

The Impact of STEM Ambassadors

School and STEM Ambassador
Perspectives

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About this report



This report presents an analysis of a number of relationships between STEM Ambassadors and schools. Each is presented as a narrative designed to tell the story of engagement and how it has benefited or impacted upon students, employers and STEM Ambassadors.

1 **School**
Ridgewood High School,
West Midlands

Sector
Programming

Organisation
Royal Air Force

2 **School**
Rangeworthy Primary
School, Bristol

Sector
Engineering

Organisation
Renishaw

3 **School**
St. Angelas Ursuline
School, Stratford

Sector
Financial Services

Organisation
Willis Towers Watson

4 **School**
The Khalsa Academy,
Wolverhampton

Sector
Robotics

Organisation
Royal Air Force

5 **School**
Windsor Clive
Primary School, Cardiff

Sector
Healthcare

Organisation
Cardiff University

6 **School**
St. Julians Primary
School, Newport

Sector
Electronics


Organisation
SPTS

7 **School**
Various across Scotland as part
of 'Marvellous Maths'

Sector
Energy/Engineering

Organisation
Catapult / Zenith Energy






From computer scientists to engineers, geologists to astrophysicists, STEM Ambassadors are STEM professionals who volunteer their time and expertise to inspire the next generation.

They support learning by helping young people to understand real world applications of science, they illuminate STEM careers through careers talks and links with the world of work, and they raise aspirations, demonstrating to students the wide range of people who pursue a future in STEM.

This report is a snapshot of how STEM Ambassadors support schools and communities across the UK in both the classroom and the workplace. It includes work undertaken with primary and secondary schools, both by individual STEM Ambassadors and those taking part in educational programmes run by STEM employers. With over 30,000 active volunteers across the UK giving 640,000 hours a year, they are a fantastic free resource which covers a large breadth of STEM industries and education establishments.



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Ridgewood High School

Royal Air Force





About the School

Ridgewood High School, Dudley, is part of the Stour Vale Academy Trust group. It is a mixed gender secondary school with 812 pupils on roll. It is a non-selective school and performs below the national average for progression in 8 core subject areas (including maths and sciences). Approximately one-quarter of pupils are classified as eligible for free school meals. The latest Ofsted report awarded the school '3 (requires improvement)'.



About the RAF

The RAF Youth and STEM team deliver engagement activities and events across the UK. They deliver in primary and secondary schools and host events and activities at educational venues and RAF bases nationwide. The RAF Youth & STEM team work with a range of academic and educational partners to design resources and deliver STEM activities.



Benefits of Engagement

Ridgewood High School got involved with the RAF and Hyett Education Programme (a delivery partner) following teacher Lisa Jones' family day trips. During these events she was impressed by the STEM activities and the STEM bus. After being informed by Hyett that there was a Mighty Minds Robotics competition to be held, she signed her school up.

Encouraging More Girls and Pupil Premium Students

The school were keen to support Hyett's aim of getting more girls and Pupil Premium students interested in STEM subjects. They found that the real-world context of the activities helped to enhance engagement and enabled students to see how it might benefit them in future.

Linking up with STEM Learning

Due to the connection with the RAF Lisa looked for information on the STEM Learning website to help with her science club and reached out to the local university. She attended a STEM conference with Google, held at the University of Wolverhampton, and has maintained contact with their Science STEM Ambassadors. She is looking forward to holding future events at school after Covid restrictions have been lifted.

Lisa hasn't worked in school with other STEM Ambassadors, STEM organisations or the STEM Learning hub in Science, but felt that could change if the availability of opportunities were to be advertised more.

Teacher Perspectives

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The girls hadn't really thought it was anything they would be interested in because it was to do with computing and robots. And a couple of boys who are not really engaged in lessons, got involved in the robotics. There was a real-world context behind the challenges so the students could see that it might fit in on a bigger scale when they're older.

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“

It's really about letting people know what's available because I wouldn't have known if I hadn't searched for it. I'm not Head of Department so maybe they had more information. We'd like to get more STEM Ambassadors involved and into school.

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Ambassador Perspectives

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It is helpful to promote what the RAF does because the UK is critically short of engineers, with only 12% of engineers and technicians represented by women. The RAF is delivering fun and exciting activities to schools that will inspire more pupils to engage with STEM subjects, that will lead to a career in STEM. Ultimately, girls in STEM become women in STEM.

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It is helpful to promote what the RAF do because they are helping to smash the gender stereotypes associated with engineering.

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It is helpful to promote what the RAF do because they are celebrating the importance of engineering by demonstrating the relevance in everyday society; from mobile phones to the furniture in our homes and most recently, medical research that has produced the vaccines to battle COVID. Engineering is everywhere!

”

Rangeworthy Primary School

Renishaw

RENISHAW 
apply innovation™





About the School

Rangeworthy Church of England Primary School, South Gloucestershire, is a voluntary controlled school. It is a mixed primary school with 69 pupils on roll. Pupils perform at the national average in reading, writing and maths. Approximately 10% of pupils are classified as eligible for free school meals. The latest Ofsted report awarded the school '2 (good)'.



About Renishaw

Renishaw is one of the world's leading engineering and scientific technology companies, with expertise in precision measurement and healthcare. The company employs over 4,400 people worldwide and supplies products for use in applications as diverse as jet engine and wind turbine manufacture, through to 3D printing, dentistry and brain surgery.



Limited resourcing to support STEM

Working at Rangeworthy, a very small primary school, teacher Sue Warnock is aware of the limited resources they have and the expense of inviting external visitors or paying for transport to events. By working together with STEM Ambassadors from local engineering company Renishaw, the school have been able to take advantage of their generous outreach programme. Sue has known the company for many years and had the opportunity to visit the site with some children after winning a competition.

Benefits of working with STEM Ambassadors

Sue believes that working with STEM organisations and their STEM Ambassadors can enhance provision in the school. Sue's first collaboration with Renishaw began when she was tasked with running a joint-school technology session and she contacted Renishaw and other companies to help build a Lego and K'Nex funfair in the school.

Teacher Perspectives

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It was great to link into Renishaw's expertise and resources. They have funded workshops with themselves and other companies and provided all the resources including laptops and Lego for a Robotics challenge.

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“

I asked Renishaw to target the girls a bit because when we are talking about future ambitions, girls are not interested in the STEM subjects. She spoke about how people in STEM can make a real difference to the world around them and I think she might have converted a few of them.

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“

We attended an experience day called Cool Aeronautics. It was like a STEM Fair with loads of different workshops with rolls-royce, BAE Systems, and lots of other different companies. It's was a shame it didn't carry on and become an annual event. I book onto events whenever I can.

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Some parents haven't considered these sorts of careers for themselves possibly because they don't know what's out there sometimes either.

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Teacher Perspectives

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It needs to start when they are infants. By the time they've got to me they've already got quite fixed ideas about things. I try to influence them towards different things and encourage them towards subjects you know they are going to be good at and enjoy.

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“

I use STEM Learning and their national resource libraries. I receive updates, newsletters, emails, and support. I haven't been made aware of any networking events with other STEM organisations, but I'd like to know of more opportunities without having to trawl through social media and flyers. I think STEM Learning could help us by streamlining information and filtering opportunities as the school gets bombarded with flyers.

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STEM Learning library resources

The school uses STEM Learning resources and welcomes the support they receive. However, Sue feels that making time to find more opportunities is difficult and would like more help to facilitate that aspect.

Relationship with local STEM Learning Hub

Sue only recently became aware of her local STEM Learning hub and plans to explore further to see if there is a place on their website for participating companies to advertise what they offer to schools. She feels that this and having a key contact who could coordinate and manage local STEM Ambassadors would address some of the issues she has faced.

Girls and STEM careers

Following the school's recent engagement in a Space Technology programme where the children all identified scientists as male, Sue became keenly aware that girls can have preconceived ideas about STEM careers, possibly formed by families, community, and media portrayal. She identified that the STEM Ambassadors programme was a great opportunity to challenge these gender misconceptions.

Working with families

In addition to this the school regularly communicates directly with parents to demonstrate their work with local industries and reinforce the notion of different careers available to their children. Throughout the pandemic this communication has continued via social media.

Benefits of engaging with Primary schools

When considering the debate whether the STEM Ambassadors programme should target primary or secondary, Sue has the view that engagement should start as early as possible.

More STEM engagement

The school is keen to participate in more STEM events and believes having access to numerous workshops and companies is a great for children.

Ambassador Perspectives

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STEM Learning helps us to officially onboard our STEM Ambassadors, they organise induction training and the DBS security check for all Ambassadors which is essential when working with young people. Every month they then relay an array of opportunities to us and we will support where we can, we support their network of activities alongside running our own engagement programmes. We have strong connections with them and will often attend meetings where we will share ideas and feedback and explore future opportunities. We are all keen to encourage engagement with more diverse audiences and they support this vision by offering employability activities that challenge gender stereotypes.

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All of our STEM Ambassadors will get internal training from our Education Outreach team when they join the programme, they will also get an overview from STEM Learning who will convey the importance of the role and will help the new Ambassadors understand more about communicating effectively with young people. Over time the STEM Ambassadors will have the opportunity to develop their presenting and communication skills as they support us at STEM events and workshops.

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The benefits for Renishaw

The Education Outreach Team at Renishaw is fortunate to have an army of STEM Ambassadors that help to deliver their STEM Outreach programmes to students in primary and secondary schools with the aim of inspiring the next generation of engineers and scientists.

Feedback is essential for our programmes and we are already seeing signs that our engagements are changing perceptions about Engineering. We have had work experience students who have later gone on to become apprentices in the business which is very encouraging.

Challenging views about engineering

There are so many misconceptions about Engineering careers, we want to show young people that they can work in a vibrant exciting environment where you can really make a difference to the world we live in.

Working with and supporting teachers

Rebecca, from the Educational Outreach Team at Renishaw is keen to note that STEM Ambassadors can help to get the message through to teachers too, which she thinks is important.



Ambassador Perspectives

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The benefits of our programmes are to grow the Engineers of the future, it is well known within our industry that there is a predicted skills gap of young people entering STEM careers and it is important to start addressing this problem now.

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We are trying to raise the student's aspirations by exposing them to the world of engineering. Many have this misconception that engineering is dirty and low-paid and it's challenging to overcome these obstacles. We invite them to STEM workshops at our New Mills site where they will have a tour of the Renishaw Innovation Centre and discover more about our exciting new technologies. Many are wowed walking through the doors seeing how modern and clean our facilities are.

”

“

This is very important to us as teachers can be very influential in supporting students in making decisions about their future and they are often integral in exploring careers options with students. We hold teacher training days and work closely with careers advisers to ensure that they have all the latest information about our early careers programmes.

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STEM Ambassador gains

Benefits are also felt by the STEM Ambassadors involved in the scheme by sharing their experiences and passing on skills and knowledge. This all contributes to their own training and professional development.

A positive relationship with STEM Learning

Rebecca feels the company gets sufficient support from STEM Learning and is confident that if they ever needed more assistance, they could request it.

Female STEM Ambassador role models

Renishaw is keen to represent women in engineering. They have a number of female STEM Ambassadors with the aim of challenging the ingrained male stereotype.

STEM Ambassadors supporting social mobility

STEM Ambassadors can be instrumental in expanding the outlook and social mobility of some students, with an inspirational talk they can really broaden the horizon for some young people. If the student can connect with the subject matter and be excited by it then this can really turn their lives around and give them a much greater focus on their studies and what they need to achieve to reach their goals.



Ambassador Perspectives

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To address the skills gap, we need more young people to consider STEM careers. As well as this we need to ensure that these industries are attracting a more diverse workforce. Renishaw is working hard to promote engineering to young people from all walks of life irrespective of gender, ethnicity, religion, sexuality and socio-economic background. We have run a number of workshops targeting these areas e.g. all female events and raising aspirations programmes.

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Evaluating the bigger picture is difficult as we can't track every individual, but statistics around the skills gap are moving slowly in the right direction.

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Renishaw is always keen to invite families to open events so that they can really see the innovative environment that we work in and give visitors the opportunity to have some fun and find out more about how exciting engineering can really be. A popular quote comes to mind “Scientists study the world as it is; engineers create the world that has never been.

”

St Angela's Ursuline School

Willis Towers Watson


Willis
Towers
Watson





About the School

St Angela's Ursuline School, Newham, is a voluntary aided school. It is classified as a 'girls on entry school' and has 1290 pupils on roll. It is a non-selective Roman Catholic school, with 39% of pupils eligible for free school meals. Over one-third (39%) of pupils do not have English as their first language. The latest Ofsted report awarded the school '1 (outstanding)'.



About Willis Towers Watson

Willis Towers Watson is an Anglo-American, Irish domiciled global multinational risk management, insurance brokerage and advisory organisation. The company has a number of STEM Ambassadors who promote the work of the company and coordinate work-experience initiatives designed to inspire young people to consider careers linked to its core areas of business.

A student perspective on the value of work experience

Following a work experience programme arranged by STEM Learning at insurance broker and risk advisor Willis Towers Watson, the students and careers teacher from St. Angela's Ursuline school were keen to discuss the benefits gained from participating.

Contextualised schoolwork

Some of the students said they were surprised to learn about the variety of routes they could go to enter the insurance broker and risk advisor industry. Many indicated that they found it very helpful to contextualise some of their maths work to real-world, employer situations.

Mentor support

The students were complimentary about the experiences and the staff they were working with. Finding staff approachable and friendly was very important to the students. In addition, the support of mentors (one point of contact) was critical for some students who were unsure of what to expect in the facilitated sessions led by other Willis Towers Watson staff.

Student Perspectives

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They showed me there are a lot of ways I can apply coding into insurance which was helpful for me because that's the area I want to get in to.

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The staff were very approachable and friendly. Our mentors were helpful and having one point of contact was extremely helpful. They let us do the work whilst they supported us. It's a good way to build confidence and to work with other people.

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Originally, I was only interested in the engineering part of STEM. But since doing the work experience, I've become really interested in going into risk management. It relates to real-life situations which I thought was really important ... Doing this work experience has made me look more into finance as a career.

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Student Perspectives

“

It helped us to think more positively about STEM subjects ... I learned the importance of STEM within business, not just maths ... We did teamwork on a cool project with people from different schools. My group were really good to work with. They were all very bright ... I enjoyed the talks and how easy it was to ask questions ... We learned how to use Excel and worked on our presenting skills ... It was really insightful and interesting learning about different aspects of insurance.

”

Mixed year groups undertaking work experience

Although older students at the school had attended work experience placements, this was the first immersive opportunity to include both the older and the younger ones. The careers teacher, Chris, was keen to add his thoughts after attending some of the sessions with his students and receiving their feedback.

Targeting recruitment

A proponent of wider participation, Chris felt that offering the experience to the more able students enabled schools to optimise the opportunity. He was keen to point out, however, that other opportunities would be made available for those who were not selected. His selection criteria included choosing students from widening participation backgrounds who were top-set or second-set maths.

Being passionate about careers, Chris spoke very highly about the level of organisation that went into the arrangement from both STEM Learning and Willis Towers Watson. He hopes that STEM Learning has a long-term agenda and will implement similar programmes in the future. He is confident the students will recommend it to their peers.

Making the experience even better?

Only a few points were suggested as to how the programme could be improved in the future. Chris suggested that establishing the media platform in advance would prevent the minor hitch the school faced. He commented that the students would like to have had even more interactive sessions and activities.

Chris echoed those thoughts and was pleased that the students had since received careers emails from the company to make contacts who could help them to move into that area of expertise. He welcomed the fact that there were professionals in many different specialist roles, including brokers and risk managers. This helped to provide participating students with a sense that there are many things they can go on and do in this industry.

Teacher Perspectives

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Previous work experience has just been for older students. It's been invaluable for them to take a lead role and act as champions and mentors for the Year 10's. The feedback was that there was a good balance of useful information on the insurance industry and the different roles available to them ... They enjoyed the teamwork, getting involved in discussions and giving presentations. It was more involved and in-depth than some of the things they've been doing.

”

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The programme was very structured and well organised. We were sent a lot of pre-work experience materials and resources for the students. If STEM Learning offers this opportunity again, I will jump through hoops to make sure it's given to our next set of students

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Overall, the programme resulted in an excellent response and has widened up the opportunities for some of the students who took part.

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Willis Towers - examining the skills gap

Kelsie is a STEM Ambassador at the insurance broker and risk advisor company Willis Towers Watson. She recently carried out a review of the company's CSR initiatives and took forward an idea that linked into a research project she had undertaken in the past to look at the STEM skills gap in young people in the UK.

Identifying and growing talent

Identifying top talent, mainly within university students, has always been one of the business incentives for the company. Targeting school age children, widening participation, and increasing diversity were three areas Kelsie wanted to expand on in order to meet the requirements of the CSR programme. With support and guidance from STEM Learning she was able to identify and target groups of participating students who would benefit from the programme.

Kelsie believes that Willis Towers Watson is well placed to work with younger people who are not too set on their careers path. She believes that they are the kind of work experience programme participants that will bring a fresh pair of eyes to what the company does and how it works. Promoting a mutually beneficial idea of enhancing the talent pool by targeting the inclusion and diversity market, she was able to generate enthusiasm within the company and secure internal funding.

Virtual work experience offer

Due to the pandemic Kelsie arranged for the project to be undertaken virtually. Although feeling the in-person setting would be more comfortable and it would have been nice to meet the students, Kelsie was able to identify many benefits of a virtual setting, including being able to re-use content in the future.

Ambassador Perspectives

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Where we lacked CSR initiatives was in volunteering, diversity and working with young people. I thought we could help address the STEM skills gap because in the insurance world we do so much with STEM-based subjects.

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We made it clear that we were trying to target students from lower social mobility and income backgrounds. A lot of people were keen to get involved and the company was happy to sponsor the project.

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“

We haven't really done anything virtual before. We thought we would be more comfortable with the in-person setting but we found the virtual setting was more engaging than we thought ... We tailored it and gave them a good overview of the STEM-based careers in the industry. In terms of staff availability, it was great too as it saved time and we were able to schedule key expertise when required.

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Combining virtual and face-to-face offer

Looking towards the future, Kelsie believes the company will combine in-person and virtual programmes to optimise the benefits of both. Feedback and survey analysis carried out after the programme identified the many benefits to the company of targeting these younger groups.

STEM Ambassadors changing perceptions of the industry

Another benefit was the opportunity for the STEM Ambassadors to change perceptions about the insurance broker and risk advisor industry being a 'dry' and uninteresting sector. Kelsie believes that from this perspective, the programme has been a huge success. Kelsie and her group of engaging STEM Ambassadors have been able to show the students that if they are interested in a STEM-based role there are many different careers available for them to consider in the insurance broker and risk advisor industry.

Adaptations and enhancements

Kelsie was keen to say that STEM Learning have been great in helping to support the programme, working closely with her and the team of STEM Ambassadors for training and guidance. She suggested a few minor improvements, particularly being able to encourage more students to use the facilities on the media platform (in particular sharing video screens and feeds). However, she agreed with STEM Learning's position that due to their age it wasn't right to insist and would be open to any advice from them on best practice.

Willis Towers Watson works closely with several insurance companies and associations. Due to the success of the STEM Ambassadors programme Kelsie was pleased to report that other companies would like to get involved in future.

Ambassador Perspectives

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There is a difference in age, so they think very differently. We noticed how many questions were associated with the digital side of things, about how much is done at the desk and how much is face-to-face in person. It was refreshing being asked questions on the basics and things that popped into their heads as they saw and heard things. They were so bright and the questions they asked were really insightful.

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If were to do it virtually again we would try to make them feel more comfortable to put the cameras on. Some students who were more confident were quite vocal and asked a lot of questions. I had hoped the students would have put their cameras on by end of the week.

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We are thinking of widening this programme out with some other insurance associations who have heard about it. They have contacted us and asked to get involved in the next one.

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Khalsa Academy Royal Air Force





About the School

The Khalsa Academy, Wolverhampton, is part of the Khalsa Academies Trust group. It is a mixed gender secondary school with 465 pupils on roll. One quarter of pupils are classified as eligible for free school meals; two-thirds do not have English as their first language. The latest Ofsted report awarded the school '2' (good).



About the RAF

The RAF Youth and STEM team deliver engagement activities and events across the UK. They deliver in primary and secondary schools and host events and activities at educational venues and RAF bases nationwide. The RAF Youth and STEM team work with a range of academic and educational partners to design resources and deliver STEM activities.



Engagement with STEM

Assistant Principal Javier De Las Heras has had several engagements with STEM Learning, the RAF, and the Hyett Education Programme, both in his current school and previous posts. The events included visits to Cosford museum, activity workshops and arranging for university students to speak to the students.

Inspiring disengaged pupils

The school found that children who were previously disengaged with STEM subjects were inspired by the activities. It not only helped with STEM subjects, but more broadly with comprehension, literacy, and communication. And although very young, several students could see potential for their future careers.



Teacher Perspectives

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I believe that inviting both male and female providers into school has created an ‘I can’ attitude for the girls. And we are lucky because we have a female Principal who is a computer scientist as well. I think we are breaking ground here. We are improving and definitely ahead of the vast majority of schools.

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Regarding a mixture of male and female, there is a problem in STEM subjects. However, in my school we do really well. Almost half of our students chose Computer Science as an option and out of those, 43% were female.

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“

The feedback we got from the youngsters was that they really liked that it was hands-on, and they could make links with what they learned in lessons and things they might be able to do as a job in future. It made them think what it would be like to be an engineer or a scientist.

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More careers support

Javier would welcome more careers support sessions and workshops from STEM Learning and other providers, and is keen to roll this out to new sixth formers.

STEM competitions and other links

Khalsa Academy liaises with numerous other STEM organisations and enters several competitions, including the School's Community of Practice, CAS, and NCCE amongst others. However, experience has proved that the paperwork for the STEM Ambassadors Programme tends to be overly onerous and could be simplified to encourage greater uptake.

Shorter-term impacts

Javier feels that the school benefits the most when the external providers undertake several shorter-term events that can be sustained throughout the year rather than larger, one-off events. In addition, the funding of some events can be difficult for both the school and parents as the school is in a deprived area.

Addressing gender issues

In terms of gender stereotypes, the school is aware there is a clear problem with the uptake of STEM subjects by girls in the school. However, due to the work done at Khalsa Academy, their engagement with STEM Learning, the RAF and the Hyett Education Programme, the school is having some success in addressing this.

Ambassador Perspectives

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Working with schools is rewarding because it is rare that as an adult and parent you get to see the children in a learning environment. Having run a series of events over 3 months, it was extremely rewarding when the class could recall information you had provided them with 2 months previously. Even more rewarding was the excitement with which they delivered the information back to me.

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It is helpful to promote what the RAF does because a lot of the children were unaware of the variety of jobs available within the RAF ... they were surprised to hear what opportunities were available to them.

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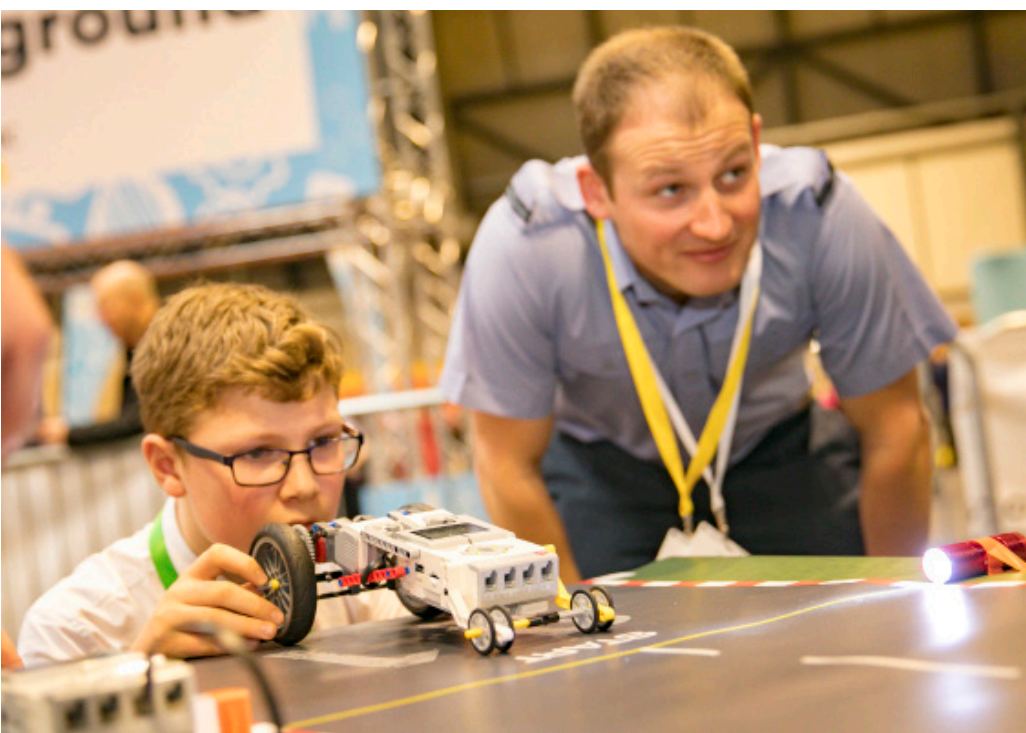
Working with schools is rewarding because I feel like I am helping the next generation of engineers and I love nothing more than seeing the girls rise to the challenge and succeed. #ThisGirlCan.

”

“

Working with schools is rewarding because I really feel like I am part of something that will make a difference. I am so enthused by the look of sheer delight and wonder when a child successfully completes a challenge and is beaming with pride in their accomplishment.

”



Windsor Clive Primary School Cardiff University





About the School

Windsor Clive Primary School, Cardiff is a mixed gender school with 488 pupils on roll. Around 54% of pupils are eligible for free school meals. Around 25% of pupils speak English as an additional language. The latest inspection report, carried out by Estyn, awarded the school a 'good' rating.



About Cardiff University

Cardiff University has a long history of engagement work. A number of the University's departments have volunteers who support outreach provision and the STEM Ambassadors programme. Professor Val Sparkes is the Lead for Impact and Innovation at the School of Healthcare Sciences.

Working with STEM Ambassadors

Windsor Clive Primary School take full advantage of the STEM Ambassadors Programme and work closely with STEM Learning to set up interactions and build strong relationships between the school, the students, and the Ambassadors. Although the school enjoys the one-off sessions, they find increased benefits with the more sustained interactions. The main driver for teacher, Kerry, is the future of the students.

University networks and relationships

Kerry has previously worked with Cardiff Metropolitan University, whose Biomechanics and Physio teams ran some workshops for the more able and talented students. She is currently liaising with Val from Cardiff University via STEM Learning, the intention being to work together more after the Covid restrictions are lifted. The future plan is for the school to visit Val at her hospital simulation suite at the university. The suite acts as an excellent teaching tool.

Virtual approach to careers talks

In the meantime, Kerry has asked Val to produce a short two-minute video showing her work environment and outlining her career pathway. These types of media could be presented virtually on Zoom with STEM Ambassadors and students interacting and asking questions, offering them their first introduction to the jobs and related topics.

Teacher Perspectives

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Anything that has a real person telling children about their real experience has got to be a good thing. Especially for those jobs where they don't know what's involved or even that the job existed.

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It's not just teachers saying science is great. You are exposing students to a different world. It's the gravitas that comes with a different person. There's automatic intrigue. That's what they love and will remember because it is different.

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“

We need to make sure our young people are inspired by STEM and exposed to the enthusiasm and curiosity of those STEM characters - positive role models play such an important part in making sense of science.

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Benefits of engaging with younger pupils

Windsor Clive Primary school see the benefits of getting students engaged at an early age with STEM Ambassadors and external providers, believing it enhances interest, provides context and builds familiarity.

Although opinions vary, the notion of primary school being the right age to engage with STEM Ambassadors is supported by Windsor Clive Primary. They undertake a lot of the work with STEM Ambassadors to promote STEM subjects whilst the children are young, believing this is the best method of introducing the subjects and ensuring a continuation as they go through to secondary school. They feel that only engaging with STEM Ambassadors in secondary school risks missing opportunities.

STEM Ambassador career pathway

The school is keen for STEM Ambassadors to show students an education and career pathway that they may never have thought was available to them. Kerry believes that showing this first-hand, through Val, could help to break down some pre-existing ideas and barriers, especially for students who may be the first person in their family to consider university as an option.

Val is intent on demonstrating that students from a working-class background could pursue a successful career, just as she herself had done. She is clear that anyone with potential from a working-class background can do her job. None of her family had ever been to university and she believes that a lot of young people say 'my family has never done anything like that, so I never thought about it'. She is still surprised that some young people don't feel they can go to university. A key to helping this happen is to introduce youngsters to people with different occupations.

Teacher Perspectives

“

The STEM Ambassadors Programme is such a valuable resource. It's so important to instil that aspirational thinking in our children, and to excite them about science. When the STEM Ambassadors come in I want to instil in the children the thought that they could do a job like that one day.

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Celebrating Women in STEM is a passion of mine and our girls need to recognise the role they can play in the future of STEM'.

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Challenging gender misconceptions

Kerry highlighted the importance of challenging gender misconceptions, ensuring that girls were given opportunities to take interest in STEM subjects. Her work with Women in Science, Cardiff Metropolitan University and with STEM Ambassadors reflected that. Kerry believes that it is in everybody's best interests to upskill all of our young people, including girls, to move the UK forward and create more equal workplaces.

Not all about 'talent spotting'

Although secondary schools have been Val's main focus in the past, she agreed that there are great benefits to working with primary children, both for the children and herself. Val is an advocate of inclusivity and believes that whilst talent-spotting has its benefits, every child, even if disadvantaged or disengaged, can make a contribution.



Ambassador Perspectives

“

I've sent Kerry a resume of what I did at school, what I did for my A-Levels and a basic synopsis of where my career took me. I just want to show them it's not something mysterious or unachievable for someone from a working-class background.

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You've got to give them the intellectual freedom to spark that inquisitiveness and lateral thinking. I'm not into talent spotting. I think every level can make a contribution and everybody needs to be given a chance. Some of the more talented students have probably got a lot of support. For me it's about going anywhere, encouraging and giving the information and enthusiasm to all levels and all ages.

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St. Julian's Primary School

SPTS Technologies





About the School

St Julian's Primary, Newport, is a mixed gender school with 685 pupils on roll. Around 18% of pupils are eligible for free school meals. Most pupils come from homes where English is the main language spoken. The school is currently a pioneer school and is working with the Welsh Government and other schools to take forward developments relating to the digital competency framework and professional learning. The latest inspection report, carried out by Estyn, awarded the school an 'excellent' rating.



About SPTS

The company designs and manufactures the wafer processing equipment used in the global semiconductor industry. SPTS has also built up strong links with Welsh universities to aid both research and recruitment.

Tackling the STEM skills gap

After attending a council meeting Luke Mansfield, Assistant Headteacher of St. Julian's Primary School, became increasingly motivated to address the issue of the STEM skills gap in industry. He got in touch with a local technology company and together they formulated a plan that would be mutually beneficial for all parties.

Visiting the company

A visit to the SPTS site was organised for the pupil's Digital Leader Group where a range of talks and activities had been arranged for the children.

The impact of Covid-19 on business engagement

However, due to the pandemic, having a real-life experience was difficult but Luke recognised that virtual learning, although limited, does have some benefits. The pandemic has really flagged up that schools need to engage with technology more. They want to re-balance these STEM skills throughout the school.

Increase the profile of STEM in the school

The school was eager to increase the profile of STEM subjects within the curriculum and believe that working with SPTS contributed hugely to implementing that. Luke believes that STEM should be a main component of the curriculum rather than an extra-curricular activity and has identified opportunities to incorporate STEM teaching into traditional subjects. Following the visit to SPTS the school continued to pursue their drive on STEM by revisiting their curriculum in this area.

The benefits of working with STEM Ambassadors

St. Julian's has a very mixed catchment, and the school believes that STEM Ambassadors can be instrumental in cultivating the interest of children. This in turn could help the community, improve the local economy, and widen the participation of children who may have fewer life chances.

Teacher Perspectives

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Employers want to work with schools and bridge that gap in STEM skills. I contacted a local company, SPTS, who said they were very keen to link up and work together to show children some of the jobs there. We chatted at length and threw ideas about.

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We had a Health and Safety talk around a boardroom table. They did some experiments and heard about the manufacturing process, global shipping and machines that cost millions of pounds. The children's jaws dropped. It was great. I believe one area of learning is experiencing.

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Often businesses say they only work with secondary schools. We've got a saying that 'Year 8 is too late'... We've got a responsibility at primary to get it going so the children arrive at secondary with STEM skills, that inquisitiveness and experience.

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It's given us an opportunity to look at what we do and say how are we developing STEM skills and understanding. We've always taught science and maths as subjects. Engineering would have fallen by the wayside and technology would be done as and when with a computer.

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STEM Ambassadors influencing parents

Luke believes this engagement with STEM Ambassadors in companies positively influenced some parents about what could be done for the children's progression, noting that in his experience the children tend to aspire only as far as their parents have done. The school has a strong policy of working closely with parents to support the children and feels this engagement with companies adds to that.

Career aspirations

The future of the children is forefront in Luke's mind. Prior to working with SPTS the school had carried out a project to ascertain the ambitions of the children. Following the visit to SPTS, a number of children have shown an increased appetite for STEM and now aspire to work in the technology industry.

Better career experiences

Luke was keen to point out that there is a gap in education that needs addressing in order to capitalise on local company involvement and ensure there are experiences that could lead to a better future for children. To support this, Luke invited SPTS to the school Careers Day where a large number of different professions come into the school and present to the children about what they do. The school believes that this provides an excellent opportunity for children to consider what they want to do in terms of a job and a career.



Teacher Perspectives

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We've got some children who don't have many varied life experiences and who don't visit much further than their estates. SPTS played a video of how the future might look and the children were amazed to see all these global projects here in this little place. These children suddenly had their horizons broadened ... If they don't know a job exists, they're not going to be setting their goals to do that sort of thing.

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We had parents contacting us saying 'we have heard about this SPTS visit, this is brilliant'. We notice that aspirations often come from the parents rather than the children ... We do lots to engage parents as we believe the best education (including STEM) is where the school and the parents are working together really closely to support the child.

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We use the STEM resource library on the STEM Learning website a lot. And we looked at the educational resources of SPTS and came up with ideas of how to pool resources and produce materials that can support other schools.

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Lots of other schools were interested in working with SPTS. They called me to find out more. My phone and emails went wild. It had a brilliant knock-on effect.

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Introductions to other companies

The positive relationship with SPTS had opened doors and influenced the school's engagement with other organisations. The school has lots of ideas and is working closely with SPTS who are keen to support them to set up projects with themselves, other companies and other STEM Ambassadors. Luke thinks this interaction is a great way for the children to see STEM in the real world and he places huge importance on authenticity.

Interest from other schools

In addition to expanding the possibilities for St. Julian's, as a result of releasing the school's videos and blogs, a large number of other local schools contacted Luke and SPTS to see how they could also get involved.

Access to STEM Learning resources

Luke is a strong proponent of STEM Learning and the school's new STEM coordinator regularly uses the STEM Learning website to look for opportunities, activities and inspiration. Luke feels that more sustained interactions between STEM Learning and companies could improve the programme further. Whilst his close working relationship with SPTS has been great, he believes there are future opportunities that could be realised by STEM Learning linking more companies to more schools.

STEM Ambassadors and Primary

When considering the question of whether STEM Ambassadors are best placed at secondary or primary schools, Luke acknowledges that it may be more difficult for companies to pitch to primary age, but strongly believes that planting the seed in these younger children provides important links to STEM skills that could inform their future careers.

Teacher Perspectives

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In the past 80% said they wanted to be Youtubers, vets, footballers or gamers. After our first visit to SPTS we interviewed our children again and they are now considering career changes. We've started a chain-reaction. SPTS had told the children that as one of the biggest local employers they could statistically end up working for them. Some of our children, particularly girls, thought that was great. The children got this real appetite for finding out about what local jobs were available to them.

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I've had regular meetings with SPTS over the past couple of years and they have referred us to several things. We linked up with The Goblin Green Power Go-Kart project run by another company. Having that initial trip to SPTS was a sort of awakening. Using STEM Ambassadors helps children to understand why we are doing STEM.

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“

I think there is scope for doing things online. It's finding the right way to do it. Live-ness adds a whole, real dimension and I think we lose something of the specialness in building that relationship with STEM Ambassadors. But there is no reason why some things can't be done virtually. It adds a different dimension.

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Introduction to the STEM Ambassadors for SPTS

The technology company SPTS, based in Wales, were introduced to the STEM Ambassadors programme when their Research and Development Team were contacted by STEM Learning. SPTS have a strong global Corporate Social Responsibility agenda and policy and have always wanted to work with schools, but found it difficult to engage schools directly. However, the STEM Learning programme has been able to successfully match them up with schools. Carolyn of SPTS got the scheme introduced and implemented into the company, and now Carolyn and more than 15 colleagues are active STEM Ambassadors. They outlined how proud the company is of its CSR programme.

Strong school relationship

One of the schools that they have been working with is St. Julian's where they have developed an excellent mutually beneficial relationship. Luke Mansfield who is now Headmaster and also a member of the Government Focus Group that assessed and recommended the new curriculum for digital content in Wales. Luke, being very proactive, approached SPTS directly following their talk at a STEM Outreach event. When he heard that the company was open to inviting schools to visit the site, he reached out and took advantage of the opportunity.

Building a future talent pipeline

Destanie Clarke, Senior Marketing Communications Director at SPTS strongly believes that getting children excited by STEM can help build the future talent pipeline. This is, she believes, a key driver and benefit of participating in the STEM Ambassadors programme for SPTS.

In addition to the job opportunities within STEM, Destanie was keen to promote the industry in a wider context. Although one of their main drivers was to build the STEM talent pool, they are focused upon educating youngsters to appreciate that there is a wide variety of career opportunities within the technology industry as a whole.

Ambassador Perspectives

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The value the teachers get is more enthusiastic students. Some teachers have limited knowledge of what a normal job is outside of an academic environment so it's really hard for them to give careers advice. Our STEM Ambassadors are great for this kind of input, they work in the sector and can really tell youngsters how it is to work in this exciting area.

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Luke is an extremely strong proponent of STEM. He runs the Digital Eagles programme in school. He's got the children all excited about STEM studies, producing videos and doing this kind of thing even after school. Since the visit, other children want to be part of the Digital Eagles. Luke's enthusiasm is infectious which is great.

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There is a national shortage of skills and people to feed and grow our industry. SPTS are looking at building our talent pool in the short, medium and long term. The long term is this engagement with primary schools to get them excited in STEM.

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Supporting local employment opportunities

Destanie pointed out that working with schools is important and invaluable to the company and the local community. She believes that by engaging with schools and publicising local companies this increases career opportunities in the area. For her, it's about building the economy of a local region which includes hiring from local areas across all areas of the business - not just in STEM, but in finance, admin and marketing.

Impact on teachers

Destanie highlighted the fact that there are great benefits for the teachers too by being involved in the programme, as it introduces new activities and keeps children motivated and interested.

Ambassador Perspectives

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A programme designed to be replicated would be great. As a company we are stretched on resources so the more packaged it could be, the better. We do use templates for risk assessments and things. But if we had more support in developing supplementary activities that could be branded for our organisation that would be good.

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The STEM Ambassadors programme has been fantastic for matchmaking. And it isn't just a one-off. We have a dedicated programme, a commitment from our management team that allows us to go and do these STEM activities on company time. All our STEM Ambassadors can make their own choices and see if anyone else wants to do it with them.

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Many people drive past the factory every day but don't know what we do. We need local people to see that working here is something they can aspire to. As STEM Ambassadors we can have such a positive impact by working with schools, making them aware of the things we do, the things we support, here in the neighbourhood.

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Plans for the future - beyond Covid-19

In the future and after the pandemic lockdown, SPTS and St. Julian's want to put together a plan for the next phase to ensure that their STEM Ambassador work is reinforced and continued into the destination secondary schools. SPTS are going to donate a 3D printer to the school so they can enhance their capabilities and experience in the Green Car project. SPTS also want to develop links with destination secondary schools to continue that project and begin to track the progress of students involved in this programme.

Closer employer links with STEM Learning

SPTS believe that working closer with STEM Learning with a more structured approach to developing a programme could be beneficial. They feel that a formalised approach could be replicated and rolled out to other schools and promoted as a model of how to engage.

Scaling-up activity with STEM Learning support

Working with STEM Learning has enabled more opportunities for the company to be able to scale up and deliver more programmes to more schools. They believe that having a local hub coordinator at STEM Learning helps to increase their list of contacts. They want the scheme to be recognised so everyone feels good being a member.

As a result, this works particularly well in supporting the development and training of young employees and apprentices too. Through the company's Internal Mentor Programme the trainees get involved in the STEM Ambassador activities with a mentor when schools come to visit the site.

Ambassador Perspectives

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We have a very active CSR programme of which STEM Learning is a big part because we are in technology. We are ultimately owned by a US company, so our CSR activity feeds up into the whole larger, corporate CSR activity. School curriculums are changing, and teachers have to start looking at how they engage and see the companies that they can work with. The fundamental problem with STEM education is that some teachers are not motivated by it. So, you have to turn the teachers first then the students because the teachers are the ones that have to continue the programme afterwards.

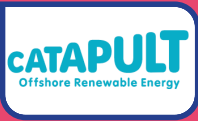
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We involve all the young recruits and apprentices in activities like this because the young kids can relate better to younger adults. And when the young adults talk about their experiences it's more relatable. It is good for the apprentices in other ways too as they get to practice presentation skills. When they are teaching and interacting with the children, they are, at the same time, reinforcing what they're learning about the industry.

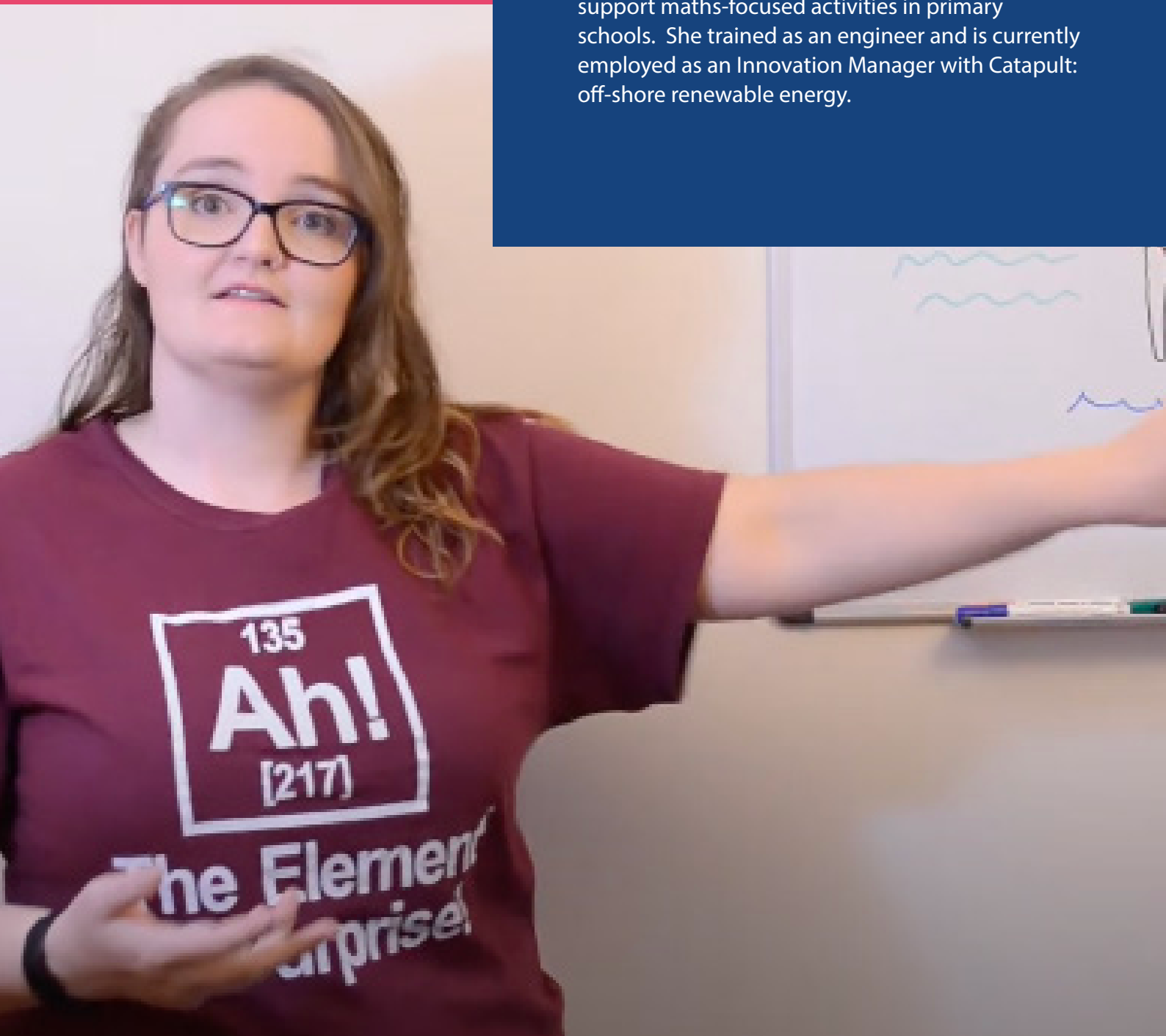
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Stephanie Mann



About Stephanie

Stephanie has been a STEM Ambassador for a number of years. She regularly volunteers to support maths-focused activities in primary schools. She trained as an engineer and is currently employed as an Innovation Manager with Catapult: off-shore renewable energy.

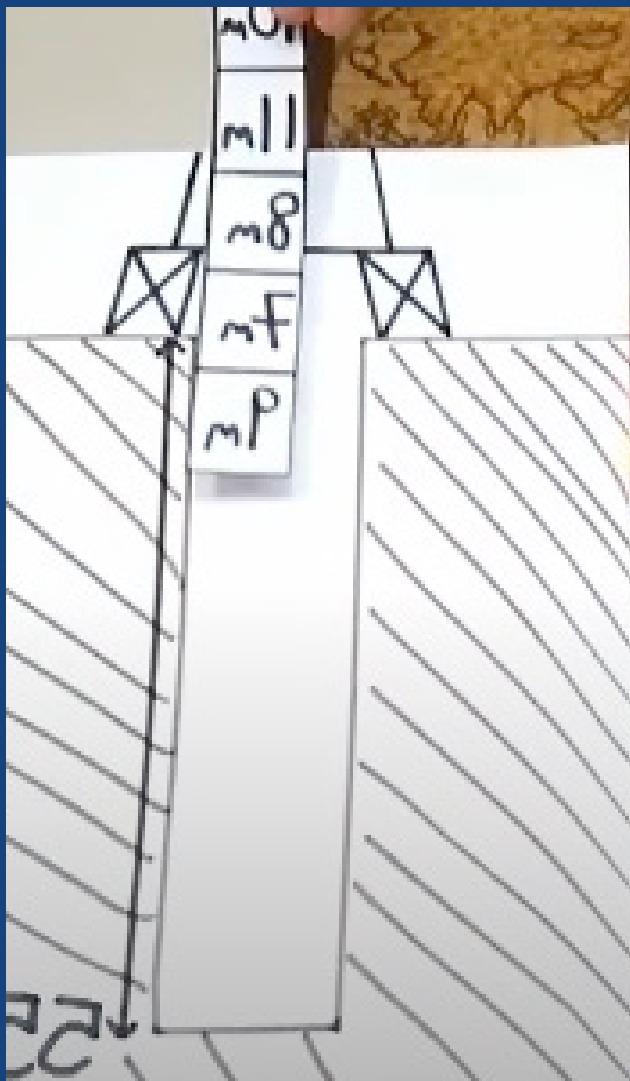


Joe Wightman



About Joe

Joe has supported the Marvellous Maths STEM programme as part of STEM Ambassadors Scotland. He is currently employed as an engineer with Zenith Energy.



Introduction to STEM Ambassador role

Stephanie Mann was introduced to volunteering as a STEM Ambassador at the local Primary school, St. Teresa's, through her work colleague Lorna. Lorna, working with the STEM Ambassadors portal, was responsible for organising all the STEM Ambassadors within the company and has regular contact with the school's science teacher who runs the science club.

YouTube video presentations

As a result of winning a STEM Engagement competition Stephanie decided that instead of using the prize money purely on equipment for just one school, she would further her STEM engagement and invest in equipment and a YouTube channel that enabled her to create educational webcasts that are used at St. Teresa's and other schools locally.

The majority of requests for access to Stephanie's YouTube videos are via the STEM Ambassador portal and she is happy to direct schools to her YouTube content. She checks for available opportunities through the monthly emails she gets from STEM Ambassadors and would be happy to make a specific video if contacted directly by a school. Although she hasn't yet hosted anything live on Zoom, she recognises the difficulties and the advantages of virtual interaction.

What STEM Ambassadors bring to the classroom

When considering the benefits that a STEM Ambassador can offer to children Stephanie was keen to outline the importance of enthusiasm. She recognised that primary teachers cannot be brilliant at all subjects and not all teachers of STEM subjects have a background or passion for STEM. She believes that science learning is one of the most important ways for young people to feel engaged with and understand the world around them. For Stephanie, it's about demonstrating some of the key fundamentals and working out logic problems, what that means and how it applies to real life. In addition to this, Stephanie was able to highlight some of the benefits that STEM Ambassadors can offer to teachers too.

Ambassador Perspectives

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We take it on a rota to host science club. I'll go out and do one or two sessions per term. I've done one session on wind energy, one on buoyancy and one on insulation. That lesson is waiting to be used. With Covid we've not managed to do face-to-face meetings, so I've been doing more of the online stuff including a Maths Week video and things.

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“

I can imagine how difficult it is for children to stay engaged and interactive on Zoom. Luckily, there are a lot of interactive features. You can make quizzes and all sorts of things.

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As STEM Ambassadors we are continually updating the CPD of the teachers. We give valuable, relevant, up-to-date information and a direct link to STEM.

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Benefits to STEM Ambassadors

Stephanie was also able to illustrate the benefits for STEM Ambassadors and raised several key points including improving communication skills, problem-solving and preparing for her own future.

Addressing the gender imbalance

Stephanie highlighted the importance of challenging gender misconceptions, stereotypes and imbalances in STEM jobs but felt that this was partly mitigated because the majority of teachers within primary school were female.

Making efforts to enhance engagement

Stephanie feels she is able to engage more with older students and is able to respond better to their questions and deeper thinking. However, she believes that targeting the STEM Ambassadors programme at primary age children has an advantage as studies have found that children have already decided whether or not they are good at maths and science prior to transitioning to secondary school.

To support the work that she undertakes as a STEM Ambassador Stephanie has recently enrolled on an Access training programme dedicated to making tutorials, communication, and child protection. She feels that STEM Learning could also offer more structured training and development to support STEM Ambassadors and increase confidence when working with disadvantaged children.

Ambassador Perspectives

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It's super rewarding and fun. If you want to present complicated scientific ideas to a ten-year old, that improves your communication skills and understanding of the topic. Being a STEM Ambassador helps with thinking on your feet and problem-solving when it comes to carrying out the lessons. I also plan to become a teacher, so it's improving my own CV for eventually applying for that job in a few years' time.

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There is still a huge drop-off of science engagement for women. Working with a primary school, it is mostly female teachers. But I went through secondary education where all my science teachers were male so that was the representation.

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I'm sure there are lots of resources for people who want to go out and find them. But it might be difficult for people to find the time, or to know what resources are really good. Offering training and support in a more structured way might really help and be really important for STEM Ambassadors.

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The value of the STEM induction

Joe Wightman works in the oil and gas industry and was recently approached by STEM Learning to become a STEM Ambassador. Following an induction session outlining how the programme works, the requirements and the resources, Joe produced videos and online content to show primary schools how maths works in industry.

Clarifying the requirements of schools

In the past Joe has visited schools in person, however due to the pandemic he is aware of the limitations of virtual presenting. Working with STEM Learning has helped to ensure that requests from schools are well defined so he can produce his videos with format, structure, and a time limit.

The benefits of learning about the reality of STEM jobs

Joe pointed out that one of the key benefits for children when schools engage with STEM Ambassadors is contextualising the STEM world. It's the link to the real-world and what a real job looks like. For him, it's conveying that the maths they are learning now is the maths that adults need at work in order to carry out their jobs. However, Joe believes that it's not just about learning maths, it's problem-solving, the ability to think clearly and the consequences when things go wrong as they sometimes do in the adult work. He also recognises that being able to provide context for the teachers too is really beneficial within the school.

Joe is aware of the barriers faced by youngsters who have limited social mobility. Working with STEM Learning he produced a video about his own movements, his education and career path to demonstrate to children first-hand that they are not limited to working where they grew up.

Ambassador Perspectives

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The induction was helpful because it's quite daunting. They have online stuff, guides, tips, props, and emails offering assistance. The STEM Ambassador Hub does the administration and sends an email every fortnight with a list of activities to sign up for. They are really helpful and approachable. It's really well done.

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I thought it would just take a couple of sessions to record a good video, but there were quite a few hiccups which was surprising. You need to know exactly what schools want because they can't interact whilst watching a video.

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When I was young, I only knew what my family did for a living. The children asked if I have always worked in the UK or if I have worked abroad. I moved from Luton to work in Scotland. Planting the idea that I don't work where I grew up is good because they are thinking about my work, how I got there, and they could do the same.

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