people, this decline in visiting with school may have been determined by non-science GCSE subject selections and/or increased study workload.

Once asked specifically, teachers, youth workers and young people reported a variety of different science-related trips they had been on. These included visiting museums, science centres, zoos, and day or residential field trip activities. One secondary school had links with a local scientific services company which their students had visited on work experience. One secondary school teacher also described organising regular 'CSI'[5] events, where a murder scene was set up in a common area of the building and students were able to conduct experiments and follow clues to discover how the 'person' had died.

Teachers described how school trips are well supported by parents if they are free or very low cost to them and require minimal effort.

"If we say we will take the children after school to 'here' then fine. Fine, go ahead. As long as it's not an inconvenience." (Primary school teacher)

Schools often subsidise this type of enrichment activity, however they find it difficult to raise sufficient funds and, as a result, a small contribution from parents was sometimes requested. In some cases, trips were unfeasible due to prohibitively high costs.

"We very rarely charge the kids for trips unless it's residential. It used to be never but now we have started to charge for the odd thing. For example, we want to take Year 2 to the zoo,

[5] *CSI: Crime Scene Investigation* (referred to as CSI) is an American crime drama television series where physical evidence is used to solve murders.

which is really expensive, but we really want them to go. We got it at discount and have heavily subsidised it but the school can't afford to pay it all." (Primary school teacher)

"We used to do a residential trip but there's no way we can afford it now. Even if we get a grant for 80 per cent of the cost, we can't afford the other 20 per cent." (Secondary school teacher)

Visiting outside of school

Visiting informal science or cultural offerings outside of school was less common, although seemed more so amongst primary age children. These visits usually occurred with parents or other family members and tended to happen in the school holidays, mainly the long summer holiday. Visiting at weekends or after school was extremely rare.

"Don't really go outside of school, I'm mainly too busy outside of school. It's not something I would do on a weekend." (Boy aged 12)

The young people and parents described visiting different types of museums in the past, such as small local museums, historical museums, art museums and science museums. Generally, visits to these offerings were one-time experiences and not repeated with any regularity. Some young people mentioned visiting more than once, but this was usually because they had visited because of a younger sibling. A minority had visited the same museum regularly in the past. For example, one mother described how she had previously lived in Yorkshire and had visited the children's museum, Eureka, quite frequently when her daughter was younger. Another 18-year-old girl with a keen interest in forensics mentioned visiting a city centre museum regularly when truanting from school.

A small number of young people in London had been to the Science Museum and in Birmingham to the Thinktank museum. Similarly in Glasgow, a small number of young people had visited the Glasgow Science Centre outside of school. Some also mentioned visiting aquariums such as the Sea Life Centre and other animal attractions such as the zoo. In Glasgow, many of the young people had visited the Riverside Museum (previously the Glasgow Museum of Transport) and Kelvingrove Art Gallery and Museum.

Visits to science-related offerings with youth groups appeared to be less common than with schools. One youth worker recalled one or two visits in the past, but nothing more recently.

The most enjoyable aspects of informal science offerings

The aspects of visits to informal science offerings which young people described as the most exciting or enjoyable were the interactive or hands-on exhibits. As with reactions to formal science in school, all the young people preferred to get involved and 'do' rather than read or observe, although interactivity which involved something shocking or surprising was also enjoyed.

"The science museum is really fun because, like, you get to see, like, rockets and spaceships. You can press a button and the dinosaurs move." (Boy aged 13)

"Sometimes it comes at you, the reaction, shocking you, like at Madam Tussauds." (Boy aged 12)

"Say if there's a movie and they splash into water and you can splash water into your face." (Boy aged 12)

"Because it was fun and you learned new stuff. Learning stuff but it's all in front of you, you can feel it, you can hear stuff." (Girl aged 10)

Factors impacting on engagement with informal science offerings

Some key factors have emerged which can impact upon visiting informal science and cultural offerings.

Age

Age of the young person was a clear differentiating factor in visiting informal science offerings. The primary age children we spoke to reacted the most excitedly and even in early secondary school, young people described visiting museums quite positively, describing them as exciting and memorable.

"It's more exciting and you can remember it for the rest of your life." (Boy aged 14)

However, later in secondary school, interest in days out with the family declined in general and in particular for trips to museums or science centres. Some of the parents we spoke to said they would go to museums but their (older) children were not interested in going to them anymore.

Those who were still having trips to museums outside of school were generally those families who have younger children of primary school age or lower. In these cases, older siblings would often still attend with the family, but this was for the benefit of their younger siblings. For some, the experience was not enjoyable, but others admitted that they had also enjoyed some aspects of the visit.

"I go with my younger brothers and sisters, but I don't enjoy it. It's boring." (Girl aged 18)

"I went to the Sea Life Centre, just for my little brother. I have been before but they had changed some bits, so it was quite good. I actually learned some things I'd forgotten." (Girl aged 12)

A minority of the older young people were still interested in visiting museums and they tended to have interests in very specific areas of science or history. In particular, one girl aged 18 and one boy aged 19 described how they liked to visit local museums fairly regularly. However, they both felt that this was unusual and not typical of 'most young people'.

Parental attitudes

Some of the young people stated that their parents would not be interested in taking them to museums. In some cases, other family members would take them instead, but in other cases, the young people would simply not visit these offerings outside of school.

"My mum doesn't really like things like that, I went with my nan." (Girl aged 11)

Teachers also described how parents would be unlikely to seek out activities with an educational focus, instead preferring activities which are seen as 'fun'. Teachers described

some parents as having a negative view of offerings such as museums, seeing them as 'boring', 'not for me', not beneficial' and 'intimidating'.

"They will take them to the park. They will take them to the Sobell Centre[6], local, local things, or McDonalds, the cinema, whatever. It's all about fun and filling time up, not educational." (Primary school teacher)

"Very few children would go to a museum with their family in this community. Some parents aren't willing to spend the money and probably have difficulties or can't afford it. The majority of parents don't think the children would benefit from them. They might go to the seaside, visit family and friends, might go on holiday. Never just a day out in London going to a museum or places of interest." (Secondary school teacher)

"It's intimidating for them too, these grand institutions. They (kids) say 'my mum's not interested in that, not interested in history'. Whilst there may be a lack of interest, there may also be some intimidation. I think their image of a museum is a dusty old boring building full of dusty old boring things. But modern museums are a lot more than that." (Primary school teacher)

Previous experience

Previous experiences of visiting informal science and cultural offerings could also be a barrier to visiting in the future. Poor past experiences of visiting a museum was described by one parent as a key reason for not trying them again.

"We took them to see the Doctor Who one and you was expecting more than what was there. There was a Dalek here and a bit of display here but nothing to really entertain them. It was terrible." (Parent)

The young people themselves also described being put off from visiting museums with their parents as they felt unable to relax, have fun and enjoy themselves.

"When you go with your parents it's kind of boring, you see them every day. And sometimes when you go they say 'don't do that, it's bad' or something like that. When you go with your friends you can, like, have fun and look at stuff." (Boy aged 12)

"If I went with my mum she'd be like 'I don't like animals, let's go home' but if I went with my aunties and uncles they would be interested in it and talk about it and you find it interesting." (Girl aged 14)

[6] The Sobell Centre is a leisure centre in Islington, North London

Experience of informal science in the home

Young people described a number of ways they engage with informal science in the home. These activities tended to be driven by the young people's own interests, rather than anything guided or directed by parents.

In home media

In their free time, all of the young people were engaging with media in the home of some sort, either watching TV, playing computer games or using the internet, and some of this could be science-related.

TV

TV appears to be the most common source of informal science-related learning opportunities in the home. Science-related TV shows mentioned included *Brainiac*[7] and *Blast Lab*[8]. A number of young people mentioned watching the science-related comedy series *Big Bang Theory*[9]. Reality programmes related to science were also mentioned, such as *24 Hours in A&E*[10] and *One Born Every Minute*[11].

Some young people had specific interests about which they liked to watch TV programmes or look up information on the internet. For example, one 18-year-old girl had a keen interest in forensics, so enjoyed watching TV fiction and factual programmes which included forensics.

When prompted, some young people mentioned watching documentaries on subjects such as animals and space/the solar system.

Technology

Many of the young people described themselves as 'techy', which for some related to an interest in gadgets and technology equipment, but for others this was more related to what technology allowed them to do, such as play computer games or communicate with others. One parent described how his 13-year-old son was very 'techy' and liked to build his own websites and upload videos of himself and his sister onto video sharing sites such as YouTube.

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[7] *Brainiac: Science Abuse* (often shortened to simply *Brainiac*) was a British reality show that aired on Sky One from 2003 to 2008.

[8] Richard Hammond's *Blast Lab* was a British children's television programme that aired on the BBC from 2009-2011.

[9] *The Big Bang Theory* is an American sitcom. Much of the show focuses on science, particularly physics. The characters frequently banter about scientific theories or news and make science-related jokes.

[10] *24 Hours in A&E* is a British medical documentary set in King's College Hospital.

[11] *One Born Every Minute* is a British observational documentary series which shows activities taking place in the labour ward.

One 12-year-old boy mentioned seeing videos of experiments on the internet, for example, on YouTube.

"I watch YouTube home experiments… putting... that stuff in food... baking soda!" (Boy aged 12)

Books

Some of the Asian boys aged 12 to 14 and the primary school aged girls enjoyed reading books and mentioned they enjoyed science fiction and non-fiction books.

Experiments/play

A minority of young boys in the lower secondary years mentioned they liked to conduct experiments in the home, however this was usually prevented by parents who didn't want them to cause mess.

"It's fun to do stuff, when you do experiments, but mum doesn't like mess. My mum and dad say 'outside with that'; they know straight away it's going to be a dirt thing!" (Boy aged 12)

One girl aged 18, who said she was not at all interested in science, admitted that she liked to play with cornflour and was quite animated when she described how it works.

"I love playing with cornflour, it's wicked, even at my age!" (Girl aged 18)

Reactions to Wellcome Trust projects

All the young people and adults we spoke to reacted positively to the examples of projects funded by the Wellcome Trust[12]. The majority were surprised by the way that science had been incorporated into other activities such as fashion design, gaming and music and felt that this was an interesting and innovative way to get young people involved in science.

Girls, in particular, were interested in the fashion show project. Both boys and girls showed an interest in the games, however some of the older young people and adults felt that the games were a little too simplistic and therefore more appropriate for younger secondary or primary age children.

The dramatisation of an emergency room at the Big Bang Fair was also seen as interesting and exciting and the young people felt they would still be engaged with this type of activity even if they were not taking part/hands-on as long as it was 'exciting'. One primary school girl said she would like this type of re-enactment to be conducted by real healthcare professionals, so that she could ask them questions afterwards.

Documentaries were less surprising and seen as a more usual way of communicating about science. A number of the young people recalled seeing *Inside Nature's Giants*[13].

[12] Design and Gerontology: http://www.actiondog.net/d&g/; Online Games: Sneeze: http://www.routesgame.com/games/?challengeId=2, DNA Heroes: http://www.routesgame.com/games/?challengeId=5, Ginger Dawn: http://www.routesgame.com/games/?challengeId=7; Natural Selection - Baba Brinkman - Rap Guide to Evolution: http://www.youtube.com/watch?v=irrKFXCoi0A; Tree of Life: http://www.wellcometreeoflife.org/; Emergency! At the Big Bang Fair: http://www.youtube.com/watch?v=nAqMhnT_hTw; Inside Nature's Giants: http://www.channel4.com/programmes/inside-natures-giants

[13] *Inside Nature's Giants* is a British science documentary part funded by the Wellcome Trust, first broadcast in 2009 by Channel 4.

The lives and aspirations of young people from low SES families

In order to understand how to effectively engage with this demographic, it is important to consider the wider context of their lives, the challenges they face and what motivates them.

Family lifestyles

Low SES families are diverse

One of the most notable findings from this research is the sheer diversity present within low SES families, ranging from those highly engaged, active and aspirational to the very disengaged.

There were some lifestyle themes emerging across low SES families; however, lifestyles differed according to a number of important influencing factors including ethnicity, family 'make up', level of parental support and engagement, and the influence of the community and school environment.

Many receiving benefits

Qualification for free school meals was used as a simple indicator of low SES for the school sessions, therefore the parents of the young people that we spoke to were generally unemployed or in low-paid employment and receiving benefits of some kind, such as income support.

Teachers reported that some families in their schools were third generation receiving benefits and it appeared difficult for them to envisage a way of breaking out of this cycle. In teachers' experience, these parents also often had low levels of educational attainment and aspiration, which prohibited them from obtaining work above the minimum wage and resultantly to stop claiming benefits.

"Many of our families have a home over their head, Sky TV, cigarettes and drink and live a happy life. They can't see beyond this." (Primary school teacher)

Poverty is higher amongst ethnic minorities

We also know from our literature review that poverty is higher amongst ethnic minority and immigrant groups (Kenway and Palmer, 2007) and there was a high prevalence of these types of families in the schools and organisations we spoke to in London and in Birmingham. These families faced additional challenges, which we discuss later.

Restrictive household budgets

Teachers and youth workers described how many families in their areas had restrictive household budgets and a general lack of disposable income. The parents we spoke to clearly faced financial challenges and had to make trade-offs and sacrifices when considering how to spend the family budget. It was also clear from speaking with the young people themselves that they were aware of these financial restrictions.

Lack of transport

Some families did not have their own transport, which often prohibited travel outside of their immediate local area. However, even if a family did have a vehicle, they may be reluctant to use it for venturing too far from their home. This may be due to the prohibitive cost of fuel, but also due to a lack of perceived need to travel outside their community or a level of nervousness about venturing to unfamiliar places.

This resulted in many accessing services mainly within their immediate communities. Some teachers described the boundary of travel for many families in their communities as being a small area of 1–2 miles. This situation was found both in inner-city areas and semi-rural areas.

"One of my pupils went to Meadowhall shopping centre on the train for her 10th birthday. It was the first time she had been on a train and outside of Barnsley, I couldn't believe it." (Primary school teacher)

"For a lot of our students, even up to 18 years old, some of them haven't been further than the high street, because they have never needed to." (Secondary school teacher)

Large family sizes

Large family sizes of 4 up to 11 children were described, which for some had a positive but for others a negative impact on their lives. In some cases, teachers and youth workers described how the children had to share their parent's attention and affections and as a result looked for love and encouragement from elsewhere.

"School is a haven for these children, they come for warmth, love and support. Every day children are here an hour early in the morning and I let them in the classroom as they just want to be in an environment where they are loved and cared for." (Primary school teacher)

For some young people, however, particularly those of Asian origin, being part of a large family was viewed as beneficial. Young people positively described having siblings to spend time with, learn from and a wide extended family to share experiences with. Teachers described these families as having strong family units, links with extended family members and the wider community which provided a supportive network for the whole family. This strong community network was felt by teachers to be a contributing factor in the manner and behaviour of children in the school.

"Generally speaking the kids are good. They are young, they do have a lot of energy, but generally well-behaved, well-mannered and respectful kids. It does make my job a lot easier." (Secondary school teacher)

"Within the community, there's lots of these students who could walk down the street and say hello to 50 to 60 per cent of the people they see. I can't say that where I live!" (Secondary school teacher)

Challenging home environments

Teachers and youth workers also described some young people as living in very challenging home environments such as those experiencing substance abuse, violence or crime. The

young people that we spoke to did not themselves mention these issues. Although this was certainly not unique to white British families, it was more often described as being associated with these families by teachers and youth workers.

"We have young folk who clearly don't have a lot going for them in their lives and their family lives are difficult." (Youth worker)

The number of young people affected varied across the schools we spoke to, from a minority of students to a much larger number.

"We have a lot of pupils with quite challenging backgrounds – families with substance abuse problems, domestic violence, single parent families." (Primary school teacher)

"Some students have special needs, they have behavioural, emotional, social difficulties, but that is just a small number." (Secondary school teacher)

"I wouldn't go down the route that it's Beirut or anything. There are perfectly affluent parts as well. But a lot of this area really has struggled historically with some quite serious deprivation." (Secondary school teacher)

"There's drugs, there's gangs there's violence all around and the students are dealing with that." (Secondary school teacher)

Some schools appeared to be very successful and had an important positive influence in the lives of their young people from deprived backgrounds. Teachers in these schools were genuinely seen as role-models, who, in the absence of positive parental role-models, young people looked to for support and guidance.

"Teachers have to fulfil the supportive parental role, it's very difficult." (Secondary school teacher)

By contrast, youth workers told us that many of their young people faced these kinds of challenges at home, and that for these young people, the youth group environment was often one of the most stable and supportive influences in their lives.

"To be in their shoes can be very scary at times because of the uncertainty of it in terms of the reactions of adults." (Youth worker)

"Fundamentally we need to get them engaged with school and having good relations with parents and not be socially isolated and that's what we do." (Youth worker)

The impact of ethnicity

Ethnicity appears to have a large impact on lifestyle and family traits.

White British

The most difficult to engage

Young people and parents from white British ethnic backgrounds were described by many of the youth workers and teachers as the hardest to engage. Aspirations in many of these families were seen to be very low. Teachers and youth workers described families where parents had not progressed with education and careers themselves and young people lacked positive parental role models which resulted, for some, in a very apathetic view of life and the future.

"Low aspirations are the biggest challenge of my career." (Primary school teacher)

"Some do (have aspirations), but many do not see any consequences to their actions at the moment, so have limited aspirations." (Youth worker)

"Apathy is the biggest challenge and breaking down what's been normalised." (Youth worker)

"There is poverty of aspiration and significant goals." (Secondary school teacher)

The most engaged were involved in regular activities

That is not to say that all the white British young people involved in the research lacked aspiration. Some had clear goals and were working towards achieving them.

"I want to do architecture and have a conditional offer to do it at uni." (Girl aged 18)

"I would like to do medicine, I have always wanted to be a doctor." (Girl aged 16)

The young people with positive attitudes tended to be involved with youth groups or clubs, had more parental support and a good experience of or relationship with teachers at school or college. Some secondary schools were working hard to raise aspirations and ensure the young people had a 'plan' for the future before leaving school.

"If our young people leave and they don't find work within nine months then there's a good chance they'll be unemployed for nine years and unemployed in a place like this implies a lot of things. A lot of unsavoury pastimes. So we work quite hard to get kids into a viable future when they leave here." (Secondary school teacher)

Distrust of authority

Teachers described an element of distrust of figures of authority, including teachers, from some white British young people and parents. In their experience, this appeared often to be based on parents' own negative personal experiences of school and authority figures within the wider community. These feelings were then passed on to their children, which could result in rebellion against the structured environment of school.

"Young folk in here have been told who they are and what they can become, it's not cool to be smart." (Youth worker)

"You have to work against what their pa, ma or granny says." (Youth worker)

Lack of parental support

Teachers and youth workers described how the parents of some white British young people did not appear to value their children's education and did not support/encourage their sons/daughters to do well. Teachers felt the importance of achieving at school and particularly at secondary level was not recognised by these parents and young people, largely because they could not envisage any employment opportunities or future for them. As a result, these parents were often disengaged with their children's education and would not support their children attending school or attend events such as parents' evenings without further encouragement.

"Many are not attending (school) – they don't have the structures within the family to allow that. They've seen siblings not attending school, they're caught up in the Children's Hearings System[14] *and they don't have the appropriate parenting; many are not in a position that they can apply appropriate boundaries so that they can attend school." (Youth worker)*

"We have to offer a prize draw of a £20 Asda voucher to encourage parents to attend parents' evening. It works and we tripled attendance!" (Primary school teacher)

Some described a 'class system' feeling from parents in terms of accessing higher education, or that university was not for 'them' or their children and this attitude could filter down to the young people themselves.

"They say 'University is not the right place for me, we'll go to college and then to work.'" (Youth worker)

"The children talk about exams in terms of re-sits. They expect to fail." (Secondary school teacher)

"Parents use a lack of money as an excuse not to encourage their children to university." (Secondary school teacher)

Inappropriate value base

Teachers and youth workers felt some young people's value base was also affected by negativity, lack of support and apathy. Actions and attitudes which would be deemed inappropriate by others were accepted by them or their parents, for example not reporting crimes to police but dealing with it themselves or with friends, and the acceptability of drink and drug abuse within the household.

[14] The Children's Hearings System is Scotland's unique care and justice system for children and young people.

"They don't seem to know what is right and wrong, they haven't been taught this correctly. The lines between are blurred. They feel their actions are acceptable within their communities but to those outside it certainly would not be." (Youth worker)

"We have frustration with some parents who have the best intentions of the children but aren't best equipped in parenting and how to positively parent young people." (Secondary school teacher)

Lack of confidence

Teachers felt that some of these parents also suffered from a lack of knowledge or confidence in new or unfamiliar situations and as a result they avoided things that put them outside their normal frame of reference. This adversely affected the young people's opportunity to engage with education, activities and people beyond the confinements of their family's 'comfortable' circle of family and friends.

Blended families

Many of the white British young people in these communities were from blended families, including children with different fathers and stepmothers or stepfathers. Family life was disjointed, with siblings visiting their different fathers at weekends then being brought back together during the week. Teachers therefore felt the young people experienced a number of different and sometimes conflicting parental influences which appeared to be difficult for them to cope with. As a result, the school saw itself as providing a stable and consistent support for the children, particularly in terms of male role-models.

"Many of the children don't have a father figure at home, this can be really difficult for the boys, I think that's why they look to us for support." (Primary school teacher)

"Part of my role is to 'plug the gap'. Many of the male pupils are living with mum and don't have a positive male role-model." (Secondary school teacher)

Minority ethnic and immigrant families

Higher aspirations

Some teachers and youth group staff reported that the young people and families from minority backgrounds, particularly Asian and more recent immigrant communities from Europe, appeared to have higher levels of aspirations as compared to some of those from white British backgrounds. They described how families of recent immigrants as well as second or third generations living in the UK had relocated to provide a better standard of living for themselves and their children. This drive for a better life had passed on to their children and thus aspirations for achieving a good education and career were higher.

"This school is managing to be aspirational to an extent, but also the community is to an extent." (Secondary school teacher)

"I want to do something to do with law, my sister is going to be a doctor so I don't have to do that!" (Girl aged 16)

A negative aspect of the desire for children to do well in these families was the amount of pressure that was sometimes felt by the young people. Young people described how there was a lot of emphasis on achieving at school or college and there were high expectations.

"I have to study about three hours every night. Sometimes I just want to watch TV or text my friends but my parents really want me to do well." (Girl aged 17)

Traditional roles

Many of the Muslim families had traditional views in terms of the roles and responsibilities of men and women, which thus affected the lifestyles of their children. Girls had restrictions placed on their time and freedom and this was described by both teachers and the young people themselves. In addition to school work they were expected to help with chores, cooking and looking after siblings in the home. They were also less able to participate in activities that took place in the evening or outside of school.

"I have quite a lot to do when I get home, I have to help mum and do my studies so don't really have time to do much. I like to sit and watch TV." (Girl aged 16)

Boys had a greater level of freedom, they were more widely allowed to socialise and spend time on activities outside the home. They did, however, have religious duties and were expected to regularly visit the mosque. Both boys and girls seemed to be aware of this difference.

English as second language

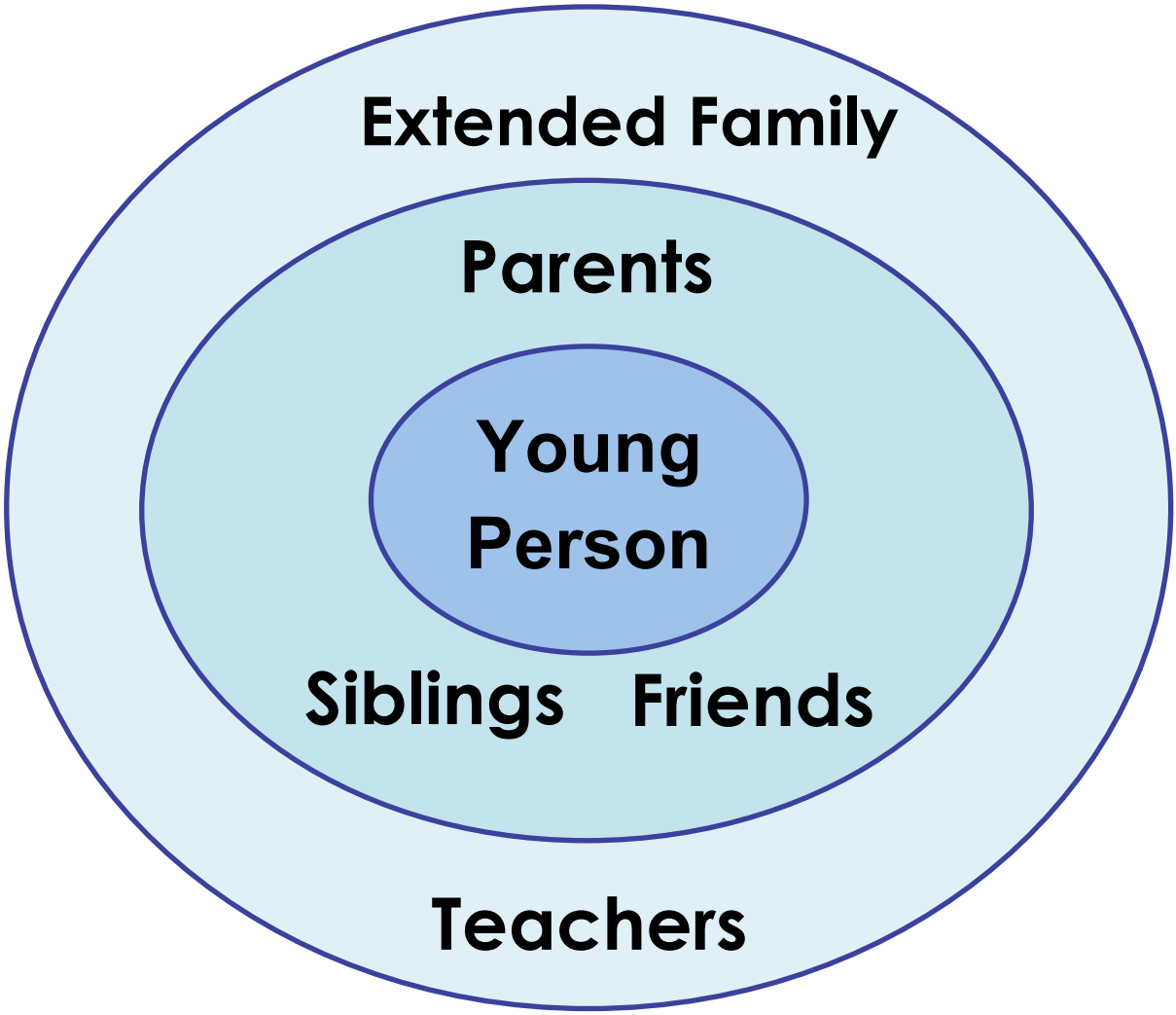
Some ethnic minority families also face some different challenges as compared to white British families. Increased mobility and a lack of understanding of the English language can present major challenges for families who have recently immigrated to the UK and the schools that their children attend, such as the ability to find well-paid work and to support their children effectively in school.

"A lot of our parents have come over to England for the first time and don't speak a lot of English, or are second generation families. Because Islington is quite a mobile community, lots of parents move out. So Islington can be a temporary base when they first arrive and then they are moved further out. We have 30 to 40 per cent mobility by the time they get to Year 6." (Primary school teacher)

Key influencers on young people's lives

As shown in the diagram below there are some key figures of influence in a young person's life. Most commonly mentioned as having an impact were parents, siblings, extended family including grandparents and cousins, friends, teachers and youth workers.

The level of influence and importance of each was dependent on the young person and the family make-up.



As highlighted, a young person's family had a significant influence on their lives. The extent to which and whether it was largely positive or negative was very dependent on the family including its size, whether it was blended, ethnicity and parental engagement.

Parents

At the more engaged end of the spectrum, parents for some young people were a positive and consistent influence, providing guidance and support during their education, helping to build relationships and introducing them to new experiences.

Primary school children in particular described spending a lot of time with their parents, including family time at home, helping with chores, watching TV and reading. They were also

more likely to be engaged in family activities on weekends and during holidays such as visits to the park or leisure centre, shopping with mum and the occasional trip to a theme park or seaside. Generally, these young people appeared to enjoy spending time with their parents and they were one of the key focuses in their lives.

As the young people move from primary to secondary education, the influence of other factors and people increases in their lives and so for some the influence and engagement with parents decreases. This was more commonly reported for white British families, but also happened to an extent amongst most families. Both parents and the young people themselves reported spending less time with their parents as they progressed through secondary school.

"We used to do loads of things together, now he doesn't even want to come on holiday with us." (Parent of 16-year-old boy)

Parents from Asian backgrounds still appeared to have a significant level of influence over their children in secondary school and this was reported by both teachers and the young people themselves, particularly girls.

"I have to make sure I do all my homework otherwise I get in trouble with my dad. I then have to help mum with the cooking." (Girl aged 16)

For some young people, parents did not provide a very positive influence on their lives. This was mainly reported by teachers and youth workers, although a minority of the young people themselves were clearly aware that they were not receiving the same level of parental support as others.

"I want to be a daddy when I grow up. Mine's not very good." (Boy aged 11)

For these young people, other people in their lives such as teachers, coaches and youth workers could provide some positive support and advice.

"Fundamentally, we need to get them engaged with school, good relations with parents and not be socially isolated." (Youth worker)

"We will do our best to advise or point them towards the people who can give them the answers." (Youth worker)

Siblings

The influence of siblings appeared to be quite consistent across the genders, ages and ethnicities. Many of those with older siblings looked up to them, strived to be able to do the same things and be like them. However, this could be a positive influence or a negative influence, depending on the aspirations and behaviours of the older siblings.

"Most of the families are pretty close knit and look up to their older siblings, older cousins. Whatever they are doing they would try and emulate." (Secondary school teacher)

Siblings socialised at home together such as watching TV, gaming and playing outside. Those with young siblings, particularly those from ethnic backgrounds, were responsible for helping to look after and entertain them.

Friends

For many young people, as they got older friends appeared to be increasingly influential and important. This was particularly the case from secondary school upwards and young people reported preferring to spend time socialising, 'Skyping' and chatting via social media with their friends than being with parents or other family members. During the secondary school years the emergence of boyfriend and girlfriend relationships also had a key influence on their lives.

The influence of friends could be seen to be positive or negative, depending on the attitudes, behaviours and lifestyles of the friends themselves. For example, one youth worker described how the young boys he worked with often had an inappropriate value base, meaning they would praise each other for negative behaviours such as stealing a bike but not for positive behaviours such as succeeding in a task or studying hard at school, as this was not deemed to be 'cool'.

Extended family

Some of the young people reported spending time with their wider family members, such as grandparents, cousins and aunties and uncles and these people were also influencers to a varied extent. A number of the young people and teachers in Asian communities described very close connections with extended family members in the community.

In Glasgow, one youth worker described the area as having lots of large families of Irish decent, with female extended family members such as grandmothers being very influential in the young people's lives.

"As a rule, it's a matriarchal society here. Mums and extended family members. Lots of families who have grannies looking after kids." (Youth worker)

For others, extended family members lived further away, therefore time spent with them was more sporadic, mainly during school holidays.

Teachers and youth groups

As mentioned previously, in families where parental support and guidance was limited, teachers or youth workers took on an element of the parental role. Some described young people from single parent or blended families that lacked the important male influence from their father.

"I find dads' influence on the kids is often limited, some hardly see their dads, maybe at a weekend." (Youth worker)

Teachers

At primary school, teachers appeared, for some, to be a source of love, companionship and someone to share problems/experiences with.

"Many of the children just want someone to listen to them, which they don't always get at home." (Primary school teacher)

At secondary school teachers supported with learning and educational choices, such as which subjects to take and options to consider post-16. Many teachers were also involved

with the young people via sports and activities and reported how they had an influence on how the young people built relationships and socialised.

"We try and encourage them to think about team work and look out for each other, it's all part of building their confidence and personalities." (Secondary school teacher)

A number of the schools were clearly very aspirational which had an influence on the young people. This is discussed in more detail later in the report.

Youth workers

Young people that attended youth groups, activities outside of school and organisations working with vulnerable/disadvantaged young people were also influenced by their youth workers. These young people looked up to their workers and the manner in which they interacted with the young people allowed a relationship to form based on trust and respect. This was particularly important for those young people who had poor experiences of those in authority.

"We try and be as relaxed as possible with them. Nothing they tell us shocks us like it might other adults, so we build a solid relationship with them." (Youth worker)

"It's better if it comes from someone they already have a relationship with and not a talking head saying some information to them" (Youth worker)

"It needs to come from someone they trust. Come and speak to us. We have spent years working with them and gaining their trust. We know what works and what doesn't work. If you come in all wrong then you have lost them and that's it then, you struggle to get them back." (Youth worker)

Those leading sporting activities and clubs also had an influence on the young people's lives and young people strived to be like them and wanted to be 'as good' at the activity as the organisers.

"I have put down Mr Brown on my sheet. He runs the football club, he is ace at football and really fair with the team." (Boy aged 11)

"Our coach, someone you already know, older than us and experienced with kids, club leader. Not a teacher." (Boy aged 13)

Other influencers

Overall, young people tended to describe people who they had regular contact with as the main influencers in their lives. A minority of young people mentioned other figures that they looked up to. These people tended to be those who worked in an area that the young person was interested in. For example, some of the older boys aged 17 to 19 mentioned cricket players and athletes. There was only one mention of anyone science-related; a boy aged 12 mentioned 'doctors' because he wanted to be a doctor in the future.

Interestingly, celebrities such as pop bands and TV stars did not appear to have a large influence on the young people. Some of the girls said they were interested in these types of people and enjoyed following their activities, for example on Twitter, but none of the young people said that the celebrity's actions had an impact on their lives.

"I used to be mad about One Direction, but I'm not into them anymore. I had all their stuff in my room." (Girl aged 15)

Some of the girls mentioned social media as having an influence, such as following vloggers[15] on YouTube. The most popular people to follow appeared to be those that they could relate to – 'non celebrities' that were sharing life experiences such as what it was like being a young person and growing up.

"I watch Carrie on YouTube, it's called 'it's way past my bedtime', she talks about having confidence and believing in herself, she is only 21." (Girl aged 17)

[15] Vloggers are people who record video diaries online (also known as video bloggers).

Aspirations

Role of parents

Some parents clearly have high aspirations for their children and this appears to be more common amongst ethnic minority families.

"Her mum is very ambitious for her and takes her to all sorts of things, as much as she can. Mum has entered her for the entrance exam for a private school. Her mum is so lovely and gives her so many experiences, she really supports everything she does both inside and outside school." (Primary school teacher)

For some families, particularly white British families, the lack of engagement amongst parents meant that aspirations tended not to be fostered at home but through school and youth organisations.

"The most hard-to-engage parents are generally white English parents who are unemployed, in a cycle of unemployment. It's generational." (Primary school teacher)

Role of the school

The role of the school in increasing aspirations appears to be extremely important, and a number of schools had worked very hard over a period of years to increase aspirations in their students. Four of the schools we spoke to credited the success of the school to their head teachers, who had succeeded in turning around schools which were previously failing and made them successful and desirable.

"This is a very desirable school. Our head has been here for 25 years. He is the core of the success of the school. When he arrived it was a school that was about to be closed, in a lot of trouble, had four head teachers in two years or something. No one wanted to send their children here. He arrived to look after it before it closed down. He was asked to stay on and now it's a successful school." (Primary school teacher)

"When I started working in this school it was under a different headship and it wasn't in the best of places and I have seen that transformation over the years, right from a school that had a notice to improve to an outstanding school. It's been a good journey so far. New head has been here five years and made a big impact." (Secondary school teacher)

That said, the success of the school was seen not entirely to be due to the head teacher alone; teachers and students from aspirational schools talked very positively about their whole school and the school ethos.

"We are really aspirational for our students. They come in well below national average and they leave well above. It's to do with the ethos of the school, we are all about helping them to realise their potential." (Secondary school teacher)

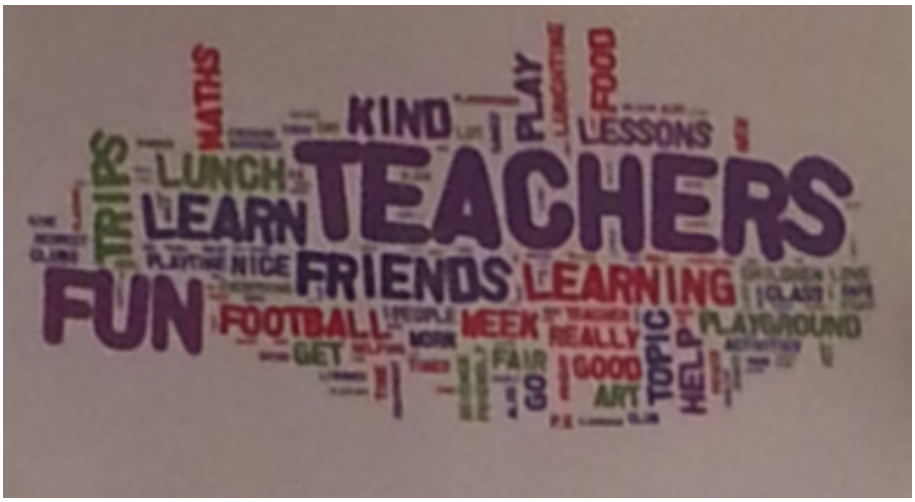
"It's not one person, it's the whole school. We call it the Small Heath Family. For a lot of our students it's the one consistent thing in their lives." (Secondary school teacher)

It was also clear from speaking to some of the young people themselves how the school's aspirational ethos was filtering down to them. The young girls we spoke to from one primary

school in London spoke of how proud they were of their school and the facilities the school offered.

"I don't think I would like to go to any other school. Most children's schools don't have their own library, but we have our own library." (Girl aged 11)

Pupils' word cloud at a primary school[16]



Schools use a variety of techniques

Schools described a variety of ways in which they supported and encouraged young people to work hard and achieve their potential, including a clearly communicated school ethos, rewards and awards for good behaviour and achievement, and forging strong links with parents and the local community.

"We have six strands in the school that we base near enough everything on. Children would get merits for communication, vision, investigation, participation, networking. It is all geared towards motivating and inspiring children to do better and better. We want them to dream big." (Secondary school teacher)

"We try to support the whole family. A lot of parents who move out of the area continue to come to the school. We try to give the children as much stability as possible and make sure the family is supported as much as possible. If children stay in the school they do very well." (Primary school teacher)

Schools changing cultural attitudes

The school can also play a big part in changing embedded cultural attitudes and behaviours, as one secondary school teacher from a predominantly Muslim school described;

"About 10 years ago, for the majority of our children, the boys would have become waiters or taxi drivers and the girls would have stayed at home and that's it. It's about changing the

[16] Word clouds do not attribute statistical significance; they only represent frequency. The font size of a word is proportional to how frequently the word was used in reply to the question.

culture of the way people think. Helping parents realise there's potential here. We have lots of communication with parents." (Secondary school teacher)

"This school is managing to be aspirational to an extent, but also the community is to an extent." (Secondary school teacher)

Exposing young people to professionals

As well as the ethos and culture of the organisation, schools and youth groups described exposing young people to people and careers that they would not normally come into contact with, including visits from successful business people, dance teachers, actors and artists.

In some schools, these opportunities are extended to parents as well as the children, with the aim of engaging parents and encouraging them to support their children's education and raise aspirations.

"We are always keen to work with any organisation, anything to benefit the children in any way. Our resident artist runs parents' groups and she takes them to art galleries. We have a parents' trip on Monday. We do whole school trips and we lay on coaches for the parents too so they can all experience it." (Primary school teacher)

"We have a business links coordinator. We have a lot of visits in the school, people from all walks of life, established people, people who have achieved a lot, companies that have achieved a lot. It's just keeping the children in that environment of success and hopefully it will rub off onto them and they become inspired and they want to do better, go to a Russell group university and better themselves." (Secondary school teacher)

Science experiences

Some of the schools mentioned visits from science representatives or science-related activities that they organised. Apart from one teacher who was responsible for STEM in the school, this was generally only mentioned when asked specifically about science. Some schools also had links with other educational institutions in the area to provide students with new experiences, mentor support or access to better resources. This is discussed in more detail later in the report.

Some youth organisations had undertaken science projects which they had deemed to be very successful. For example, one project involved growing organic vegetables, where the boys helped dig, make and plant a new food growing garden. Produce from the garden was harvested and sold to local companies. The project allowed the young people to develop an understanding of business and negotiation skills, as well as an understanding of the benefits of growing organic food.

Aspirations can decline in the transition to secondary school

At primary school, children themselves still tended to have positive goals and high levels of enthusiasm for the future. This was nurtured and encouraged by primary school teachers.

"I want to be a professional footballer." (Boy aged 9)

"I'd like to be an engineer or an artist because I love drawing." (Boy aged 9)

"I'd like to be a zoo keeper." (Boy aged 10)

"I want to be a doctor." (Girl aged 11)

However, for some young people, there appeared to be a significant change in aspirations during the transition from primary to secondary school. For some, the attainability of achieving their dream job disappeared and their passion for doing well dwindled.

"I have no idea what I would want to be when I'm older, nothing out there I could do." (Girl aged 13)

"I always wanted to be a vet, but you have to have really good results and go to uni for that which I will never be able to do." (Girl aged 14)

Teachers and youth workers suggested a number of contributory factors, including peer pressure, lack of parental support, the loss of a trusted and respected authority figure of their primary school teacher, lack of confidence of the young people in their own ability and lack of knowledge of how to achieve something they might want.

"At primary school the kids are all still excited and want to be firemen or footballers or doctors. But then they get to secondary school and that gets taken away. The secondary schools around here are not very good." (Youth worker)

The role of youth workers

Youth organisations reported striving to have a positive impact on the aspirations of young people. Youth workers in these organisations worked hard to engage with the young people; encouraging them to have aspirations, providing them with opportunities to meet people from different professions that they would not normally have access to and providing advice and direction as to how these young people can achieve their goals. In order to help these young people break out of the 'norm', obtaining their trust is vital and relationships with the youth workers themselves are key.

"Apathy is probably the biggest one, and breaking down of what's been normalised. If your family and your close relationships and close friendships are saying one thing and we are working against that. Trust is very important." (Youth worker)

"We will do our best to advise or point them towards the people who can give them the answers" (Youth worker)

"The most important thing in this project is the young people and their relationship with their workers, that's how we effect change." (Youth worker)

"It's remarkable how, given the right circumstances, the kids can change." (Youth worker)

Clear aspirations

A number of young people from secondary school age upwards did have clear aspirations for the future and these tended to be the young people who were more engaged in education. For example, one 17-year-old girl was about to start college to study cooking and baking and aspired to own her own bakery. Other mentions by girls included fashion, merchandising, marketing, travel and tourism. Boys mentioned learning a different language

and going travelling, sports, business, accountancy, acting, joining the army or an apprenticeship.

A number of young people did aspire to science-related careers in the future and some were studying science-related subjects. Several aspired to be doctors and this was mentioned across both primary and secondary age groups. Other science-related careers included engineering, computer science and being a vet.

For those who had left school and were now studying at college, aspirations included animal care, nursing and healthcare. Two young people had received offers to study science-related subjects at university: forensics and architecture.

Engagement with activities

Types and levels of engagement

The level and type of activities young people were engaged with varied enormously. On one end of the scale were those that spent most of their time in the home environment, rarely engaging in activities beyond socialising with their friends or family. This was reported by teachers, parents and the young people themselves.

On the other end of the scale were those that were more heavily involved with clubs, sports and youth groups and these young people really enjoyed the activities and the interaction with others.

Primary school age children tended to be engaged in more activities, sometimes being involved with several different clubs. Many of these were run by the school, however some also seemed to be more active at the weekends, engaging with activities at their local sports centre or having day trips out with their families.

Once the young people reached secondary school they tended to reduce the activities they were involved in. For some, this would mean that they stopped going to any clubs all together. Others would become more selective and choose just one main activity that they engaged with regularly, sometimes several times a week and at weekends.

There were many factors which influenced this behaviour which we will come on to discuss (page 50).

Spare Time

Spare time for young people was divided into three main areas – after school, weekends and holidays – and their behaviours varied across these different areas.

After School

Time after school tended to be spent:

- at home
- taking part in after-school activities
- taking part in activities outside of school.

At home

Much of the young people's after-school time appeared to be spent at home. For many young people, particularly those at secondary school, after being at school all day they just wanted to come home and relax. For many young people this meant watching TV. A variety of programme types were mentioned such as soaps, comedy, reality TV shows and teen drama series. A minority mentioned they watched documentaries, but generally this was only revealed once prompted. Some mentioned they enjoyed reading, this seemed particularly common amongst the primary age children, however a number of younger secondary age children also mentioned reading. Genres included science fiction, crime, paranormal romance and comedy.

A number of young people enjoyed cooking at home and this was an activity they mainly did with a parent. This was more likely to be mentioned by girls, however some of the Asian boys aged 12 to 14 also said they enjoyed cooking meals and baking at home.

Gaming

Gaming was a popular pastime amongst boys, particularly at secondary school age. A minority of girls mentioned that they played computer games, but this appeared to be less regularly than for the boys. Popular games included *Grand Theft Auto*, *FIFA*, *Halo*, *Minecraft* and *Candy Crush*. A minority were playing these games online with others. One 18-year-old girl mentioned other games such as *Zelda*, *Tomb Raider*, *Sims* and *Mario*.

"I was excited about GTA5[17]*, the new game coming out, and everyone was excited. I saw the trailers on TV and found it very interesting." (Boy aged 16)*

"Candy Crush is so addictive. Once you start you can't stop. I missed my stop on the subway because of that game!" (Girl aged 18)

[17] *Grand Theft Auto* is an open world, action-adventure video game. It was released in September 2013 for the PlayStation 3 and Xbox 360 and is the 15th title in the *Grand Theft Auto* series.

Social media

Contacting friends via social media was also very popular amongst girls over 12 and for some this was one of their main pastimes in the evenings. Sites included Twitter and image or video sharing sites such as Tumblr, Instagram and Vine. Sites such as Facebook were seen by some to be less popular now. A number of girls and boys also mentioned watching videos online on sites such as YouTube.

"I love Twitter. I've got 74 followers." (Girl aged 19)

"Twitter is really good. You can direct-message people or tweet people. Better than Facebook." (Girl aged 19)

"Everybody uses Tumblr and Instagram. And Vine. Vine is hilarious. It's six-second videos. Some people, it's ridiculous what they do in six seconds." (Girl aged 18)

"Me and my friend, we just randomly skyped each other one night and started dancing!" (Girl aged 12)

Outdoors

In the warmer weather some said they might 'hang out at the park with friends', walk the dog or go out in the local area on their bikes or scooters. Primary age children also talked about going to local playgrounds.

Clubs and activities

There were some young people that were involved with clubs and activities provided by the school and a minority were involved with regular clubs outside of school. This appeared to be more common in young people at primary school level. Many of the young people at secondary school used to be involved with more activities when they were younger, but had stopped taking part due to a number of reasons (discussed fully later in the report, page 53), including: time pressures, boredom and a lack of funds, resources or other support.

The regular activities that young people were involved with were often physical activities. The types of clubs and activities that they were involved in included:

Physical Activities

- Football
- Rugby
- Netball
- Basketball
- Martial Arts
- Gymnastics
- Cross Country
- Dance
- Cheerleading

Other Activities

- Film club
- Choir
- Brass band
- Debating

Some of the young people had continued with interests started at school and were involved with organisations outside of the school environment, both in the evenings and at weekends. These generally included sports clubs such as karate, cricket, football and majorettes.

Other young people were regularly involved with the youth groups we spoke to. For these young people, involvement with these youth groups was not necessarily just sports or arts based. The opportunity to 'hang out' with friends, chat with youth workers and get involved in different activities were other reasons for attending youth groups. Examples of non-sports-based activities in youth groups include film nights, meals out, gaming, cooking or baking, drama and art-based activities.

Science-related activities

No young people mentioned any science-related activities that they took part in after school. Some teachers mentioned science clubs organised by the school, but these were seen to be less popular than sports or creative clubs. It was rare for young people or families to engage with cultural offerings after school.

Weekends and Holidays

Family time

More time was available to spend with the family at weekends and some of the young people we spoke to were doing things with their parents, siblings and wider family members at the weekends. Activities tended to be visiting relatives, going out for meals to places such as McDonalds or Nando's and shopping in the town centre. Occasionally families would do other things such as go to the cinema or visit local sports centres, but for most families these outings were infrequent.

Friends

Friends featured more prominently for older teenagers. For example, older girls liked to go shopping, boys visited skate parks and generally liked to just 'hang out' in their local areas.

Work

Some of the older young people had part-time jobs, such as helping in a hair salon, local shop or restaurant. Others, particularly those from ethnic backgrounds, worked with their parents in the family business.

Cultural activities

Visiting theatres was more likely to be mentioned by young adults as they were able to go with friends. Some of the young adults also mentioned going to local music festivals or gigs; these tended to be those that were based in London or Birmingham, where there was greater opportunity for these type of events. However, this was rare, as music events were generally seen to be too expensive.

Holidays

Holidays followed a similar trend. Few mentioned actually going away on holiday and if they did they tended to be short breaks to caravan/holiday parks and often UK-based. Some young people went to stay with grandparents or aunts and uncles.

"Not many of our kids go away on holiday, some go with the children's holiday scheme." (Youth worker)

Holiday activities

Some young people mentioned being involved in holiday activities organised by the local authority or youth groups. Examples of which included an activities van that visited local parks, giving young people the opportunity to do arts and crafts such as t-shirt printing for free.

Youth group activities

Youth group workers also described a range of organised activities at weekends or during holidays. These included day and residential trips as well as visits to local offerings such as the theatre and longer term projects such as vegetable growing or DIY fashion design. One youth group encouraged their young people to become involved in the Duke of Edinburgh scheme and this was mentioned positively by the young people as well.

"It's good to get away from everyone and everything you've got going on at home, a chance to get away and relax, and away from reality to be honest." (Girl aged 17)

Informal science offerings

Even at weekends or holidays, few young people appeared to visit museums, or other 'day trip' attractions, particularly once they reached secondary school. Days out tended to happen in school holidays and would often be to 'fun' attractions such as theme parks, leisure complexes or the seaside.

Science-related activities tended not to be mentioned spontaneously by young people, teachers or youth workers. Occasionally a visit to a local museum was mentioned spontaneously; however for the most part this was only mentioned when prompted. This highlights how science-related activities are not seen by many as equivalent to other recreational activities.

Trips to places such as museums or science centres tended to be organised by the school, or if organised by families it was usually for primary school age children or for much younger siblings in the family.

Reach of activities for young people

Perceptions of the number of activities and clubs available to young people varied from location to location and depended quite heavily on what was provided by the school or what was available privately as paid-for lessons, for example, dancing, swimming and martial arts, etc.

However in all locations the number of free or low-cost activities outside of school was described as low or unattractive to young people. For example, local libraries or museums may be free to enter or hold activities for young people, but teachers and the young people themselves said they were unlikely to go to them. In some areas, local churches or mosques held youth sessions which were attended by a minority of young people. However, the link with religion in these venues could be off-putting for some young people.

There were some instances of schools linking with youth organisations in the local area, for example, one of the youth organisations which provided drama classes conducted some of those classes in a local secondary school.

A number of schools also linked with other educational establishments at higher or lower key stages, usually to provide students with additional learning opportunities during the school day. For example, one primary school mentioned linking with a local secondary school to enable them to conduct experiments that they didn't have the resources for. Another secondary school mentioned linking with universities.

"We had our second foundation day just recently, which I don't think any other school does, which is like a graduation day in secondary school. It's because of the facilities that are afforded to us by our trustees. We have the foundation day at the Queen's Palace and Queen Mary's University. It's a very formal event like a graduation day and children are awarded for their achievements across the year and the whole school takes part. Kids look forward to it and get inspired." (Secondary school teacher)

However, it appears that schools do not tend to link with other schools at the same key stage and similarly, local youth organisations linking together was also not mentioned. The sharing of information, resources, tools and best practice was therefore rare and one science teacher from a secondary school expressed a desire for a platform for sharing ideas with others working with young people and developing local networks.

"If we are looking at particular topics on the curriculum, where they have novel ideas for practicals we could do which would be really simple to put in the lab. A list of equipment and a worksheet. Anything to cut down the hours we spend on finding out from scratch." (Secondary school teacher)

Reasons for engagement in regular activities

There were a number of emerging themes as to the reasons why some young people continued with their interests or started new ones.

The key factors in continued participation mentioned by the young people were friendship and enjoyment. A number of other factors also clearly contributed, although these were perhaps not explicitly mentioned by the young people themselves.

Friendship

Having friends taking part in the activities with them was very important for most young people. It meant there was someone to enjoy or share the experience with, whether that was playing a sport or simply gossiping at a youth club. The presence of friends seemed to be particularly important to those from secondary school age and upwards.

"If my friends didn't go to the YMCA then I wouldn't go on my own, don't want to be billy-no-mates." (Boy aged 14)

"I like cricket because we are all friends who come together, I enjoy myself and socialise, we do teamwork. It helps communication." (Boy aged 17)

Being with friends appears to be an important part of the enjoyment of school trips and in particular residential trips. Some young people said they would be reluctant to go on day trips with their parents because this was seen to be less fun than going with friends.

"It would be more fun with friends. My mum would say we should go on this trip and I say but I won't be with my friends so what's the point." (Girl aged 12)

"When you are with your friends, every boring thing is fun!" (Girl aged 13)

Enjoyment

Really enjoying the activity they were involved with was also crucial to continued participation. The young people had to be interested in the activities and find them exciting, exhilarating or both. The activity sessions needed to retain their interest and give them the opportunity to really take part in something they were passionate about.

"I love playing cricket, you have to draw on your own skills and work out how to win." (Boy aged 16)

For some of the young people engaged in sports, the opportunities to exercise, stay healthy and engage in competition were elements that made the activity enjoyable. For others, the opportunities to do something new or different or to create something were described as enjoyable as they provided the young person with a sense of achievement.

Being in control

Many of the youth organisations gave young people the opportunity to control how the group's activities were run. This included what they would spend their time doing, how the time was organised and places they might visit. This gave them a sense of empowerment

and encouraged them to continue to participate as their needs and enjoyment were at the forefront allowing them to feel in control.

"I like it that they listen to what we want to do and we can make real decisions about what goes on at the Barn." (Girl aged 18)

"We try and ask them for ideas about what they want to do, like a film night." (Youth worker)

"What doesn't work is actually trying to suggest an activity, organising it and getting them to come along. We need to get it from their perspective and what they want to do." (Youth worker)

However, there was some concern that young people may find it difficult to come up with ideas on their own and that they may require some guidance to help them get started.

"I think it would be difficult for them to just come up with an idea from nothing. They need some kind of guidance or direction to get them started." (Youth worker)

Increased self-esteem

Many of the youth workers and teachers said that a key way of engaging young people was to boost their confidence and self-esteem through success. If a young person finds they are good at something and can achieve challenges they are set then they are encouraged to want to continue to take part.

"Success breeds success, they keep coming because they are doing well. If they fail then they don't want to come back. These kids have enough knocks in life to deal with." (Primary school teacher)

Incentives to participate

Some of the youth workers and sports organisers felt that the young people continued attending their groups partly due to the fact that they were incentivised or rewarded. This could be in the form of badges or grades to complete, the promise of a trip somewhere such as a theme park, a meal out or a residential activity week.

Some organisations incentivised young people to take part in specific activities simply by rewarding the young people with the chance to participate in an activity they loved. For example, one youth worker described their weekly sessions as split into two halves; the first half of the session they would do 'something different' such as someone coming in to run an activity or talk to the young people; the second half of the session would then be spent playing football on a local Astroturf pitch.

Youth groups also used treats such as soft drinks, crisps and chocolate bars as incentives to take part in activities, and outside organisations coming in to engage with these young people were encouraged to bring these treats to the sessions.

Some schools reported using incentives such as prizes and rewards to encourage students to engage in activities. Teachers, youth workers and the young people themselves also mentioned fundraising activities, where the young people could help to raise money for the school, organisation or to keep for themselves. This included sponsored activities such as

reading and dancing, or fundraising through the sale of homemade produce such as cakes and vegetables.

School-based activities

All the schools we spoke to organised after-school activities and clubs which their students could take part in. The number and type of these clubs varied from school to school, from just one or two 'standard' clubs such as football or drama to a wide range of clubs across a number of different sports, film clubs, arts clubs and science clubs.

"There's a lot of after-school extracurricular activities. A lot of it is geared towards healthy lifestyle, sport activities. We have after-school clubs from every faculty in the school. We work closely with a few youth clubs and we try and encourage the students to get involved with the extracurricular activities on offer there as well." (Secondary school teacher)

"Every faculty is encouraged to hold after-school clubs. There is a science club and they do experiments, in art there's a textiles class. It's more the leisure activities. We have a film club which is popular." (Secondary school teacher)

For some schools, the number of activities offered was limited due to lack of resources such as staffing, and also low participation from students.

Parental support and family involvement

For a minority of families, engagement with regular activities was seen as important and parents actively encouraged, or even enforced, that the children or the whole family engage in activities regularly.

"They have never been allowed to say they are not going (to karate). For the first couple of years they hated it. It is intense, you are constantly working out. But they go from hating it to loving it. He's teaching the younger ones as well now. It's like a light that just switches on. I think it gives them a release and getting respect and they are learning discipline as well." (Parents of 13-year-old girl and 14-year-old boy)

The reasons that parents encouraged and supported their children in these activities varied, for example, to keep active and healthy, to provide varied experiences or to teach their children key skills such as determination and discipline.

For a minority of young people it was clear their parents actively encouraged the whole family to engage in a wide range of cultural activities, including different sports, museums, theatres and other cultural offerings.

"I like going out with my family to a museum. My family thinks expanding your mind is better than keeping it closed." (Girl aged 14)

"I do lots of things. Mum takes me to lots of activities, I do ice skating, my brother does karate." (Girl aged 10)

Barriers to engagement

There were a number of influencing factors that prohibited young people engaging in activities. Some of these barriers were the opposite or absence of reasons for engagement. For example, lack of parental support, or peer pressure from friends to stop doing activities which are perceived to be 'uncool'. However, a number of other barriers were identified.

Inertia or boredom

Many of the young people said that they simply could not be bothered to take part in activities in their free time. They felt that they were unsuitable or would be 'dull and boring'. This was the reason given by many of those that had given up activities that they were involved with in the past, such as dance and drama. The content of the activities had become too repetitive, lacked excitement and therefore the young people had lost interest.

"We never did anything new, just the same thing each week so I stopped going (karate)." (Girl aged 14)

"I'd rather be lying in my bed than doing that (dance class) at night." (Girl aged 16)

"I'm tired after school, I can't be bothered to go out. I just want to watch TV on my bed." (Girl aged 13)

Lack of confidence

Some of the young people gave up activities or were afraid to start new ones as they lacked confidence.

"I was asked to try out for the Scottish netball team, but I was too embarrassed to do it, then by the 3rd year I gave up going." (Girl aged 17)

A lack of confidence could also provide a barrier to young people enjoying and celebrating their achievements, as described by one youth worker:

"These young people don't know how to celebrate their successes. They don't know how to accept praise for what they have achieved. (Youth worker)

Lack of time and school work

For those at secondary school or college, lack of time and school work was mentioned by many of the young people as to why they do not do more in the evenings.

"I am kind of multi-tasking. My sister needs help with her homework and my brother says come and play, between 4 and 7 I am running around. My mum is doing the cooking and my dad is at work and I have got my own homework to do too." (Girl aged 13)

Time spent on homework increased dramatically in Years 10 to 11 when students study for GCSE qualifications, with up to 2–3 hours a night dedicated to study. This meant that these young people felt they do not have the time to engage with regular activities from the age of 14/15 onwards and even those who had continued with activities in early secondary school had often stopped them by Year 10.

"I did drama until I was 15 but then exams got in the way." (Girl aged 17)

One secondary school teacher also described how students may be tired after a busy day at school.

"They do have a long day at the school. It's normal school hours, but in the school they are pushed. A lesson is never not challenging." (Secondary school teacher)

Cost

The cost of activities was prohibitive for some families, particularly those with larger families and the young people themselves appeared to be aware that cost is an issue.

"If you do it for one you have to do it for the others, and we can't afford that." (Parent)

"I started boxing but it got really expensive with all the stuff I needed and subs every week so I had to stop." (Girl aged 13)

"They (the children) are very aware that they don't have money. Their parents do say that a lot, I hear it from their parents in the playground; 'don't have the money', 'can't afford that'. They do worry about money themselves, about how much things cost." (Primary school teacher)

Families and young people were looking for free or cheaper ways to entertain themselves like visiting the park, going for walks or small treats such as a trip to McDonalds or the cinema.

"I go to the skate park every week cause it's something to do that's free." (Boy aged 12)

Trips to attractions such as theme parks, zoos and museums were deemed by the parents as too costly and so would happen rarely, mainly during the main school summer holiday as a special treat. Parents were concerned that a family day out, including travel, admission and lunch could be in excess of £100, which for many on tight household budgets was simply not affordable.

Parents also complained that family tickets were not beneficial, as most were designed for two adults and two children. These types of tickets do not take into account different family types; for example, they do not offer a single parent family any cost saving and/or they do not cater to families who have more than two children.

"No good to us. I've got five kids, doesn't make it cheaper for me." (Parent)

Free passes to return within the year were also not deemed attractive by parents, who felt that once their children had visited they would not want to visit again during the free period. In order to encourage families to visit again, parents felt that the services on offer would need to be significantly different each time. Lower overall admission fees throughout the year were therefore preferred.

"My kids get bored quickly. If they've seen something once they won't go again." (Parent)

Funding challenges

Youth organisations described difficulties in obtaining funding for their organisations, which limited the types of activities and the level of involvement they could offer their young people.

"What we wanted to do, and what we strived to do, was have funding where we could do a kind of 'flash-bang' thing with young people where they could decide within their groups what they wanted to do, feed it back to us and within a month or so of that we would be able to make it happen. But you don't get funded like that." (Youth worker)

"They'll fund things to do with employability and getting people life-skilled, basic things like cooking and stuff, but they won't fund youth work; youth work being that process where you build relationships, build trust, build informal education into that and grow along with that young person and that young person's understanding of who they are and the world around about them." (Youth worker)

Availability in the local area and lack of transport

For some, a major barrier to taking part in activities was the limited availability of things to do in the local area. Some of the families did not have their own transport, relying on public transport or foot to reach activities. Even amongst families who have access to a vehicle, there appeared to be a reluctance to use it to travel to activities, possibly because of the cost. This limited their access to activities outside of the immediate local area.

"There is nothing round here for the kids to do. The only thing at the community centre are fat clubs!" (Parent)

Whilst schools often provided extracurricular activities for their students to take part in, for one semi-rural school, the number of clubs the school offered was limited. This was in part due to low participation levels because the school was not within easy walking distance for many students and public transport links were poor in the evenings.

Safety

Some of the parents and young people said that they were limited as to what they could do or where they could go in their local area due to feelings of being unsafe. This is a particular problem during the winter months.

Some of the parks, skate parks and playing fields, particularly after dark, were not felt by parents to be suitable for the young people to spend time in, largely due to the abuse of such facilities by others or the presence of older children or young adults.

"In the park, people do the toilet down the shuts, I wouldn't go there." (Boy aged 12)

"There's no way my kids would be allowed to the park after about 5pm, there are some right characters hanging about." (Parent)

"Some of the older kids drink on the park so my mum doesn't like me to go up there." (Girl aged 10)

Teachers were also aware of concerns about safety in the local area and felt that school was perceived as a safe environment for activities:

"Why a lot of these parents don't want their children to venture out too far without an appropriate adult is because they are quite worried about the safety. It's a big issue and that plays a huge part and it's been like that for a long, long time. It is improving but there's still stigmas attached to certain parts of the borough. And naturally parents worry about their children. But I think if we deliver and we try to get them engaged via the school or other authorised establishments keen to work with the school, I think through that medium and having an appropriate adult facilitating, that we can definitely get more children involved."
(Secondary school teacher)

Recommendations

It is clear from speaking to the teachers, youth workers, parents and even the young people themselves that young people from low SES families can be extremely challenging to engage with. Effective engagement is also increasingly more difficult through the teenage years and in particular with girls aged 15+. Whilst this is not necessarily a unique issue amongst young people from low SES families, the additional challenges they face can make engagement even more difficult than for those with higher SES.

This piece of research has highlighted a number of themes which may be useful in guiding not just funders and providers of informal science experiences, but also any organisation wishing to engage with young people from low SES families.

1. Know your target audience

Knowing your audience is absolutely vital to the success of any engagement activity. The best strategy will differ wildly depending on individuals and the community you wish to engage, so identifying and understanding your audience is essential.

There are a variety of factors which affect how best to engage with any given audience, however, two factors seem particularly differentiating: the level of engagement with school and the ethnicity of the community.

Engagement with school

Where schools are having success in engaging young people and raising the aspirations of those from low SES families, the school is likely to be a relevant and successful channel for engaging young people with any informal science offering. These schools often have established links with external organisations and businesses and they are keen to provide their students with a wide variety of enriching experiences. The students also view these experiences positively.

In these communities, parents and young people feel most comfortable taking part in activities after school which take place at the school – the young people are already there, there is no need to travel anywhere else, it is a safe and familiar environment.

School trips

As we have seen, school trips are often the main or only way people from low SES families engage with informal science offerings such as museums, as parents are often either unable or unwilling to take their children to these offerings.

This type of enrichment activity is often subsidised, however schools do find it difficult to raise sufficient funds. Therefore, investment in links with schools would best be wholly or largely covered by the organisation, where possible.

Promoting local activities

A number of schools also promote activities and events in their local area, therefore the school can be an effective channel for simply raising awareness of services currently on offer.

Engaging parents

Engagement through schools and colleges can also be an effective way of engaging some parents. Some of the parents said they would be willing to attend an event at the school.

Other channels required for the most disengaged

For young people who are disengaged from school, activity through the school is much less likely to achieve the desired impact. These young people have a negative and distrusting view of school and education and so any activity through school can potentially be viewed in the same light.

Teachers also described the hardest parents to reach, the parents that they are trying hard to engage with, as unlikely to respond to approaches via the school.

These extremely disengaged young people may therefore be better targeted through other organisations that they are involved with or places they are already attending.

Ethnicity

The ethnic composition of the community that young people live in can have an impact on the engagement approach which needs to be taken, so it is important to fully understand this from the start. In particular, in areas where there is a predominant ethnic minority community, it is important to gain the support and trust of the community.

For example, one teacher from a predominantly Muslim community school described the importance of establishing links with influential members of the community. These links could potentially be established directly, but it may be quicker and more effective to establish links via local schools who have already made connections.

Understanding the ethnic background of the audience is also important to ensure any activity is culturally sensitive, relevant and communicated effectively.

2. Engage a champion

Engagement with these young people appears to work best when a trusted and relevant champion is involved. Coaches, youth workers and club leaders were examples of effective champions.

Older peers who young people respect and look up to can also be very effective in engaging younger members.

Both trusted youth workers and peers provide an invaluable source of information about the target audience, what might interest them and how best to engage with them, therefore it is key that they are consulted right from the start.

3. Ensure activity is young person-led

The best engagement involves young people in the whole process, right from the very start. Schools and youth organisations acknowledged the powerful impact of involving young people in making decisions, generating ideas and implementing those ideas. The young people themselves also said they would like the opportunity to design and deliver informal science activities and that this would be a way to get them really interested and engaged.

Fig. Example of effective engagement – school STEM club

STEM Club

The school operates a STEM club for Year Seven pupils. The after-school club is attended by 70+ pupils. Over the term the students undertake challenges which develop their science skills and their engagement in science.

Examples of challenges include building bridges that become increasingly complex and egg transportation challenges.

Parents are invited and do attend. This fits with the school's aspiration to work with community but has also led to parents being involved in science activities in school (e.g. sharing their work experiences).

In the summer term the year seven students run a STEM club for year 6 pupils from the local primary schools as part of the transition activities. This allows the older students to demonstrate their science skills and pass on their enthusiasm for science to younger students.

The success of the club was attributed to:

- Young people having the time to work at their own speed and develop their skills in a relaxed environment and not being under pressure to achieve
- Students having the opportunity to be hands on and take part in practical activities whilst having fun
- Progression pathways being built into the challenges (progressively becoming more challenging
- Collaborating with parents in an engaging environment
- Offering young people the opportunity to take ownership of the club

By contrast, failure to consult the young people early in the process could quite easily lead to a failure of the whole project.

For example, one youth worker described a project to build a local monument which was funded by an outside organisation. He described it as "a perfect example of how you can get it totally wrong" and that the key errors made were in engaging with the wrong people and leaving consultation with young people in the area until too late in the process.

Guide choices

It is important to encourage young people to lead the activity, but in some cases they may find it difficult to actually generate ideas themselves. Whilst apathy is a key barrier, the problem can also be due to the lack of experience young people have in creating ideas and making decisions.

Funding challenges

Youth organisations described difficulties in executing this type of young person-led activity as the process for gaining funding for projects often does not allow for this kind of flexibility,

nor does it happen quickly enough for young people's interest to be maintained in the project.

Funding processes therefore need to be developed in a way that allows activities to be led by young people. This may mean considering less defined applications, where activities will be finalised with participants during the delivery phase of a project.

4. Ensure activity is relevant and at the right level

Ensuring informal science activities are relevant and set at the right level is important, and was mentioned by both those working with young people and the young people themselves. Young people can quickly lose interest in engagement that is not relevant or is pitched too high or too low.

Find out what interests young people

A key component of relevance is that the activity is either about something that the young people are interested in, or clearly links to something that they are interested in.

For those involved in sporting activities, links between science and sport may prove effective. For example, some of the boys who regularly attended a cricket club said they would be interested in understanding the science behind improving their performance in cricket, how to become fitter and prevent injury.

Therefore, in order to create relevant engagement, our previous points of understanding the audience and consulting them early in the processes are key.

Factors to consider

A number of other factors should be considered to ensure the activity is relevant and at a suitable level for the young people;

- **Demographics**; consider the demographic make-up of the young people involved and design teams and activities accordingly. Sub-groups may need to be established to encourage participation, for example separating older and younger participants
- **Provide challenge and stretch**; but at the right level to ensure the young people can achieve success
- **Novelty and excitement**; regularly changing content and providing interesting and exciting activities is key for maintaining interest
- **Progression**; the ability for young people to progress through stages or levels helps to maintain interest
- **Language**; communications, whether verbal or written, should take into account the educational level of these young people as well as any cultural differences
- **Avoid being overtly educational**; this can be off-putting for young people, particularly those disengaged with education, and can even result in them stopping attending groups altogether

- **Taster sessions**; would be useful for young people to establish whether an activity or subject is of interest to them. This could be particularly helpful for young adults who have left full-time education, when it is more difficult to engage with potential new interests due to the costs associated with courses. Young people also described how they would like to be free to pursue interests without the pressure of having to take exams or qualify at the end of the course.

5. Invest in long-term relationships for maximum impact

Whilst schools and youth groups do regularly engage with other organisations on a one-off or infrequent basis and recognise the value in these experiences for young people, long-term relationships are likely to have a much greater and long-lasting impact on young people, the school/organisation and the wider community.

Reliability/regularity is important

It appears that it is the reliability and regularity of interaction that is key, rather than the actual length of engagement. Therefore, 'long-term' could mean, for example, consistent engagement on a weekly or monthly basis over the course of months or years, or an event which takes place over a shorter time period, but which happens with regularity, for example every year.

6. Make it practical and interactive

Young people enjoy practical activities; doing rather than watching and getting actively involved. Informal science engagement should therefore be interactive and hands-on to maximise enjoyment.

7. Facilitate socialising with friends

A key component of fun and enjoyment for young people was friends. This was extremely important for young people of secondary school age and upwards, but perhaps less so for younger children (primary school age).

Many of the young people at secondary school age mentioned residential trips with school or youth organisations as very enjoyable as they got to spend an extended time with friends. These trips also often allowed the young people to experience places and activities that they would normally not be able to.

8. Be accessible/local

All the different audiences we spoke to recognised that accessibility is important for encouraging young people and families to take part in activities. Lack of transport, prohibitive travel costs and a general lack of desire or need to travel outside the immediate local community were barriers to engaging with informal cultural offerings. Young people and parents expressed the desire for activities to be brought to them in their own communities.

Suggestions for places that would be accessible for young people and families tended to focus around places they were already going, such as the school, youth groups, churches, leisure centres and local parks. Using familiar places would also help to overcome the concerns parents have about safety and potentially overcome any fear of the unknown.

9. Celebrate/reward successes

Most of the schools and youth organisations spoke about rewarding young people for their achievements, for example, rewarding good behaviour, completing specific tasks or achieving goals.

In schools, points-style rewards systems were mentioned by both teachers and the young people themselves and these were generally used to reward good or desirable behaviour. Celebrating successful achievements may often be more motivating than competition or the potential to 'win' for many young people, as it allows them to recognise their own progress.

Many of the young people were not accustomed to receiving praise either at home or in school, and so receiving it appeared to really boost their self-worth. However, it is important that praise or recognition is given out genuinely, as one youth worker described:

"You must only give praise where it is deserved; if you do it falsely they will sniff you out!" (Youth worker)

10. Communicate through trusted channels

'Word of mouth' appears to be an extremely important channel for communicating with these young people. This may be face-to-face, but also through texting and social media.

"We spend a lot of time with our friends, we go to the gym, we learn things together, we enjoy, we speak about it. That is how it is spread. If anything happens the first thing we do is tell our friends." (Boy aged 17)

Creating 'buzz' or 'social currency' amongst young people is therefore an important way for providers and funders of informal science offerings to attract this audience. However, this activity needs to be carefully executed with appropriate champions as the communicators, as 'advertising' in these spaces may be rejected.

The schools also reported serving as communications channels for local activities and events and this worked best where their students and parents were more engaged with education.

11. Be clear on the objectives from the outset

Given the wide variation in the engagement with science of young people from low SES families, it is extremely important that the objectives of any engagement are clear from the outset. This will affect a number of factors, such as who to engage, where to target them and how best to engage the young people.

For example, if the objective of a project is to widen the audience for informal science amongst young people from low SES families and reach those who are not currently engaged, the strategy will be different than if the objective is to ensure those with talent have the right inspiration and opportunity to reach their potential.

Similarly, whilst it is feasible to engage families/parents, it is not necessary in order to engage with the young people themselves. A different strategy would be required for engaging parents and young people versus just the young people.

12. The language used can attract or detract

The word ‘science’ appears to be quite divisive and for some young people can be immediately off-putting. ‘Science’ also seems to have a strong association with school and formal learning.

By contrast, ‘experiments’ brings more positive associations: practical, explosive, exciting, change, cause and effect. However, again, this is quite heavily linked to formal learning and to the core science subjects in school. ‘Experiments’ did not link well with ‘space’ which was another important association with the ‘science’.

Because of this strong link between ‘science’ and school, many young people did not make the link between some science-related fields and the word ‘science’, for example, doctors.

As such, the words used to describe any engagement activity need to be considered carefully as they could potentially put off some young people.

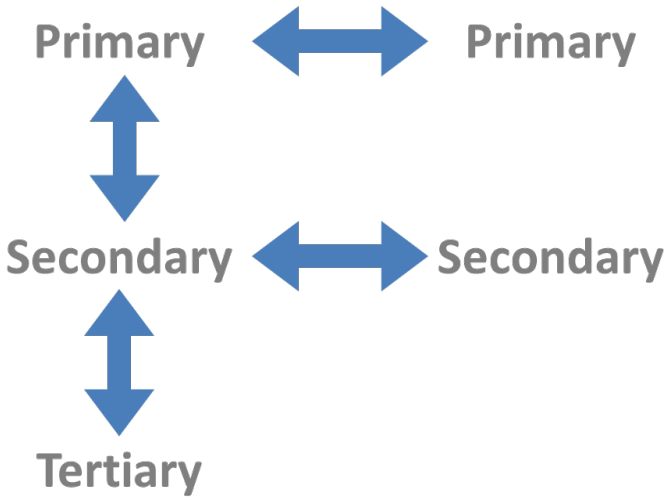
13. Create and facilitate links and partnerships

Both schools and youth organisations welcome opportunities to provide young people with different experiences therefore there is a clear opportunity for establishing links between them and funders or providers of informal science:

- Work with schools to access young people who are more engaged with education (but not necessarily science)
- Work with youth organisations to access the more disengaged young people. Links with sports organisations may be very valuable given the activities young people are involved in are often sports-based.

However, there is also an opportunity to create and facilitate links between schools, both within and across educational stages.

Fig. Links across and within educational stages



This research also suggests that providing better science experiences in primary school and then maintaining that link through to positive experiences in secondary school may be important in fostering an enduring interest in science and preventing young people from ‘switching off’ from science in their mid-teens. The key component here is ‘maintaining that link’ from primary to secondary and it would be interesting to test this approach specifically to assess whether this improves attitudes to science in secondary school and beyond.

As well as links between schools, creating and facilitating links between youth organisations may also be beneficial as there appears to be little interaction at present. This could be targeted at youth workers, for example, linking youth workers to share resources, experiences and best practice or providing training courses on informal science activities and networking opportunities for youth workers.

It also appears there may be an opportunity to set up, or if already in existence promote, online informal science resources for those working with young people. This resource could provide access to information, tools, ideas and opportunities for promotion and networking of formal and informal science contacts and services for young people.

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