TECH PARTNERSHIP

MY TECH FUTURE

Headline report on research into girls' attitudes to technology, and the interventions that will make a difference to their career plans.

Sponsored by:

BT

Hewlett Packard Enterprise

TATA CONSULTANCY SERVICES

Commissioned by the Tech Partnership and carried out by Childwise.

Introduction

When employers talk about the lack of women in technology, it's often raised in the context of the skills gap. How can we fill the roles we have, if we can't access half the population, goes the argument. But dig a little more deeply and the debate becomes far broader: a diverse workforce is more open, more creative, more productive – and the people in it more engaged and excited by what they do.

Employers in the digital world are problem solvers by nature, and with the My Tech Future campaign they are renewing their efforts to improve the gender balance. Through this research, they are ensuring they address the problem from a basis of knowledge – a thorough understanding of this nuanced, evolving issue.

The tech sector is now lining up to take action. With the insights from this research, employers will be developing a range of interventions to change the conversation around girls in tech: that will speak to girls about the things they want to hear, in the language they want to hear it.

Thanks to the generous sponsorship of BT, HPE and Tata Consultancy Services, this research has identified new ways to change girls' perception of digital careers. Through My Tech Future, the sector will now be reaching out to make a real difference to young people's opportunities. We all look forward to seeing the results - in our apprentice recruitment, in our graduate intake, and in our workplaces.

Karen Price OBE
Chief Executive, the Tech Partnership

The Tech Partnership is keen to boost the number of girls who become involved in tech careers, to help accelerate the flow of talented people from all backgrounds and ensure that companies develop the technology skills they need for the future.

Currently 17% of tech jobs are held by women[1], and this proportion is falling. As more and more industries step into the digital age, technology will fill every part of our economy. The tech industry needs more top talent – if we want this country to keep its competitive edge, it is crucial that women are not left behind.

CHILDWISE was commissioned to consult with a wide range of individuals, including girls aged 9-18, parents, teachers and women in industry, to discover what can be done to make this industry more appealing to young women, and help increase the number who choose to become involved in tech careers. The project was funded by three company sponsors – BT, Hewlett Packard Enterprise and Tata Consultancy Services.

The research comprised of three stages;

1) **Knowledge building** – speaking with women already pursuing a career in technology, to find out what inspired them and what they think the biggest priorities concerning recruitment in the future are. We interviewed female trailblazers and female tech specialists[2], to find out what made an impact on them. As a result of these interviews we were able to develop some ideas and potential solutions to explore further among key audiences.

2) **Evaluating the potential solutions –** this stage focused on introducing and gathering in-depth feedback about the potential solutions, as well as exploring other ways in which girls could be inspired to consider a career in technology. We interviewed girls aged 10-18, parents and teachers, to find out what they thought of the proposed ideas and how they thought these could be implemented.

3) **Measuring the potential solutions** – for this final stage of research we measured the incidence of views relating to technology, and evaluated the proposed solutions in terms of their popularity among a larger sample of girls, parents and teachers.

   The final outcome is a prioritised set of solutions that have been thoroughly tested and evaluated – providing The Tech Partnership with a wealth of information about what needs to be done in order to boost the number of girls and young women who choose to pursue a career in technology.

[1] Tech Partnership Women in IT Scorecard 2015

[2] We defined *Tech Trailblazers* as women with up to 3 years industry experience, and *Tech Specialists* as women with more than 10 years experience in the industry

Methodology and Sample

Stage 1 – Knowledge Building

Women in industry were offered the opportunity to contribute to this project, by sharing their experiences and motivations for pursuing a career in technology. Candidates were invited to take part via the Tech Partnership's network of employers, with emails sent out to a selection of women.

- 27 women in industry volunteered to take part, including 18 tech specialists (10+ years experience) and 9 trailblazers (up to 3 years experience).
- **8 women were selected to take part** (4 tech specialists and 4 trailblazers), including representatives from BT, Hewlett Packard Enterprises, Tata Consultancy Services, Balfour Beatty, Global and New Look. The women were chosen to reflect a range of different views and experiences.
- Fieldwork took place during w/c 11 April 2016.

Stage 2 – Evaluating Potential Solutions

For this second stage of research we carried out discussion groups and in-depth interviews with girls, parents and teachers, to introduce and evaluate some of the ideas that had been discussed during the first stage.

Five discussion groups were carried out among girls aged 10 to 18 (across school years 6 to 12), from schools selected from the **CHILD**WISE panel.

- **A total of 34 girls took part**, with between 6 and 8 girls in each group
- Research took place during w/c 9, 16 May 2016

Two discussion groups were carried out among parents of girls aged 9 to 18.

- **A total of 16 parents took part**, including a mix of Mums and Dads
- Recruitment focused on those with daughters who were in the broadest sense potential candidates for a career in technology.
- Fieldwork took place on 12 May 2016

Telephone interviews were conducted with teachers involved in STEM / ICT, via schools from the **CHILD**WISE panel.

- **7 teachers took part,** two from primary schools and the rest from secondary schools
- Two of the teachers we spoke to were female, five were male
- Fieldwork took place during w/c 9, 16 May 2016

Stage 3 – Measuring Potential Solutions

For this final stage of research, we conducted **three online surveys with girls, parents and teachers**, to measure the incidence of views and opinions towards the potential solutions.

- **505 parents of girls aged 9-18, and their daughters**
- **248 teachers** involved in STEM / ICT
- Fieldwork took place during w/c 6, 13, 20 June 2016

Executive Summary and Conclusions

Knowledge Building Research with Women in Industry

A career in technology was not an obvious first choice for any of the women we interviewed. They all considered pursuing alternative options first – including accountancy and nursing. These industries are regarded as familiar and traditional, and are widely endorsed by family and teachers. **Technology on the other hand, is still regarded as a non-traditional career –** typically because it is fast-paced and constantly changing.

Some of the women we spoke to completed degrees in different disciplines, and went on to discover technology at a later stage, but for others, questions and doubts about their career choices set in at an earlier age, often as they approached higher education (age 16-18). In some cases these doubts resulted in course changes and last minute switches to technology. These late decisions typically required great courage and determination – characteristics that were evident in many of the women we interviewed.

Technology is all-pervasive nowadays, yet many of the women we spoke to agree that those without links to the industry still struggle to appreciate the vast range of career opportunities available within it. Several described their own first experiences of technology at school, with comments often referring to boring and uninspiring ICT lessons. Yet these women now realise that the industry has so much more to offer. Some feel there is too much focus on mainstream roles, and instead girls need to be shown that there is a wide range of very rewarding and creative jobs available within the industry, that don't involve coding or sitting at a computer all day. These types of jobs im that only a computer science type degree will lead to a career in technology, when they know that this is absolutely not the case. **There was some consensus that a skills framework focusing on the broad types of career choices available would be very effective.**

Although technology was initially not an obvious choice for any of these women, they were all able to identify character traits that they now regard as key to their success in the industry – a logical and analytical mind, enjoying puzzles and board games as a child, a keen problem solver, an interest in using computers, and an aptitude for maths and science. **However, it also became apparent from the interviews that these women share some other important qualities – they all had a willingness to try new things, to grab opportunities when they arise, and a strong work ethic.** Several also referred to an inner confidence and not being afraid to do something a bit different. But above all of this, many of them regard the support and encouragement of others as the keystone to their success.

Encouraging teachers, supportive parents and inspiring mentors – these are the people who helped to uncover the potential of the women we spoke to, often before they could see it for themselves. Several of the women were able to name teachers who inspired them and championed their success, and parents who encouraged them to consider options that otherwise would have gone unnoticed. **There is so much potential for teachers and parents to help guide girls towards a career in technology,** and the evidence from these interviews illustrates just how effective this can be – but it cannot happen if the people with the greatest influence do not know what skills and characteristics are required, and indeed what opportunities the industry has to offer.

A career mentor was regarded as a valuable source of support for several of the women we spoke to – particularly those working for technology focussed companies. One interviewee crediting her

mentor with helping her overcome confidence barriers and take on new challenges when otherwise she would probably have held back.

The value of these relationships is something that several of the women feel could and should be replicated among young people making career related decisions. Inspiring talks in schools have long been seen as a positive approach to educating young people about what the industry has to offer, but as one interviewee commented, these **visits need to be followed up with a co-ordinated and sustained approach that builds on the need that many girls and young women have to discuss and talk things through.** There should be many opportunities for consultation and discussion (these can be online as well as face to face), and importantly there should also be room to involve parents and teachers in the process as well.

Several of the women also recognise how important it is to have someone who believes in you, someone who takes an interest in what you are doing professionally. Not all of the women we spoke to had this – one of the women said she had struggled with moments of doubt and confidence barriers throughout her education and career journey, and that this lack of confidence has undoubtedly held her back at times.

The findings point towards an inherent need for women to talk things through with other people, a need which isn't perhaps so prominent among men. **Women like to talk in situations where they are sustaining relationships, they like to discuss and analyse things, and there is a great deal of evidence that this pattern starts early in childhood. There is a role for building relationships with trusted individuals, especially for girls who don't already have supportive adults in their lives** – someone who can relate to the challenges they face and help guide them on their career journey. It is also important that girls are given lots of opportunities to build their confidence at school. Overcoming challenges, doing well, surpassing expectations, even changing perceptions in some cases, all help to boost girls' confidence, and help provide a source of inner strength and determination.

The reality of working in the technology industry is a good one for the women we spoke to. They enjoy the variety of work, the challenges, the pressures and being part of a team. **On a day to day basis few say they are really aware of their gender, although they all commented on the lack of women in senior management roles.**

There was some feeling that the industry is often portrayed as being too 'techy', when in fact, there are lots of important roles that don't confine you to sitting in front of a computer all day. Yet some of the women acknowledged that it is important to keep up with the 'techy' side of things if you want to progress and have credibility within the industry.

The women we spoke to feel that a career in technology is becoming a more popular prospect, with some actively involved in career events and school visits. However they also recognise that the majority of young girls simply don't know enough about the vast range of opportunities available within the tech industry. Any potential solutions must address this.

> *"I think it's about helping schools do a better job of explaining the huge variety of roles available in technology and that they're gender neutral. And helping remove some of those gender biases that are influencing teachers, influencing parents, and influencing groups like Scouts and Guides"*
>
> Tech Specialist

The Impact of Gender Differences

As part of this knowledge building stage we met with research psychologist, Dr Amanda Gummer, a leading authority on child development, to help gain a better understanding of gender differences in relation to education, careers and technology. Her key points for consideration are included below.

1) **Meet girls where they are, and take them where you want them to go -** use trends data to identify the lifestyle features of girls aged 9-18, to enable creative solutions that are based around activities that girls already enjoy and aspire to.

2) **Learning Styles – girls like to understand what they have to do before attempting to do it, whereas boys jump straight in to experimentation** - research has shown that boys tend to prefer multi-modal learning – they need to see, do and hear it, so the practical nature of STEM experimentation, and trial and error learning suits boys more. Girls tend to learn more socially, so teaching methods that tap into girls' learning preferences need to be employed, and teachers need to be aware of these differences.

3) **Boys overestimate their ability, girls underestimate theirs – this can lead to them switching off from 'hard subjects'** – the perception that STEM subjects are 'more academic' and therefore more challenging can be a turn off for children with low self-confidence. Pre-teens and young teenage girls often go through a period of lower self-esteem as they hit puberty, so the timing of choosing options may lead girls to 'play it safe' and choose subjects that they feel less likely to fail at

4) **Hide and disguise technology within subjects they do like** - the skills required for a successful career in technology (analytical thinking, critical analysis, problem solving etc) are not only developed through STEM subjects. By embedding these skills in other activities and lessons, girls will find STEM less scary and gain in confidence as they find they already possess many of the skills required

5) **Tap into girls' social conscience, regarding creativity and inventing** – make it clear that technology based careers can help 'make the world a better place'. This is likely to be motivating for teenage girls who are becoming more aware of global and social issues, and are keen to be part of the solution to some of these issues

6) **Better Careers advice – let young people know what they can do with their qualifications, and how they can keep the doors open –** with the disappearance of a 'job for life' it is increasingly important for children to develop a wide base of skills and knowledge, and STEM subjects form an integral part of this. Careers advice at Secondary schools needs to be updated to reflect the changing world of work, and students made aware of the broad range of careers that benefit from the skills learnt in STEM subjects. In addition, parents and wider society need to understand the role that technology has to play in living a healthy and fulfilling life.

7) **Tackling societal gender differences** - things are improving but there are still popular media, especially around science that reinforce the stereotypes (e.g. Big Bang Theory). Mass-media role models are powerful in addressing this, and in the UK there are some good preschool programmes that challenge these stereotypes e.g. Doc McStuffins, Nina and the Neurons.

8) **More female science and technology teachers – this could happen as a result of other initiatives working –** the imbalance between the gender of teachers is a natural result of the disparity between the number of boys and girls taking STEM subjects, and without more accessible female role models, girls are going to continue to struggle to relate to technology as an option for their future.

9) **Increase boys' interest in Art, English and reading, in order to make Maths, Science and Technology less male, and therefore more attractive to girls –** the well-documented delay that boys have in learning to read and write may lead to arts subjects being inadvertently seen as more 'girly' as they gain confidence from early advances when compared to their early peers. Boys, therefore may choose STEM subjects more because the alternatives are perceived as girly, which then creates an imbalance that results in girls perceiving STEM as 'boyish'. By addressing the early approaches to English and the Arts, and making them more accessible and appealing to boys, the imbalance will become less obvious and all children will be able to access all subjects on a level playing field.

This first stage of knowledge building research with women in industry resulted in the development of six ideas, designed to give girls a better understanding of the opportunities available in the technology industry. These ideas were put forward for consideration by The Tech Partnership and project sponsors, with four chosen for further evaluation. These are listed below.

Ideas selected for evaluation

1) **A tech mentoring scheme in schools** – students who would like to know more about what a career in tech would involve would be matched up with young people already making a career in the sector. These mentors would develop a working relationship with the students, supporting and encouraging them throughout the academic year, and offering regular opportunities to meet, exchange ideas and work together

2) **A tech skills app** - an app, and associated website, that help students find out more about careers in technology, and decide what sort of role would suit them best, based on their aptitudes and the activities they already enjoy. The app could include articles, games, quizzes, vlogs and blogs, case studies and Q&As, all helping students see how their particular strengths could translate into a tech career.

3) **A campaign to build knowledge and awareness among parents and teachers** - parents and teachers have a vital role in uncovering the potential of young people, often before they can see it for themselves. The technology industry is fast moving and the campaign will give parents and teachers the inside track on the careers available in technology, the many routes into the sector, and the skills and characteristics that are most in demand.

4) **A campaign to tackle social stereotypes and promote more female role models** - popular media, especially round science and technology, often reinforce the stereotype that these industries are geeky and more for men. But in reality the tech sector is welcoming and exciting, and there are many women making interesting and dynamic careers in it. This campaign will show girls the true face of the tech sector, introduce them to real life role models through school visits, and highlight what women have already achieved.

Evaluating and Measuring Potential Solutions

The second stage of research focused on introducing and evaluating the potential solutions, in discussion groups and in-depth interviews. This was followed by a third and final stage which measured the incidence of views towards the four propositions, among girls, parents and teachers.

The girls in the groups were not particularly surprised or concerned that more men than women currently work in technology roles – provided that girls can do so if they want to. They felt it was important that girls be given the opportunity if that is their choice, although some were suspicious that the industry is trying to recruit women to fill roles that men no longer want to do themselves. Most girls and teachers were also keen that any potential solutions target boys and girls equally. In particular, teachers feel that any proposed approach should not positively discriminate. Instead they would like to see initiatives that target boys and girls, but with a focus on female role models.

There is a lot of groundwork to do with girls to convey the wide range of exciting and different jobs available in technology, beyond their immediate associations. There is a degree of innate resistance to the concept from many girls who simply do not perceive themselves as a 'tech girl'. However, from an early age they are interested and enthusiastic to know more, and this presents an opportunity to show them that technology features in just about any area they can think of.

When asked what they think needs to be done to help boost the number of women in technology roles, the overwhelming response was *"show us what we can do".* When they are encouraged to think beyond the stereotypes, most girls are interested to know a bit more, but they want to see things with their own eyes – they want video content, workplace visits, open days, visits to schools and work experience opportunities. Parents and teachers echo these views, but also highlight that the presentation and delivery of this information is just as important as the content itself – it needs to capture their enthusiasm, challenge their perceptions and most of all be relevant to them.

"I think getting involved in workshops and things, because when I get told about things, it just doesn't really sink in. I have to be shown something to get more in-depth with it. Technology lessons in school…everyone hated it. It wasn't interesting, it was old school stuff"
Girl aged 16-17

"I think they need a better understanding of what IT careers are available. I think far too many people have a fixed idea in their heads that it's about programming, but it isn't all about programming. Technology is changing and it won't be the same in five years time. These are potential opportunities"
Parent of girl aged 14-18

The Tech Skills App was a popular solution in all of the girls groups, but especially among girls aged 10-15. They felt it could be introduced around the age of 12/13, when girls are starting to become curious about the working world and where they could potentially fit in, and whilst they are still keen to know more. Several of the older girls feel that the current process of careers interviews in Year 9 is too rushed and impersonal. They would like the opportunity to find things out informally before this, so they feel more prepared when they have to start making decisions.

But in order to appeal to this age group the resource **needs to be fun and exciting, preferably an app of some kind, and with a subtle focus on careers**. The emphasis should be on building their knowledge and expanding their horizons, rather than imposing a decision or encouraging them to focus their choices too soon.

Older girls (16-17) were also interested in this concept, but their requirements were slightly different. They would like a resource that alerts them to open days and local activities, gives them opportunities to chat (online) with industry ambassadors, and helps them prepare a CV. Along with some of the 14-15 year olds, they also liked the idea of being matched with other like minded people, so they could discuss mutual interests and potentially find new friends – they think this could be a useful source of support as they get older.

All of the girls were interested in the idea of an app that acts as a portal, directing them towards new content, people / companies of interest, games and competitions. Video content is especially popular, across the age range.

Parents also responded positively to the Tech Skills App in the groups, recognising that it could *"sow the seeds"* for a future career in technology. They felt it would be a good opportunity to show the youthful and playful side of the industry, and step away from the serious and complicated image that people typically associate with it.

But in its current form, this idea was less appealing to teachers. It was felt that a *"one stop shop"* resource with up to date information about careers in technology would be beneficial to teachers and students, but their concern was that it would be text heavy and it would fail to engage the girls. However, they all agreed that **a resource featuring lots of video content would be more appealing,** especially given girls' love for video sharing sites such as YouTube. Suggestions for content included 'virtual' work place tours, video conferencing with ambassadors and, video conferencing Q&A sessions with women in industry. Using online technology to promote the technology industry was a popular suggestion, and all of the teachers felt this would sit comfortably with the girls. Several of the teachers also felt this type of content could be used in lessons, presentations and parents evenings, and would be especially helpful when girls were choosing their options.

"I think this is really good, because it gives them the opportunity to understand that it's not just the old IT careers that they would be channeled into, and it lays out the opportunities, and in simple terms they can relate to."
Parent of girl aged 14-18

"I think this would be a fantastic idea in primary schools, because it comes back to what we've said about knowing the career paths and knowing what all the different strands are"
Male Teacher, Primary

Survey results for the TECH SKILLS APP:

	Parents *very / quite (%)*	**Daughters** *very / quite (%)*	**Teachers** *very / quite (%)*
*How **helpful** do you think a TECH SKILLS APP would be in giving girls a better understanding of the opportunities available in the technology industry?*	**39 / 49**	**41 / 46**	**45 / 43**
*How **interested** would your daughter / you / your students be in this?*	**27 / 48**	**34 / 42**	**35 / 45**
Base	505	505	248

The Mentoring Scheme was also a popular suggestion in the groups, with interest peaking among girls aged 14-18. The general consensus among the girls was that a mentor would be most helpful to those who have chosen their GCSE options, and are starting to think about their post 16 choices (age 15-16). This is when girls feel they start to have questions about the best route for them, the type of qualifications needed and what opportunities are available to them. It is also the point when parents say they begin to feel out of their depth.

All of the girls liked the idea of speaking to someone young (early to mid 20s), who can relate to their situation. The prospect of face to face interaction and the opportunity for someone to take a real interest in them and what they're capable of is really appealing to them. Some of the girls said they don't get as much contact time with teachers when they reach secondary school, and this is something that they miss. They also feel this approach would help them to feel more involved in the industry. A few of the oldest girls were keen on this idea because it might give them the opportunity to speak to people who have followed a less conventional path into technology, and this would help to reassure them that it is never too late to change your mind.

Parents were equally enthused by the Mentoring Scheme in the groups. They feel it could work with girls as young as 13. In particular they like the idea of it bringing roles to life, and helping their daughters to appreciate what life is really like in the working world, plus the prospect of it not being a 'one off' visit. However, they are quick to stress that mentors would need to be *"young and funky"* in order to build a rapport with their daughters. They were also unsure exactly how the girls would be selected to take part – they would need to be chosen, they couldn't be relied upon to put themselves forward because technology is simply not an obvious choice for them.

The Mentoring Scheme was initially greeted with much enthusiasm by teachers, although further exploration did highlight some issues. The most appealing elements of the scheme were the prospect of building better links with industry (something that teachers struggle to do themselves), and the opportunity to challenge the negative gender stereotypes associated with the technology industry. It was also felt that **the scheme would have longevity, and could potentially have a real impact on girls' commitment and enthusiasm for STEM subjects**. In particular the teachers felt it would be most suited to highflyers who already show confidence in these areas, and those who might be lacking confidence and direction. Based on its current description, teachers were generally in agreement that this idea would work well for girls who had already selected their GCSE options and showed an aptitude for STEM (15-16).

However, whilst initial reactions to the idea were positive, further exploration did reveal some potential issues. Teachers were unsure how the concept would work in practice – would girls need to have time out of lessons, could it fit in with the curriculum, would they be expected to convince the headteacher that time away from planned activities would be worthwhile? There were also concerns about pupil safeguarding and risk assessments, particularly if girls were to meet mentors on their own, and if there was a continued relationship – who would be responsible for monitoring this? Teachers were also apprehensive about whether the success of this scheme would be dependent on them sourcing mentors, as well as organising and managing their visits.

But despite their concerns, several of the teachers felt the principle of this idea was very good. During the interviews some of them shifted away from the mentoring idea towards one where female representatives could come into school and run group sessions, set challenges and have Q&A sessions, rather than one to one mentoring. **The idea of group activities was felt to fit a wider range of girls, and could potentially be introduced in primary schools, where early preconceptions and stereotypes are often formed.** It was also felt that it would be easier to organise and manage for a group or class – both in terms of safeguarding, but also including boys and fitting it around the curriculum. Some also argued that in their experience, girls tend to prefer attending sessions or taking part in activities as a group, and are less confident to take part on their own. This supports the findings from the groups with girls.

It was felt that through mentoring and the exposure to female industry ambassadors, that real life role models could be developed. This was regarded as really important among the teachers. They also felt that building better links with businesses and industry would encourage better quality work experience opportunities.

The idea of workplace visits also generated a positive response, from teachers, girls and parents. In particular, girls really liked the idea of open days and opportunities for relevant work experience – they want to see first hand what the working world is all about, they want to feel inspired rather than anxious, and they want to feel more confident about the choices they are making. Teachers were slightly concerned that they would be responsible for finding the places to visit, there would be

issues around safeguarding, and more time away from lessons – but in principle they thought it would be a very good idea.

The majority of girls, teachers and parents said they feel the mentoring scheme would be more effective if it included boys as well. Most of the girls were uncomfortable with an initiative that is just for girls. They recognise the need to recruit more women into tech roles, but also feel that boys could benefit from an approach that helps increase knowledge of the opportunities available within the industry and challenges the negative gender stereotypes.

"You have someone who has had the experience. It gets through to you. IT at school isn't great, so we don't know what is out there, because we don't have access to it"
Girl aged 14-15

"I think this makes it more of a reality for them, it's like getting first hand information"
Parent of girl aged 14-18

"Mentoring is always a good way of encouraging people. I just think when people are mentoring, that is when you have what I call a real life role model, because they are doing what you want to do"
Female Teacher, Secondary

Survey results for the TECH MENTORING SCHEME in schools:

	Parents *very / quite (%)*	**Daughters** *very / quite (%)*	**Teachers** *very / quite (%)*
*How **helpful** do you think a TECH MENTORING SCHEME IN SCHOOLS would be in giving girls a better understanding of the opportunities available in the technology industry?*	**47 / 45**	**42 / 46**	**63 / 32**
*How **interested** would your daughter / you be in this?*	**26 / 50**	**34 / 42**	**42 / 48**
Base	505	505	248

A campaign to build knowledge and awareness among parents and teachers

was the top choice for half of the oldest girls (16-17), who feel their parents have no idea about the pressures they face. They would like their parents (and teachers) to be a source of knowledge as well as support.

Parents were initially very receptive to this idea as well, and they cite the effectiveness of similar campaigns that have raised the profile of midwives, and the Barclays coding campaign. However they were unsure about how this campaign could be effectively executed. They want to know how they can support their daughters, but at the same time, they don't want to be overwhelmed with information. The most obvious route to them is TV advertising, but others also suggest targeted year group newsletters from school, and events during school holidays. However parents of older girls in particular questioned whether schools would have the time or resources to be able to engage with such a campaign given the cuts that have been made to careers services to date, and the continually increasing pressures on their time.

The teachers were very keen on this idea and felt it could potentially tick a lot of boxes – keeping teachers up to date, allowing girls to find out about the range of careers available, educating parents that tech is a valid education and career path, and addressing social stereotypes. It was also felt that the awareness campaign could easily incorporate elements from the other ideas, such as building links with female ambassadors, industry and local businesses, and developing an online resource showing the different types of careers available and the different types of women working in those careers. Teachers were very candid about their struggle to build links with local businesses and wider industry, and to show pupils real life examples of the career opportunities available to them. Building networks and links with businesses is an area where teachers genuinely feel they need help and support, and anything that could facilitate this would be welcomed. Online resources, face-to-face meetings and representatives coming into school are preferred methods of finding out information among teachers. They were very dismissive of email, and felt this would not be an effective method of contact because emails often get put to one side and not read.

Aside from keeping themselves up to date, teachers also feel strongly that there is a need to raise awareness among parents. They think that more needs to be done to help parents appreciate the range of careers available, and to reassure them that technology is a rewarding and exciting career path. Their **ideas centered on showing parents video clips when they attended school events** e.g. open days, parents evening, option evenings. Besides showing them real examples of different roles within the industry, they also felt it would be important to highlight some of the different lifestyle benefits including, opportunities to travel or work from home.

"I think this is a really good one, my parents know nothing. I think sometimes they don't know how to help us and what to do, especially if they aren't sure about the industry"
Girl aged 16-17

"I think this is massively overdue and I think the schools are quite a long way behind where they should be on that"
Parent of girl aged 14-18

"I mean if you think about it, Maths is always Maths, French is always French, but anything in Technology, if you look even five years ago what is being taught now, you know, wow – hadn't even thought about teaching that. So there is a real problem with giving teachers the skills to be able to deliver the lessons"
Male Teacher, Secondary

Survey results for a CAMPAIGN TO BUILD KNOWLEDGE AND AWARENESS AMONG PARENTS AND TEACHERS:

	Parents *very / quite (%)*	**Daughters** *very / quite (%)*	**Teachers** *very / quite (%)*
*How **helpful** do you think a CAMPAIGN TO BUILD KNOWLEDGE AND AWARENESS AMONG PARENTS AND TEACHERS would be in giving girls a better understanding of the opportunities available in the technology industry?*	**40 / 50**	**31 / 48**	**58 / 38**
*How **interested** would you / your parents and teachers be in this?*	**30 / 51**	**28 / 46**	**50 / 41**
Base	505	505	248

A campaign to tackle social stereotypes and promote more female role models was a popular concept in theory, but girls struggle to see who the role models would be as they couldn't think of any, beyond their teachers or parents. Equally parents could not think of any female role models they could associate with the industry. The characteristics that girls admire most are confidence, work ethic, determination, enthusiasm and a general likeability. They want to see people they can relate to, people who have similar backgrounds to them, and people who have worked hard to achieve success. Parents suggested the role models should be bright, young, professional, smart women – who above all are passionate about what they do.

The idea of highlighting positive female role models from the tech industry was considered by teachers as an important step towards tackling social stereotypes. They drew comparisons with sport and athletics, with references made to the increasing focus on female athletes such as Jessica Ennis and the impact this has had on perceptions of women in sport. **The idea of girls meeting role models from local businesses was very popular, and it was felt this would probably have more impact than reading about high profile female role models such as Sheryl Sandberg, COO of Facebook**.

Opinions towards a campaign focused on tackling social stereotypes were mixed. Parents felt it was important, but they regarded it as low priority – it was seen as too ambitious and unlikely to have much impact in the short term. Teachers however regarded this as a high priority – perhaps because they have closer links to the industry and see it as worthwhile in the long term. They recognise that it will be a hard task, but feel it is achievable if some of the other ideas are introduced – including more mentors and female representatives coming into school, advertising campaigns showing women in industry, and case studies focusing on women in different roles, as part of the skills framework.

The idea of a guide to good practice when teaching girls was also discussed in the interviews with teachers. Interestingly, the male teachers said this could be useful, but they were unsure what it would contain. The female teachers were less enthusiastic however, and actually questioned how teaching technology to girls is any different to teaching boys. The overall interpretation of this idea focused on a guide that would suggest ways to tailor activities towards girls, although most of the teachers we spoke to said they already tailor activities towards pupils own interests. It was suggested that girls themselves should be asked to help with development of the guide, to ensure it genuinely reflects their interests and needs. Initial suggestions from the teachers included tapping into girls usage of social media and YouTube, making the approach to tackling social stereotypes more subtle – including avoiding positive discrimination, and case studies and examples that are based on reality – it was felt that if these were too gimmicky or 'made up' girls would see through them and switch off.

Ultimately, positioning the technology industry as a valid career choice is regarded as an important part of tackling stereotypes. Teachers feel that more needs to be done to help parents understand this. They believe that **parents have a tendency to focus on and positively reinforce traditional roles such as doctors, teachers and lawyers, and that technology is often overlooked because they don't know enough about it.** Promoting the positive aspects of a career in technology would help parents see it as a more valid career choice. When the girls themselves were encouraged to think beyond the stereotypes, most of them were interested to know a bit more

"She's academically very strong in maths and IT, but she has no interest. At the moment she wants to be a translator"
Parent of girl aged 14-18

"If you are a good teacher and you are inspirational, I think just the fact that they will associate a nice teacher or good teacher with the subject is good. That is already a massive deal, especially at school. They are not necessarily thinking about careers but they are thinking about what subjects do I enjoy?"
Male Teacher, Secondary

"It's definitely about role models. I still feel I am up against preconceived ideas at an early age. So I think the key is definitely younger. Having female engineers coming in and having a chat, and if they run a challenge of activity, make it less focused on girls and (technology), and more about the challenge"
Male teacher, Secondary

Survey results for a CAMPAIGN TO TACKLE SOCIAL STEREOTYPES AND PROMOTE FEMALE ROLE MODELS:

	Parents *very / quite (%)*	**Daughters** *very / quite (%)*	**Teachers** *very / quite (%)*
*How **helpful** do you think a CAMPAIGN TO TACKLE SOCIAL STEREOTYPES AND PROMOTE MORE FEMALE ROLE MODELS would be in giving girls a better understanding of the opportunities available in the technology industry?*	**45 / 44**	**35 / 46**	**65 / 30**
*How **interested** would you / your daughter be in this?*	**27 / 49**	**26 / 47**	**55 / 37**
Base	505	505	248

Prioritising the potential solutions

At the end of the online surveys, respondents were asked to choose which of the four ideas they thought would be most effective in helping to show girls the range of opportunities available in the technology industry.

Which ONE of these four solutions do you think would be most effective in helping to show girls the range of opportunities available in the technology industry?

	Parents (%)	**Daughters (%)**	**Teachers (%)**
A tech mentoring scheme in schools	**44**	**36**	**39**
A campaign to tackle social stereotypes and promote more female role models	**22**	**20**	**31**
A tech skills app	**15**	**25**	**14**
A campaign to build knowledge and awareness among parents and teachers	**12**	**10**	**15**
Base	505	505	248

When considering these solutions, all were positively received, but **the tech mentoring scheme in schools is seen as the most effective solution by all groups** (parents, daughters and teachers)

- Teachers are the most positive about this, in terms of how helpful they think it will be
- The scheme should be aimed at students aged 13 to 16 years old
- To ensure the best response from teachers mentors should support students in groups
- Students should see their mentors once a month at most, once every 2-3 months at the least
- The scheme should be aimed at both girls and boys, but girls should be allowed to participate in girls only groups if required

A campaign to tackle social stereotypes, and promote more female role models came in second place amongst teachers and parents

- Teachers are the most positive about this, in terms of how helpful they think it will be
- The scheme should be aimed at students aged 11 to 16 years old
- The best role models would be young women who have recently started in technology careers (trailblazers), women who have worked in tech several years (specialists) and high profile women in tech

A tech skills app is the third choice overall, but second amongst girls themselves

- All groups were positive about this solution in equal measure
- The scheme should be aimed at students aged 11 to 16 years old
- Including Q&A sessions with women in tech would gain the support of parents and teachers, plus alerts for local activities and open days to further engage teachers, and support for CV writing to engage parents
- Girls themselves would want videos, games / puzzles, competitions, quizzes, but as they get older this would need to adapt to more career orientated features

A campaign to build knowledge and awareness amongst parents and teachers was the last choice for all (marginally for parents and teachers)

- Teachers are the most positive about this, in terms of how helpful they think it will be
- According to teachers, the scheme would have the most benefit on students aged 11 to 16 years old
- The best method of delivery would be through schools, but this would need to include material for teachers to use at parents' / careers evenings, and teachers would like this backed up a social media campaign

Conclusions and recommendations

The majority of parents agree that they would encourage their daughters to consider a career in technology (70%), and encouragingly, girls themselves say this is an appealing proposition (72% would consider a job in tech) – but enthusiasm drops as girls get older. Likewise, the majority of girls enjoy their ICT lessons at primary school (53% of 9-11s), but as they make the transition to secondary school, they quickly lose interest – describing their lessons as boring, repetitive and out of date.

The research findings indicate that *people* are the most effective source of inspiration – teachers, parents and mentors. But these individuals need to know what skills and characteristics are required in tech careers, and what opportunities the industry has to offer, in order for them to effectively guide girls in this direction. Worryingly though, a considerable number of teachers (45%) say they do not feel well informed about the different career opportunities available in the technology industry, and confidence among parents also drops off as girls start secondary school.

Going forward, teachers and parents feel the industry should make better use of technology to promote the opportunities available to girls – including video content for teachers to use at school events, video conferencing sessions with tech ambassadors, virtual workplace tours, and online helpdesks.

Research psychologist, Dr Amanda Gummer, also suggests that as girls get older more effort needs to be made to *"meet girls where they are, and take them where you want them to go".* Girls' lives are dominated by life online, and so any potential solution needs to consider how much they value the opportunity to watch, read and write about their favourite things in this way.

Help to build girls' confidence and knowledge

A tech mentoring scheme in schools

This is considered the most effective solution among all groups – reinforcing the view that inspiring and knowledgeable people are the biggest influencers of education and career choices

The suggested age is 13-16 when girls are starting to think about further education, and when they typically begin to exhaust parental (and often teacher) knowledge

Girls of this age need reassurance that a career in tech is rewarding and exciting. They also need knowledge, confidence and conviction to deviate from a traditional career path

To ensure support from teachers, the scheme should target students in groups, and be aimed at boys and girls. Several teachers argue that girls prefer to attend sessions as part of a group, and are less confident to take part on their own

Girls would expect to see their mentor once a month at most, and once every 2-3 months at the least. They don't expect contact to always be face to face however, and are keen on the idea of video conferencing and Q&A sessions

It was felt that through mentoring and the exposure to female industry ambassadors, that real life role models could be developed

Encourage girls to see beyond ICT at school

A campaign to tackle social stereotypes and promote more female role models

ICT is the most enjoyable subject among girls aged 9-11, but willingness to consider tech as a prospective career drops with age

Without more accessible female role models in STEM / ICT, and more exposure to the true face of the tech sector, girls will struggle to relate to technology as an option for their future

Teachers and parents regard this idea as high priority, but recognise that it will take time to have an effect.

Women who have recently started their tech career are considered the best role models for girls, followed by women who have worked in tech for several years and high profile women such as Sheryl Sandberg

Groundwork needs to be done whilst girls are still at primary school, to ensure they remain open minded and interested in tech education – female ambassadors could help tackle negative gender stereotypes and give girls the confidence to see tech as a positive choice

Campaign delivery should be subtle and avoid positive discrimination wherever possible

Make tech education and careers more relevant and personal

A tech skills app

This was third choice overall, but second amongst girls themselves

The suggested age is 11-16, with girls generally becoming curious about the working world and where they could potentially fit in at age 11-12

Teachers feel the app should feature lots of video content, given girls love of YouTube, and should avoid being too text heavy. This view is reinforced by the girls themselves, who say they would rather watch something than read about it

Primary teachers also believe a resource of this kind could work well among younger children, provided the focus is on fun and engaging activities and games

Girls themselves want videos, games / puzzles, competitions and quizzes – but as they get older this would need to adapt to more career orientated features – Q&A sessions with women in tech, alerts for local activities and open days, and support with CV writing

The Tech Partnership could consider involving girls in the design and development of the app to ensure authenticity and broad appeal. Regular consultation with girls would also provide opportunities for others to become involved and keep the content up to date

Maximising the potential for teachers and parents to guide girls towards a career in tech

A campaign to build knowledge and awareness among parents and teachers

This idea resonates most with teachers – they are keen to update their own knowledge and recognise the potential they have to sow the seeds of interest

Building networks and links with local businesses is also an area where they genuinely feel they need more help and support

There is some disparity between what parents think they know and what they actually know. They do acknowledge that the range of opportunities is far greater nowadays, and many aren't aware of how their daughter's strengths could translate into a modern tech career

All audiences agree that the best method of delivery for a campaign of this kind would be through schools – with teachers appealing for more resources to show parents and girls e.g. at parents evening, options evenings, open days

Online content such as YouTube videos is seen to 'fit' well with the technology industry and the careers it is trying to promote. Videos should showcase young and inspiring women, and highlight the wide range of opportunities available

"Oh yeah. Yeah, I mean I could think of three or four girls off the top of my head that I know are great at ICT, and that with the right push in the right direction could go that way. Yeah, if they could just see other people that have done it."

Male Teacher, Primary

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