



# Project STEM

BOOK OF INSIGHTS

2014



*Research with young people, their parents and teachers*

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# ABOUT THIS BOOK

In this book we describe young people's attitudes, beliefs, motivations and behaviours that affect their decisions on subject choice and career paths to add depth to the current understanding of how they perceive STEM careers.

This book brings together **four** phases of research activity with young people, namely; **qualitative, social listening, co-creation** and **quantitative research activities** that ran between February and March 2014.

It follows a knowledge and scoping phase that laid the foundation for the research design and approach of the above mentioned research activities.

Prior to this book of insights we carried out:

- i. A thorough **review of existing research** on STEM.
- ii. Heard feedback and hunches from a session held with **stakeholders** on 12 December 2013.
- iii. **Depth interviews** with **career advisors** to fast track understanding of how young people make career decisions.

- iv. Qualitative sessions with **STEM professionals** to determine the motivations and barriers they experienced in their learning journey and to identify the influences and critical ages when they made decisions.

In the qualitative phase, we spoke to young people aged 14-17 years (separately as year 9, year 11 and year 12/FE college years) from a wide range of social and educational backgrounds, through the lens of understanding their attitude to STEM as a career path. We interviewed parents and teachers to understand the influential role they play in young people's career choices.

To complement the qualitative research, we listened to young people's social media conversations to understand their sentiment towards STEM careers and subjects.

Our co-creation sessions with young people served to validate and probe further their career ambitions as well as to inform the development of communications that would resonate with young people.

The final research activity was an online quantitative survey with a sample of 2280 teenagers that ran on the 24th to 28th of March 2014. This final phase provided a quantifiable complete picture of their attitudes, behaviours and perceptions of career choices and a baseline measure to track intervention effectiveness.

# WHO WE SPOKE TO

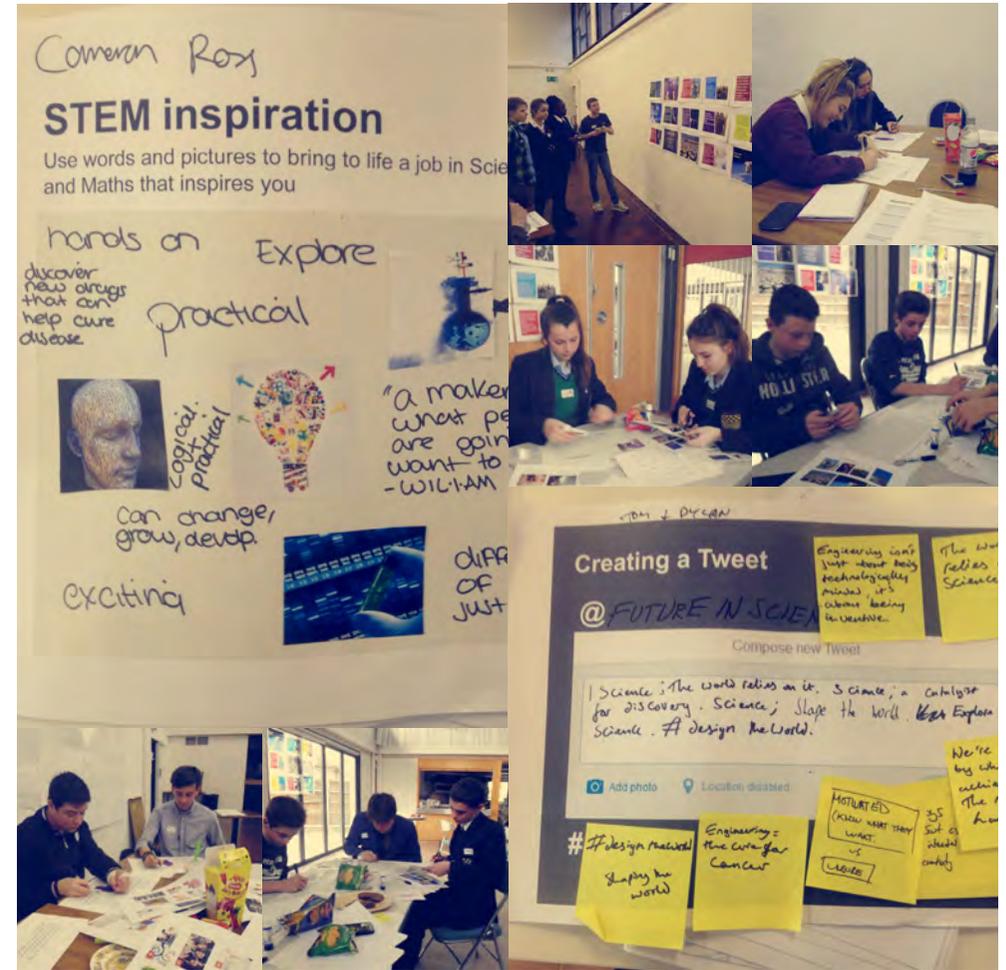
We interviewed friendship pairs and quads of young people in year 9 and year 11, ages identified as the key decision making points from the previous research phase with STEM professionals.

Throughout this report we will refer to high and low support young people, parents and teachers.

By high support we mean: Young people who attend schools where over 80% of pupils go on to higher education AND the school received an Ofsted grade of 'outstanding' or 'good' in the last two years. And have parents/guardians in ABC1 SEG who have had a higher education.

By low support we mean young people who attend schools where less than 60% of pupils go on to higher education and the school received an Ofsted grade of 'inadequate' or 'requires improvement' in the last two years. And have parents/guardians in C2DE SEG who have not had a higher education.

Low or high support teachers refers to the Ofsted grading of the school they teach at.



Further details of the sample mix can be found in the appendix.

# Attitudes and mindsets

This section describes attitudes and mindsets that define today's generation of **14 to 17 year olds** across England. Although the research was designed through the lens of STEM, the insights uncovered have much broader implications. They provide the wider context in how we communicate with young people in 2014.

# 01

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Sense of inner potential  
Self centric not self centred  
Risk aversion lowers ambition  
It must work now  
Passengers not drivers  
Users not creators  
Geek not so chic  
Parents first line of influence  
Celebrities are still inspirational  
Secure and stable

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# SENSE OF INNER POTENTIAL

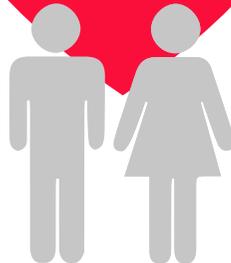
*Young people feel they have ideas, but it's external conditions that prevent them from realising their potential.*

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“ I'm thinking about being a photographer, but I know someone who did that at uni and really struggled to get a job, so I'm thinking about what I could do instead.”

*Girl 16, High Support, London*

KEEP SENSE OF  
POTENTIAL ALIVE BY  
CREATING A SENSE  
OF OPPORTUNITY  
FOR EVERYONE



# 01

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**Young people tend to have an internal sense of potential. They all feel they have “ideas” and something to offer in life.**

However, as they progress through their school career, external factors such as their perception of the job market, their exam grades, as well as social and gender expectations means their sense of potential all too often gets dampened and doesn't translate into active ambition for their future.

“I want to be a film producer but I do worry about if I'll get a job at the end of it. You don't want to have done all that work to find there are no jobs.”

*Boy 16, High Support, London*

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# SELF-CENTRIC NOT SELF CENTRED

*With limited life experience it's hard to see beyond a narrow world view*

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“ I want to help people. You see people doing that - like the police – that's what I mean by helping people. ”

*Girl 18, Low Support, Birmingham*



# 01

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**For most young people, connection to the wider world and its issues is somewhat limited. Although interested in travel, their 'world' very much focuses on them, their peers and their family. It is through this lens that they mostly view opportunities and interests.**

Their views on careers are often limited to what they know or have experienced and they discuss having impact on those close to hand. Young people do not readily consider the more far-reaching affect across society they could have. Focussing on the potential that their actions could have a wider impact on the world can feel daunting and overwhelming.

“My sister, my cousins they are all doing media so I think I am going to do that.”

*Girl, 13, High Support, Newcastle*

# RISK AVERSION LOWERS AMBITION

*Unforgiving online culture amplifies  
fear of failure*

“ The teachers are always saying that you need to do well to get on, they are giving us tests all the time. ”

*Girl, 13, High Support, London*

“ Our lives really depend on it – getting the marks and that will impact on the lifestyle that we can have when we are older. ”

*Girl, 14, High support, Yate*



**There is this constant pressure from parents and teachers on young people to get the right results and qualifications so they can get a decent job.**

With their lives indelibly documented and projected online, they perceive their failures are on display for their friends and peers to see.

As a result their ambition to find an interesting and fulfilling career path conflicts with the strong consideration that their chosen subjects must be achievable and ultimately lead to a guaranteed job at the end.

RISK AVERSION  
LOWERS  
AMBITION

For

**77%**

doing well in  
exams was one  
of the biggest  
things they  
worry about.

The pressure starts at an early age.

**77%** of 13-14 yo  
rising to

**81%** of 15-16 yo  
but dropping to

**72%** of 17-18 yo.

# IT MUST WORK NOW

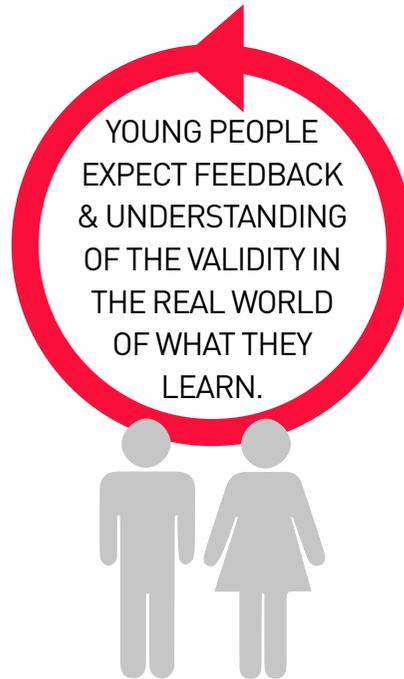
*Instant gratification and the expectation for everything to work immediately*

“ You get...why do I have to do algebra? Nobody ever does that. Why do I have to do fractions? Everybody uses decimals and calculators now. ”

*Teacher, High support, Birmingham*

“ If I knew why it was useful, I'd do it.”

*Boy 14, Low Support, Newcastle*



# 01

**Young people expect instant feedback in their lives. This is rooted in the technology that surrounds them which gives instant access to information and computes things fast.**

This attitude manifests itself in several ways. Young people expect to see the results of their efforts immediately and they expect to see how things can be applied in the real world. They get frustrated and lose interest fast if they do not understand something and do not see the relevance of the subjects they learn.

Again the expectation for immediate results runs contrary to STEM and other subjects, where ideas and innovations are developed through a process of iteration and discovery.

IT MUST  
WORK NOW

---

82%

agree with statement

*“I find it easier to learn  
stuff I think I’ll use  
when I start work”*

---

# PASSENGERS NOT DRIVERS

*Young people often shy away from the prospect of responsibility or shaping the future*

“It’s always a real struggle for many when they are tasked with developing their own coding project from scratch.”

*Computing teacher, Newcastle high support*

“I don’t want to be responsible for it all – what if it goes wrong or I don’t do it right.”

*Girl, 14, High Support, Bristol*



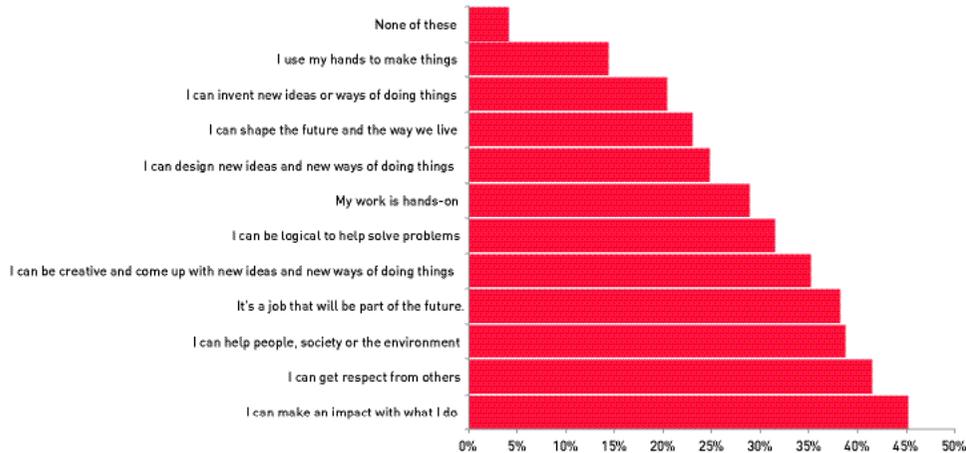
**For many young people (particularly at the young end of the sample) the consideration that they could make a difference in the future felt daunting.**

Personal responsibility for many felt overwhelming and 'hard' - potentially turning them away from considering some careers. For example, when presented with job descriptions where a person was personally responsible for something large, there was concern that this would be difficult. Instead young people are more drawn to opportunities where there is **shared responsibility**, i.e. working as part of a team.

Similarly - although interested in the future, the notion of creating it can feel hard and daunting for young people. The idea of being the one that could create the new game-changing piece of technology or do something to change the future was not always readily engaging. They want to contribute to innovations but cannot see themselves creating them.

PASSENGERS  
NOT DRIVERS

Which, if any, of the following are important to you? I want a job where...



23%

want jobs where they can shape the future and the way we live

45%

want to make an impact

42%

want a job that earns respect from others

# USERS NOT CREATORS

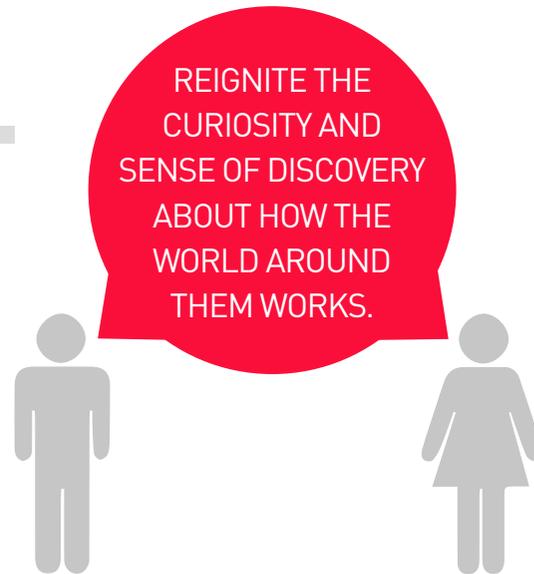
*Technology valued for its utility, without questioning how it works*

“I’m not that interested in technology, I like having the latest phone, that’s about it.”

*Girl, 13, Low Support, Newcastle*

“Technology has gone as far as it can go.”

*Girl 17, Low support, Newcastle*



**This is a generation that takes technology for granted. They value its functionality and role in their lives, above most things, however there is less curiosity into how and why it works.**

Genuine digital natives - today’s 16 year olds have been exposed to iPhones since they were 11, Twitter since they were 10 and YouTube since they were 9. However they lack curiosity into what goes on under their phone cover, or behind their computer screens – and with modern technology being so inaccessible, this is understandable.

Similarly, the majority can only see how the technology around them affects them on a personal level and not at a macro scale, with a good proportion believing we have already seen the pinnacle of technological achievements.

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# GEEK NOT SO CHIC

*Attitude towards intelligence differs by gender,  
age and support level*

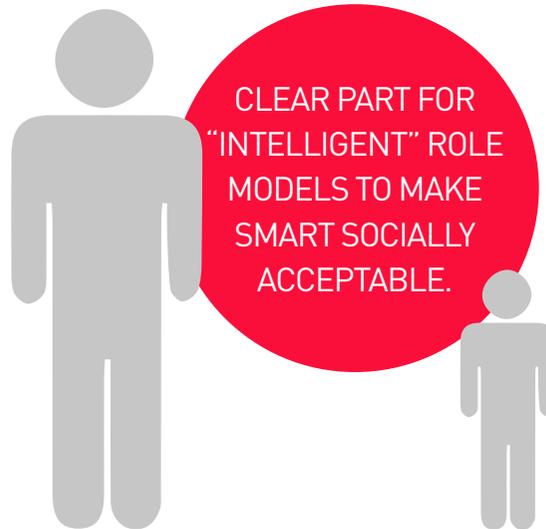
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“Geek is the wrong word. But they  
tend to keep their heads down.”

*Teacher, Low Support, Birmingham*

“It’s ok to be good at something.  
As long as you don’t boast  
about it.”

*Girl, 17, Low Support, Birmingham*



# 01

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**The negativity associated with being a  
“geek” starts to emerge in years 8 and 9  
when pupils have settled into secondary  
school life.**

As young people progress through school, ability and intelligence becomes a clear way that they are defined. For lower achievers, their views on higher achievers are mixed. There is some respect for those that are brighter than them with a recognition that things come easier to them and in some ways a wish to be more like them.

However, there is a perception that a proportion of those higher achievers are less ‘social’ (i.e. very focused on school work) which generates a more negative perception of boring, dull, obnoxious and boastful – things that they don’t want to associate with.

“It’s cool to be smart,  
it’s just really hard.”

*Boy 16, High Support, London*

GEEK NOT  
SO CHIC

---

**54%** vs **45%**  
of high support of low support

believe being intelligent  
earns their respect.

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**55%** of 17-  
18 yo

vs

---

**44%** of 13-  
14 yo

believe being intelligent  
earns **respect**.

# PARENTS FIRST LINE OF INFLUENCE

*Young people respect their parents' achievements and are happy to be influenced by them*

“ My mum never got to go to uni, she leads me onto the path that I should go, I listen to her.”

*Girl, 13, High Support, London*

“ My Dad has got a hands-on job. He's been there, so he can help me choose.”

*Boy 16, Low support, London*



**Many young people, whether high or low support, see their parents as role models. They see their parents as resources to help them get established. They'll ask them for advice regarding subject and career choices.**

Some lower support young people may look to follow more directly the footsteps of their parents in terms of career choice but in general parents are the sounding boards for the choices young people make.

However, parents often have limited knowledge of the opportunities available to their children, and although they almost universally only want what's best for their children – they can have “out of touch” gender stereotype views which hold them back.

PARENTS  
FIRST LINE OF  
INFLUENCE

13-14 yo are more likely to turn to their parents than 17-18 yo.

20%  
vs.  
14%

Higher support young people are more likely to turn to their parents than low support.

18%  
vs.  
13%

Low support are more likely to head to a career advisor than high support teenagers.

34%  
vs.  
29%

# CELEBRITIES ARE STILL INSPIRATIONAL

*They act as role models of aspiration and inspiration for young people*

“Alan Sugar,  
he worked  
hard to get  
what he got.”

*Boy, 16, Birmingham, High support*



**Famous business people are admired for the hard work that made them successful. For boys in particular, there is a desire to follow passions and be like their sporting heroes.**

**Famous actors were also aspired to, as well as celebrities linked to fashion, particularly for girls.**

There is huge potential to use celebrity role models to promote certain career areas and inspire ambition, however, particularly for young people, the “cool” celebrity landscape changes at a dramatic rate so ensuring the role model is current is key.

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# SECURE AND STABLE

*The post recession generation want a stable future for themselves and their family*

---

“ I do worry if they end up in a niche job that has no future, I mean look what happened to his dad, he was a miner. ”

*Parent, High Support, Newcastle*

“ Not having to worry about being out of a job and being in debt that's what's important to me. ”

*Boy, 13, High Support, Birmingham*

HOW DO WE  
COMMUNICATE THE  
CAREERS WE WANT  
YOUNG PEOPLE  
TO CONSIDER  
PROVIDE A STABLE  
FUTURE?



# 01

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**Almost without exception young people crave stability for themselves and their families. The common aspiration regardless of background was that young people wanted to provide a safe and stable home for their family.**

For some the need to provide stability was more pressing owing to struggling family circumstances. Low support pre-GCSE students would talk of the need to provide for their family. An indication of the tension they already feel of finding a career path they enjoy and being able to contribute to their family's income.

High support young people also felt the need for a career that offered stability. Having seen their parents and older siblings experience the recession, young people even at 13 years old place stability and avoiding debt as a priority for their future career.

# Career goals and ambitions

This section describes the motivations, aspirations and considerations young people have when considering life after education.

## 02

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Opportunity for success  
Wanting to make a difference  
Following their passions  
Practical not theoretical  
Passengers not drivers  
All work and all play  
Money is important but not critical  
Fear of boredom – challenge me  
University is not the only way  
Creativity: motivator and barrier

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# OPPORTUNITY FOR SUCCESS

*For young people success is  
about recognition not power*

---

“ I want to be fairly high up  
and important. ”

*Girl, 16, High Support, London*

“ I want to be a leader, I don't  
really want people telling  
me what to do. I want to be  
able to lead. ”

*Girl, 16, High support, London*



# 02

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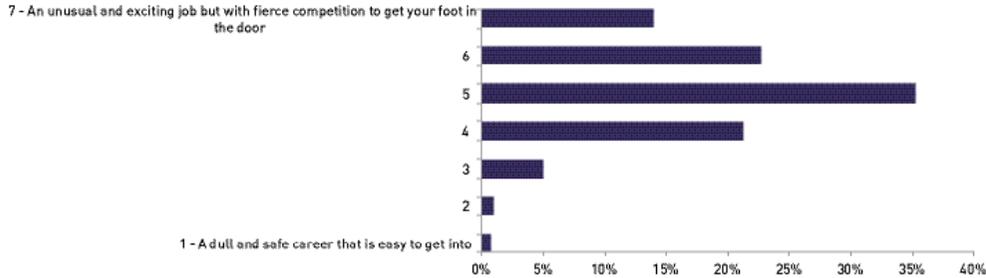
**For young people success in their  
chosen field is something that they  
naturally aspire to.**

Although all want to achieve a secure and stable career, for some it was also important to go beyond that and achieve notable success and responsibility either through promotion and leadership or by creating their own business. Both low and high support young people wanted to be successful, but it was more frequent that those from a high support background talked about 'being high up' in their jobs.

Achieving success was about recognition, as well as personal achievement and accomplishments. Recognition from their parents and peers that they had made it.

Becoming successful is about building self-confidence, a way of knowing that they were doing a good job and that they were proud of the work that they had done.

## I see myself aiming for...



6%

of boys

vs.

4%

of girls

see themselves high up and running a team by their mid-twenties.

72%

to some extent still want to aim for a job that is unusual and exciting despite potential fierce competition.

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# WANTING TO MAKE A DIFFERENCE

*Young people want the opportunity to help others and society in their career*

---

“ I want a job that isn't self-centred, I like the idea of making people happy. If I am doing a job that is helping people, that is really rewarding.”

*Girl, 14, Low support, London*

DOING GOOD  
NEEDS A RANGE  
OF MESSAGES  
TO CAPTURE  
DIFFERENT  
EMPHASES

# 02

---

**For some young people the opportunity to 'make a difference' was considered important in their career choices.**

The definition of making a difference was broad ranging. For some it tended to be about 'helping others', but for others it was about wanting to 'make a difference' in their community. This was often considered on a one to one or community level (helping individuals in need) rather than on a more broader scale, global scale. It was considered that this type of work was hugely rewarding and satisfying. Focus of careers for these individuals tended to be around public services.

For a confident minority it was about making more of a societal impact and leaving a legacy.

“ I like the idea of leaving a legacy – or making my mark.”

*Girl, 16, High support, London*

—  
WANTING  
TO MAKE A  
DIFFERENCE

---

18%

see themselves in a job where  
they are helping people.

---

22%

of girls

vs.

14%

of boys

---

---

# FOLLOWING THEIR PASSIONS

*Young people use their passions as a focus when considering their careers*

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“ I can see how becoming a radio producer gets me close to my love of music.”

*Boy, 16, High Support, London*

“ I really like sport – I really want to go into something to do with sport.”

*Boy, 13, Low Support, Bristol*



# 02

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**Personal interests can strongly drive consideration of careers and are often the starting point. TV programmes can also prompt consideration of careers, for example, crime series, medical series.**

Young people often focus on 'their' world when considering careers. This can be influencers in their lives but interest and passions are strong starting points too. Careers which contain elements of their current passions can resonate strongly and have increased interest and this differed across gender.

For boys, sport and music were often key starting points when thinking of their career pathway.

For girls it was more varied but fashion, food, drama and art/design were often of strong interest.

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# PRACTICAL NOT THEORETICAL

*Young people are interested in careers which allow them to be hands-on*

---

“ I’ve always been interested in doing something with my hands. When I was younger I was always building and making things. I don’t want to be sitting at an office desk answering phones. That sounds boring.”

*Boy, 13, Low Support, London*



# 02

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**For young people, in particular boys, there was a strong interest in subjects and careers which allowed them to be more practical and hands-on.**

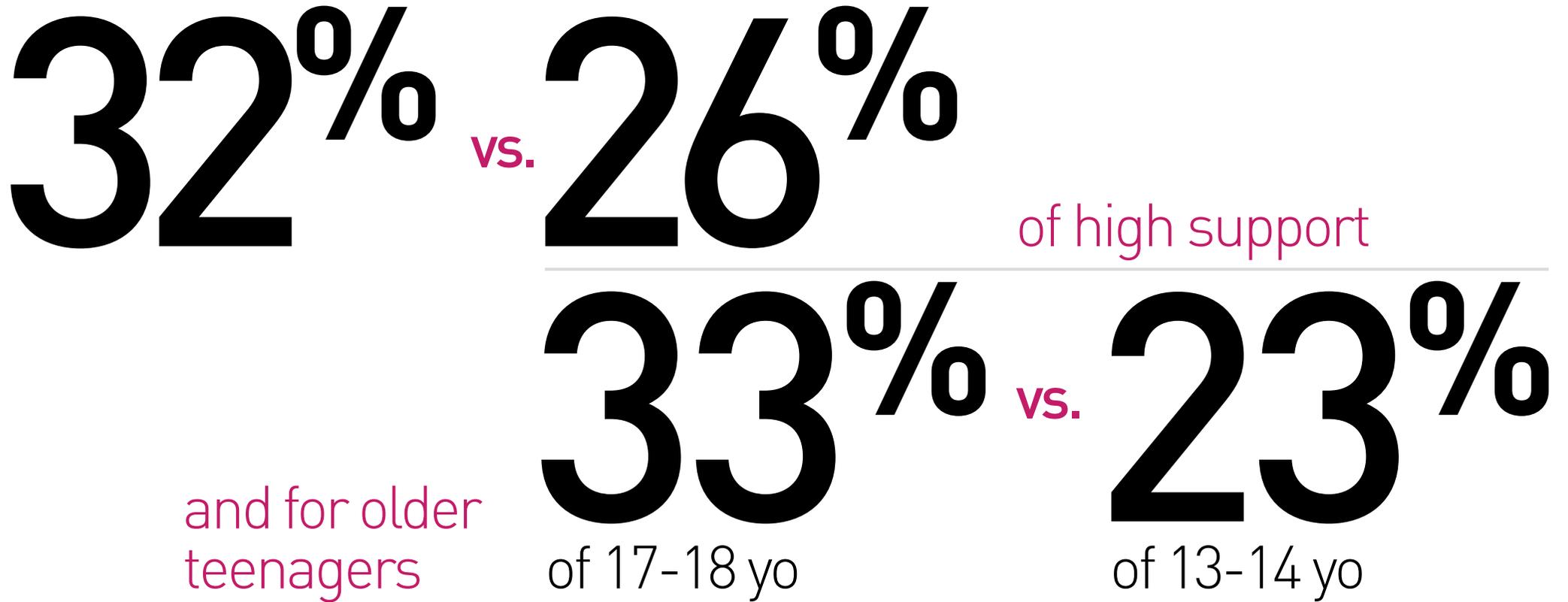
They often cited that they were keen to have jobs which allowed them to use more practical skills, rather than jobs which were considered more theoretical or office based.

They were more inspired by subjects where they could see the end goal of their learning, that is where the theory very quickly turned into practice.

“ I like doing practicals, I like getting involved.”

*Boy, 14, Low Support, Bristol*

Where work is hands-on it's more of a draw for low support



# ALL WORK AND ALL PLAY

*Young people want work to be an enjoyable integral part of their life*

“What I really want is where I go to work, but it doesn't feel like work because I enjoy it.”

*Girl, 13, High Support, London*

FOR YOUNG  
PEOPLE ENJOYMENT  
DETERMINES  
ACCOMPLISHMENT



**Young people want their work life to be enjoyable and for many a strong part of that includes the ability to socialise and meet new people within the role.**

There was an aversion to working alone, instead there was a strong desire to be part of a larger team and have a good social life as part of work.

There is also a desire not to work long hours as some have experienced their parents doing, but that does not necessarily mean they want to work to fixed working hours, i.e. 9-5. Having flexibility within their working lives was discussed, with the ideal job not feeling like work.

“I want to be able to make good friends at work.”

*Girl, 14, High Support, Newcastle*

---

# MONEY IS IMPORTANT BUT NOT CRITICAL

*Young people aspire to have a good wage but only a few aspire to be rich*

---

“ Money is important but it’s not as important as having a good experience. Having a quality and range of experiences is really important to me.”

*Boy, 13, low support, London*

“ I want something that pays ok, you see a lot of people struggling. I want to enjoy my job and get paid enough to support my family. ”

*Girl, 14, Low Support, Bristol*



**Money is important to young people when considering their careers, they want to be able to afford what they want in life and become independent.**

Young people want to be independent and to be able to provide for their family as well as do what they want in life. To do this they want a good wage, however many are less concerned with having a high wage or being rich. This was because there is a belief that a 'highly paid job' can come with other issues, such as stress and long working hours.

For many, this is not a trade-off they are interested in making.

Of course, there were some (from both high and low support) who were more interested in earning a high wage. For those from low support, there were aspirations to do better than their family or current lifestyle and for those from high support an aspiration to match their parents' lifestyles.

MONEY IS  
IMPORTANT BUT  
NOT CRITICAL

£25,000

is the median  
annual salary young  
people consider to  
be a good salary.

47%

of young people  
believe £15k to  
£25k is a good  
starting salary.

30%  
of boys

vs.

25%  
of girls

believe £25-45k is a  
good starting salary.

# FEAR OF BOREDOM- GIVE ME A CHALLENGE

*Young people want their job to feel varied and different every day*

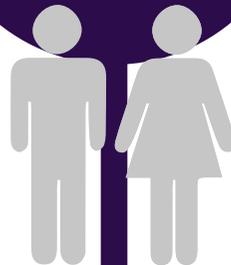
“ I want something that’s a bit of a challenge, it makes it more interesting.”

*Girl, 13, High Support, Bristol*

“ I don’t want to be stuck in an office all day, stuck behind a computer, that would be boring. ”

*Girl, 13, High Support, Bristol*

STEM  
PROVIDES THE  
OPPORTUNITY TO  
AVOID THE BORING  
DESK JOB.



**Across the sample, there was a strong aversion to any sense of boredom within their job.**

For young people a ‘boring’ job is one that that feels repetitious, monotonous and the same every day. An ‘office job’ was seen as the worst kind of job and appeared to act as a metaphor to represent the types of job they do not want, that is, being stuck at a desk and not going ‘out’. For some this felt like an extension of school (at a desk being given ‘work’ to do) which for many they were hoping to avoid once leaving education.

Instead for a proportion of the audience, there was a sense that they would like their job to provide them with a sense of challenge. Although not looking for their job to be too difficult, a sense of challenge suggested that they would be doing something varied and different everyday.

---

FEAR OF  
BOREDOM - GIVE  
ME A CHALLENGE

---

**72%**

selected a job where I'm working from a desk most of the time as an aspect they do NOT want in a job.

---

Only

**10%**

see themselves in their 20s working in an office for a big corporation.

---

# FEAR OF UNEMPLOYMENT OR 'DEAD END' JOB

*Young people want a job where they can progress and improve*

“ I think it’s going to be hard to find a job. My dad tells me that it used to be 7 or 8 going for a job, but now you have 100s of people going for the same job – so I have to outshine them, I can’t make mistakes now. ”

*Boy, 13, Low Support, Bristol*



**Young people readily cite that finding a job or the ‘job they want’ after school is likely to be difficult. This can make them either feel despondent or realise that there is a lot of pressure to do well at school to stand out from the crowd.**

Parents and older siblings having gone through recent tough times, reminding them of the difficulty in getting a job, telling them that they need to work hard at school to overcome this.

The fear of unemployment was stated by nearly all young people but those from lower support appeared to raise it more readily. This fear of unemployment or getting a good jobs, raises concerns about not being able to provide for their families, or get the things they want out of life.

“ I don’t want to be unemployed without any direction, poor and struggling to pay the bills. ”

*Girl, 13, Low support, Newcastle*

---

FEAR OF  
UNEMPLOYMENT OR  
'DEAD END' JOB

---

Of 17-18 yo

**71%**

were concerned how  
they'd be earning money.

---

---

**65%**

were concerned about  
getting a job they'd enjoy.

---

# UNIVERSITY IS NOT THE ONLY WAY

*Some young people are questioning the need for Higher Education*

“ I don't know if it's the right term, but I think of university as somewhere where posh people go. ”

*Boy, 13, Low support, Birmingham*

“ I'm definitely not thinking about university, I don't want to have loads of debt and spend 3 years there and come out and still have to find a job – I'm going to look for an apprenticeship. ”

*Girl, 16, Low Support, London*



**Young people have mixed attitudes towards going to university and there is a strong difference between those from high support and low support backgrounds.**

Those from high support families tend to have a natural expectation that they will go. They readily cite that university will provide them with greater opportunities through either a greater chance of employment or through allowing them to understand more fully career options.

However, some with a high support background readily raise the drawbacks of university, with concerns around debt coupled with doubts as to whether it will provide better employment prospects. They cite instances of those that have struggled out of university which reinforces these perceptions. They are open-minded towards more vocational alternatives, as are their parents but these options are not often discussed at school.

Some within low support are keen to go to university – again to better their prospects, however, for many university is not readily considered. They raise concerns about cost and being away from home as major barriers. There is also an underlying perception that university is beyond them. They can lack confidence believing it is for those that are ‘cleverer’ or ‘posher’ than them.

UNIVERSITY  
IS NOT THE  
ONLY WAY

At year 12

68%

want to go on to  
university.

26%

are looking at  
vocational options.

Apprenticeships are  
more for boys.

22%  
of boys

vs.

13%  
of girls.

# CREATIVITY: A MOTIVATOR AND A BARRIER

*Providing young people with the opportunity to be creative is important*

“ I like the idea of creativity because it lets you have freedom in a job, it lets you have the opportunity to create a more reliable efficient way. ”

*Girl, 13, High support, Bristol*

“ I am not so interested in creativity, I’m just not a creative person. I’m not very good at coming up with ideas, I’m more logical. ”

*Girl, 13, High Support, Bristol*



**For some young people the opportunity to use their skills creatively in the workplace is a strong need. In particular, they want to be able to use their creative and design skills to develop and adapt ways of doing or making things.**

Being able to put their own stamp on things was felt to give them freedom and flexibility within a job – rather than following someone’s ideas and ways of doing things. Opportunity for this freedom felt liberating.

Young people, however, were less interested if creativity was positioned as ‘invention’. The notion of inventing was considered difficult and hard rather than inspiring, with a perception that it is difficult to come up with brand new ideas.

However creativity is not for everyone. For other young people, there was lower interest in the opportunity to be creative as they felt they were not ‘creative types’.

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CREATIVITY: A  
MOTIVATOR AND  
A BARRIER

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61%

want to be logical  
in their jobs.

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71%

want to be creative  
in their jobs.

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# Decision points

This section identifies the key decision points for young people in their learning journey and the role parents and teachers play in subject and career choice.

## 03

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The key decision points  
Shaping the learning journey  
The key decision points differ in duration  
Career decisions front of mind Jan to May  
GCSE options; subject enjoyment prevails  
Further education / vocational next steps  
Keeping their options open  
Stick to strengths  
Teachers are helpful but time poor

# THE KEY DECISION POINTS

## YR 9

**Year 9** when they start making decisions for their **GSCEs** and have been influenced by two years of secondary school.

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## YR 11

**Year 11** when the reality that the next step after school is imminent and career / further subject choices have to be made.

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## YR 12

**Year 12** (or equivalent age at FE college) when higher education or job choices have to be made.

# SUBJECT ENJOYMENT AND TEENAGE MILESTONES SHAPE THE LEARNING JOURNEY

## SUBJECT ENJOYMENT

*Enjoying a subject is key to taking it further and after GCSEs they get to drop the ones they didn't enjoy and focus on the ones they prefer*

Arriving at secondary school new subjects such as science and DT are exciting

"They come into secondary school, they love it... everything's new and it's fun"

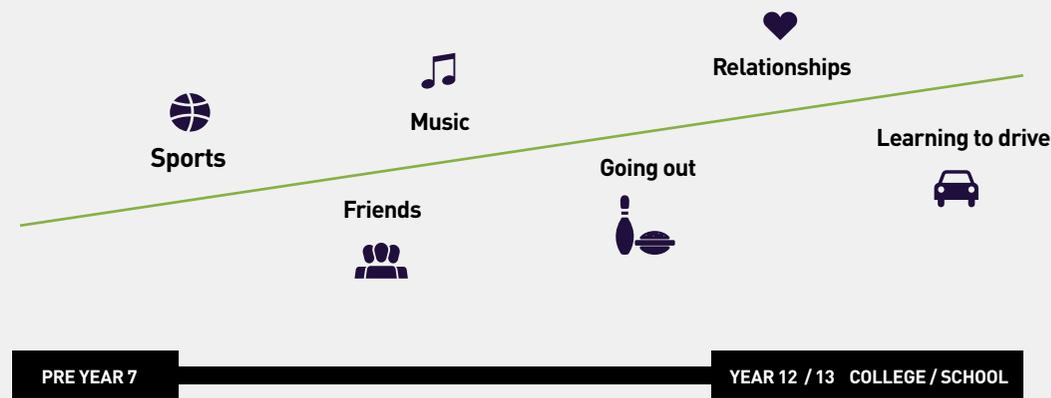
Enjoyment of subjects dips during GCSEs as difficulty increases and many difficult subjects get dismissed.

"It's just stressful. Hate it"

The transition from GCSE to A-levels or college is a struggle for many

## TEENAGE MILESTONES

*As they get older, life gets more interesting outside of school, their social lives become more important and there are more distractions*



# THE KEY DECISION POINTS DIFFER IN DURATION

## Decision point 1: GCSE choices

GCSE options are the first key decision making point. The choices may be limited but it's the applied effort and enthusiasm for compulsory subjects that shapes subject decisions at a later stage.

### Wide timeframe

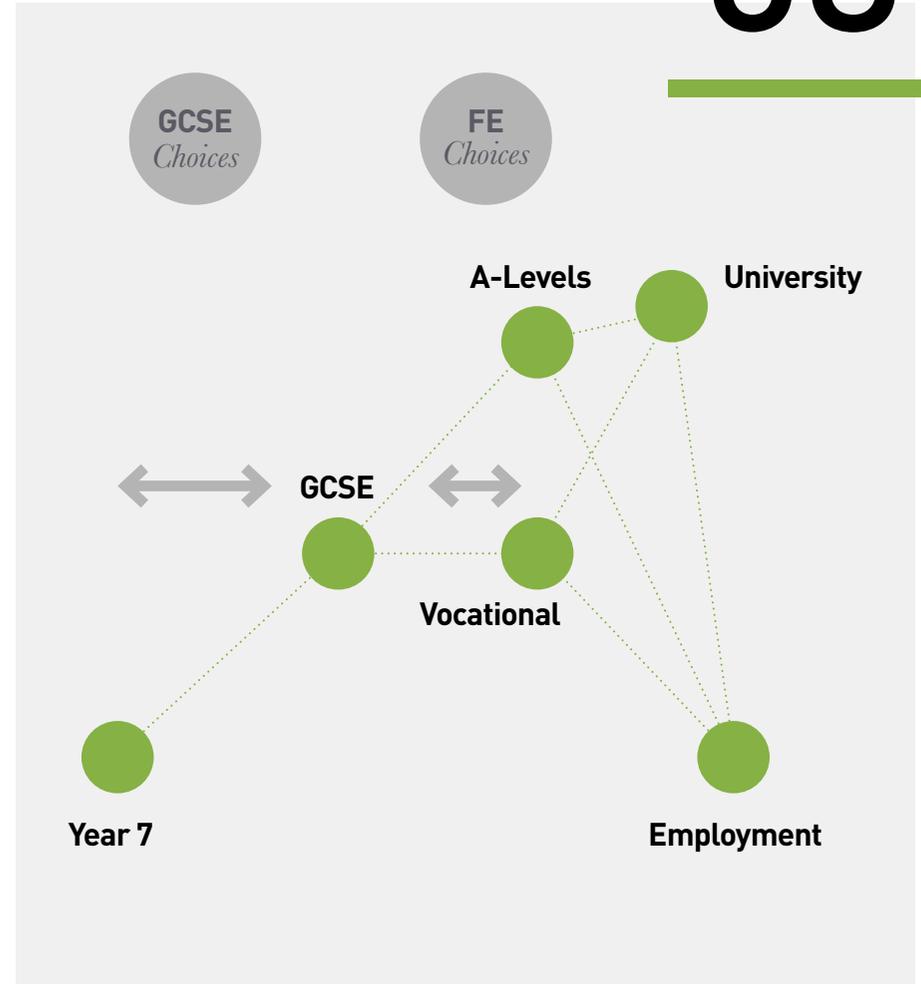
When GCSE choices are made varies considerably by school, for some it's in year 8, for others it's in late Winter year 9.

## Decision point 2: Further Education choices

Subject enjoyment has been shaped significantly by the GCSE experience, tough subjects are out, subjects they enjoy and that will keep options open prevail.

### Very short timeframe

After GCSE exams, the focus is on further education (FE). The thought process on what the next step should look like may have begun before, but now it's front of mind across the UK at the same time.



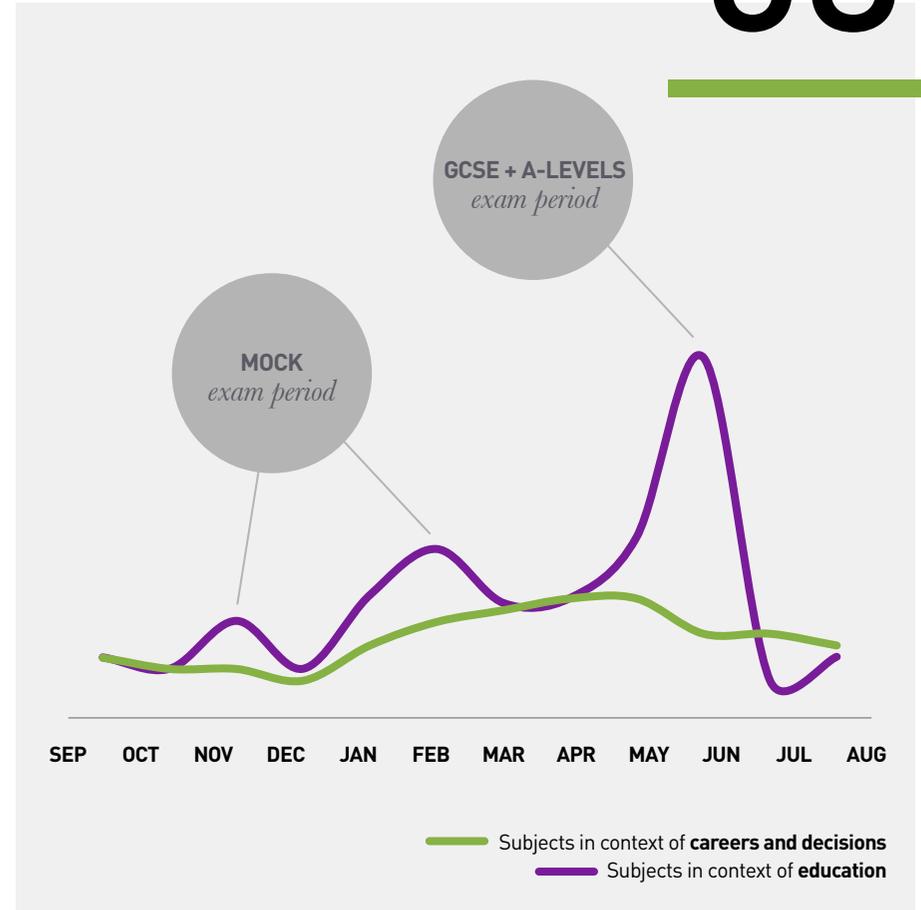
# CAREER DECISIONS ARE FRONT OF MIND JANUARY TO MAY

Social media conversations around careers and subject are more focused towards the latter half of the academic year.

Conversations around subjects specifically are in line with the key exam periods, during these times the conversations are all about revision in those subjects, and sharing subject tips and exam anxieties.

There is a natural dip in career conversations during exam periods, as when exams are on, that's what is top of mind, but career conversations rise from January through to May regardless of many taking mock exams in February.

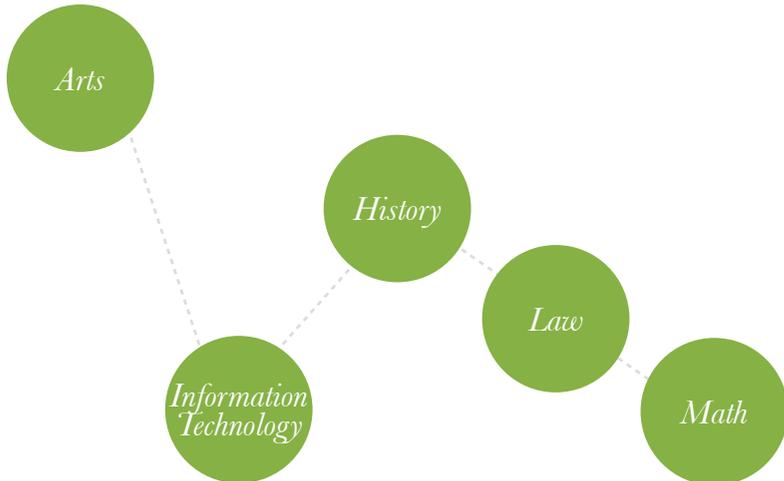
This rise in career dialogue is something natural given that many will be making the next steps, potentially into the world of work at the end of that school year.



*\*The graph represents the seasonality of over 1M conversations from January to December 2013.*

**SOURCE:** Sysomos.

# GCSE OPTION TIME; SUBJECT ENJOYMENT PREVAILS



Many don't know what careers they might pursue, they only know the subjects they've experienced.

Very few have a good idea about what they'd like to do as a career. Most might like the idea of a certain subject area but very few will have looked into the potential jobs in detail.

Most pick the subjects that they enjoy. If they haven't enjoyed something already, they will cast it aside if they can.

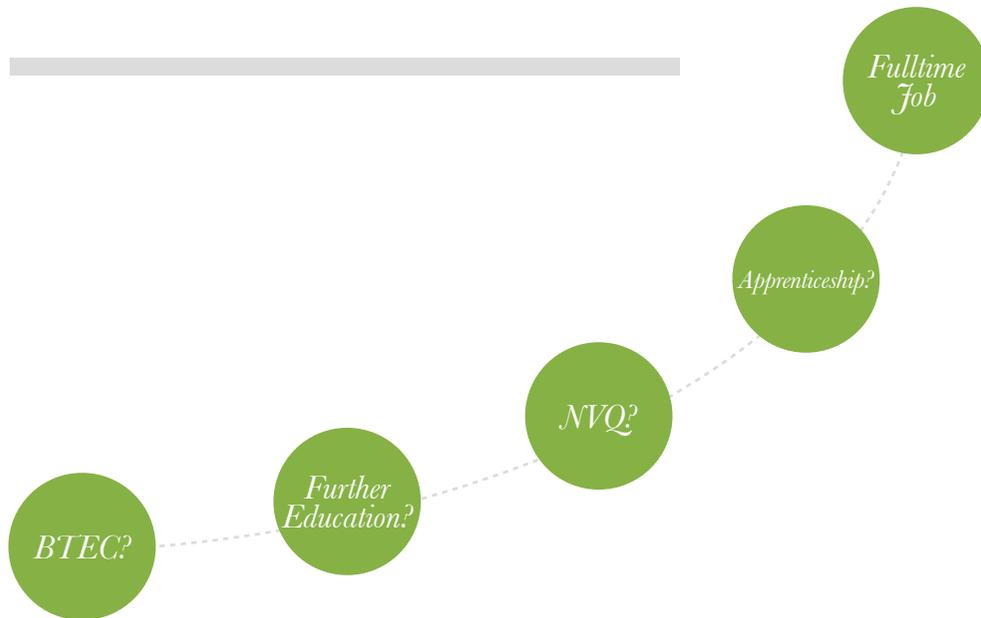
Many low support parents don't understand the importance of GCSE choices in the context of their child's learning journey and are not well informed.

Low support parents are more likely to expect the school to lead the discussion as to what their child's strengths are and which subjects they should take.

High support parents are more aware of the importance of GCSE choices, they're better informed, and much more likely to take an active role in the decisions their child makes for GCSEs.

Those children with older siblings are much more in tune with what subjects they might take and general ideas for the future.

# FURTHER EDUCATION OR VOCATIONAL NEXT STEPS



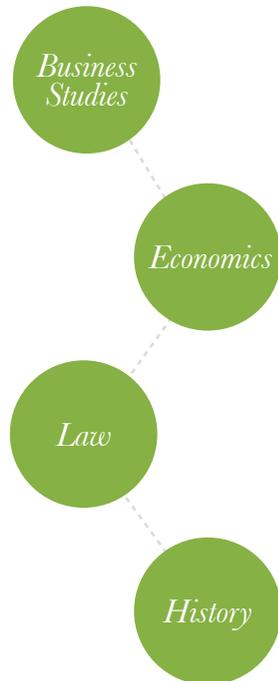
Many have seen just how hard certain subjects are at GCSE and are put off from choosing them for further education.

Many low-support boys who have found GCSEs very difficult have set themselves on vocational routes so they can learn and earn and ultimately be outside of the school environment.

Teachers are helpful in choosing subjects, but many students don't think their teachers have enough experience outside of education to help them with career choices.

Many reported having spoken with the schools career advisor but few reported that it was worthwhile.

# KEEPING THEIR OPTIONS OPEN



**There is a strong idea amongst young people that any decision they make is fixed and they can't go back and change things.**

They worry they can't change their path and so many choose certain subjects to keep their options open. For those without a career path in mind, they will follow the advice from their teachers.

“ I enjoyed business studies at GCSE so I'm taking it at A-Level along with Economics but I want to keep my options open so I'm taking Law and History too.”

*Girl, 17, Birmingham, High Support*

“ Photography is my passion, but I've seen older friends really struggle to get jobs in it, so I'm thinking about web-design as well.”

*Girl, 16, London, High Support*

“ I'm unsure what to do, I really enjoy History so I'll keep doing that, but my teachers told me to also take English and Maths to keep my options open.”

*Girl, 16, London, High Support*

KEEPING THEIR  
OPTIONS OPEN

The pressure mounts up.  
Those concerned about making the right decisions.

59%

13-14 year olds

65%

15-16 year olds

68%

17-18 year olds

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# STICK TO STRENGTHS

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Many students are very uncertain as to what career area they might pursue and so pick subjects they're good at and they enjoy.

“The next steps you should be taking should be doing subjects you enjoyed at school.”

*Boy, 16, Low Support, Bristol*

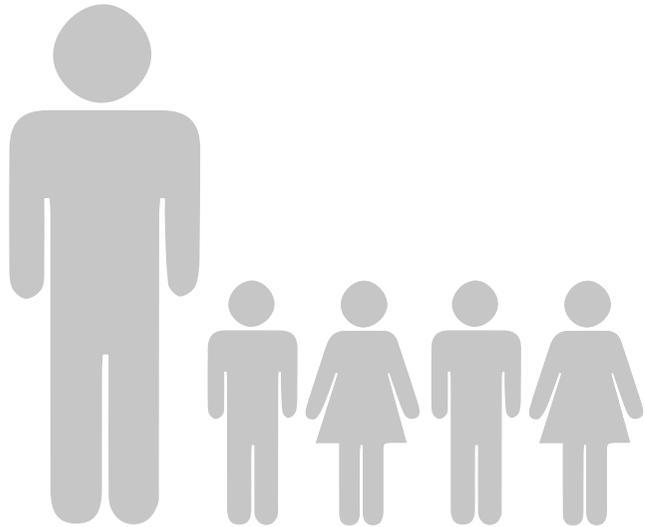
They feel it's reassuring to study what you enjoy and what you're good at, for some it meant even without looking any further to find out what the career prospects might be.

Parents encourage their children to stick to their strengths and to make sure they enjoy what they study especially if they get a job related to that subject.

“I emphasise she's got to be happy with what she's going to do. You have to work for a long time after all.”

*Father of Girl, 14, London, Low Support*

# TEACHERS ARE HELPFUL BUT TIME POOR



**Teachers give advice to students where they can, and it's something they do enjoy being able to do, they just have no time to do it.**

Giving career advice is not something they have to do proactively, due to the pressures of the curriculum and grade targets.

Some have tutorial obligations to talk to their students but this is not restricted to their subjects they teach.

They feel their experience is limited and they have a lack of knowledge about careers to help decisions.

Teachers who do find time to advise and inform in the classroom receive strong feedback from their students:

*“ My biology teacher was really supportive. He was great and made it all really interesting.”*

*Boy, 17, High Support, Birmingham*

*“ Knowledge of careers in my subject is not as good as it should be, it's difficult to stay up to date given the pressure on grades.”*

*Teacher, Low support, London*

# TV SHOWS HOLD HUGE POWER TO INFLUENCE



## **For many, TV shows provided a huge inspiration for considering a career in a STEM discipline**

TV shows and popular films were regularly mentioned by school students, teachers, career advisors, and young STEM professionals as sparking an interest in STEM and specific subject areas.

Those that were mentioned included science fact shows such as the Christmas lectures, wildlife programmes, and popular crime dramas that featured role model scientists such as NCIS and CSI.

TV can be a powerful tool to inspire STEM aspirations, however we did come across examples where unrealistic expectations were created by shows which did not match the reality of the career. For some young people, this disappointment resulted in them switching courses and careers paths away from STEM.

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“ I loved Abbey out of NCIS, she was cool, not your typical scientist, so I wanted to be like her ”

*Female who took a pharmaceutical apprenticeship*

“ Media can play such a big influence. We can always link back a spike in interest in a career path with a TV show ”

*Careers advisor*

# Perceptions of STEM

This section reports on how STEM is perceived by young people, parents and teachers.

# 04

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# THE PERCEPTIONS OF STEM ARE WELL ESTABLISHED

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The issues surrounding STEM have been well researched previously. Our research was designed to uncover attitudes and influences surrounding career decisions using STEM as a focal point. Here we describe how people perceive STEM, from the way people talked to us directly and from the unprompted conversations they had online. Both methodologies complemented and reinforced our findings.

First and foremost STEM has an image problem. Negative connotations surrounding STEM came straight to mind for the majority of people. The benefits of STEM had to be carefully considered.

The message is clear. Attitudes have to be shifted.

# PERCEPTIONS OF WORKING IN SCIENCE

*Young people naturally mentioned careers that were relevant to the ones they have already been exposed to in their lives, so medical based professions and teachers were common. Many had been influenced by their favourite crime based TV shows like CSI resulting in aspiring to become forensic scientists.*

## NEGATIVES

### **Difficult choice beyond GCSE**

Taking the subject further than GCSE felt beyond a lot of them as they had struggled with the subject at GCSE level. They felt you had to be really clever to take science to a career level, and that was definitely not them.

### **Fear of making a mistake**

Considerable fear of getting it wrong in a science job and what the implications might be.

### **Stressful in the job and getting the job**

Some thought it would be quite stressful and difficult trying to get a job in science.

*“ If the subject at school is really hard, then a job in science must be super hard – too hard for me.”*

*Boy, 14, Low support, London*

## POSITIVES

### **Doing good**

The benefits of science being able to cure diseases both to help other people and also to achieve respect and personal reward.

### **Making an impact**

Many talked about how you discover new things in science, and feel like you're doing something good for the whole world and making an impact.

### **For the future**

Some more keen on science talked about how important science was for the future.

*“ In science you can cure diseases and it feels like you're doing something to help the world. ”*

*Girl, 14, Low support, Bristol*

# THE MOST INTERESTING STEM: TECHNOLOGY

*The range of jobs and subjects brought to mind within technology were varied and included: mending and fixing computers and IT, working with gadgets/mobile phones, graphic design or technology subjects at school, such as, resistant materials, food technology. Depending which jobs were top of mind, affected their perception of the technology discipline. Overall, however, technology was often viewed as the most interesting of the four disciplines within STEM.*

## NEGATIVES

### **Lonely and desk bound**

There was a perception if they focussed on IT that working in technology was a lonely job and very desk bound.

### **Lack of social status**

There was also some sense that working in technology (mainly IT) lacks social kudos.

“ I like this because you get to see new things – you are part of creating something new. ”

*Girl, 16, High support, London*

“ I think it might be just like a desk job, a bit isolating. ”

*Girl, 14, Low Support, Birmingham*

## POSITIVES

### **It's the easiest one**

Some considered a career relatively easy in terms of intellectual ability compared with other STEM careers.

### **Hands-on and creative**

Technology careers were considered of interest as it was felt to be practical and hands-on discipline. It was also considered an area which would allow them to be creative (for those that considered graphics/design as part of technology).

### **Cutting edge**

Working in technology was also felt exciting as it was considered to allow them to be part of a modern, cutting edge area of work.

### **Future proofed**

It's a growing industry where jobs will always be available.

# PERCEPTIONS OF WORKING IN ENGINEERING

*The range of jobs that are brought up when talking to young people about engineering were quite limited. They generally consisted of jobs that involved fixing cars, trains and planes. They viewed these professions as being very hands on and practical versus other areas of STEM. Some boys were more naturally clued up about engineering as they had been exposed to a slightly wider range of professions thanks to their close family and so mentioned specific types of engineers.*

## NEGATIVES

### **It's for boys only**

Most girls saw engineering as quite boring but also very male dominated, and some thought as a result it would be hard to get into.

### **It's difficult**

Many saw it as difficult. Engineering involves too much maths, especially if they were not hands on or practical people.

### **Low status**

Engineering is associated with boiler repair men and mechanics. A consequence of the term engineer being freely used to describe anyone that fixes things.

**“ When I think of that I think of a more ‘masculine’ type of job – I don’t think it’s a feminine job.”**

*Girl, 14, High Support, London*

## POSITIVES

### **It's practical**

Some of the lower support boys considered engineering to be very practical and less academic, and for those who were more vocationally led this was a strong reason for them to consider it.

### **It's collaborative**

Some saw it as a job that meant working in a team and about problem solving and so rewarding as a result.

### **The pay is decent**

Many thought that the pay was fairly decent although not as much as jobs in maths.

**“ I’m definitely more open to it, it’s more hands on and less academic, it’s not necessarily easier but it’s more exciting than science.”**

*Boy 15, Low Support Bristol*

# PERCEPTIONS OF WORKING IN MATHS

*Young people struggled to bring to mind opportunities of using maths in the work place. Most common jobs raised were: accountants, bankers and maths teachers. It was less common for them to realise that it was a core part of many jobs or to see its application across other disciplines.*

## NEGATIVES

### **It's just for the really clever**

The notion of continuing to study in maths was considered very difficult. Even those that were academically bright often felt further study or a job in maths would be beyond their ability and that to work in maths one would have to be 'really clever'.

### **It's not relevant**

In addition, it was often felt that maths was not 'relevant' for 'real life' and therefore there was no real reason to continue to study in this area. This was raised as a barrier even by those that enjoyed and were good at maths.

### **The career pathways are boring**

Beyond ability there was a perception that working in maths would be boring, more than likely an office job.

**“ Maths – it's difficult, I can't really see any benefits. ”**

*Girl, 16, High support, Birmingham*

## POSITIVES

### **Appealed to the logically minded**

Some young people stated they enjoyed maths and were keen to take it to the next level. They enjoyed the logical side of it – knowing that there was a right or wrong answer.

**“ I like maths, I like the way that you can be logical and work things out – I am thinking about doing something to do with maths. ”**

*Girl, 16, High support, London*



# ZOOMING INTO HOW STEM SUBJECTS ARE POSITIONED

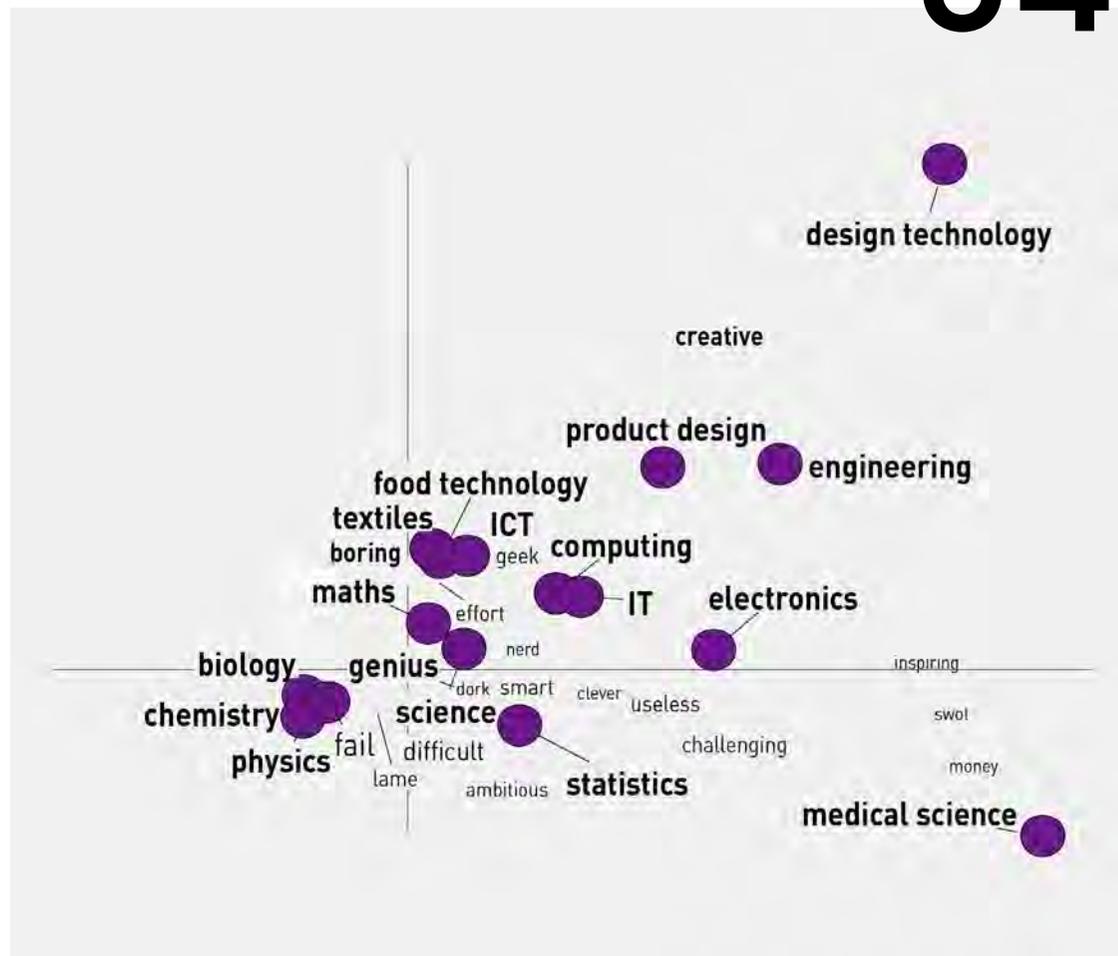
This correspondence map zooms into how STEM subjects are positioned relative to each other.

The **sciences**, close to **maths**, and **statistics** are all gathered around 'fail', 'difficult', 'genius', 'smart', 'nerd', 'dork', 'ambitious', 'effort' and 'useless'.

More technical-oriented subjects are further away from these concepts. **ICT, computing, IT, textiles, food technology and electronics** are all concentrated around the concepts of 'geek', 'boring' and 'effort'.

**Design technology, product design and engineering** are closer to the 'creative' concept.

**Medical science** is the subject most associated with financial rewards.

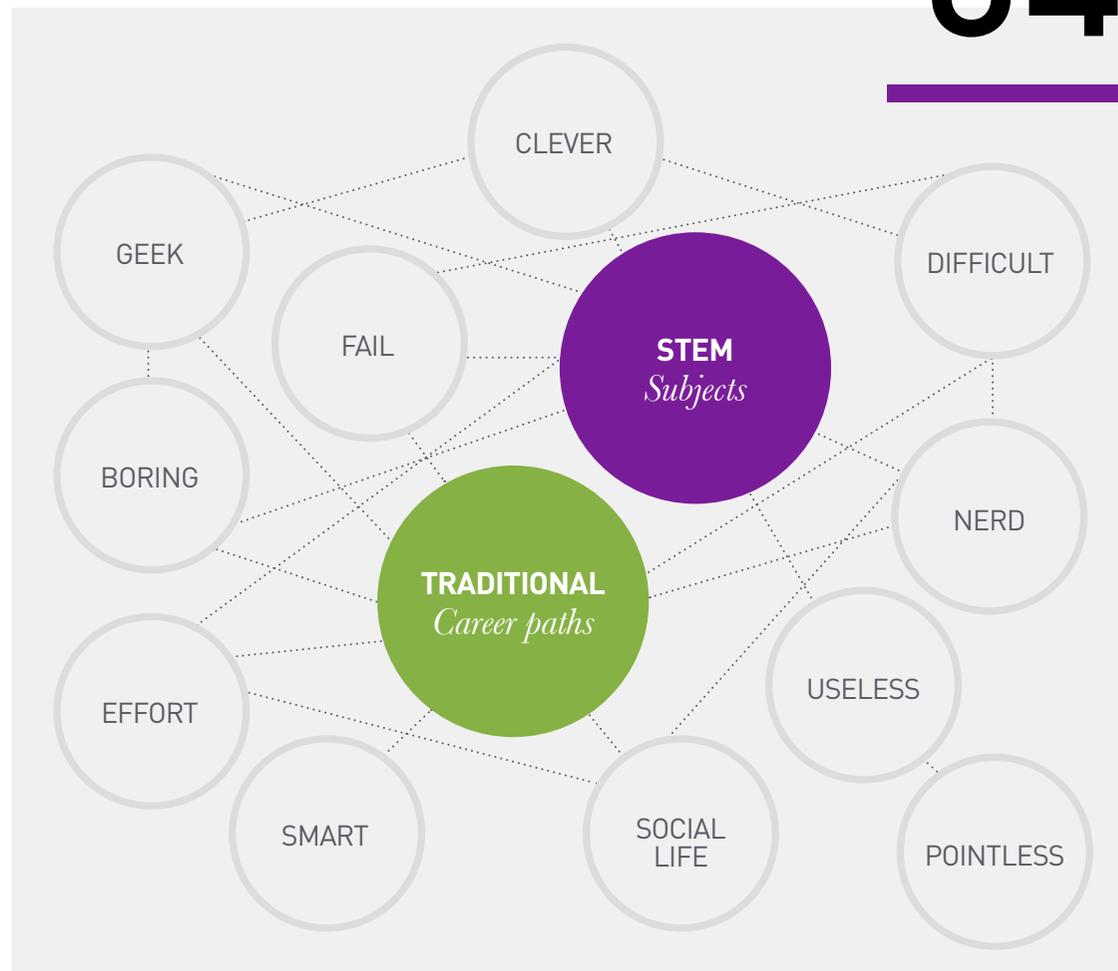


# HOW YOUNG PEOPLE ARE TALKING ABOUT STEM

To understand how STEM is perceived by young people, we looked at the concepts they use when talking about STEM on social media. This visual represents a map of the conceptual associations derived from real-time Twitter conversations.

By looking into the concepts people use when talking about STEM and based on talkability\*, this map aims to understand perception on a large scale.

*\*Our analysis is based on talkability: the quality or state of being talked about. It is a direct function of the volume of conversations, without any necessary implications regarding the sentiment of those conversations.*



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# HOW YOUNG PEOPLE ARE TALKING ABOUT STEM ONLINE

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55%

**STEM subjects are too difficult**

Conversations relate to the fear of failing and poor academic performance.

11%

**Are strong stereotypical views**

STEM is for 'geeks', 'nerds', 'social retards' and 'weirdos'; boring and associated to traditional career paths.

2%

**Enjoyable and successful STEM subject/career choice**

22%

**To choose STEM you need to be naturally smart**

Conversations relate to the complexity and the desire to be clever.

7%

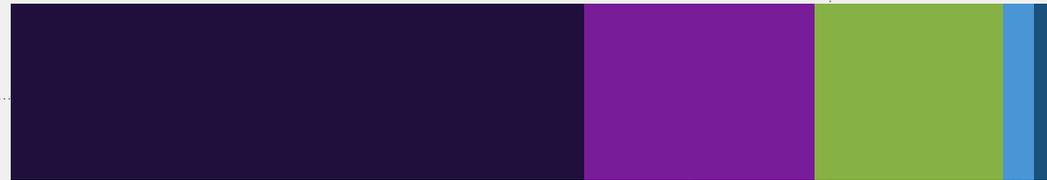
**STEM subjects require huge effort**

Too much work is involved to pass subjects.

3%

**Financial rewards of STEM careers**

Conversations considering the financial rewards in STEM careers and organisations promoting the high salaries available in STEM.



SOURCE: *Sysomos*.

# STEM SUBJECTS ARE TOO DIFFICULT AND THERE IS A FEAR FAILURE

STEM is perceived as being too difficult and complex, hence young people fear STEM choices will lead to poor academic performance and they will end up with unachievable goals.

Peer-to-peer advice focuses on the challenging nature of the content and the need to prepare to ensure deep understanding of the subject matter in order to succeed.

The screenshot shows a Twitter thread with four tweets. The first tweet asks if someone who has done science as an A-Level finds it incredibly hard. The second tweet expresses a student's fear of failing an IT exam. The third tweet compares getting up on a morning to level biology. The fourth tweet shares a student's struggle with a maths exam. Below these are three replies providing advice and support.

**Tweet 1:** someone who has done science as an A-Level, are they incredibly hard?

**Tweet 2:** I am in no way prepared for the IT exam tomorrow. I genuinely know I'm going to fail.

**Tweet 3:** Getting up on a morning is harder than a level biology. #fact

**Tweet 4:** still can't get over how much of a shambles that maths exam was #failed#nightmare

**Reply 1:** My A-level results are AAB. The B was in physics. Do I have a chance of doing physics/astrophysics at Uni? Would I find the content too difficult even if I work really hard? And finally could someone suggest some universities that will let me in with only a B?

**Reply 2:** I wouldn't recommend it to be honest, it requires a lot of time and effort and the ability to understand complex ideas best to take something else and get an A.

**Reply 3:** I'm doing biology, chemistry and maths. Chemistry is very difficult, I'm not going to sugar coat. There are obviously people who don't struggle with it, but most do (in my school so far). We've had our mocks and there were lots of E's, D's and U's (I don't know about the level of preparation everyone did). Maths is also hard, biology less so imo. I've heard from my physicist friends that they found the mock difficult. They're difficult as a combination because maths and chem in particular require good understanding of challenging content. You will probably have to spend some time going over things, ensuring you understand it.

# STEM SUBJECTS & CAREERS REQUIRE TOO MUCH EFFORT

STEM is perceived to involve a heavy workload and personal commitment. Young people believe that if they choose these type of subjects they will struggle and end with huge amounts of stress.

Peer-to-peer advice consists of the importance of enjoying and being interested in the subject matter. They openly recognise the time consuming aspect, and therefore the given advice converges on the fact that the only way of enduring the workload is by being genuinely motivated.

The image shows a collage of social media posts. The top row contains two tweets. The left tweet is from a user with a profile picture of a woman, dated 10:50 AM - 15 Jan 2014, with the text: "On GCSE bitesize trying to get my head round some maths.. Not ideal #struggling". The right tweet is from a user with a profile picture of a woman, dated 10:01 PM - 31 May 2013, with the text: "I am going to knuckle down so much in sixth form, then I can get my science alevels and degree then become a forensic scientist".

The middle row contains two tweets. The left tweet is from a user with a profile picture of a woman, dated 8:58 PM - 20 Jan 2014, with the text: "Looking at studying veterinary science makes me realise how hard I have to work". The right tweet is from a user with a profile picture of a woman, dated 10:01 PM - 31 May 2013, with the text: "@\_breannatiffany doctors go to school for 7+ years and do math chem and bio."

The bottom section shows a list of replies to a question: "I know this is a very naive question, but how much free time would a typical Aerospace Engineering student at (for example) Bath university have?". The replies are:

- Reply 1: "Just because I'm looking at getting a part time job whilst at university for the money." (1 week ago, 1 reply)
- Reply 2: "Hi, it looks like you're in much the same boat as me. I'm just finishing year 12, and in my GCSEs I got 8 A's, 2As and a B. In my January exams this year I got ABCD (oops XD) but I retook the B and for the end of this year I'm looking at about AAAAB in my AS levels of maths, french, physics, biology and chemistry. Originally I wanted to do medicine, but I don't think I can face being a student for basically the next decade. I like exams and I'm good at them generally, but I do want to get on in the real world." (14-06-2013 20:49, 3 replies)
- Reply 3: "If you enjoy maths I'd definitely recommend further maths. Chemistry is a competitive degree, if you want to aim for a top university, further maths will most surely showcase your abilities. However, it is a hard subject requiring a lot of work, if you are willing to work hard, I'd say go for it!" (6 days ago, 18 replies)
- Reply 4: "As long as you do well in you science subjects and okay English and maths then what other gcse's you pick don't matter too much! Chose subjects you enjoy and so therefore will be able to reach your full potential! Try to pick triple science if you think you can do well in it, because that will help you later in life! 😊" (17 hours ago, 4 replies)

# YOU NEED TO BE NATURALLY SMART TO EXCEL AT STEM

There is a strong association between STEM and the idea of being naturally smart. There is the idea of having to be “born clever” as a precondition to choosing STEM. There is therefore the feeling of not being good or bright enough to take STEM further.

Peer-to-peer advice focuses once again on enjoyment as a key element to gain the motivation to deal with the complexity of the content, and the determination to face the hard work.

The screenshot shows a Twitter thread with several tweets. The first tweet is from user 'hafsa' (@hafsa\_pi) who says: "I swear if I was smart enough I would do a degree in chemistry, its actually a really good subject even though I always complain about it." The second tweet is from 'usmaan' (@usmabazil) who says: "Why did I choose to do a maths degree. I'm not smart. I'm average and scraped a B. Wtf usy". The third tweet is from 'Clare Roche' (@ClareRoche54) who says: "My mum just took at least 7 minutes and a calculator to work out 30% of 50. I'm doing a maths degree. How we're related is beyond me." The fourth tweet is from 'Rachael Pambianchi' (@PAMBIANCHI\_r) who says: "If I was a born genius at Maths and Science I would defo be doing a degrec in Astronomy. I blame my parents for my lack of brain cells ffs". The fifth tweet is from 'Ciara Anderson' (@CiaraAnderson94) who says: "I really would love to study astronomy at university, but dumb, so cant #teammohopeinlife #foreverfalling". Below these tweets is a 'Thread Starter' post from a user with a blue verified badge. The thread starter text is: "I am very interested in applying for either *Electronic Engineering* or *Computer Science* at University. **Question 1)** Am I the only one that learns best by reading/watching something about 5 times in a row? Do people applying for these courses have an inane ability to pick up information instantly?.. *as opposed to practising over and over?* **Question 2)** Can the required maths/science be picked up in a year with my background? **Question 3)** Honestly.. Does my outlook seem realistic for this subject?" Below the thread starter text is a response: "An emphasis really revolves around the end of Question 1. I'm prepared to put in the work but I don't know if these courses pretty much reserved for the *alpha-Einstein's among us.*". At the bottom of the screenshot is another tweet from a user with a blue verified badge who says: "i understand 'hard' is relative but in the grand scheme of things, does it require far more intellectual rigour than the average a-level for someone who is an able mathematician? is it doable with a certain amount of effort and commtment, or do you have to be a natural-born maths whiz to even stand a chance?" Below this tweet is a response: "As long as you enjoy maths and are willing to work towards the grade, yes it is very much possible."

77% agree you need to be really clever to work in STEM. Girls thought this more to be the case. Strongly agree 29% vs. 24% for boys

# STEM SUBJECTS AREN'T RELEVANT IN REAL LIFE

STEM subjects are perceived as too abstract and academic. Young people believe they are useless in real life and there is no point choosing them since they do not see how they will use or apply such abstract knowledge in the real world.

The collage consists of several social media posts:

- Twitter (Top Left):** A tweet from a user with a profile picture of a woman. The text reads: "I don't understand how people study Maths at university... Not only is it impossible but I just don't get how doing a degree in it works". It has 1 favourite and is dated 6:43 AM - 8 Dec 13.
- Twitter (Top Right):** A tweet from a user with a profile picture of a woman. The text reads: "No one should do a maths degree, it makes you stupid at all the useful things in life". It has 1 retweet and 1 favourite, and is dated 10:19 AM - 6 Mar 13.
- Twitter (Middle Left):** A tweet from a user with a profile picture of a woman. The text reads: "one nice thing about doing a maths degree is understanding equations in things and how little they relate to anything". It includes a link to [bleedingcool.com/2013/12/18/the...](http://bleedingcool.com/2013/12/18/the...) and is dated 1:31 PM - 10 Dec 13 from Mid Sussex, West Sussex.
- Twitter (Middle Right):** A tweet from a user with a profile picture of a woman. The text reads: "maths A level is really difficult and would be useless to those who don't intend to go into anything maths-related". It has 2:36 pm - 4 Feb 2014.
- Twitter (Bottom Left):** A tweet from a user with a profile picture of a woman. The text reads: "it's been three years and I still regret taking double science for GCSE, such a useless qualification. #shouldhavetakenhistory". It is dated 5:30 PM - 6 Sep 2013.
- Twitter (Bottom Right):** A tweet from a user with a profile picture of a red car. The text reads: "A level physics are for dumb people. I done English because that's actually useful in real life." It is dated 04-12-2012 09:19.
- Facebook (Bottom):** A thread starter post from a user with a profile picture of a woman. The text reads: "I enjoy physics and find it interesting, but I'm almost sure I won't get a job in science when I graduate... I'll probably go into finance/computing. Soo... is there a point in taking a degree in physics when it's unlikely I'll ever NEED most of the stuff I learn on the course in the future? Also will a physics degree hamper my ability to work in other sectors of the industry... Do employers in finance really want people with physics degrees, or this with experience in finance. Basically, should I take a degree just cos I find it interesting, or should I take a degree relating to my job? Thanks." It is dated 06-12-2012 13:58.

# STEM IS SOCIALLY UNCOOL

STEM is associated with a 'lame lifestyle' to use the current language of teenagers. People going into STEM are perceived as 'uncool' and associated with a lack of social skills and boring social life.

Even the young people who are already engaged with STEM are self-conscious about being perceived as socially uncool or "weird". The advice they give each other focuses on the fact that while this perception is indeed drawn to STEM, it should not necessarily be drawn to the students themselves. They advise each other to be more confident and positive about their own university experience.

The image shows a collage of seven tweets from a social media thread. The tweets are as follows:

- Tweet 1:** "If you do an astronomy degree you cannot wear a jacket with galaxies on. We're already losers ffs" (Nov 2013)
- Tweet 2:** "Not sure if it's possible to do an engineering degree and have good fashion sense, don't think baggy jeans and a hoodie is 'reem' enough" (Dec 13)
- Tweet 3:** "in a brief moment of what can only be described as madness I applies to study maths at university...RIP to my social life." (Oct 2013)
- Tweet 4:** "The problem with doing a computer science degree is that everyone on the course is a COMPLETE social retard." (Oct 2013)
- Tweet 5:** "I'm doing a maths degree I'll take the friends I can get" (Nov 13)
- Tweet 6:** "My ict class is full of weirdos" (Jun 13)
- Tweet 7:** "Hi I just got my AS results back and got AABB. A's in Maths and English, and B's in psychology and anthropology (which I'm dropping). I'm going to pick up Further maths As this year and really want to study maths at university. I'm not entirely worried about getting into uni, but I'm insanely nervous about how I'll cope. I've imagined these scenarios of me having no friends and no social life and simply 'slaving over equations for three years' (the thought is making me ill, please could someone tell whether a maths degree allows for a social life AND time for hard work???)" (Aug 2013)

Below the tweets, there are two additional text blocks:

- Text 1:** "You've got a correlation-implying-causation fallacy in there 😊 doing a computer science degree does not wash you out socially. The socially washed-out type is drawn to computer science, if you believe the stereotypes - which you shouldn't. Don't want to hang out with CS types? Go work for the student newspaper and befriend a bunch of English Lit students, or work sound/lighting for the drama society unless you want to perform, etc etc. The only thing which can wash you out socially at university is you 😊"

Science subjects  
are for the geeks.  
53% disagree vs.  
47% agree

# YOUNG PEOPLE HAVE AN ENTRENCHED VIEW TOWARDS STEM

STEM has a set of stereotypical concepts. It's perceived as too boring and dull, and the people opting for STEM are considered to be geeks or nerds.

In addition, there is a gender-biased view perceiving STEM as a predominantly male field.

On online forums this stereotypical view is not an active topic of discussion but more of a latent issue that young people seem to assume while speaking to one another.

The collage consists of six screenshots from various online forums, each showing a user's post with a negative or stereotypical view on STEM:

- Top Left:** A user says "you're an odd one... Fashion= girly and fun civil engineering= manly and full of lesbians".
- Top Right:** A user asks "Any hot as shit physicist with a ginger quiff and glasses wanna pretend to be me and take my physics a-level for me? I need an A\* k thnx!".
- Middle Left:** A user asks "How can Mum text saying 'sitting by maths geeks on the train argh'? She's a maths teacher and I'm doing a maths degree, we're maths geeks..".
- Middle Right:** A user says "feeling like a nerd actually doing ICT revision".
- Bottom Left:** A user says "There is no way to motivate myself to do engineering coursework because it's just so DULL".
- Bottom Middle:** A user discusses the difficulty of physics compared to chemistry and biology, noting that physics is often perceived as 'stale' and less appealing.
- Bottom Right:** A user expresses concerns about a Computer Science degree, mentioning that it might be socially stigmatized as a 'geek programme' and that it is a stressful degree requiring advanced preparation.

# STEM SUBJECTS ONLY LEAD TO LIMITED CAREER PATHS

There is a lack of awareness of the alternative career options in STEM. Young people associate STEM subjects with the traditional career paths of scientist, biologist, engineer, doctor, which require higher education, or with academic activities such as research or teaching.

The image displays a grid of seven tweets from various users, each expressing a common sentiment about the perceived limited career options for STEM subjects. The tweets are as follows:

- Top Left:** "Unless your a scientist or doctor your never going to use science when you leave school, so what's the point?" (1 retweet, 4 Jun 13)
- Top Right:** "I hate that people assume just because I'm doing a degree in Maths, I want to be a teacher. No, I wouldn't mind it, but it's not my aim" (1 retweet, 3:35 AM - 21 Oct 13)
- Middle Left:** "20% I think" What was the point of me doing A level maths?! So glad I decided not to become an engineer..." (1 retweet, 5:34 AM - 12 Sep 13)
- Middle Right:** "I hate that people assume just because I'm doing a degree in Maths, I want to be a teacher. No, I wouldn't mind it, but it's not my aim" (1 retweet, 10:25 AM - 15 Apr 13)
- Bottom Left (Top):** "Why would anyone want to take a science as an A level, u won't be a scientist uno" (4 retweets, 4:02 AM - 9 Apr 13)
- Bottom Left (Bottom):** "Im not going to be a doctor or a dentist or a vet, so A level Biology is a waste for me" (1 retweet, 10:25 AM - 15 Apr 13)
- Bottom Right (Top):** "I would like to study physics, but I am worried if I will be able to find a job. Which careers are suitable for physicists? Is it possible to find a job which does not involve lecturing?" (1 retweet, 13-12-2013 22:55)
- Bottom Right (Bottom):** "I'm not 100% sure on this, but it does seem to me as though theres more jobs out there for engineering which require an MEng degree in engineering, than jobs which requires a physics degree specifically. I can't think of that many jobs here apart from research and teaching, and even then you could say these jobs exist in engineering as well."

# SOCIAL SCIENCE SUBJECTS ARE BOTH MORE FUN AND ACHIEVABLE

When speaking about social science subjects young people bring up the easier and “softer” aspect of the content, in that they are more achievable than STEM. In addition, they also point out they are more interesting and fun, making them more appealing in any decision-making process.

When giving advice to each other, young people recognise that social science subjects are not held in the same regard as STEM in university applications. They believe that there is no need to ‘be a genius’, even someone “dumb” or “thick” could study these subjects.

The peer-to-peer advice concentrates on choosing a subject based on enjoyment and passion instead of either the way it is perceived by universities or the financial rewards brought in the workplace. People tell each other that opting for what you enjoy will ensure you put in the effort and ultimately, get better grades and success.

The screenshot shows a social media thread with several posts. The top post is a tweet from a user with a profile picture of a woman, dated Jan 24, 12:11 PM. The text says: "Geography exam was the hardest exam... it's meant to be the easiest subject, guess not." Below it is a reply from a user with a profile picture of a woman, dated Jan 24, 12:11 PM. The text says: "To the people who thinks that history A level is easy #offwiththeirheads from Dudley, Dudley". Below that is a reply from a user with a profile picture of a man, dated 6 days ago. The text says: "choose something you may enjoy! based on your current subjects @ choose none of English physics or history haha! Maths is very hard, same with Biology and Chemistry, but lots more work involved there. Have a look at Psychology! It's relatively fun and not hard work." Below that is a reply from a user with a profile picture of a blue speech bubble, dated 2 days ago. The text says: "don't bother doing english language. Most schools don't even offer that as a choice cos it looks a little dumb. If you wanna do english, do english lit. Def do chem- it's tricky and requires hard work though. I got 95% in my chemistry GCSE and i find it difficult. So just be prepared. Can't comment too much about the others since i don't do them, but geography is apparently very easy." Below that is a reply from a user with a profile picture of three colored circles, dated 2 days ago. The text says: "Pretty much reiterating what the others have said. English Language and Psychology are considered 'soft' subjects for some universities so I would have a look around at potential universities and course requirements if you can. I would choose the subjects you enjoy the most. I don't know much about the other subjects unfortunately so I would ask current A Level students at your school about them." Below that is a reply from a user with a profile picture of a red speech bubble, dated 3 weeks ago. The text says: "I'd swap child care for history! History is really interesting and quite easy at GCSE (I got full marks in both exams)! I'd keep food because it shows that your creative as well academic! 😊 But that's my opinion, do what you ENJOY and not what looks good on your C.V! As if you do what you enjoy you will get better grades then doing subjects for the sake of them looking good. 😊". Below that is a reply from a user with a profile picture of a blue speech bubble, dated 19-03-2008 16:04. The text says: "I love history, as well as languages, which is why i'm gonna do it at uni, along with french...was going to do law, but then realised i couldn't give up history yet! and history has so much use in the real world.. you can't understand the present without understanding the past and it helps us to understand our society and culture, which is what makes it so facinating. - learning where we have come from and how our country, and others have changed!". Below that is a reply from a user with a profile picture of a dog, dated 19-03-2008 16:04. The text says: "Ok it's probably not as respected as biology or geography but if you find it interesting, why not? It's better to do well in a subject that you enjoy than struggle in a subject and come out with a worse grade just because it was more respectable."

# STEM ISN'T CREATIVE

Conversations comparing STEM against other subjects not only highlight that the language used for the latter is more positive but also shows a latent dichotomy around being 'techie (or into STEM) vs. arty or creative'. This mental imagery associates STEM subjects and careers with rational logical thinking as opposed to creative thinking.

The conversations that show this contrast suggest that for those who enjoy or are looking for subjects/careers that allow creative thinking and expressing their own imagination, STEM should not be considered. The young people that question this view are the ones that are already engaged with STEM and therefore have further knowledge of the spectrum of opportunities to design and be creative.

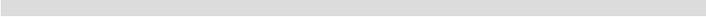
The image shows a screenshot of a Twitter thread with several tweets. The tweets are as follows:

- Tweet 1:** "haha my parents stopped caring about that a long time ago espec since me & sam are more the creative types than the maths etc"
- Tweet 2:** "My argument was literally 'WELL SORRY YOU BIRTHED A CREATIVE CHILD INSTEAD OF ONE WHO FAVOURS MATHS AND SCIENCE'"
- Tweet 3:** "i was going to take all engineering classes for my junior year but fuck that i'm gonna take all music and creative classes"
- Tweet 4:** "Well my preference is economics and physics. I just genuinely find them interesting"
- Tweet 5:** "Or just take some creativity subject such as art, textile, multimedia and photography. These subjects are definitely fun, a nice way to express your imagination and creativity."
- Tweet 6:** "Yep they seem fine, you might wanna swap geog/history for a techy subject to widen your skill set but that is just personal preference 😊"
- Tweet 7:** "So I know it isn't really the time to start my EPQ yet but I'm stuck on ideas on what I want to do for it. The subjects I'm currently studying are maths, physics and psychology. I also have no idea what course I want to do at university. I'm also interested in doing something creative or making some kind of film, but that isn't an area I would like to pursue in the future. Any ideas or general tips for EPQing? Also what EPQ are you doing or have done?"
- Tweet 8:** "Right. On another post you claimed History is a 'mickey mouse degree', guessing you're one of these people who think the only degrees worth doing are Maths, Chemistry, Engineering etc because who needs creativity right?"
- Tweet 9:** "Also, how do you know these are dominated by females? I understand that some of them e.g. social work might be more likely to be completed by women but I mean did you see some statistics somewhere?"



# STEM CAREERS' MOST POPULAR DISCUSSION THREADS:

*Salary concerns, job prospects, difficulty involved and choice of university*



\*Based on number of views and replies on career – related discussion threads on The Student Room.

**Engineering** What can I do with this degree?  
What jobs can I do? What salary can I expect?

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**Life Sciences** What are the best / more prestigious Universities?  
How hard is it? Is it worth the effort?

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**Health & Emergency Services** What can I do with this degree?  
What jobs can I do?  
How hard is it?

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**Physics & Chemistry** What can I do with this degree?  
What jobs can I do?  
What salary can I expect?

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**Pharmacy** What does the course involve?  
What salary can I expect?  
What are the best Universities?

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**Investment, Banking & Consultancy** What are the highest paid jobs?  
How do I become a Commodity Trader/Banker?  
Company-related threads.

**Dentistry** How much do dentists get paid? What is the average starting salary?

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**Armed Forces** What is the minimum service required? What are the medical requirements? How hard is joining the RAF?

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**Finance & Accountancy** What is the average starting salary? How do I become a Finance Director/Accountant?  
Company-related threads.

---

**IT & Technology** Do I need a degree to get a job in IT? What salary can I expect?  
Are IT apprenticeships worth it?

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**Veterinary Science** What is the average salary?  
What are the best/more prestigious Universities?

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**Property, Construction, Transport & Logistics** What to do with a Science/Engineering Degree?  
What jobs can I do?  
What salary can I expect?

# Appendix

# 05

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## **Our approach and what we did:**

Over **132** participants consisting of **56** interview hours

**80** young people

**8** teachers

**12** parents

Co-creation sessions with **32** young people

Social listening over of **150,000** social media conversations

# ONE HUNDRED PARTICIPANTS AND 52 RESEARCH HOURS

# 05



We held qualitative interviews with young people, their parents and their STEM teachers in February 2014. We spoke with young people from two distinct home and school environments we identified as high support vs. low support. In addition we recruited against their interest level in STEM from those doing double science and unsure of their next steps to young people with a strong interest in taking STEM as a career. We spoke with 12 parents and 8 teachers.

Location	High support: <i>school and home environment</i>	Low support: <i>school and home environment</i>	Post 16 <i>education establishment</i>
London	2 x paired interviews with boy and girl pair at year 9 1 x quad with mixed group at year 11	2 x paired interviews with boy and girl pair at year 9 1 x quad with mixed group at year 11	1 quad interview at 17/18 years old. Sixth form college
Birmingham	2 x paired interviews with boy and girl pair at year 9 1 x quad with mixed group at year 11	2 x paired interviews with boy and girl pair at year 9 1 x quad with mixed group at year 11	1 quad interview at 17/18 years old. FE college
Newcastle	2 x paired interviews with boy and girl pair at year 9 1 x quad with mixed group at year 11	2 x paired interviews with boy and girl pair at year 9 1 x quad with mixed group at year 11	1 quad interview at 17/18 years old. FE college
Yate	2 x paired interviews with boy and girl pair at year 9 1 x quad with mixed group at year 11	2 x paired interviews with boy and girl pair at year 9 1 x quad with mixed group at year 11	1 quad interview at 17/18 years old. Sixth form college

# CO-CREATION WITH 32 YOUNG PEOPLE

We ran co-creation workshops with young people in early March 2014. We used the insights from the qualitative sessions as stimulus to build on our understanding of their hopes and fears and designed creative tasks that would inform the inspirational messaging that would encourage young people to take the first step to finding out more about STEM.

We ran four sessions across the following sample range:

**Year 9** Low Support

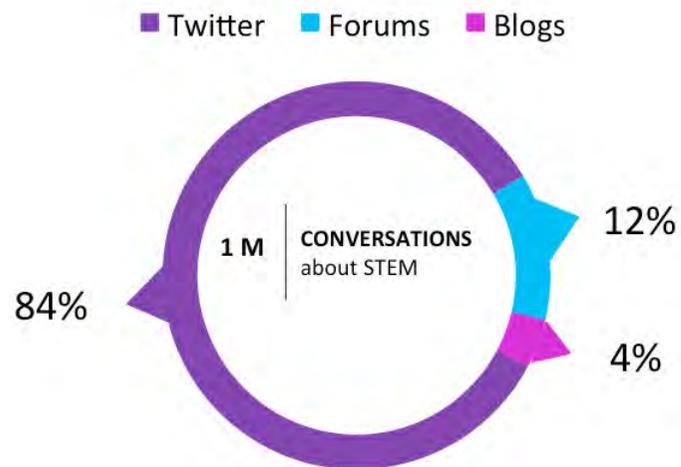
**Year 11** High Support

**Year 9** High Support

**Year 11** Low Support



# OUR SOCIAL LISTENING APPROACH



Social listening allows us to blend qualitative and quantitative approaches. By taking a qualitative approach to a quantitative scale we analysed tens of thousands of unprompted online conversations, listening to people's conversations on STEM and career choice.

Creating a smart approach we continually iterated our approach following qualitative fieldwork sessions, identifying specific themes and subjects to listen to.

The purpose of the social listening was to:

**Understand the sentiment towards STEM careers and subjects. How they are perceived and how they are spoken about.**

We identified three key sources for this research project.

Twitter gave us vast research. Potentially anyone could be talking about STEM and 25% of Twitter users are 15-24 years old.

Going into forums and blogs allowed us to explore conversations more deeply than the 140 character limitation Twitter imposes. Forums such as the studentroom.co.uk proved an invaluable source of rich conversations on the subject of STEM and career choice.

By analysing Twitter and social media conversations we could analyse STEM in the context of self-expression (what people are thinking) and peer-to-peer advice (what people say to each other regarding career and subject choice).

# OUR QUANTITATIVE APPROACH

We ran a 15 minute online survey with 2280 teenagers aged 13-14, 15-16 and 17-18 (760 per year group) between 24th and 28th March 2014. The sample was evenly split by gender, socio-economic groups and regions in England.

The questionnaire was designed to quantify young peoples' attitudes, behaviours and perceptions of career choices that we uncovered during the qualitative research phase, as well as provide a baseline measure of young people's attitude to STEM careers.

An online methodology allowed us to reach an age group fluent in the digital world and an age group that are harder to reach by phone or face to face approaches.

The screenshot displays two survey questions. The first question asks for the top 5 biggest things the respondent is worried about right now, with a list of 15 items and a ranking interface. The second question asks which statement most closely matches their thoughts about what they want to do, with five radio button options. Below this, a third question asks what they see themselves doing in their mid-twenties, with a grid of 12 radio button options.

**Question 1: What are the 5 biggest things you worry about right now?**  
Please rank the items by dragging each one to the desired rank.

- Being able to support a family
- Getting a job I enjoy
- Arguing with my family
- Being in a relationship
- Earning money
- Getting bullied
- Being well liked
- Being able to live near my family
- Doing well in exams
- Having good friends
- Getting into debt
- Having the right clothes and tech brands

**Question 2: Which of the following statements most closely matches your thoughts about what you want to do?**  
Please select one response only.

- I am thinking seriously about a career in science, technology, engineering or maths at uni or college
- I am looking to do an apprenticeship in this area of science, technology, engineering or maths
- I may do a career in science, technology, engineering or maths but I haven't made up my mind
- I definitely do not want to carry on with science, technology, engineering or maths
- None of these apply to me

**Question 3: imagine yourself 5 years from now. What do you think will be the things that you are worrying about then?**  
Please rank the items by dragging each one to the desired rank.

- Getting any kind of job
- Being able to live near my family
- Doing well in exams
- Getting a job I enjoy
- Having good friends

**Question 4: What do you see yourself doing in your mid-twenties?**  
Please select one response only.

- Working in a place where every day is different
- Unemployed
- Having a family
- Really high up in a company with my own team
- Running my own business
- Being famous
- Working in a shop
- Travelling the world
- In a job where I'm making things
- In a job where I'm helping people
- Working in an office for a big company
- Still studying

MINDSHARE



Department  
for Business  
Innovation & Skills