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Special edition

Women in tech special edition

Special focus
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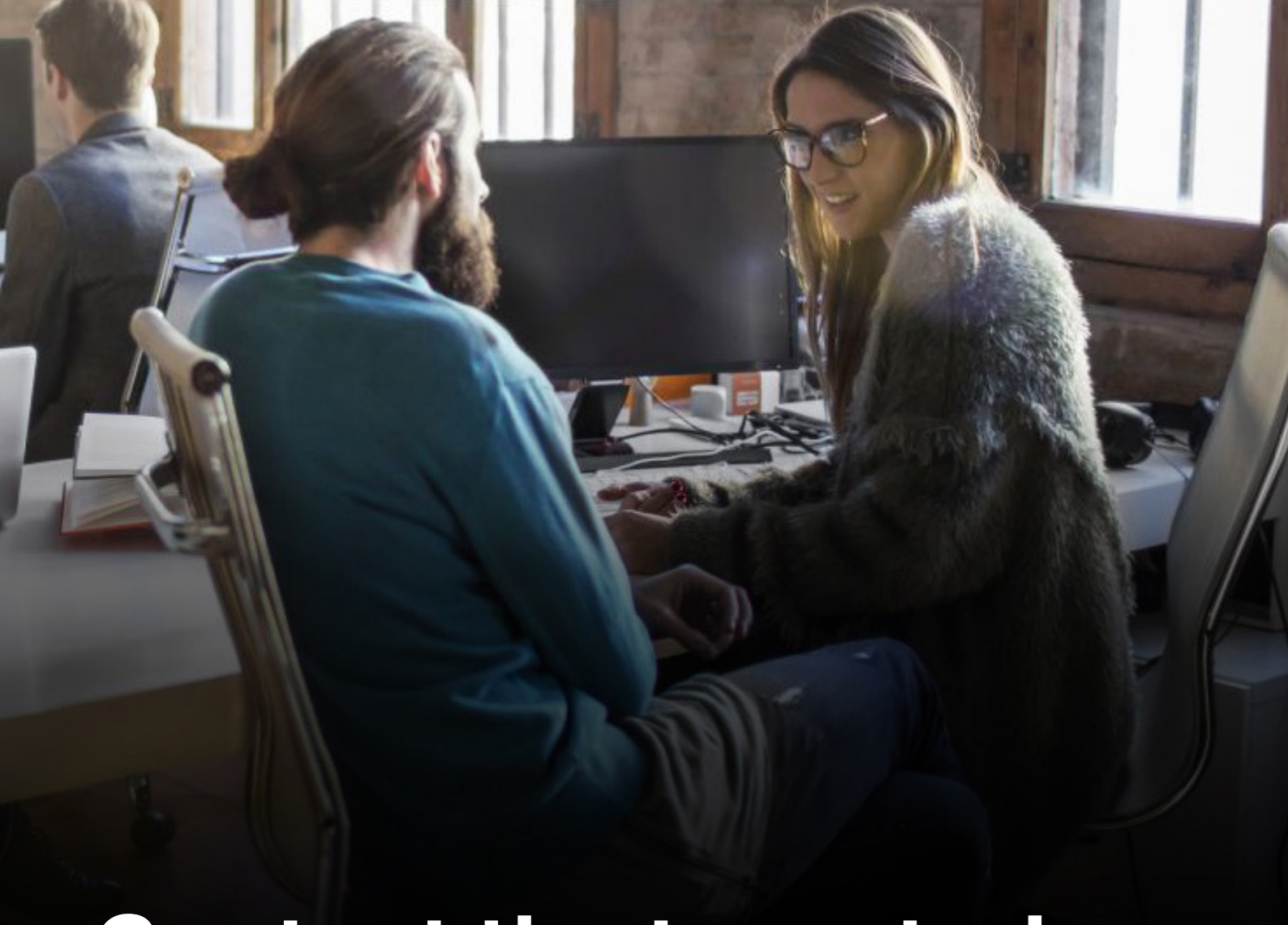

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Welcome to this special edition of the Sync NI magazine

Foreword

Pamela Lamour

Research and Statistics Manager, CCEA

CCEA is a unique educational body in the UK, bringing together the three areas of curriculum, examinations and assessment.

We put the learner at the centre of everything we do. We think about what learners need for life and work and then build solutions to meet those needs. We do this for all levels of education from Foundation Stage and Early Years to A level and beyond.

Our annual Insight Reports provide an in-depth look at trends and patterns, in both GCSE and A Level. The reports contain analyses based on historic trends and patterns for GCSE and GCE qualifications over a period of three academic years, with the aim of promoting discussion and engagement on educational matters, supporting policy makers, education professionals and industry to work together to improve education in Northern Ireland.

Critical to our success are the strong relationships CCEA has forged with schools, colleges, teacher unions and stakeholders. Collaborating with Queen's University Belfast, for example, provided CCEA with the opportunity to develop a Python coding resource for learners aged 11 to 14. These successful partnerships demonstrate the huge benefits for all involved with tangible outputs in areas such as digital skills development.

CCEA is also working on Project Quantum with a range of teachers on a formative assessment pilot to: build on digital skills developed at Key Stage 2; inform teaching and learning in ICT subject classes at Key Stage 3; and prepare pupils for progression to GCSE Digital Technology at Key Stage 4.

To support the teaching of digital skills at Key Stage 3 and GCSE Digital Technology at Key Stage 4, we have developed a Key Stage 3 online diagnostic assessment tool that is aligned to the Digital Skills Framework. It gives teachers feedback on aspects of their pupils' digital skills and helps us discover the areas where schools may need more support.

In 2016, the top candidates in Northern Ireland for CCEA's Software Systems Development qualification were three females. Summer 2019 was the first awarding of CCEA GCSE Digital Technology (Programming) and the top candidate was female from an all-female school, taught by a female teacher, who was delivering a course containing coding learning outcomes for the first time following teacher upskilling facilitated by CCEA.

Conducting these analyses leads to further research into various trends, and in 2019 one research strand developed into a working paper investigating the low participation of females taking computing in Northern Ireland schools.

Our analyses and research has shown that the total entry numbers of females into computing-related subjects in NI at GCSE and A Level continues to be much lower than that of males despite improved employment opportunities. The research suggests that one of the causes of this differential arises from cultural stereotyping.

Specifically, it is the stereotyping of computing as a male-dominated activity that dissuades young women from feeling a sense of belonging in the computing environment. This may be aggravated by negative experiences young females often have at home, at school, in popular culture, and when faced

with computing as a career. These factors establish significant barriers to female participation in computing at school, and are reflected by the low level of female entry across GCSE and A Level in NI.

With the barriers outlined, the CCEA research paper debates a range of potential remedies to low female participation in computing at schools, all considered in light of the need to cultivate a positive sense of belonging for females within the computing environment. These remedies include: the need for further research into the NI educational context; integration of positive female role models into schooling programmes; changes to the computing teaching environment; the integrated use of Inclusive ICTs; and the promotion of computing as a career choice for females.

In a bid to help understand the issues highlighted in the research and help progress the remedies mentioned above, we sought discourse with others and the report was launched at the DigitalDNA conference in Belfast and then presented to the BCS Tech for Good event. Both these events gave the opportunity for us to engage with industry and ask what we could collectively do to improve female participation. Following the BCS event I was delighted to participate in the inaugural round table event held by SyncNI in December 2019 to discuss the report.

The round table had a range of female representatives from Corporate Technology businesses, Academia and Government, all experts in their area. The format encouraged discussion and debate about ways that females can be encouraged to study computing and how society can support this.

Ultimately CCEA's goal is to ensure access for all, but we must also support and encourage participation for all students when there appears to be societal pressures not to.

The research report and subsequent discussions, suggest that there is no short term fix to the issue. Lack of female participation in GCSE and GCE computing subjects is a cultural problem and as such responsibility lies with all educationalists, industry, and the wider public. I hope that by highlighting some of the issues facing young students we will find a mix of strategies that will tackle both the cultural and educational issues.

sync ni magazine

About Sync NI
Sync NI is proud to be the voice of Northern Ireland's vibrant technology and business sector.

The Sync NI website and magazine brings readers the latest tech and business news, views, jobs and events in Belfast and beyond.

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Inside this edition

Investing in the skills for the future

Technology has enabled unprecedented change in the way we live, the world of work and how people can earn a living. The pace of change is relentless and accelerating!

The concept of a "job for life" no longer exists. Now, it is estimated that most people will have at least 3 careers in their working lifetime. And many of those careers have yet to be established.

For a child starting school now, by the time they leave in 10 or 12 years, it is estimated that around 60% of their potential career options don't exist today.

It is not only jobs which will change, it will also be the nature of work. As automation and digitisation increasingly enable machines to perform routine tasks and many of today's jobs

Author
Rose Mary Stalker
Chair of Invest NI

disappear, people's roles will focus on added-value activities and where softer skills such as communications, empathy and relationships are increasingly important.

Whatever the jobs of the future may be, to address the challenges of decarbonisation, digitisation, automation and the Internet of Things, it is inevitable that STEM-related subjects will be in strong demand.

However, we are still not producing the right skills mix to meet today's demand, let alone our future needs. Computer Science and Information Systems are amongst our most undersupplied degree subjects – yet these are where the current and future opportunities lie.

Currently only 14.8% of women pursue core STEM subjects, and are particularly underrepresented in computer science (16%). Despite women making up almost half the workforce, only 11% of engineering professionals are female and female representation in non-traditional, STEM occupations remains low, particularly in senior roles.

Young girls, in particular, are put off pursuing these career options largely due to self-confidence issues, a fear of numbers and data, stereotypes, and the perceived attractiveness of the sector.

This is an issue we must address. And it also places challenges on us all, not just new entrants to the workforce but also those already in employment, for whom continuous training and life-long learning are becoming the norm.

Invest NI works directly with companies to help them upskill and re-skill their existing employees through our Skills Growth programme, which has supported over £220m of investment in skills over the past 8 years. Whilst our GATE (Gaining Access to Employment) initiative incentivises companies to employ disadvantaged workers in order to help address economic inactivity and under-employment.

We also work closely with government departments on wider approaches to encourage the economically inactive into the workforce, and to promote a greater uptake of apprenticeships and higher level apprenticeships.

Alongside the Department for the Economy we have helped develop the Assured Skills programme and a range of academies - key propositions to support the growth of local and international companies, by guaranteeing an available and relevant skills base.

Employers also need to respond to the changing nature of work and consider their total employment proposition as the war for talent heats up.

Employees, either entering or already in the workforce, expect opportunities for personal growth, variety and flexibility and, increasingly an employer with ethical work practices and a strong social conscience.

International research also shows that employers committed to proactively addressing gender gaps by embedding diversity strategies create a more inclusive, respectful and meritocratic employment culture.

That's important because diverse workforces are more efficient, more productive, more competitive and, ultimately, more profitable.

Currently the attractiveness of certain careers is based on history, not the demands of the future. A good job in the past may not necessarily be a good job of the future. In fact, it may not even exist.

We all have a role to play to put Northern Ireland where we aspire it to be.

Given the frantic pace of change, young people, parents, education providers and business, all need to challenge the conventional norms and to prepare all of society for the future of work, through support, signposting, and the showcasing of role models.

The challenge for us all is to help individuals, regardless of age, gender, ability or any other parameter, to be the best version of themselves. In doing so, we will help them increase their self-worth, grow their contribution to the economy and wider society and ultimately improve Northern Ireland's global competitiveness.

Addressing the digital divide

Access to skills is one of the single biggest barriers to business growth across all industries in Northern Ireland, but the problem is particularly pertinent in the technology sector

nnovative firms have created high value jobs in STEM industries, with attractive rewards and great potential, yet they have challenges filling the positions.

Companies consistently tell us that they need more people with degrees in subjects like engineering and technology. According to the 2019 Northern Ireland Skills Barometer, published by Ulster University and Department for the Economy, science and technology professionals will have the most job opportunities over the coming decade, with the number of roles growing by almost a third.

This is not just a problem for the future though – it's a very real issue now. Responding to one of NI Chamber's recent economic surveys, just under half of our members said that their business is currently experiencing a gap between the skills required for their business and the actual skills its employees possess. Over half said that there is a serious mismatch between the skills people have and actual job requirements, which is severely hampering business and economic growth across the province. The economic cost of skills shortages can be substantial and we know that the growth of Northern Ireland's economy is going to become increasingly reliant on the knowledge economy, so the problem is a matter of urgency.

Women are undoubtedly vastly under-represented in the sector. Encouraging more females to study Engineering and Technology, Maths and Computer Science, as well as physical sciences and languages and subsequently supporting them to remain in this skills pipeline, could go a long way to solving those skills shortages.

In order to do so, the sector must tackle the perceived barriers to entry for females. Until such times, women will continue to miss out on job opportunities in a fast-growing sector and businesses will not benefit from their enormous potential.

Last year, CCEA reported that cultural stereotyping of computer users as 'male, socially awkward and intense' has led to a low number of girls in Northern Ireland studying computing. Jobs in these sectors are not for just 'computer nerds' – they should be considered a career path of choice for ambitious, intelligent and commercially minded young women and men. To achieve this, our young people must be introduced to peers and role models who they find both inspirational and relatable. There are many exceptional women and men leading the way already – as a business community, we need to make sure they are seen and heard by the next generation.

Business has a significant role to play in breaking these barriers down and I commend many of our members who have rolled our excellent initiatives already. For example, Deloitte's BrightSpark apprenticeship programme has recently helped 17 women and men from a diverse range of backgrounds to obtain degrees from Ulster University and secure jobs with the firm.

If we're to address the gap, we need to inspire young people not just at graduate level, but at primary and post-primary level too. Neueda's Code Club is a great example of a local company doing just that. By helping primary school children to develop an interest, skills and confidence in coding at a young age, the company is inspiring the next generation of tech talent at the earliest possible opportunity.

Across all industries in Northern Ireland, there is a way to go to address the gender imbalance, which is evident from graduate, right up to boardroom level. Doing so must be a priority for policy makers, educators and business leaders. But we can't do it alone - females can and must, stand up and be counted because the future of this economy relies on it.

How tech has helped journalists tell stories

BBC Three's Fiona Campbell discusses how starting out in electronic engineering led to a career in the media and telling the stories of thousands through tech

Digital, tech, analytics, and engagement - these were all concepts that just weren't relevant when you were trying to think of a career in the 1980s as a teenager in Belfast.

Instead I found myself caught up in the push for girls to become engineers. I applied for Electronic Engineering degrees all over the UK – winding up at Jesus College Cambridge in the winter of 1988. I was surrounded by a lot of guys who had already spent a year in engineering firms and frankly I was lost immediately. There were maths lectures where equations spanned across four blackboards (yes chalk!) and by Christmas of first term I realised I had no idea why I was there or where it was taking me.

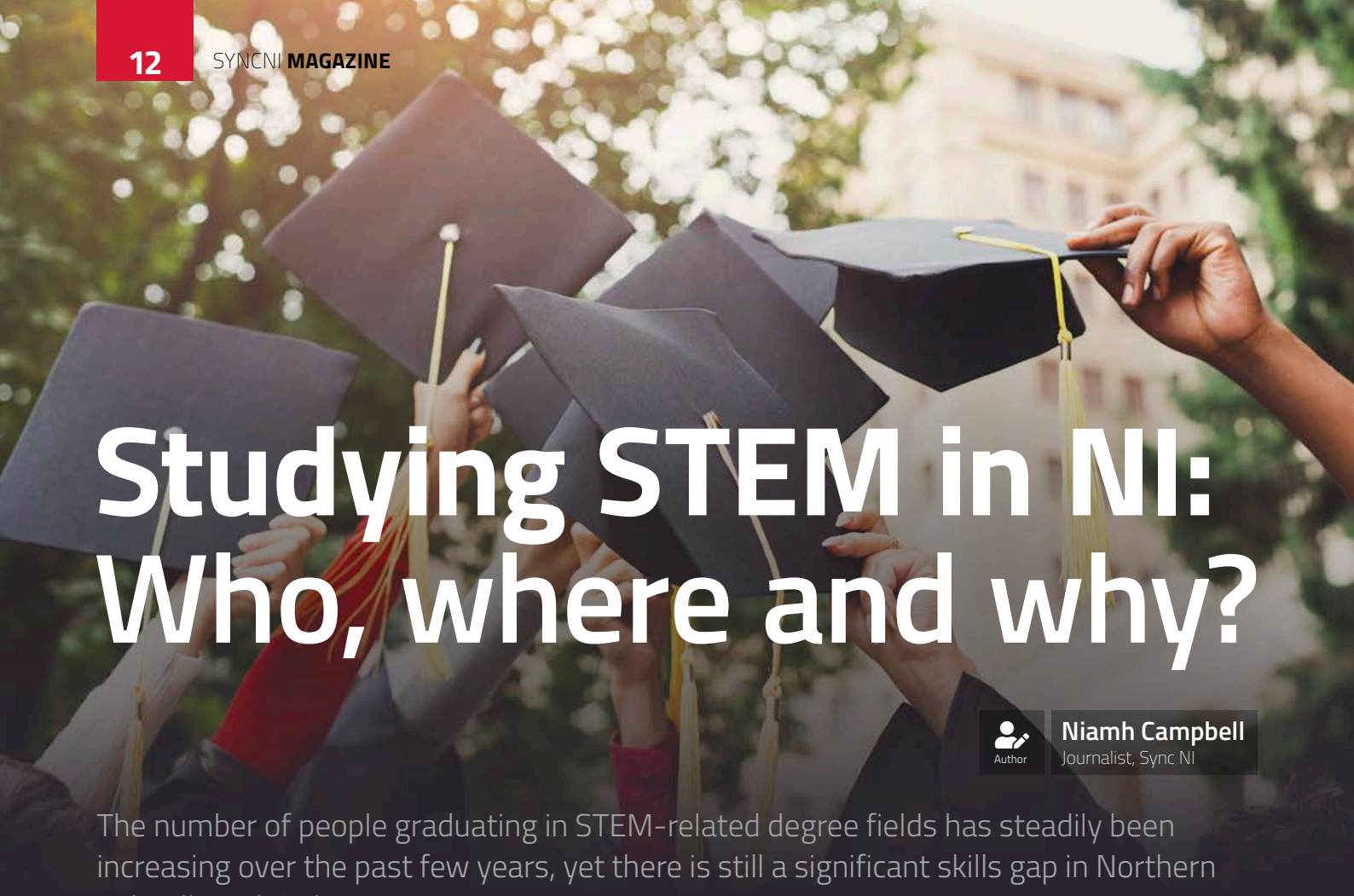
Never one to waste time; I left the course.

Fast forward over thirty years and I have spent time at Infinite Loop; the Apple HQ in California, met Evan Spiegel - the founder of Snapchat, and worked with Jio, the largest digital content platform in India (331 million customers and counting). It turned out the world of digital was exactly where I wanted to be, as a free flowing place to tell stories in a dynamic, unfettered way. It just took 30 years for this opportunity to become clearer.

In 2017 I became the Digital Director of BBC News at a time when the BBC was investing in bespoke content for mobile and online audiences. I have always been passionate about telling hidden stories. I had embraced the early technologies and learned to shoot my own video and record my own sound for documentaries. Now I had this opportunity to tell stories to people all over the world across BBC platforms that reach 30 million in the UK and 80 million globally. I set up BBC Stories as a pioneer BBC brand focussed on the perspective and experience of women, the young and the less well off. These videos drove that new thing called **Engagement!** We found an audience who loved the unfiltered nature of storytelling and it worked.

So my journalism started to meld into the world of tech as we explained our editorial approach to partners like Facebook, Snapchat, Twitter, Instagram and Apple. The way we told stories changed in vertical video and the data analytics showed new insights like - at what point do people stop watching? How many women are watching? How many under-35s are watching? The data all helped change the type of stories we told and how we told them. None of this people-focussed insight was imaginable when I dropped out of engineering in 1988, but it is what excites me about how tech enables real people. That's why I became passionate about digital content.

I now am the Controller of BBC Three's content stream in factual, entertainment and drama, focussed on under-35s. This is the channel that brought us Fleabag; People Just do Nothing and Ru Paul's Drag Race UK. I can safely say all the learnings from the emergence of vertical video, data platform analytics, video production and global tech partnerships are coming together for me at BBC Three. Tech and digital enables your ideas that people may not even think possible, but in which you believe passionately – it is important to support the next generations to believe their ideas. Their concepts can be made a reality using the tech sector. In the 2020s Digital, Tech, Analytics and Engagement are core attractions to any job that the next generation will invest in. We just have to invite them in and wonder; what comes next?!



Studying STEM in NI: Who, where and why?

Author
Niamh Campbell
Journalist, Sync NI

The number of people graduating in STEM-related degree fields has steadily been increasing over the past few years, yet there is still a significant skills gap in Northern Ireland's tech industry

Around 86% of companies surveyed by the CBI (Confederation of British Industry) in 2019 said they were facing digital skills shortages and 93% expect their need for digital skills to grow over the coming years.

Education initiatives such as mTech.Academy are trying to engage more young people with STEM subjects to support talent in tech from an earlier age. However, Sync NI wanted to delve deeper to find out exactly who is graduating from tech-related qualifications, and how can Northern Ireland help engage those that aren't?

Sync wanted to analyse the differences between various areas in Northern Ireland, based on data attained from The Data Times over a five-year span.

A report by the Department for the Economy (DfE) found that in the academic year 2013/14, a total of 2020 people graduated in mathematical sciences, computer science, engineering and technology degrees, of all levels (undergraduates, postgraduates, those studying part-time etc.)

This number has steadily increased, with the latest data showing nearly 2400 graduated in these disciplines in 2016/17. Around 1800 of graduates were male, with a much lower number of 545 females graduating from the same courses.

Only 475 females studied STEM subjects specifically as their first undergraduate degree, compared to a much larger number of approximately 1560 males.

Gender gaps in STEM are thought to be most likely due to social factors. A spokesperson from Queen's University Belfast (QUB) commented that research across 34 countries suggested that "the more strongly people in a country believe in traditional gender stereotypes, the larger the gender differences in math performance in that country."

The spokesperson continued that STEM initiatives at all levels tend to have positive effects on the motivation of girls and their performance in science: "They may also have delayed effects, with graduation rates one year reflecting initiatives put in place years before. The important thing is to monitor these initiatives to ensure they are being positively received and actually lead to improvements in girls' subjective and objective experiences with STEM."

The DfE shows data which is broken into five Multiple Deprivation Measures (MDM) groups; information unfortunately isn't broken down regarding which students originate from which areas.

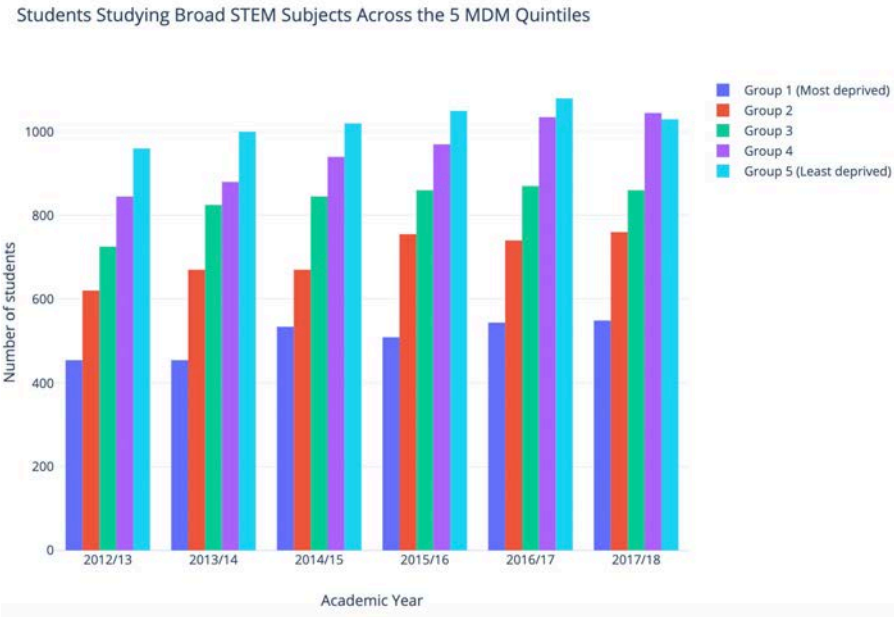
The MDM rank areas based on a number of factors; Income Deprivation (25%); Employment Deprivation (25%); Health Deprivation and Disability (15%); Education Skills and Training Deprivation (15%); Proximity to Services (10%); Living

Environment (5%); and Crime and Disorder (5%).

The groups thus range from Group 1, which comprises of graduates from the most deprived areas, and then is scaled down to Group 5, to the least deprived.

Over time, the number of students graduating with a degree in any subject is surprisingly steadily decreasing. The new data from the DfE though shows that the general numbers for STEM subjects are on the rise.

It should be noted that 44 students with no postcodes are omitted from the DfE data, so these cannot be accounted for.



Broad STEM subjects as this graph depicts, relates to areas such as medicine, dentistry, and veterinary sciences. Narrow STEM is a subset of these relating to such disciplines as biological, physical, mathematical and computer sciences, as well as engineering and technology. Both broad and narrow STEM subjects have seen large increases in uptakes from the country's most deprived areas.

Targeting earlier education

Earlier in 2019, The Council for the Curriculum, Examinations and Assessment (CCEA) reported that few girls are choosing to study computer-related subjects at GCSE and A-Level, especially in all-girls schools.

This year's GCSE stats also showed a 1.4% decrease proportional entry for STEM subjects, but CCEA said it was too early to discern a trend. Nonetheless, although STEM subjects have more male entries as a whole, statistically females gained a higher percentage of higher grades at GCSE overall.

The A-level results in 2019 also revealed that more girls than boys entered science subjects for the first time.

Application rates from the most disadvantaged 18-year-olds to university between 2009 and 2018 have also increased dramatically across the UK, but particularly in Northern Ireland, according to a report regarding Patterns and Trends in UK Higher Education in 2018 by Universities UK.

When asked about what the country can do to engage more females in STEM subjects, QUB listed multiple initiatives it has developed to encourage this, including a 'Girls in Maths' event, 'Women Creating Our Tech Future' and open day events.

Sync NI contacted the DfE regarding all of this information. A spokesperson responded with an extract from their Women in STEM report, which said: "A girl's motivation to pursue a Core STEM career can be influenced by self-confidence, stereotypes, educational environment, the perceived attractiveness of the sector and social factors including peers, parents, the presence of role models and media. Girls have lower levels of self-confidence in their ability than boys in mathematics and science and are less likely to continue in STEM education or pursue STEM careers, even within the context where they outperform boys.

"Interviews with women in STEM careers across NI found that resilience and determination to succeed, despite the potential barriers, are key. However, the interviewees recorded a supportive home environment where STEM experiences were the norm and the presence of strong role models and mentors as being every bit as important."

The DfE provided Sync NI with a further report that shows in 2016/17, a higher proportion of males qualified in a STEM subject, but a higher proportion of females graduated with a first class or second class upper degree across all disciplines.

The department also said an initiative that may be encouraging people from more deprived areas to engage in STEM is their 'I'm Happy' programme, which is specifically aimed in areas of disadvantage.

Possibly more opportunities are becoming widely available for females and all those from lower socio-economic backgrounds now. However the results of these will not be brought to fruition for at least a few years, when the career pathways of today's children and teenagers will show for it.

Encouraging girls in STEM is a matter of 'principal'

Author
Niamh Campbell
Journalist, Sync NI

Karen Quinn, head teacher of Victoria College, Belfast talks to Sync NI about how the education of wider society is needed to break down the barriers between women and STEM

Karen is a past pupil of the school herself and has taught maths her entire career. She has taught in mixed schools as well as all-girls/all-boys schools and is passionate about mTech.Academy, which Victoria College is now involved with.

She told us she currently sees that girls are enthusiastic about STEM and that it is so much wider than just science, technology, engineering and maths; "There's a lot going on in school and the girls want to do it. In one of my first mTech panels, a computer programming company said that some of the best computer programmers that they see have English in their background, because they can tell a story. I really hadn't thought about that before."

A common theme amongst most women Sync NI has interviewed recently is that there is a perception in which one has to have a scientific background to break into the tech world.

Karen said: "We need to get people to understand that a tech savvy company still needs to have so many other employees. It doesn't necessarily mean you need to have a STEM-based degree. It means that you need to have good people skills, marketing backgrounds, HR backgrounds and so on. Every subject has its part to play.

"In history pupils learn about resources and the past. In geography they can compare and contrast case studies. It's about firing the imagination, and all of that actually helps with STEM. I'm not as worried as a principal of an all-girls school about girls' engagement in STEM. My bigger worry is that we need to do more work in helping people understand that STEM actually is much wider."

We discussed the cultural issue facing women in STEM and deliberated whether its parents and the wider community that may need educated on the opportunities STEM careers can bring.

Karen continued: "I think there is this traditional perception that the only good options are high-earning jobs like lawyers

and medics. You need to make sure you get the work/life balance right. The wider community needs to hear from employers that, actually, you don't need to have a computing degree to go and work in this tech company, that they have all of these programmes where they'll upskill you and work with the degree you have.

"What's important is that you do something that you're passionate about and that you enjoy, and ideally something that you're good at. If you do all of those things you'll develop skills that will allow you to go into whatever jobs you want to go into. That for me is more important. I feel it's more external pressures rather than internal school pressures pushing the "traditional" careers along."

Progress is already being made though, with social media having a part to play, and universities coming together with schools to bring careers fairs and taster events that involve pupils, parents and teachers. A focus in previous years may have been; if someone is particularly good at maths, they should go on to be an accountant. But, Karen commented: "We're breaking down years and years of education."

She continued: "My fear at the moment - because I do see a decrease in STEM numbers - is that we narrow subjects at A-level when actually I think we should be widening. I think the competition for university, particularly at home now, is so high that they want three good grades and three subjects. We're missing even that fourth AS. So you might have had, for example, pupils aiming for degrees in medicine, would study biology, chemistry, and maths. They might have had physics as their fourth subject but we're possibly seeing less of that. Similarly, we're seeing less of three sciences and say a language, which worries me. We narrow down when actually we need to be encouraging more breadth at that stage, so that people can make more informed choices."

Are we victims of circumstance? As the NI economy has faced economic downturns and university fees have increased over the past decade, is the pressure getting too much for our young people? Getting a job can be more difficult anecdotally in some areas, yet the NI tech sector has a serious shortage in skills. Are students being pigeonholed by their subjects and not realising the scope of careers that could be made available to them by exploring different disciplines?

Karen certainly seems to think so, as she commented: "We tell our young people that they need three good A-levels for university and for jobs, but in saying that we're not encouraging them to keep on a subject because they enjoy it. They should just take it because they never know where that might take them at some point. It struck me whenever the employers said that some of the best computer programmers have creative backgrounds; how are we actually in our education system encouraging that?"

My final question to Karen was that if a young girl was considering a career in STEM but was intimidated or afraid, what advice would you give to her?

Her answer was both honest and modest: "I'm the wrong person to advise that girl because I'm in a school. Sometimes I tell the pupils I've never worked in the real world. Where I get to advise that person is through what I do in terms of our careers programmes and who I invite in as guest speakers.

"For example, just before Christmas, I read what I think at the time was the most widely read piece of research across the world. It was recently published by Queen's University Belfast regarding vaping and was conducted by Dr Deirdre Gilpin. She's a past pupil from Victoria. I got in touch with her and asked her to come to speak to our girls.

Karen Quinn, head teacher of Victoria College, Belfast

"So I advise the pupils by introducing them to people with different life experiences, and I always look for people to do that who solve problems and have had different pathways. Real life is no straight path. It was for me as I did the 11 plus, GCSEs, A-Levels then my PGCE and straight back into school, but I'm the minority. The biggest question I've asked the pupils is, go home and talk to whoever is in their house about how they got into their jobs, and most people ended up in that job, by chance or in a way they never thought they would. That's the real world."

It was refreshing to hear from a school principal that wants to prioritise pupils' personal preferences and mental health above grade levels and league table scores. It was invigorating to have an educator enlighten students to take risks and embrace the not-so-straightforward path. It is the hope then that any young person – male or female – reading this interview takes away something I feel can be summarised through a quote by Harley Davidson; "When writing the story of your life, don't let anyone else hold the pen".

What exactly is the problem with the lack of women in tech?

This piece was contributed to Sync NI by mTech.Academy's Diane Morrow and Bazaarvoice's Seamus Cushley

At first look, most people from the novice to the expert would highlight the lack of women in technology and the broader start-up ecosystem as a pipeline problem.

In March 2018, prior to their 'Stemettes' event held in Derry, job site Monster published the research that nearly half (45%) of UK employees believe that women are underrepresented in jobs that require tech and digital skills.

According to statistics, only 11% of women pursued an IT and tech degree at university. Although there is a continuous debate in Northern Ireland around the number of university places available to study computer-related subjects at our domestic universities; the argument around widening access to careers in tech and digital is a much more complex discussion. In essence, it is a complex problem which is not new and indeed not unique to the tech sector; however, in a world which is digitally transforming, it is imperative that all our young people and their family influencers are aware of the opportunities which exist. The economy is transforming - technology is creating new jobs and changing our lives, our society and our planet through blockchain, artificial intelligence (AI), wearable computing, drones, robotics, predictive analytics and 3D printing. While the polling company MORI suggests that teachers are the most trusted citizens to give advice; to drive change requires a collaborative approach from those in tech, business leaders and parents to help all under-represented see the contribution they could make in this world of complex problems.

Let's explore the factors that drive women to pursue technology career pathways from their earliest years to later in their careers.

As a parent of a daughter, would I suggest a career in tech to her? My view is at nine years old she is too young to decide on a career choice, but she is old enough to start looking at her skills and passions. I want her to make informed choices throughout her life, whether that be her next school, her subjects, her work experience, the country she chooses to live in, her route to higher or further qualifications, or the company she chooses to align her values to. I want her make informed choices with a curious and questioning mind.

In a world of digital overload through Instagram, TikTok and YouTube, it is relevant to ask; "are role models important as an influencer for girls?" In November 2019, a study commissioned by CW Jobs, indicated that role models are more important for women than men. 60% of women working in STEM (science-technology-engineering-mathematics) say that they have been inspired by a role model compared to 46% of men. For women working in tech, role models are even more important: 64% were inspired by a role

model to pursue their career compared to just 47% of men.

However, a recent study conducted by professional services firm PwC, indicated that only ''22% of students can name a famous female working in technology, whereas two thirds can name a famous man working in technology". Further statistics suggested that a quarter of female students say they've been put off a career in technology as it's "too male dominated."

In comparison, if we look to the Republic of Ireland, where Microsoft Ireland's Managing Director is the inspirational female leader Cathriona Hallahan, is the situation any better? Statistics from a survey conducted by female-based STEM initiative, I Wish found that "59% of girls in the Republic of Ireland believe they don't know enough about STEM careers. 93% of teachers say that self-belief in girls' own ability is a major roadblock to STEM promotion in schools, and 90% of teachers want to see workshops for girls to enhance resilience and confidence." Momentarily ignoring the STEM as opposed to the wider STEAM for a moment, the similarity in problems is interesting. However, perhaps where the Irish are leading is in a joint approach to tackling the issue with an agreed collaboration with not-for-profits, tech companies, and universities leading new initiatives endorsed with ministerial support.

The situation is similar across the pond. In the USA women make up less than 25% of the STEM workforce. Data from the US National Science Foundation shows that between 2006-2014, the number of women graduating with a degree in computer science actually declined.

Economic Drivers

While at a basic level less women in tech can be seen as a pipeline problem, there is a valid economic argument; currently in 'tech' across software houses, professional and financial services there is an undersupply of people (talent) to fill in excess of 325 vacant positions per year.

Therefore, increasing the pipeline will to some extent alleviate the pressure on companies trying to recruit and this is positive for the economic growth of NI. However, it goes deeper than current recruitment needs. 95% of businesses are seeking to increase their demand for digital skills in the future; with current overheating in the market, does this play well for NI as an FDI (foreign direct investment) tech hub in the long term?

The CBI (Confederation of British Industry) argues that the current situation is a people and skills issue with foundations in a mismatch between industry needs and content taught at higher and further education. However in order to address the issues of too few girls going into tech, we at mTech.Academy believe the issue is deeper. With the much-discussed impact of AI and automation, every job will be a technology job. Microsoft's educationalists predict that "in fewer than ten years, we estimate three in four jobs will require deep and specific technical skills." From a Northern Ireland lens, the recent Tech Nation report suggests that "nearly one in four jobs advertised in Northern Ireland last year was for a digital tech worker as demand for talent grows in the sector." The Skills Barometer created by Ulster University suggests that in a high growth scenario for NI, the Information and Communication sector will grow by over 50% with one in three jobs requiring an undergraduate level educational qualification.

In NI, not having women participate in computer and technology is a serious issue which is causing short term heartburn for the NI economy, but if not addressed NI will not grow at the required rate.

The skills demanded in this transforming economy have been coined as 21st century skills including critical thinking, collaboration, creative problem-solving, self-awareness, self-management, responsible decision-making, and the ability to construct complex solutions. They will all be required in this digital age.

This is important because in this knowledge, we are missing key skills in which girls and women excel at – problem-solving. The Global Educational standard tests PISA (a test that evaluates students' academic abilities). In 2012 individual problem tests showed that in isolation boys outperform girls. However in 2017, assessing 125,000 15-year-olds to see how well they solved problems collaboratively, girls "on average, were about half a year ahead of their male classmates in collaborative problem solving." This is significant when the working world values collaboration and team working. In NI that translates to problem-solving for some the biggest tech and engineering firms from Belfast but with teams located across the globe.

Authors
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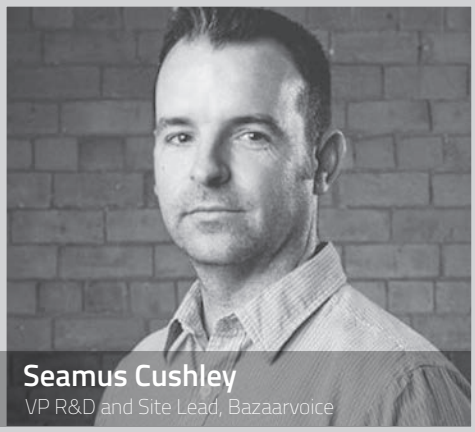


Seamus Cushley
VP R&D and Site Lead, Bazaarvoice

The concept of problem-solving in computing is not new and indeed; if we look to the 1960's and the work of the Lincoln Labs at MIT, more than one in four 'career programmers' (a term categorising those working with technology) were women. One of the women and indeed the lead programmer, Mary Allen Wilkes attributed the statistics to the fact that the work of the 'programmers' at that time was not seen as 'high status work'.

In her interview in The New York Times, Mary recounts that the work she and her team did was akin to solving complex problems. "It was like working logic puzzles — big, complicated logic puzzles," Wilkes says. "I still have a very picky, precise mind, to a fault. I notice pictures that are crooked on the wall." The skills of the female 'human computers' lay in their mathematical educations, and this can be seen in Hollywood adaptations of the women behind NASA, such as the movie 'Hidden Figures'.

If we go back to careers advice of the late 1990's, Maths and English were deemed as the subjects students were advised to study if they wished to follow a career in technology or engineering. In recent years the additions of computer science subjects have posed problems for head teachers in a metrics and league tables-focused environment. Educational funding pressures and competition for student numbers equates to curriculums offering subjects which will allow students to achieve above the NI average of A*-C. So, is it essential for students and female students in particular to study computer science at school? Are there better ways to highlight to young girls the value they could bring to the tech sector and the type of work they could be involved in?

Females aren't considering technology careers as they aren't given enough information on what working in the sector involves, and also because no one is putting it forward as an option to them. Unless you work in the sector it is difficult to comprehend the endless roles and opportunities available to young, bright curious minds and it becomes more of a conversation about talent diversity than a narrow focus of girls in tech. Technology organisations need to highlight how technology is a force for good if they want to attract more females to the sector. Half of females say that feeling like the work they do makes the world a better place is the most important factor when deciding their future career.

So what can be done? If we look to the Republic of Ireland again, beginning teachers spend a semester in a start-up - giving those whom are most trusted in influencing young people real insights in the opportunities of tech enabled jobs.

If role models make a difference in helping young girls see themselves in a tech career, is it incumbent on all our tech driven businesses to highlight their leading ladies?

Researchers from the recruitment company, Nerdelia state that "girls lack a sense of "belonging" to a tech community, but they also lacked the facts – the doors that open as a result of a computer science degree or the amount of money developers have the potential to earn, for example. Many respondents felt that the opportunity to meet women who work in the tech industry would have been invaluable when they were making their career choices. These are all things that start-ups have the power to change."

We are living in an age of increased complexity and are facing global challenges at an unprecedented scale. The nature of connectivity, interactivity, and information is changing at lightning speed. In a world of choice, informed and perceived options, how can we as parents, educators, business leaders and females in tech collectively work to improve women's participation in the tech industry at each key stage of their careers?

This movement to build a generation of design thinkers could not be timelier or more relevant, but it will take the ability to open our eyes to see what could be for our daughters, and a willingness to work collaboratively to create a diverse workforce for all in tech. We need to enable a generation of leaders who believe they can make a difference in the world around them because we need this generation to build new systems and rebuild declining ones. We need them to be great collaborators, great communicators, and great innovators.

NI tech companies make their mark on diversity

Christine White discusses how Diversity Mark NI recognises organisations' commitment to diversity

Diversity Mark NI Ltd is a not-for-profit organisation which awards companies the Diversity Charter Mark. Members join a learning community which supports them to work towards achieving, and maintaining, the now highly regarded, Diversity Charter Mark.

With seventy progressive organisations signed up to their learning community many now hold the 'Mark of Progress' which is as a public declaration for their commitment to Diversity - vital in today's competitive talent market.

Founding member Allstate NI were one of the first in NI to achieve the Charter Mark and since then Liberty IT, Learning Pool, Outsource Solutions and Slice now have achieved the award and can use the Charter Mark symbol and are clearly recognised as progressive and inclusive organisations.

Diversity Mark NI members benefit from the sharing of best practice through Roundtables, best practice sessions, keynote speaker events and annual independent feedback. The Inaugural Diversity and Inclusion Summit hosted by Diversity Mark was held on Thursday 20th February in Titanic Belfast - the first of its kind to take place in Northern Ireland.

Head of Business at Diversity Mark NI, Christine White said, "Diversity and inclusion is one of the biggest challenges facing the tech industry today especially considering that every other sector is reliant on technology. Just 7.8% of girls in N Ireland currently pursue a career in STEM to the point of employment so companies must adapt their strategies now to be able to attract & retain diverse talent needed to compete in the coming years.

"Members utilise our framework to give them structure, focus and accountability and they come up with their own targets to be assessed by our independent panel. Some of the Gender Diversity initiatives that our members are working on include mentoring programmes, flexible working practices, gender balance through succession planning, women's returners programmes and education outreach initiatives.

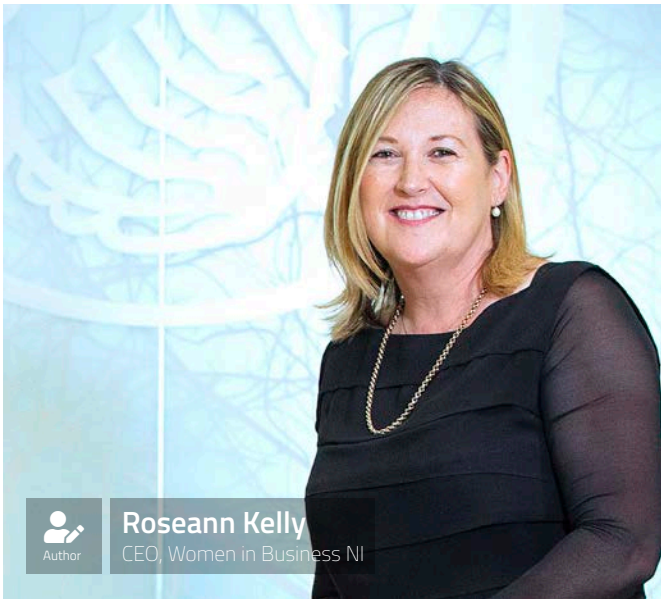
"When Diversity goes beyond 'ticking a box' with an effective strategy to attract and promote a more diverse workforce, it will naturally lead to a more inclusive culture. When a company's culture feels fair and inclusive, women and underrepresented groups are happier and more likely to thrive."

If you are interested in pledging your company's commitment to the Diversity Charter Mark find out more at www.diversity-mark-ni.co.uk.

Real leadership can deliver £7.08bn to our economy

Roseann Kelly, the chief executive of Women in Business NI discusses the UK's gender gap in entrepreneurship and how closing it can benefit the nation in more ways than one

In September past, the HM Treasury launched a review into barriers for women in business which has become known as 'The Rose Report', and while it reported that the UK is one of the best places in the world to grow a business, it also found that women are half as likely as men to be involved in starting one.



The review found that only one in three entrepreneurs are women and that closing the gender gap could add an additional £250 billion in Gross Value Add to the UK economy, equivalent to 4 years of economic growth. Northern Ireland's potential share of this is £7.08 billion!

The same review found the five key barriers that lead to lower rates of entrepreneurship amongst women are: low access and awareness of capital; greater risk awareness; perceived missing skills & experience; disproportionate primary care responsibilities and; a lack of relatable sponsorship, mentorship and role models.

At Women in Business we understand the need to tackle these five obstacles and keep female enterprise at the top of the agenda. Last year on International Women's Day, we launched the new three-year programme, 'Yes You Can' supported by Invest NI and the 11 councils, aimed to assist female entrepreneurs in breaking down these barriers.

We are excited and energised to support these, our wonderful entrepreneurs who are talented, skilled and have so much to offer our economy - £7.08 billion to be precise. However, the findings from 'The Rose Report' and the need to implement real, tangible change compound the need for strong leadership in business, and in Northern Ireland.

When considering exceptional leaders today, it is important to recognise New Zealand Prime Minister Jacinda Ardern as a great example of strong leadership. This 39 year-old politician has already had a remarkable impact on world politics proving she's a true leader for modern times.

The youngest female Prime Minister New Zealand has ever had, and only the second world leader to have given birth while in office, she represents something entirely new in world leaders. She embodies the best attributes of optimism, common sense, approachability and, most of all, empathy.

In her debut speech to the United Nations Assembly, she reflected that, for true progression for all, "MeToo must become We Too" and she demonstrated her wise and worldly views, asking for global cooperation and kindness from all leaders present which was met with thunderous applause.

Her actions in the wake of the tragic events in New Zealand last year clearly indicate that their applause was well warranted. Through her kindness and inclusivity, she has shown that not only is she deeply empathetic, but she is strong and decisive – and can lead in times of chaos and tragedy.

This is the type of leadership we all need and deserve, including here in Northern Ireland. We need leadership which strives to implement the initiatives set out by the Rose Report.

"If it wasn't for a female software teacher, I might have dropped out"

Lauren Vallely talks to Sync NI about her experience of the PwC Flying Start Software Tech Degree Programme

Author
Niamh Campbell
Journalist, Sync NI

Lauren Vallely from Portadown is now in her second year of the PwC Flying Start Software Tech Degree Programme, in which she earns a salary all year round while also getting her full tuition fees paid for to study at Queen's University, Belfast.

Lauren told Sync NI: "I left school in 2018 and applied for a software engineering degree at QUB. Anyone who applied for the course then received an e-mail asking if they would like to apply to switch to the PwC tech degree. I remember my mum was putting up the Christmas decorations at the time and I went into her and said 'I don't think I'll get onto it, everyone who applied for that software engineering degree got that e-mail so they'll all be applying for it too.' It seemed way too good to be true.

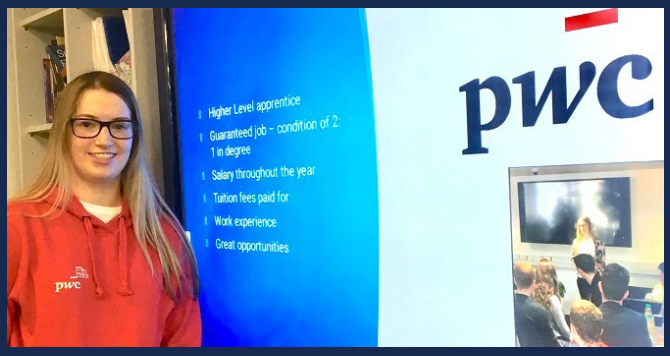
"It was the first year PwC had launched the degree as well and they also have the same programmes in universities in Birmingham and Leeds. The reason it seemed too good to be true was because it is debt free – I don't even need to get a part-time job."

Lauren is paid monthly by PwC, while still getting to enjoy life as a full-time student. She works for 10 weeks in the summer as an associate for the firm in their London office from Monday to Thursday, and then works on a Friday in the Belfast premises. She talked about the extra perks this has given her – earning valuable experience in the industry but also getting access to the best London hotels and earning airline miles.

She added that her tech degree classes are essentially the same as QUB's Software Engineering Digital Technology degree, with her first academic year including the same modules as that of Computer Science and Computing and Information Technology. Now in her second year, she is learning more about the software engineering side.

Lauren continued: "When I was growing up I liked playing on computers and I did ICT for GCSE, because when you got into class you were able to sit down at a computer and work at your coursework straight away. I liked it because it was a different setting; it wasn't just sitting at a desk while a teacher stands at the front and talks while you write. Then we had to develop a very basic platform-based game. I showed my teacher and she said it was really good. She suggested that I take on Software Systems Development for A-Level.

"I looked into it and it sounded interesting. I liked the whole idea of problem-solving, but I was terrified at the start when I first walked in as I was the only girl in the class with about 19 boys. I didn't know them very well either as they hadn't been in any of my previous classes. A lot of them had studied Computing at GCSE so they knew loads about coding whereas I didn't, but I kept working at it and doing it for my own benefit. Eventually I nearly did better than a lot of those who had previously studied coding."



Lauren is guaranteed a job with PwC at the end of her degree programme, although she isn't contracted and is free to go wherever she pleases. She was selected from hundreds of applicants for the scheme and secured one of 20 places allocated to people in Northern Ireland. Out of those 20 places, there are only five girls in Lauren's year, including her. She talked about her passion to inspire more women to get into tech, and her own inspiration: "Mrs McKernan was my ICT teacher that encouraged me to take on the Software Systems Development A-Level, which she also taught. If it wasn't for having a female teacher, I might have dropped out because as I said, it was really intimidating initially. She was always motivating me."

Lauren's past school, St Patrick's Academy in Dungannon has been offering the Software Systems Development A-Level since 2014, which Lauren studied alongside Biology and Maths. Last year, a further two of the Academy's pupils were successful applicants for the PwC Flying Start Software Tech Degree Programme, Ailise Wylie and Lorcan Kilpatrick. Lauren was recently invited back to school to talk to current pupils about all the opportunities a career in tech has given her, encouraging them to consider a tech apprenticeship route.

Meet the women using tech to fight poverty

ESTHER is a peer to peer charitable donation platform, which allows the user to donate directly to someone living in need in their own city

Once signed up, the user receives a short biography detailing the situation of a local person in need. They will then get updates on how the recipient is doing once they receive donations, which they receive on a pre-paid card.

Co-founder Ailis McCaul said this "looks like a normal bank card, and the recipient of the donation can spend it on anything they like in shops; they just can't take money out of an ATM machine with it. In the future there will be restrictions on certain things though, such as alcohol and gambling."

Chief executive and co-founder Carol Rossborough had the idea for ESTHER around two years ago, having noticed the increase in the lack of trust towards charities, yet increase in need from people living in poverty. She believed that peer-to-

peer giving could help to combat this. She watched a video about a YouTuber who was contacted by what he assumed was a scammer from Liberia.

Ben Taylor from the Youtube channel Pleasant Green was contacted by Liberian Joel, who asked if he could send him some electronics which he would sell and then split the proceeds with Ben.

Ben, who specialised in exposing scammers, had even previously gone viral after posting 'horse poop' to a different Nigerian scam artist. He said his initial theory was to waste as much of Joel's time as possible, but then he asked him to take some photos of Liberia on his phone and send them to him with the promise of payment.

The first pictures were blurry so Ben sent Joel a $30 camera and gave him some photography tips on holding the camera still and finding good lighting. The end result was 20 shocking images of Joel's impoverished village. Ben went on to create a photo book showcasing this work of Joel's– who said he wanted to be a journalist. The book entitled By D Grace of God initially sold around 2500 copies at $10 each, raising $25,000, according to the Daily Mail.

This money was then used to help Joel, his family and the children in his Liberian village.

Carol saw this video in 2017 and to her it demonstrated that if a person gives another person trust – the way Ben did by sending over the camera to Joel – they will use that help to do good.

She wanted to recreate that sense of trust between two strangers in Belfast, so that someone who wanted to help could directly donate to someone in need, with the peace of mind of knowing that the money was actually helping.

Ailis said they had originally thought of using Blockchain to do this, but that no Blockchain start-up needs Blockchain to start-up. There were other simpler ways to get started on solving this problem.

She told Sync NI: "People often think, 'where is my money going and is my donation making an impact at all?' We thought that if people could see a direct impact on an individual from their contributions, will that make them more likely to give? So we tested it out when we first started.

"We contacted Storehouse food bank charity which is one of the largest food banks in Belfast city. They put us in touch with five people in need on very low incomes, and then when people donated to them we collected those donations through the charity's website and texted the donors to let them know the impact they had made. We had no marketing budget but we actually raised a grand more than our target."

"One person was able to buy their son a Christmas present for the first time. One could top up their electricity when otherwise they would have been sitting in the cold and dark. Recipients started to accept the counselling provided by Storehouse, whereas before they didn't want it. Not because the money freed it up, but because for 6 weeks they didn't have to focus on things like 'how am I going to feed my kids next week?' By helping to fulfil people's basic needs, it was actually making other services offered by the charity more effective. That is why all of our recipients are also supported by our partner charities."

ESTHER has received funding through grants and is now a fully functioning app. The team has recently launched another larger scale pilot and are on the lookout for new donors and any corporations that want to get involved. Currently, anyone from anywhere can sign up as a donor but for the time being, donations are only going to vulnerable people living in Belfast.

The team hope to expand the initiative to help major cities worldwide in the future. They even won an all-expenses paid trip to New York City in January to showcase the app. The plans are to move into the US market, as Carol said: "There is a real wealth divide in major cities such as New York and San Francisco, so it's important for us to learn what is happening in the American third sector."

If you are part of a company that would like to collaborate with ESTHER, please contact us at the email address below.

Email **ESTHER**
hello@esther.org.uk

Why is diversity in people and talents needed in tech?

Deepa Mann-Kler is a woman of a thousand - if not a million - talents. She sat down with Sync NI to explain why being a woman in tech does not mean confining yourself to one type of career

Deepa is a consultant in equality, diversity and inclusion, a TEDx speaker, CEO of her own med tech company, Visiting Professor in Immersive Futures with Ulster University, a Non-Executive Director holding positions across the UK and an award winning artist to top it all.

Her firm, Neon specialises in immersive software applications for health and wellbeing, including the BreatheVR app to help people relax who are suffering from anxiety or pain. As a Non-Executive Director she serves on the boards of the Public Health Agency and Registers of Scotland. Her artistry focuses on light based installations, paintings and prints, and she has been commissioned for several large scale permanent public artworks.

Deepa's skillset has swept across the tech, health, art and public sectors, and she is also a well practised public speaker. Her story really resonated with us at Sync NI; the fact that she strikes a balance between the 'corporate' and the 'creative' –

Author **Niamh Campbell**
Journalist, Sync NI

through having her own business and still taking time to produce her own art.

Using tech to better society

Deepa told us that when she studied social policy at the London School of Economics, she had no inkling about the tech industry. She said: "The one consistent aspect throughout my life and career is my value basis, in that whatever I do has to have a positive impact on people around me and it has to contribute constructively to society."

Having now published extensively on virtual reality (VR), she told me that she initially became interested in VR in November 2016, and then set up a new company to realise a project called "Retne". She continued: "It was 2017 really that the idea for developing VR and augmented reality (AR) for health started to properly crystallise. Around the same time, I had been invited to a pain hackathon, to develop a solution for people living with chronic pain that is persistent for three months or more."

Deepa said it was there that they developed BreatheVR. She carried on: "The breath is such a powerful medicine for human beings. We each breathe up to 23,000 times daily, but we are not taught to breathe deeply or properly. In fact when we are stressed or in pain we go into a state of shallow breathing which can exacerbate our stress or pain. So for me BreatheVR uses the best of what cutting edge technology has to offer and combines it with the essence of what it is to be human."

We asked Deepa her thoughts on gender inequality within the tech industry, and what society can be doing collectively to challenge gender bias and discrimination. She believes "that the conversation needs to include intersectionality so race, age, disability, LGBTQ+ and other equality characteristics are part of this conversation. The focus is always on how we can get young women into the tech industry, as if the problem is with young women themselves. To be honest many tech companies should be focusing on retaining the women that they already have in their workforce. The industry needs to recognise the role that their policies and culture play in causing inequality. By implementing more open recruitment strategies, with specific and measurable performance evaluation criteria and by having transparent procedures for pay, bonuses, promotions and project allocations, this will help to start to address some of these systemic barriers."

"It is also about the tech industry having women in leadership positions and having role models. People get inspired to do something when they can see others like themselves doing it. When women see other women in these roles, they find it easier to imagine themselves in those roles. This is not rocket science and it's like Marian Wright Edelman said, "you can't be what

you can't see."

We also need to start thinking seriously about implementing quotas. Quotas are not an anathema to meritocracy, what they actually do is increase competence levels by displacing mediocre men. This finding is based on fascinating research in Sweden. Once again we need to change the narrative of focus and move the burden of the argument "from the under-representation of women to the unjustifiable over-representation of men".

Northern Ireland's tech scene is fortunately booming. Not only are there indigenous start-ups popping up frequently, but foreign direct investment has been growing steadily over the past decade. Deepa then pointed out that if these tech companies want to attract, recruit and retain the best talent then they are going to have to deliver on a clear "employee value proposition." "This has to articulate a healthy, inclusive culture where every employee is valued to be their best unique self and it has to be meaningful and not just pay lip service to these ideals."

"If I was a women in the tech industry looking for new employment opportunities I would do my due diligence. I would look at the company structure and pay close attention to the composition (gender, race, age and so on) of their board, executive and senior management teams. I would read Glassdoor reviews. I would read the company gender pay gap reports. I would read the company's equality, diversity and inclusion policies and see what commitments are made on the company website and I would reach out to women currently working in the company to hear their first hand experiences. We are in a market of high demand for these skillsets and you have choice."

"Diversity leads to innovation"

"To be honest the business case for diversity and inclusion is overwhelming. We know that profit margins at the most diverse companies are 14% higher (source: McKinsey 2012). The relationship between diversity and inclusion and innovation is also fascinating where companies that have more diverse management teams have a 19% higher revenue due to increased innovation (source: Boston Consulting Group 2018 research based on 1700 companies across 8 countries). For me it's very simple, diversity in thinking, experience and background are strategic competitive advantages to drive innovation and by getting this right tech companies will build the next generation of meaningful digital experiences, services and products. It also means that these tech companies are more likely to meet the needs of all of their customers, and to generate ideas and qualify concepts to fill the innovation growth pipeline more efficiently."

Predictions over the future of what work will be are so uncertain "While an increasing number of jobs will be mechanised, creativity is still a unique human skill that may be difficult to replace through automation (for now). What is important is having an innovation mindset."

Deepa told me that while she does not believe in having regrets, when she reflects over the past, "I do not regret times when I have made a fool of myself, but rather the times when I have been silent. That was probably my motivation behind becoming an artist in 2007. I have this talent that I had never felt brave enough to pursue, so I took a career break and spent the next 11 years painting and teaching myself how to paint. I relish new challenges."

The same, Deepa said, applies to tech: "People are going to have to be prepared to have a learning mindset and keep retraining and reskillling and that is quite exciting. I think to have a job for life now will be incredibly rare, and if that is the case then you will need

to keep upskilling. Surround yourself with good mentors, peers and allies from all types of backgrounds. People are genuinely kind and if they can, they will always try and help you."

The power of education

What about the unknown? Deepa commented: "We don't know what we don't know. With the current exploitation of data, facial recognition tech, machine learning and artificial intelligence, we should really be informing our young people and each other about the complexity and impact of these technologies. Society is being redesigned as we speak. We have not future proofed our tech, nor have we thought through the intended and unintended consequences of everything that is happening currently.

"We are powering a society that will benefit powerful corporations and I think we will be/are pawns in that. I want people to question what is happening and I try to do it in my own way through the talks that I give. I am not alone. We are part of a growing community that wants to change this narrative. We have to take responsibility for our own learning."

Follow **Deepa Mann-Kler**
@deepamann_kler

Encouraging young girls into STEM and supporting women in tech in NI

Young Enterprise believes in integrating STEM into all aspects of learning. We believe in showcasing tech and female role models to our students. And we believe it's essential to start from a young age

The charity provides enterprise, employability and entrepreneurship skills training to over 90,000 young people aged 4-25 in Primary & Post Primary schools, community groups, and Further and Higher Education throughout Northern Ireland each year.

We partner with over 400 schools and 900+ business mentors from across the business community.

When students get the opportunity to set up and run their own business at school age, they learn about all the aspects of business such as product design, customer experience, marketing and selling their own products in order to maximise sales. They are also given the chance to see how they can apply technology to their product and learn about how STEM and tech are relevant to every aspect of business, and the importance of digital skills as a critical skill for the workplace they will inhabit. This may take the form of developing an app to meet a customer need, the use of digital marketing tools to promote their product, or making use of digital technology to design and manufacture a new product for sale. Though exposure to the role of technology in their business, students from all subject areas learn the importance of understanding the application of technology for any future job role or business start-up.

One example is YE alumna, Sarah McBride, who took part in our Company programme a few years ago and now works in the States in the tech sector. As a non-STEM student, she believed she couldn't work in the tech sector. Her student business developed a homework app, with someone else in the team taking on the role of app developer, whilst she ran the business. As a result, she recognised that a career in tech was open to her, just not necessarily in a development role. If we want to see more young women in tech, we need to ensure that the pathway to the sector is kept open for them, with opportunities to upskill, such as through employment academies, or companies investing in staff development.

It is often said that you can't be what you can't see, and this is particularly true when it comes to role models in business for young women. The Young Enterprise includes tech entrepreneur Mary McKenna and Venture Capitalist, Jayne Brady, and we have a wide range of female business mentors that go out to the classroom, ensuring students & teachers see women as active participants in the sector.

Starting from a young age and nurturing digital skills through all areas of the curriculum is critical. Understanding the application of digital technology to all areas of business is a key aspect of what we do. In our Primary schools, there is strong use of technology for the delivery of all subject areas, and it is vital that we retain the excitement for STEM as students move in to the Post Primary sector.

In Young Enterprise, that's about bringing it to life and helping students to visualise how it will be a skill they can benefit from in the future, and understand the excitement of technology developments to solve problems for society as they move into the world of work and business start-up.

The charity is funded through the Department of Education, business supporters, trusts and foundations, and is seeking businesses to come on board to allow more young people to have the opportunity to get involved.

How Apprentices could be the answer to the technology skills gap

Camilla Long is the director of Bespoke Communications and CareerEncode.com Facilitator. She helps organisations to develop their brightest talent and offers media training, public speaking coaching and leadership development to the country's biggest and best-known organisations

We live in a data-driven world. Digital transformation is now at the heart of every industry, providing decision-makers with access to information to drive their organisation forward.

Right across the UK, growth in the digital sector is 2.6 times that of the economy as a whole. And here in Northern Ireland we have embraced this digital future. According to Tech Nation, of all the new jobs created in Northern Ireland in 2018, one in four was a digital job.

Digital skills gap

But has this explosive growth now become the tech industry's biggest challenge? The digital skills gap is now being laid bare, as the number of unfilled jobs in the tech industry is now 22% higher than 5 years ago.

So how can companies in Northern Ireland keep pace with growth? It's time to add some new ingredients into the recruitment cake-mix. Alongside tried and test recipes with graduate recruitment and recruitment agencies, any growing company will need to look at new ways of serving up a high performing team. This is where Apprenticeships could help.

Connecting with the future workforce

Young talent is an obvious place to look when considering new recruits. And it's interesting to hear what they think of technology as a career. At the World Economic Forum in Davos recently, the OECD presented their take on the Future of Work. Specifically they asked 15 year-olds what they want to be when they grow up. It turns out that in twenty years, young people's career aspirations haven't changed much at all.

Over 50% of 15-year olds see themselves in traditional job roles like doctors, teachers and lawyers. This is the most digitally connected generation ever but it's clear that it's time for tech employers to find ways to connect with their future workforce. Young people need to understand that tech jobs exist, and how to get the skills they need to get into the industry. David

Lysakowski, now working as a Higher Level Apprentice, got tailored career guidance while at school at St. Mary's in Limavady which led him to choose a career in technology with Mallon Technology in Cookstown.

David Lysakowski, Mallon Technology and St. Marys

Early-career choices

Initiatives like mTech.Academy here in Northern Ireland have shown that learning by doing can have a huge impact on how students see their career choices. And arguably just as important as career guidance in schools, is the choice available to young people at the point of leaving school. Higher Level Apprenticeships can be an effective pathway into a fulfilling tech career at this important moment in the life of a school leaver or early-career changer.

Higher Level Apprenticeships

A Higher Level Apprenticeship allows an employer to recruit a young person or a career changer into a job role, and mentor them and guide them with the specific skills they need to do that job.

Connor Hamilton now works in the IT department of CDE Global as a Higher Level Apprentice. Connor said that he felt ready to enter the workplace after leaving school, so his CareerEncode.com Apprenticeship 'combines the best of both worlds with training in the workplace as well as a Foundation Degree qualification'.

Connor Hamilton, CDE Global

A tech job comes in a variety of shapes and sizes and changes fast. That's what makes it hard to explain to the future workforce. But it's clear that every company nowadays is an IT company. Digital transformation means that software systems are at the heart of every business.

For continued business growth, every company will need digital skills. And for our young people to develop a fulfilling career, it's important that they see themselves as part of this tech landscape. There are ways for employers to tap into this source of talent - it sometimes means thinking differently and embracing change. But then again, isn't change what the tech industry is all about?

Roundtable: **Why don't more young women go into STEM careers?**

Female figures from some of Northern Ireland's most prolific tech companies and academic institutions gathered to discuss this pressing question

CCEA (the Council for the Curriculum, Examinations & Assessment) recently released a report entitled 'Why Don't More Young Women Study Computing?' This research served as a catalyst for a roundtable event here at Sync NI, where we gathered 11 female figures from Northern Ireland's most prolific tech companies and academic institutions to discuss the wider question of why more young women don't go into STEM careers.

What the research shows

CCEA's Pamela Larmour kicked off the roundtable event with a breakdown of the recent CCEA report. As the head of research and statistics at CCEA, Pamela's role is to provide high calibre research and statistical investigations in education. Her team is responsible for analysing GCE and GCSE results every year and highlighting and monitoring any trends, and the recent report was a direct result of their monitoring efforts. CCEA Research is used to support and inform management and to provide valuable evidence to inform practice and improve CCEA services to schools.

"The gender balance in students studying computing subjects has been the same for the last 20 years," Pamela explained. "The report investigates some reasons why this gender divide may be present but it doesn't offer the solution, just some issues we feel need recognised. The intention of the report is to provoke discussions on how people view computing, but also how they view young females at school and what their career choices are."

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Niamh Campbell
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"Qualifications are gender neutral. They are designed and written to make sure there is no bias towards anybody in any way. There are always slight differences in the number of males and females taking subjects, for example maths and double-award science, but there is nothing as stark as the numbers in computing."

"Specifications are reviewed every five years and new specifications developed if there is a need. CCEA developed new computing A-levels of Software Systems Development (SSD) and Digital Technology. Digital Technology is also available at GCSE. The new qualifications were developed as accessible for all, yet the figures going forward from 2015 still show in a drop in females taking them."

Computer anxiety and low self-efficacy

"Girls outperform boys at school in most subjects. However, research shows that females are less confident in their ability with computers than males," Pamela explained.

One of the examples cited in CCEA's report is of a computing undergraduate who felt she had lower computing skills than somebody who wasn't even doing that degree. Pamela added: "The last thing we want to do with this report is to encourage that view, because it is clear that girls are very high achievers in these subjects. It is bizarre that girls would rate themselves lower in comparison with boys. The research suggests that computer anxiety then can be influenced by classroom culture, home culture, popular culture and career prospects."

"In the report we mention that there is a stereotype of what a computer scientist looks like. It's not what all girls or parents feel, but there is a stereotype and because that exists, a lot of girls don't want to display the behaviour of that stereotype. So, maybe they find it easier to just step aside and not do the subject."

"Our responsibility is to make sure that we offer students a broad range of interesting and useful GCSEs and A-levels. In the case of subjects were there is a gender imbalance we need to try to understand why there is a difference and if possible change it. In the case of computing it would seem that the environment and culture around females and computing needs to change. So that is why I have come here today to discuss the issues identified in our report and ask 'Is there anything you can do to help with this issue?' "

Undervaluing broad skills

Diane Morrow is co-founder of mTech. Academy, a group focused on helping young people think about the skills and opportunities available to them through problem-based and experiential learning within the classroom. Having previously taught careers and business studies for 10 years, Diane works very closely with middle leaders and principals in schools. She's found that what employers want may not match up with today's narrow software development qualifications.

"We worked with 16 schools this year and 10 schools last year. When we bring them out to industry leader CEOs, they say, 'Yes, do SSD (Software Systems Development), it's brilliant. It does show that there's a higher level of retention in university. But at the end of the day, we want math students, people who can write properly, and problem solvers.'"

"When we look at some research coming out of Harvard, they're saying that humanities and liberal arts are completely being ignored," explained Diane. "If we think about what technology is doing, and we think about the need for that human skill set, you're getting that from other subject areas as opposed to going narrow with SSD. What would be really interesting is to look at how many people actually enter the tech sectors and what backgrounds they come from, because when we look at AI and cyber-security, those workers don't come from pure coding backgrounds."

Inspiring young people to take on a career in tech

Narelle Height is the education outreach manager at PwC NI. She comes from a computing background and has taught students of all ages, including lecturing at university level. She doesn't think girls often realise the creativity coding can bring, and it could be partly due to how it's presented in schools.

"You can train your brain to think in different ways and come up with innovative solutions, but it's getting that message across," she explained. "At primary school it's so interactive, visual and appealing. Then they get into the C2K environment, to learn the Python course, which is so uninspiring. Teachers don't have the knowledge and understanding to actually be able to take it outside to the playground, draw a grid and show them through kinesthetic learning."

Samantha Kirk is the VP of engineering and site lead for tech company Dynamic Signal, a Silicon Valley based business that provides a platform to help employers communicate and engage with their workforce. Its centre of excellence was set up in Belfast in January 2019 and Sam has spent the year recruiting and building the team while maintaining gender balance. Sam

reiterated Narelle's view on increasing the creativity and appeal of problem-solving:

"I think too often the technical problems that we use in schools are boring; they don't inspire and attract people. Students do them because they have to, not because they are interesting, and it's not a real reflection of what we do in the industry day-to-day.

"We want students to understand the sorts of challenges we work on day to day in our organisations– how digital transformation works in the real world and the fantastic impact that it has. It changes people's lives! That's how we start getting them excited. Ultimately, what we do is 'shiny and exciting' but I don't think students are given sight of that."

Susan McCambridge is an Economic Development Manager at Belfast Metropolitan College. Through the Bring IT On programme funded by the Department for the Economy, Belfast Met run a number of school presentations that help with "repositioning IT and technology around social good". They use the Red Cross charity as an example of where

technology can be used to solve real world problems, and hope that an emphasis on using technology for social good will encourage more young people to consider a career in tech.

Narelle added that from a lecturing point of view, when in university she had a cohort of 400: "It's really hard to find the time to do invigorating lectures and live coding while trying to manage retention for that many people. So it's worthwhile taking that into consideration when addressing new challenges to females in STEM."

Too much is left to chance

Pauline Keys is a senior manager in software development at digital marketing company BazaarVoice, originally working in Java software engineering for many years before moving up into leadership roles. Pauline admitted that she almost didn't make it through university and struggled a lot with the coding element of her career at the beginning:

"I was very close to dropping out of software engineering at university at the end of second year," she said. They were teaching the basics of coding and I could just about gather it, but I was constantly just keeping my head above water. I was fortunate enough to do a really good placement year and when I got out into the industry, I realised that yes I could code and hold my own, but I could do so many other things. I can take control and be organised, and have good communication skills as well. That's where I realised my strengths are."

Pauline recalls selecting Computer Science by chance: "I remember we had a careers day in high school and a friend's sister was hosting a stand on her own. Everybody else was busy so I went over and asked what she did, which was Computer Science at [Ulster University] Jordanstown. She described to me what a software engineer did and it ended up in this one hour conversation about problem solving. So I picked it by pure accident."

Sam Kirk said her path was also down to sheer chance for the most part: "I didn't know what I wanted to do and my mum suggested computer science so I gave it a go. I hated the first year as it was mainly coding which I wasn't good at it, but I was too stubborn to drop it. I had to work really hard at it. I remember when I was applying for placements that I was worried I wouldn't get a job, but I got a really good placement and had a great female manager who became my mentor at the time."

It was this practical experience and not the actual lectures that really engaged Sam and pushed her to finish uni and get a first in her degree: "The journey itself was hard. I love what I do now and am good at it, but the journey to get there wasn't overly enjoyable. I stuck it out because I was stubborn, but how many people didn't? How many great people did we lose along the way?"

Roisin Finnegan is a senior manager at Deloitte Ventures NI and is particularly focused on innovation and entrepreneurship. Her team focuses on external ventures such as start-ups that they can collaborate with and invest in, internal ventures and engagement, and also education around innovation. Discussing Pauline and Sam's career pathways, Roisin added:

"I think that both of your testimonials show that too much is left to chance; there are chance conversations and a strong female mentor. It should have been made apparent to you when you were making career or university choices that software engineering is a viable choice. I think those issues still exist now many years later; females in particular don't know about their choices. There's an education point that needs to be made to these young females about problem-based learning: it's not just stereotypical of computer engineers to be sitting alone in quiet, darkened corners, you have so many choices."

Does tech have a role awareness problem?

Camilla Long is the director of Bespoke Communications, a leading people development agency and she is a computer scientist by trade. She initiated the CareerEncode.com programme that helps employers recruit and retain top digital apprenticeship talent, and emphasised the importance of making the journey for young girls into STEM easier and better.

Camilla makes it her business to meet young people and ask them what they're interested in, and notes that girls don't see themselves in tech jobs. From a recent experience at a Skills NI event for schools, Camilla said that 95% of the Year 10 schoolgirls she spoke to expressed their preference in pursuing careers in Health and Social Care. By contrast, the boys wanted to do "agriculture, engineering, tech, accountancy; they wanted to do everything." So, Camilla asked, "At the age of 14, why is there that cultural socialisation that feeds into that lack of awareness?"

Roundtable: Inspiring young women to go into STEM careers

Does awareness need to be made among wider society, with teachers, employers and parents?

Susan has seen this problem first-hand, noting that Bring IT On visit 141 (two-thirds) of Northern Ireland's schools to spread this awareness of careers in tech.

They ask kids, "What do you perceive to be somebody who works in IT?" and aim to dispel the usual stereotypes of sitting in a dark corner coding for hours on end. Their approach in engaging school children is to ask the young people questions such as "Have you thought about the jobs that are involved in developing Snapchat? There's everything from business analysts, project managers and designers to obviously, software engineers, testers and UX designers."

The Bring IT On programme, funded by the Department for the Economy and run by Belfast Met, has seen recent success with a new matching service through its Ambassador Initiative, in which companies can register to be matched with a school that they will then support. The programme includes mentoring of ICT, Digital Media and Careers teachers, and provides pupils with talks on careers and technology. The scheme encourages closer collaboration between schools and business, with 20 ambassadors having been matched with schools so far.

Alternative educational schemes

Diane Morrow's mTech.Academy programme also works closely with industry and schools to promote STEM education to both pupils and parents. The scheme took in over 300 young people last year and had a measurable impact, with only 62% of parents having considered STEM career options

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for their children before the programme compared to 100% after it.

Diane explained exactly how the mTech. Academy programme pans out; "We are in one class for an hour for 14 weeks, and we are in ICT classes, English classes, R.E. classes, the works.

"We kick off in September and we work with them right the way through until February because GCSE subject choices are round February and March. We looked at supporting ICT skills at Key Stage 3 and we have mapped a curriculum around that which is all around project-based learning."

The Deloitte-sponsored 'Generation Innovation' programme has been a similar success, taking sixth-form students on a week-long mission to solve a real-world tech industry type problem.

"They take a challenge given from industry and they work through it," explained Diane, adding that "it really allows young people to see the wide range of UX and UI tech that they can work with. The research that we used to put into the programme for launch was phenomenal."

Pairing industry with education

Steps are being taken towards helping educators become more comfortable in teaching specialised subjects, with support offered to schools from the wider digital community and industry. CCEA is working with the Department of Education, Education Authority, and the Education and Training Inspectorate on its 'Learning Leaders' initiative.

Pamela explained that the scheme is an attempt to promote collaborative working, the sharing of best practice through professional learning communities and networks, and the strengthening of leadership capacity in our schools.

Under the Learning Leaders programme, teachers don't have to rely on getting specific training themselves but can also use the experiences of their colleagues and industry to help deliver digital learning. As part of the programme, CCEA is working on progression pathways for Digital Skills that will help teachers upskill to implement computational thinking and coding in the classroom. The pathway will enable teachers to identify ways of delivering computational thinking and coding through teaching, learning and assessment, and will encourage heads of departments to embed computational thinking and coding within Key Stage 3.

The need to pair schools with industry more closely was a key idea that came out of the roundtable discussion. Sarah Milliken is the leader of talent and culture at Aflac, a US insurance company that has recently set up a base in Belfast. She suggested: "If we were able to pair teachers with a mentor in industry to help get that learning across, it would make the classroom more relevant and teaching would be practical rather than conceptual with real world examples."

Engaging students in the classroom

Narelle explained that while there are amazing things going on in industry and young girls are being given a lot of opportunities, it often doesn't translate back into the classroom: "We're getting them ready and we're getting them

really excited. But then they go back into the classroom. You can inspire somebody so much but unless they have resilience and grit - if they are going back into an environment where they're not given the opportunity to put into practice all the things that businesses are talking about, they're switched off."

A recurring theme of the roundtable discussion was the idea that ICT and computing subjects should be taught in a more interesting and accessible way that reflects the real-life careers those skills are used in. Most of the young people coming through the pipeline are those who show resilience to persevere through a qualification they perceive to be boring or particularly difficult, and this resilience is needed in the workplace too. How many talented young people is the local tech industry losing out on because they find the subjects too mundane in the first place?

Getting parents on board

Parental influence isn't to be underestimated when young people are choosing their careers, which is why several schemes right now are aimed at educating parents about tech opportunities too. Camilla spoke about CareerEncode.com's focus on parental influence and how it's helped change young minds:

"People in companies are busy doing what they do, and they don't have all the time in the world to promote tech careers. I launched CareerEncode.com as a portal to digital opportunity only last year and it's amazing how engaged parents get all of a sudden when you get in front of them and give a message that resonates. We ran open nights and promoted on social media, and parents turned up with their young people and engaged online."

One of the big factors in getting parents on board with careers in tech has been the rise of degree apprenticeships, assured skills academies, and other earn-as-you-learn schemes. "[Parents] liked the idea of access to a degree with no fees to pay, that their young people could go straight to an employer and start working out of school and at the end of it they were getting a degree qualification," Camilla explained. "Suddenly we had students diverting into wanting to do a degree in technology, and that was something that was only decided at the very end of their school years."

What do talent leaders actually look for?

With the range of skills used in industry, it can be difficult for parents and young people to choose a degree from the numerous choices and subsectors various universities offer. Sam noted that often when people are graduating from universities, "they are not ready for the industry and the courses don't always equip them with the skills that they need." Current degrees may not relate specifically to a job role at the end of education, and may be missing valuable skills employers want.

So what do talent leaders actually look for in new candidates for their organisations? Lisa Gepp is the lead consultant for university and entry level talent at Allstate Northern Ireland.

She said that "it's really important for them to be good problem solvers, to have very logical thinking, and they must be inquisitive. To want to learn is so important, especially coming into a big company like Allstate. You can be very good at maths, the sciences and IT, but if you don't have those other soft skills, you're not going to succeed."

PA Consulting's Maeve Dunseath added: "We are a consultancy, so we speak to our clients every single day. We present to them, and people need to be able to effectively and confidently communicate with them." Maeve is relatively new to PA Consulting and looks after the firm's internal learning and development, along with the university engagements and all the STEM activities.

Sarah Milliken suggested that it all comes down to the traits of resilience and adaptability: "Sometimes we're very good through university at 'hand-holding' quite a lot. I would much prefer someone who's maybe done the wrong undergrad degree and done a conversion course or something to come in, because they're hungry for it."

Sam agreed that firms would "rather have a well-rounded individual with a great attitude that will persevere to problem solve and get the work done, as opposed to someone that is just technically strong."

This is a trend seen across the industry, with Pauline noting that people retrain into tech from a variety of disciplines: "A couple of folks I've worked with for example have psychology degrees. When they do a Master's conversion into something computer-related at that stage, they're more mature and make a conscious decision of what they want."

Although the skills shortage in Northern Ireland makes it much easier for graduates to get a job in software engineering in Northern Ireland, Pauline warned against students being complacent based on purely academic performance: "I would agree with Sam on needing that ability to 'self-start'. There's a sense of self-entitlement with some new graduates that they can walk into a job anywhere, but really it's so competitive."

Should IT be mandatory?

The tech sector in Northern Ireland shows no sign of slowing down, and the future of work will always be tied to new technology, so should software engineering and tech be mandatory in the same way that Maths and English are? Many of those at the roundtable agreed that the existing culture in schools with regard to tech is already changing. Pamela commented; "It could be a while to see that change in society, but how do we switch society onto this? Is it something that needs to be done with the parents and the wider community?"

Roisin noted that in most schools only one out of around 36 classroom periods per week is currently devoted to careers, adding: "You have to go into the root cause of the problem in terms of looking at how time is given to students over here to inform them. That again, is looking at the school governance system in terms of how funding is allocated, and then the tick box exercise in terms of how the curriculum is taught. Certainly more time towards looking at careers should be focused on and shared with teachers and parents."

There have been a number of schemes over the years to help encourage young women to take up STEM subjects and aim for careers in tech, but there's a definite need for a more unified industry approach. Speaking about these schemes, Maeve noted that "there are lots of people doing different things but there's no one thing that is totally connected." Diane similarly commented on how great it would be to have "one really connected, holistic drive instead of lots of different pockets" when it comes to pairing industry with education.

What are the solutions?

The NI tech industry recognises that there are problems encouraging young women to take up jobs in tech, but what's the solution? Is enough being done to engage girls in STEM education, or is the problem that too many smaller spinout programmes are occurring rather than one cohesive effort to combine industry with academic initiatives? Many young women can't see themselves in STEM career roles, and perhaps that has more to do with stereotyping and visibility of actual industry roles.

Narelle pointed out that funding sits at the heart of many current issues, such as allowing teachers out of the classroom to get upskilled: "Get businesses to provide the funding for schools to enable that to happen, and to get cover teachers so that educators can get out of the classroom to learn and bring something new and innovative back to the school. Allow young people out of the classroom and into the workplaces to get the experience so that there's a journey for the teacher to develop their skills and capabilities."

The solution to both problems may lie in industry helping to support alternative educational programmes that sit alongside the normal education routes. Diane noted that the stats coming out of mTech.Academy are extremely promising but more sponsorship, funding and partner companies are needed to help them reach more schools -- the scheme had 40 applications in June but couldn't take all 40 at their current level of support.

"One of the biggest eye-openers is getting our head teachers and middle leaders into each of your offices," explained Diane. "Then we start to see what we're delivering in schools doesn't necessarily match in terms of getting young people employment ready – and that's a big, big challenge."

Final thoughts...

This roundtable discussion was a positive step toward solving the problems between education and industry, but it's clear that real change is needed if we want to avoid having the same conversation in another 10 years. It's time for government, academia and industry to come together with a stronger, united approach in helping young women realise their full STEM potential.

Stay cyber savvy with these top tips

Allstate NI's Cybersecurity Communication and Awareness Specialist, Victoria Logan shares her top cybersecurity tips to help you stay more secure online

My role at Allstate is to raise awareness and inspire change in employees across Allstate's global organisation.

I focus on the human element of cybersecurity; creating materials to reinforce secure habits in employees' personal and professional lives.
This month, I'm sharing my top 10 cybersecurity tips to help you stay more secure online.

Top causes of security breaches
Phishing and malware incidents are the top causes of security breaches, and the bad guys are getting more sophisticated every day. But what's more troubling is that successful hacking attempts are often the result of human error. Education and awareness are critically important in the fight against cybercriminal activity and preventing security breaches.

By following the tips below and remaining vigilant, you are doing your part to protect yourself and others.

Tip #1 – Realise you are a target to hackers
"It couldn't happen to me" is a dangerous frame of mind. In a world where information is currency, we are all at risk and everyone has something to lose.

Tip #2 - Practice good password management
Today, everything is password protected. With so many passwords to remember, it's easy to take short-cuts. However compromised credentials are a hacker's bread and butter – once they are into one site there's a good chance they can get into other, more important sites. Here are some general password tips to keep in mind:

- Use long passwords and consider using a passphrase – words or phrases with 20 characters or more are recommended
- Use a strong mix of characters - did you know using the space bar creates equal complexity to a letter
- Never use the same password for multiple sites
- Don't share your passwords with anyone and don't write them down
- Update your passwords periodically, ideally every 90 days
- Use two-factor or multi-factor authentication when offered

A password manager application can help you to maintain strong unique passwords for all of your accounts. These programs can generate strong passwords for you, enter credentials automatically, and remind you to update your passwords periodically.

Tip #3 - Beware of suspicious emails and phone calls
Phishing scams are a constant threat - using various social engineering ploys, cyber-criminals will attempt to trick you into divulging personal information such as your login ID and password, banking or credit card information.

- Phishing scams can be carried

out by phone, text, or through social networking sites, but most commonly by email

- Be suspicious of emails or phone calls that ask you to respond immediately with personal or financial information. Check where it came from and if there are grammatical errors
- If attachments or links in the email are unexpected or suspicious for any reason, delete the message immediately
- Malicious links can come from friends who have been infected too, so be extra careful. That friend requesting you transfer her money because she's stuck in Bali probably isn't true!

Tip #4 - Update, update, update

Installing software updates for your operating system and programs is critical. Always install the latest security updates for your devices so intruders can't take advantage of holes in security.

- Turn on Automatic Updates for your operating system
- Use web browsers such as Chrome or Firefox that receive frequent, automatic security updates
- Make sure to keep browser plug-ins (Flash, Java, etc.) up to date

Tip #5 - Don't use public Wi-Fi without a VPN

Don't use public Wi-Fi without using a Virtual Private Network (VPN). With a VPN, the traffic between your device and the server is encrypted, meaning it's much more difficult for a cybercriminal to access to your data. If you don't have a VPN, use your mobile network.

Tip #6 - Be careful what you click

Avoid visiting unknown websites or downloading software from untrusted sources. These sites often host malware that will compromise your computer. Sensitive browsing, like banking or shopping, should only be done on a device that belongs to you on a network you trust. Don't forget to logout of these sites when you've completed your transactions.

Tip #7 - Never leave devices unattended

The physical security of your devices is just as important as their technical security. Safely store when not in use and don't leave unattended.

- If you need to leave your laptop, phone, or tablet for any length of time - lock it up so no one else can use it
- If you keep sensitive information on a flash drive or external hard drive, make sure to keep these locked as well
- For desktop computers, shut-down the system when not in use

Tip #8 - Protect sensitive data

Be mindful about what information you share. Don't share confidential information outside of trusted sources.

- Keep sensitive data (e.g., credit card numbers, passport information, client credentials, etc.) off your workstation, laptop, and mobile devices
- Securely remove sensitive data files from your system when they are no longer needed
- Always use encryption when storing or transmitting sensitive data

Tip #9 - Use mobile devices safely

Considering how much we rely on our mobile devices, and how susceptible they are to attack, you'll want to make sure you are protected:

- Use a strong mobile passcode (not your birthdate or bank PIN) - and never leave it in public
- Only install apps from trusted sources
- Use Apple's 'Find my iPhone' or the Android Device Manager tools to help prevent loss or theft
- Never use public USB charging stations - cybercriminals can modify those USB connections to install malware on your phone or download data without your knowledge

Tip #10 - Back up your data

Backup your data regularly using iCloud or enabling backup and sync from Android. If you are a victim of a security incident, the only guaranteed way to repair your computer is to erase and re-install the system.

Here are some additional tips to help keep you safe and secure online:

- Use smart devices safely in your home by applying the same tips, just like a smartphone, laptop or PC, smart devices can be hacked to leave your data and privacy at risk
- Use a firewall, Mac and Windows have basic desktop firewalls as part of their operating system that can help protect your computer from external attacks
- Be conscientious of what you plug into your computer as flash drives and even other smartphones can contain malware
- Be careful of what you share on social networking sites
- Monitor your accounts for suspicious activity

Allstate Cyber Safety for Kids

My passion for cybersecurity led to my involvement in the award-winning Allstate Cyber Safety for Kids program/ The program involves cybersecurity professionals delivering an interactive session on how to stay safe online to children ages 5-9.

For further information, including how to book a session for your school or community group visit the website below.

Allstate Cyber Safety for Kids

allstate.com/cybersafetyforkids

Author
Julie Gray
Instructional designer, CCEA

Digital games-based learning in the classroom

Julie Gray details how the CCEA team introduced digital games-based learning into the classroom, engaging children with tech using a more fun and interactive approach

CCEA (the Council for the Curriculum, Examinations and Assessment) developed 'STEM in Minecraft: The Vikings' - a resource to inspire cross-curricular exploration in an environment that motivates and engages learners.

Available at www.ccea.org.uk/stemworks/vikings, it demonstrates how one subject can unlock multi-layered learning. Offline STEM enquiries are coupled with purposeful in-game Minecraft tasks that allow learners to experience authentic simulations of Viking life.

Here we discuss how the team came together and the skills we needed on our journey into digital games-based learning in the classroom.

Harnessing the captivation of the gaming world

The Northern Ireland Curriculum emphasises the development of 21st century skills. When the curriculum is implemented effectively, it has the power to develop young people who can make responsible, informed choices and decisions as effective contributors to society, the environment and the economy.

Our role at CCEA is to develop resources that support teachers and learners. Teachers told us that they lacked confidence to find ways of connecting learning in History with Science and Technology. In response, we developed the 'STEM in Minecraft: The Vikings' resource.

According to Business Insider, nearly 112 million people play Minecraft each month and its popularity is not fading. Young

people are already immersed in the games environment. We saw this as an opportunity to harness the captivation of the gaming world and bring it to schools in a structured way that supports the STEM agenda, CCEA's Digital Skills Framework, primary teachers' confidence and learners' skills and knowledge of Minecraft.

Collaboration

Based on these objectives, we set out our vision and maintained our focus on this at every stage of development. This is where our STEM in Minecraft team started, initially growing from two to four women from CCEA's Curriculum and Multimedia teams. We are very proud of advocating women in this primarily male-dominated area.

We are a diverse group with different experiences, backgrounds and skill sets in education, STEM, special educational needs, educational technology, multimedia development, digital games-based learning, 3D skills and, of course, Minecraft. The interdisciplinary approach has been key to the innovation and success of the project, which was fully developed in-house with our existing staff in Curriculum and Multimedia, guided by research, along with game development and curriculum expertise.

Design thinking

Throughout development, we applied the quality assurance process CCEA adheres to in all production work, including gathering feedback from teachers and learners, and using that information to further refine the resource. This iterative design process highlighted how tech savvy the learners were and how much upskilling the teachers needed. We updated in-game quests, giving learners more autonomy, and teacher resources to include explicit teaching strategies and deeper guidance on the software.

The importance of purposeful play

We selected a popular and familiar topic (the Vikings), which most schools teach during Key Stage 2, and combined it with an area less familiar to teachers: digital games-based learning. The role of the teacher is vital and we highlighted teaching strategies throughout the resource to enable explicit skills development in the gaming environment. These skills include problem-solving and creativity, as well as spatial ability, which is a major skill for STEM.

Most learners will have had some experience or knowledge of Minecraft and we have been mindful in maintaining the integrity of the gameplay, connecting what young people do outside of school with learning. Using the tools of Minecraft, we created a sense of 'we' through the in-game quests and sign posted co-operative digital gameplay for the teacher to cultivate.

In designing the 'STEM in Minecraft' resource, we very carefully considered the emotions we wanted to create and maintained a focus on the benefits of purposeful play at every phase. These include the cognitive benefit of drawing on learners' imaginations, the social benefit of developing learner interaction and the emotional benefits of providing a safe context in which to take risks and try new ideas.

We wanted to produce a resource that would encourage learners to lose sense of time, resulting in increased involvement. When we see learners using 'STEM in Minecraft', we see this in action. This is what Jane McGonigal, researcher of games and Director of Games Research and Development at the Institute for the Future, calls 'blissful productivity'. It has been a powerful experience seeing learners get excited about their learning. The proof is in the practice. Teachers are telling us how their pupils 'have enjoyed Vikings more than any other topic they've ever done' and that 'it is amazing how their language and communication is so 'on task' and focused'.

Building a community of practice

The 'STEM in Minecraft' project is a great example of how collaboration and design thinking are vital to creativity, problem-solving and innovation, which are all key components of STEM careers.

By creating a culture of collaboration, both internally across CCEA teams and externally with teachers, learners, agencies such as C2k (who deliver the managed network for Northern Ireland schools), Microsoft Ireland and the Minecraft Seattle team, we continually strive to remove barriers to learning for both teachers and learners. As part of C2k provision, all schools in Northern Ireland now have free access to Minecraft: Education Edition software and we are really excited to see how teachers plan to implement the resources innovatively in their classrooms.

As women in tech, we are proud to be part of a field that is fast-paced and changing. Each day brings opportunities for new challenges, learning and problem-solving.

To learn more about CCEA's STEM in Minecraft resource visit the website below.

STEM in Minecraft: The Vikings

ccea.org.uk/stemworks/vikings

Why we need to invest in our young people's tech talents early

Stephanie Gowdy discusses PwC's approach to developing the technology experts of tomorrow

As the PwC landscape continues to evolve so too does our need for tech-savvy talent who can confidently support our digital transformation - both for our clients and for our people.

And it's not just ensuring we are successful as a firm: as digital skills become critical for workplaces, we feel we have a responsibility to support people right across society to play their fullest part in the future of work. And these goals have given us the opportunity to become incredibly creative about how to achieve it.

PwC has shown a phenomenal passion to develop the technology experts of tomorrow and the creation of a Level 6 Technology Apprenticeship - a BEng degree in Software Engineering with Digital Technology with Queen's University Belfast, was the catalyst. The model complements PwC's recruitment methods of bringing graduates into its Tech business but does so at a much earlier stage in their academic career, when they are post-A level.

The first of its kind in Northern Ireland, it challenges traditional on/off-the-job and day-release models. Fully funded, covering fees and providing a salary from day one, our apprentices get to experience university life with placements at the firm during summer. At the end of the course, they'll be offered a graduate job. It's a different learning model and work experience programme, and in years 3 and 4, students have the opportunity to study for one semester with longer placements of nine months which gives them a more immersive experience in the business.

This model is also having a transformational impact on the people who are getting involved in tech. By providing a funded course, it's accessible to all and it's also encouraged women to consider a career in tech at a much earlier stage. Women currently make up 35% of the PwC/QUB Tech degree, which is more than double the national average of c16% females who consider studying a tech-related degree.

Working alongside programmes such as mTech.Academy, Sentinus and Belfast IT girls and offering PwC specific programmes such as Digital Insight Week and Females of the Future, our approach has helped create awareness around options available for women and also provides a platform to showcase some of our fantastic role models - one of whom has been shortlisted for the Department for the Economy's Higher Level Apprentice of the year award. For the third year in a row, PwC is delighted to offer 20 spots on the degree programme.

It's so important that we continue to invest in talent early and make sure we shout out to parents, teacher, and students that these routes are available, that they really are free and a fantastic introduction to a future career in tech in NI. For more information, get in touch with our Student Recruitment team.

Meet the QUB women who founded spinout companies

Meet the Queen's University Belfast (QUB) professors with the aim of inspiring women in STEM research to explore opportunities at the academia-commercial interface

Author Niamh Campbell
Journalist, Sync NI

The 'STEM Innovators' discussion was led by Professor Karen McCloskey, director of QUB's Gender Initiative.

It involved biochemist Professor Lorraine Martin, Professor Helen McCarthy also from the School of Pharmacy and Professor Su Taylor, the current Dean of Research for the Faculty of Engineering and Physical Sciences.

Professor Lorraine Martin

Prof Martin is the co-founder of ProAxsis Ltd, for which she won the NISP Connect 25K Award (now known as the Invent award from Catalyst Inc). The company uses patented 'ProteaseTag' technology in developing products to detect, catch and measure active protease markers of disease.

Professor Helen McCarthy

Prof McCarthy has designed and patented three non-viral delivery systems for nanomedicine applications. Her current research projects include the regeneration of bone by increasing the bioavailability of ceramics. The widespread utility of these delivery systems has led to a spinout company called Phion Therapeutics.

Professor Su Taylor

Prof Taylor is the first female Professor in Civil Engineering at QUB and she leads the Intelligent Infrastructure Research group. Her company, Sengenia Ltd is focused on bringing innovative sensing solutions for a range of sectors.

Professor Nola Hewitt-Dundas

The audience also heard from Professor Nola Hewitt-Dundas, the Head of Queen's Management School and Professor of Innovation Management and Policy. She addressed the fact that only 13% of active sinpouts had a female founder, with only 8% having gender-balanced boards, according to a 2016 discussion paper by Oxford Brookes University.

She also pointed out that there are "massive gaps between females and males at professor level" as well, with bigger gaps in the biosciences, stating that this matters on a "social and entrepenruial level".

When asked about things they might have done differently when becoming entrepreneurs, Prof McCarthy stated that the best thing for a woman to do when starting her own spinout is to "strip emotion from business and leave gender behind". She encouraged the audience to call gender bias out at any stage.

Prof Martin added: "You have to walk into male-dominated environments, deliver a message and engage them. You can't take things personally. The benefit to an academic career is learning to communicate differently; in business you're told to sell the product and there's not enough of that in female academia. Own belief in yourself and what you can achieve when you face a challenge."

Prof Hewitt-Dundas encouraged any students thinking of starting their own spinouts in the future to firstly, "don't feel that you have to do it all at once, as you probably won't. That's not to say you shouldn't try, but if it doesn't work you've learned along the way.

"Get exposure to as many different situations and as many people as you can. Build up your networks and don't take no for an answer. The extent of your own ambition is the only thing that's going to hold you back."

How BT is inspiring w to get into

Méabh Mackel, Séainín McCoy and Anousheh Ramezani talk about their roles in the BT Ireland Innovation Centre and why they want to see more girls getting into tech

What is the BT Ireland Innovation Centre?

Méabh: BT Ireland Innovation Centre (BTIIC), is a multi-million-pound initiative in Belfast, driving innovation across the Internet of Things, Artificial Intelligence and Data Analytics, Cyber Security and 5G communications.

BT teams work closely with our academic partner, Ulster University. The Centre's currently working on 19 separate projects with almost 200 people working together on those projects. So, it's big!

It's a major investment for BT, and with £9m additional support from Invest NI, we've been able to create and protect high-quality tech jobs.

Why did you choose to study tech subjects?

Séainín: I'm quite easily distracted, so studying subjects that allowed me to understand how and why "things" work sparked my curiosity. With Technology, the pace of change is so quick it's very hard not have something new to learn.

Anousheh: It's simple - techie subjects solve the most impactful of the world's problems! I want to play a part in that.

Méabh: I always had an interest in tech, but I chose history and politics at school. After a few years managing charities, I decided to retrain as a software engineer. It was challenging changing careers, but I'm glad I did.

Now here I am running the Innovation Centre and I love it. It's a great combination of my new and my old skills.

Women in tech

What's a typical day in the Innovation Centre?

Anousheh: A typical day involves carrying out research work including experiments, reading, writing, discussions, meetings, attending workshops or seminars and part-time lab demonstrations.

Séainín: No day is the same! I know a lot of people say that about their jobs, but, honestly, it's true. It can range from having discussions about the future of technology over the next ten years, to working on the architecture of software that's solving issues for the here and now.

Méabh: Like Séainín, every day is different, but it's always busy! Sometimes I meet with our project leaders for progress updates. Other times I meet teams in other parts of BT to plan how to use the great innovations coming out of the Centre.

What skills or tools do you use?

Séainín: I'd say communication is key as I have to articulate the value of what we do really well. Working with other people to create an environment where they can do the best work they can is another key skill and both of these go hand in hand with having first class technical skills.

Anousheh: I use technical skills to analyse data, using various approaches to extract insights into data and solve the challenges facing BT to provide good customer services. So, attention to detail is important.

Méabh: As a project manager, I need to plan and organise well. I spend a lot of time problem solving and collaborating across teams. I think the most crucial skill is to stop and take a breath when things get really busy. That's helpful no matter what you do.

What kind of projects do you work on?

Séainín: Part of my work is taking my

knowledge from the Big Data area and helping other teams to bring data into their ways of working. This can range from looking at modelling the data we have, or assessing where there are information gaps, to building out new architecture to ensure we able to support our customers with the data we gather.

Anousheh: I'm currently working on novel adaptive machine learning in autonomic systems. Such systems can recommend a way of resolving an issue before it impacts the customer, so our goal is to use the technology to improve the customer experience.

What's your proudest achievement to date?

Séainín: I'm most proud when I step back and look at the amazing things my team achieve every day, and how we make our customers' experience better. On a personal level, I was super chuffed to win an industry award, but that wouldn't have been possible with all the people who support me.

Anousheh: My proudest accomplishment so far is when I decided to do my PhD and received phenomenal support from my family. Doing a PhD is hard, but all the ups and downs, smiles and frowns, pains and struggles of life, bring a different perspective to the PhD process.

Méabh: We had a big showcase in November to celebrate the Innovation Centre's 2nd birthday and everything we'd achieved so far. I was so proud when I looked around at a room full of BTIIC innovations.

What would you say to girls who aren't sure if Tech is for them?

Séainín: Go for it! Tech is in everything we do, why not be part of shaping, designing, building and implementing it.

Anousheh: When I started a telecommunications engineering course at college, I was the only woman. Now I'm doing my PhD, I'm still the only woman!

While society has made huge strides towards gender equality recently, there's still a lot of work left to do to get women into tech.

I would encourage any girl to consider a career in engineering or technology – the range of careers available is vast – just look at Meabh, Séainín and me! We each took different routes to get here and each do different jobs – but our tech skills and qualifications got us here, doing jobs we love. Good tech skills will take you places!

Méabh: That's so true. I used to think, mistakenly, that I had to choose tech over other interests. But technology is in every part of our lives now. Tech skills will help you with almost any kind of career.

What kind of tech roles are available in BT?

Séainín: BT provides a huge variety of technology roles. Whether it's as a field engineer in our operations team, working to make our apps accessible (UX design), understanding whether the software changes we deploy are making it better for our customers (data, and A/B testing), making sure everyone can download the latest games (network engineering) or bringing the Olympics to our screens (development), we do it all!

The best thing is, the Technology jobs you'll work in probably haven't even been created it yet!

Méabh: Absolutely - there's no age limit on our apprenticeship or graduate programmes, but doing a placement, or coming on a BT Work Ready scheme are great ways to get a taster of life in BT.

BTIIC also recently supported a programme called FurtHER, retraining women from differing career backgrounds in software engineering. Some of them even moved from London to Belfast and now work in the Innovation Centre.

Check out the opportunities at: www.btplc.com/Careercentre

What's BT doing to encourage people to get into tech?

Méabh: Lots! BT recently launched a major programme called Skills for Tomorrow designed to empower 10 million people with skills for the digital future.

It's completely free and open to anyone. There are specific programmes for children and young people, young people not in education, employment or training, working adults, older people and vulnerable adults and SMEs. You can find out more at the website below.

BT's Skills for Tomorrow

bt.com/skillsfortomorrow

Empowerment in employment

According to statistics by STEM ambassadors' site Wise Campaign, in 2017 only 23% of the UK STEM workforces were female. This however was an increase from 2016, by 105,470 people.

Author
Lucy Desai
on behalf of Lookers Group

Careers in STEM are changing for the better, with more women getting involved and gaining jobs. 2019 has seen some of the biggest names and influential figures in the industry being women, such as Kate Bouman, the woman who achieved the first image of a black hole. In this article, we track how more women have entered STEM than any other field in the past four decades.

LinkedIn found out that over the last four decades, more women got involved in science, technology, engineering, and mathematics careers than in any other decade. Philanthropist and former general manager at Microsoft, Melinda Gates said: "Innovation happens when we approach urgent challenges from every different point of view. Bringing women and underrepresented minorities into the field guarantees that we see the full range of solutions to the real problems that people face in the world".

The need for more women in these sectors was highlighted when Fitbit came under fire in 2018. The issue was that their period tracker had a 10-day cycle. If more women were involved in the creation, they would've realised this was – on average - three days too long.

We're breaking through bias

Charles Darwin described women as intellectual inferiors and universities rejected women up until the 20th century.

''Teachers and parents provide explicit and implicit messages starting in early childhood that boys and men are 'better' at math, and the gaps in the professions reinforce the opportunities, culture and lack of role models that perpetuate male dominance," said the senior vice president for the American Association of University Women, Laura Segal.

There have been various programmes from schools, universities and recruitment agencies in the UK to help women take up STEM-related careers. Previously, female students reported avoiding STEM courses because of a lack of female role models to identify with. If girls were taught about female role models like Marie Curie, for example, who discovered the effects of radiation, perhaps they'd be more inclined to pursue a career in the field.

Exam boards have created more content with famous women in the industry, to help change ideas revolving STEM careers for women. Rosalind Franklin, a woman central to the understanding of DNA, has been taught across the nation. This has been linked to this year's A-level results, which saw female students studying STEM courses (50.3%) outnumber male students (49.7%).

Apprenticeships for women in STEM

According to a report by the Institution of Mechanical Engineers, a lack of skilled STEM workers in the UK is costing the nation £1.5 billion a year. Apprenticeships have an equal gender balance, yet only 9% of STEM apprentices are women.

A disappointing statistic, the government is trying to fix this disparity by helping women become more informed about apprenticeships to help them access STEM-related careers.

Lookers, who offer a range of car service plans, launched a female apprenticeship scheme back in 2018. The aim is to double the amount of their female apprenticeships and provide a positive environment to encourage and attract women to STEM.

STEM is changing and positive changes are happening, for example, advertisements use more gender-neutral language. However, there is a lot of progress to be made for women in STEM.

Could you be an ambassador to help the younger generation fall in love with tech?

Author
Niamh Campbell
Journalist, Sync NI

Bring IT On is aiming to engage NI's youth by combining academia with industry, and they want you to be a part of it

Bring IT On aims to raise awareness on career pathways into the tech sector and targets people from primary school age - right through the school system - up to adults who are thinking of changing careers or those who are returning to work. It is also funded by the Department for the Economy (DfE).

Sara Lyons, who delivers the programme at Belfast Met, says the Bring IT On message is spread through school presentations. This year they will be heading to 130 post-primary schools and 20 primary schools.

She added: "We also attend many careers events around Northern Ireland and organise our own. For example, in February we are doing two big events in Derry and Dungannon which are targeted at Year 10 girls, to help them make informed choices about their GCSEs. We will also host events with parents and teachers, and then engage with employers as well."

Belfast Met has been delivering Bring IT On for four years now, and has its fair share of success stories, one of which Sara explained: "We support Belfast IT Girls every year, which is a week-long summer camp here at Belfast Met. A young lady called Victoria Porter attended that a few years ago. She had chosen her A-levels specifically to go into a career in medicine. However she was so inspired by the subjects she had taken and the industry mentors she had met in that week she decided to totally change track and she's now in her second year of the PwC tech degree apprenticeship."

What is a Bring IT On ambassador all about?

Bring IT On ambassadors could be anyone working in the tech community in Northern Ireland. Sara continued: "The initiative is there to create closer links between IT companies and schools, so that ambassadors from those firms might be able to mentor ICT, digital media and careers teachers.

"They could go into the schools and give careers or tech talks and they might offer work placements to students. The level of engagement is essentially up to them. They also might invite students to come to their offices to help them visualise what the world of work is like. Some of the tech spaces and offices are amazing. They have social areas and places for games; that well-being aspect of the sector is so important. They want to encourage their employees, and for them to feel content and valued within their teams, as any workplace should be – but the tech sector really emphasises that and it's quite attractive for any young person but they need to be made aware of it. "We also want young people to understand the diversity in the sector. Ambassadors will come from a whole range of backgrounds. They could be really techy but could also be a business owner, project manager or a UI/UX designer. We want a wide representation of people across different roles to open young peoples' eyes and show them what's available."

One of the first ambassador visits was at Ashfield Girls High School, Belfast. Three representatives from tech firm Unosquare - Roisin Hughes, Mel Keenan and Michaela Cromie - talked to Year 12 girls about how they got into the industry and how they can support women in tech.

Colette Walker, Head of ICT at the school was "delighted to be involved" and said that "having a link with a well-known, local IT company meant that our girls could discuss opportunities for work experience and gain invaluable advice about specific roles in IT."

Roisin Hughes, Human Resources Manager at Unosquare added that "working as Bring IT On Ambassadors was a fantastic opportunity which facilitated us to be able to inspire more young women to join the IT sector."

The Bring IT On team is reaching out to "anyone in the industry with passion and enthusiasm to speak with the younger generation," said Sara. "It could be anybody from that young person who's just starting off in their career, to a person with extensive years' worth of experience who really wants to talk about how their career has evolved and how exciting it is to see the industry evolve. It's a good opportunity for people who are just starting out - for personal development - to go out and talk in front of people and hone those presentation skills as well. We would suggest for a lot of the bigger employers to encourage their younger members of staff to thus weigh in."

Susan commented that Bring IT On is delivered throughout Northern Ireland in collaboration with all other colleges. The team is constantly on the lookout for new ambassadors and new schools to partner with.

"In the future it would be amazing to have a Bring IT On ambassador in every school in Northern Ireland," Sara concluded.

If you are part of a company within NI's tech sector and would like to get involved in the Bring IT On programme, fill out their simple survey at: **bringitonni.co.uk/bring-ambassadors-programme**

Also visit this site to fill out a survey if you would like your school to join the Bring IT On programme. You can also follow the team on Facebook and Twitter **@BringITOnNI**

Liberty IT's Gillian Armstrong discusses the ethical impact of tech and the future

Gillian Armstrong was recently awarded AWS (Amazon Web Services) Machine Learning Hero status at AWS re:Invent in Las Vegas and co-organised ServerlessDays Belfast, a tech community event at the start of 2020

Author
Niamh Campbell
Journalist, Sync NI

Gillian is a Solutions Engineer at Liberty IT. Put simply, she works across a number of teams, both hands-on and also to help set direction to ensure they are moving forward with the right technical choices, as well as keeping aligned and knowledge-sharing with the rest of the company.

Liberty IT is the technology arm of Liberty Mutual Insurance. Gillian joined the company as a fresh graduate 15 years ago, after studying Electronic and Software Engineering at Queen's University, Belfast.

She had no idea what she wanted to do as a teenager, and told Sync NI: "My school didn't offer any computing at all - apart from word processing! I didn't know anyone that worked in software, and so I had no idea really what the job entailed. I just knew that I really liked practical problem-solving, so engineering seemed like a good fit. Then my careers teacher said, "You should look at these computer things!" I wasn't fully bought in, but I did decide to do a degree with some software engineering content. When I got to Queen's and started doing programming for the first time, I really preferred it to electronic engineering, and so I pivoted towards a career in software quite naturally. I haven't looked back since."

I asked Gillian exactly what "AWS hero status" meant. She said it is "a sort of designation, that Amazon Web Services awards to people who are very active in the global tech community, and whose knowledge-sharing and passion they feel has had a real influence. There's 14 Machine Learning Heroes across the world, but there's lots of different types of heroes. I think it's exciting because it's not awarded for something you've built yourself, but rather for your contribution to making other people better."

When speaking to Gillian, it was very apparent that she has a caring, philanthropic world view. She clearly wants to help people and uses her tech career and knowledge to do so, adding: "I've benefited so much from other people out there who have shared their experiences online or given talks. I think every developer has. So being able to contribute back into the community by helping organise conferences (like AI NI or Serverlessdays), by going and speaking at conferences or meet ups or by writing blogs; I think is so important because when the community gets better, everybody gets better."

She told us about ServerlessDays Belfast, which is a conference for the tech community run by local volunteers; "Serverless is the future of software development. We brought speakers

from around the world who are really key in the serverless community. We had speakers from Germany, England and all over the US, standing in a sold out conference in Belfast talking to local developers. It's generated a lot of excitement and interest. We hope this will inspire a whole bunch of new people to start upskilling in serverless, which I think is really important."

One of the things Gillian is really proud of working on in Liberty IT is the employee digital assistant; "I worked for a number of years on a team that was building employee-focused solutions, to try and help productivity, and make employees' lives a little bit easier. We worked on a number of tools and then we worked up to a Chatbot. I was on a really small team and we hadn't used the cloud or artificial intelligence before, so it was all brand new. We were then able to take our learnings and present them at conferences in the US and across Europe. That product was so useful to our own employees that has now been spun off into a start-up within Liberty called 'Workgrid'. Teams are based in Belfast and the US now and they are selling the Chatbot to other companies so their employees can get the same benefits as we have."

This is where her passion for ethical and human-centred AI design comes into play, and understanding how AI is changing the paradigms of human-computer interaction.

She continued: "Ethics are important in every job. But as we're moving into areas such as artificial intelligence and cloud development, it starts to become even more important. Anybody, anywhere, sitting in a coffee shop or in their bedroom can build huge systems, they can use machine learning, they can have this massive impact on people around the world; so I think it's really important that we start thinking and talking about these things. It's not good enough for a developer to say "this is what I was told to do." I think every developer needs to be considering what they're building and what its impact on society is.

"That can even be in relation to how we're building things affecting the environment. For example, one of the things about serverless is that when your application is not being used, it's not running, so it's not using any electricity. Previously servers would have been running and using electricity all the time. That's important if you're committed to alleviating climate change. There are trade-offs in everything you build, but we need to make sure we are making mindful choices."

"Working with the chatbot and conversational AI is particularly interesting, because as you start to talk to computers, you have this more human experience and more of a connection with them. That can be used in really powerful ways, but also could be misused. For instance, there are chatbots out there that are being used to help users who may quite isolated, neurodiverse or could be struggling with mental health. These chatbots give them someone to talk to and can give some advice. A chatbot can be available 24/7 and never gets tired of listening to you. But while this can be really positive, what we want to make sure is that we're using this to augment and not replace other forms of mental health care; it's a help but not a solution to all."

If you are thinking about a career in tech – particularly if you're a young female, Gillian provided some advice on ensuring you value your own impact: "Although it's easy to not feel confident and to look at other people and think they know everything, you should realise that you've got a contribution to make that no one else can, and you do know things that others don't know. It definitely can feel intimidating at times - in my degree I think there only 10% were females on the electrical engineering side and maybe 30% on the computer science side. But as you move up throughout your career, it gets easier, because you gain lots of life experience, meet different people and realise your own personal contributions really do matter."

Meet Northern Ireland's Tech Trailblazers

With a lot of focus on how to engage females in STEM and on the gender gap in the tech industry – it's important to remember that it's not all doom, gloom and sad statistics! That's why Sync NI wanted the world to know about the female tech trailblazers who are paving the way in Northern Ireland's booming tech scene.

If she can't see it, she can't be it. So here's a hall of fame for our country's top STEM role models of the moment. For full profiles on all of the below inspirational women, visit **syncni.com** today.

Claire Baird
Head of NPD & Senior Account Manager
Davison's

Jenny Beattie
Development Manager
Cover.Net

Ritu Bhatt
IT Director
iEngageIT

Dr Laura Bond
Chair
The Change VC Fund

Emer Caldwell
IT Manager
Payescape

Robyn Catterall
Product Specialist
Kainos

Carla Conway
Operations Service Manager
Kainos

Eimear Corrigan
UX Developer
Synergy Learning

Rozy Corry
CEO
Replify

Amy Crockett
Software Engineer
Instil

If I were to advise other people considering a job in the tech industry, I would say try learning anything physically creative - sewing, woodwork, crocheting, metalwork, pottery - anything you can hold in your hand after a short time and say 'I made that'. Now make the same thing again - see how much faster you did it this time. Now learn how to do that in code. The initial learning curve is steep, but you will see yourself improve so stick at it!

As in life, there are always problems to solve in programming – big or small; simple or complex. They take time to work through and the best part of my job is that moment of working out exactly what is wrong, and knowing how to fix it.

I'm told that at the age of three, I was hooked on a computer game involving kittens, and while I was perfectly capable of turning on our old desktop computer and operating the ball mouse and wired keyboard, I could not turn it off – maybe I just didn't want to.

Mary Fealty
Founder
Broadtree Solutions

Megan Fitzpatrick
Business and Support Analyst
Dawson Andrews

Kathy Flanagan
Global Head of IT Service Desk
TP ICAP

Jessica Gambrill
City Lead
Women Who Code Belfast

Barbara Greer-Sayer
HR Manager
FP McCann

Adrienne Hanna
Founder & CEO
Right Revenue

Claire Houston
Senior AI Engineer
Kainos

Amanda Jolliffe
DreamSpace Lead
Microsoft Ireland

Roseann Kelly
CEO
Women in Business NI

Paula Kennedy Garcia
Vice President
Concentrix

I lead DreamSpace from a teaching and learning perspective. DreamSpace is our €5m education and innovation hub at our campus at One Microsoft Place in Dublin which was opened in April 2017. We've been working to expand DreamSpace in Northern Ireland with our digital skills experience due to be rolled out in a new Digital Learning Centre opening at W5 in autumn 2020. Through this new facility, we will be able to reach over 15,000 students from across the region each year.

Working in Microsoft has opened my eyes to technology that I didn't know much about beforehand. Now that I know more, I am SO excited about how people using technology (such as AI and quantum computing etc.) can help us solve some of the world's biggest problems like climate change, inequalities and access and more. DreamSpace is not only about young people learning about the power of technology, but how technology can empower them to create, innovate, engineer and shape their own future.

Lauren Kerr
Team Lead - Smart Delivery Assurance
Kainos

Pauline Keys
Senior Software Development Manager
Bazaarvoice

Alison Killen
Curriculum Leader ICT
Coleraine Grammar School

Faye Koukia-Koutelaki
User Researcher
Kainos

Dearbhla Laverty
Graduate Engineer
SAM NI

I studied Software Engineering at Ulster University, Jordanstown. After graduating in 2003, I started my career as a java developer but have never 'stayed inside the lines'. I have always been curious about how the business works, the larger ecosystem, and understand the importance of relationships. This naturally led me into senior technical roles, and leadership. I spent a few years as a Principal Engineer/Scrum Master leading teams, before moving to Bazaarvoice as the first Belfast Development Manager in Feb 2018.

My passion, the reason I get out of bed in the morning, is because I get to work with a smart bunch of people, solving problems. The most exciting part of my day is coordinating all of the pieces of the puzzle together in the right way to solve a problem - be it a people or delivery focused problem. I love it when a plan comes together.

Margaret Le Roux
IT Operations Team Leader
Randox Laboratories

Siobhan Leneghan
Software Development Team Lead
TP ICAP

Victoria Logan
Cybersecurity Communications Specialist
Allstate NI

Stephanie Maher
Senior Development Manager
PwC

Caroline Maitland
Senior Software Development Engineer
ESO

There are so many opportunities in tech in Northern Ireland at the moment with lots of organisations building really interesting technology products. In Belfast, there is no shortage of tech-related meet-ups where you can learn from experts, keep up to date with new technologies and learn about job opportunities in the local market. They are the best way to get insights into the tech industry.

Since joining PwC 4 years ago I have worked with large multinational organisations, technology startups and government bodies. From a personal perspective, PwC embraces flexible working which is key for me in balancing my work and home life. Technology as a whole has the potential to improve everyone's lives - if used the right way. We need to ensure technology does not become all-encompassing and replace the human interactions that help us truly connect.

Helena Majury
Senior Associate – Forensic Data Analytics
EY

Emma Martin
Software Engineer
BT

Leona McAllister
Co-founder & Chief Commercial Officer
PlotBox

Sarah McAnallen
Founder & CEO
McAnallen

Chloe McAteer
AI Engineer
Kainos

Aislinn McBride
Digital Services Deputy CTO
Kainos

Marie-Therese McCann
UX Lead
Fathom

Aine McCaughey
Senior Software Engineer
Civica

Steph McClelland
Software Engineer
GCD Technologies

Beverley McCormick
Regional Mathematics Educator EMEA
3P Learning

There's no such thing as typical work in tech! As a technology leader my role isn't to dictate, but to see the challenges and opportunities for improvements and give teams the freedom to be creative in finding solutions.

With technology, you're never building from the ground up, you're always standing on the shoulders of all the technologists who've come before you (other people have built hardware solutions, OS platforms, frameworks and libraries that we now depend on).

A lot of the work of my role has been trying to understand what these things are, pulling information apart and coming up with my personal opinion on how to solve problems with what we have available. It gives me enormous satisfaction when I've contributed to real working software that makes a difference for people.

Louise McElvaney
Director of People and Performance
Learning Pool

Ann McGregor
CEO
NI Chamber of Commerce & Industry

Helen McNulty
Senior Client Executive
Spatialest

Emily Mikailli
Head of HR
Signifyd

Tara Moore
Professor of Personalised Medicine
Ulster University

Caitriona Mulhern
Data Analytics Manager
EY

Marion Murphy
Managing Director
Mallon Technology

Kelly Neill
Security Risk & Governance Sales Specialist
Micro Focus

Barbara Rollo
Product Specialist
Kainos

Kathy Ruddy
Research Assistant Professor
Trinity College Institute of Neuroscience

If you want to be challenged every day, be creative and innovative then this is the industry for you!

Since beginning my role in EY, I have come into contact with numerous women who have inspired me both professionally and personally. It has been a breath of fresh air to see so many professional women excelling in their area of expertise whilst also managing families and other personal commitments. They have instilled in me the importance of networking and building my profile and have inspired me to always push to excel further in my career. I would recommend getting involved in the large number of tech and women groups that are available.

One of the benefits of working in consultancy is that every day is different. Every day is a new challenge, whether it is working on a different national or global client or using a new piece of technology to solve a client problem.

Bronagh Smyth
User Research Consultant
Kainos

Laura Soutar
Senior Software Engineer
Civica

Rose Mary Stalker
Chair
Invest NI

Rachel Steenson
Market Engagement Manager NI
Esri Ireland

Lynsey Ussher
Software Engineer
Teamwork

Kasia Wichrowska
Business Systems Engineer
CDE Global

Jen Winson
Project Delivery Manager
Dawson Andrews

For full profiles on all of these inspirational women, **visit syncni.com today**

Transforming digital enterprise in the Causeway Coast

How Northern Ireland's first enterprise zone is building a digital future in the Causeway Coast and Glens

Northern Ireland's rapidly growing tech and digital innovation scene is most concentrated in and around Belfast, but that isn't the only area building a bright digital future for Northern Ireland.

The Atlantic Link Enterprise Campus in Coleraine was established in 2016 as Northern Ireland's first official enterprise zone in over three decades, offering generous capital tax allowances designed to attract major tech players to invest in the region.

The Atlantic Link Enterprise Campus

Located next to Ulster University's Coleraine campus, the Atlantic Link Enterprise Campus sits less than a kilometre away from the landing point of a major transatlantic fibre-optic cable linking Northern Ireland directly to major North American and European cities. This made it the ideal location for global data centre company 5NINES to build a data centre, a move that it's hoped will now spark a virtual data revolution on the Causeway Coast.

The Coleraine data centre offers a local alternative to US or London-based data centres and has been an important tool for local companies in data-heavy sectors such as fintech and cyber-security. Many local tech and software firms already benefit from operating in the Causeway area, with software development firms such as ISArc, Spatialest, and Cover.net all

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Brendan Drain
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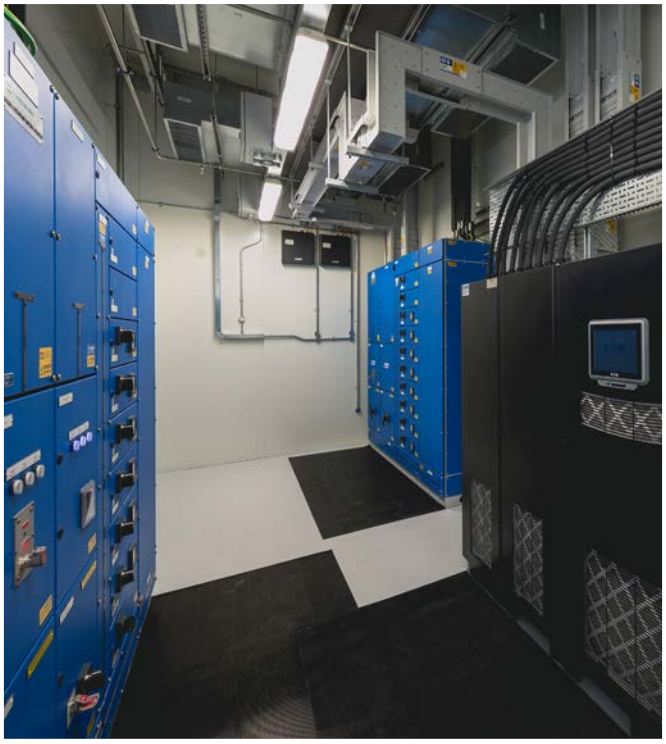


servicing global clients from their offices in Coleraine.

Data-driven marketing automation firm Zymplify relies on the strong local data infrastructure in its office in nearby Portstewart and offers a positive quality of life on the Antrim coast. Further afield, firms such as payment provider Payescape and software developer Acorn IT Solutions Ltd have also managed to retain great local talent in the Causeway area.

Laying the foundations for a digital future

The coast is known for its stunning natural beauty and quality of life, being home to four internationally recognised areas of outstanding natural beauty, nine Blue Flag beaches, and the Giant's Causeway (a UNESCO World Heritage site). The council now has ambitious plans to transform the local workforce and industries and make the coast a dream place to live and work in an increasingly digital future.

The Atlantic Link has now laid the foundations for building a Digital Causeway, providing a high-speed data link with the US that should make the area attractive for tech firms. The area already boasts good transport links and the extensive Ulster University campus nearby is home to research groups working with cutting-edge technology in the fields of bio-imaging, genomics, and biotechnology.

Many graduating students currently move abroad for work or face long commutes from Coleraine or Portstewart to tech jobs in Belfast, and the council aims to retain local talent by attracting major global firms operating in data-heavy fields such as fintech, cyber-security, and pharmaceutical development. It also has its eye on the booming digital creative industries, including cloud gaming, multiplayer server infrastructure for games, and realtime TV streaming platforms.

Attracting inward investment

The land around the Atlantic Link is being released for development, and the council is offering enhanced capital allowances and investment support. Low costs of living and direct access to one of the fastest data links between the North American and European continents is expected to make the area attractive to US firms, especially those that currently have operations in Dublin and are looking to set up separate UK infrastructure due to Brexit.

The Causeway Coast in the unique position of being a highly suitable location in the UK that's still on the same island Dublin's tech infrastructure, making support and servicing much easier. Companies concerned about the carbon footprint of their data services may also be attracted to the area as it's on the all-island energy grid and Ireland's wind generation capabilities are helping it hit renewable energy targets far ahead of schedule. With all of these factors in its favour, the Causeway Coast is on track to reimagine itself for a digital future.

The ABC Council provides opportunities through A-Z for NI's techies

There are plenty of places within Northern Ireland where the tech sector thrives outside of Belfast; here the Armagh City, Banbridge and Craigavon Borough Council details why it is one of them!

Armagh City, Banbridge and Craigavon Borough Council prides itself with the ability to blend its proud heritage and culture with its diverse, dynamic and successful business platform.

With land zoned for economic development; a number of existing enterprise areas and a prime location on the Belfast/Dublin Belfast/Enniskileen economic corridor it is ideally positioned both for inward investment and indigenous business growth.

As the second largest borough in Northern Ireland it is encouraged and motivated by the strength and progressive growth of its business sectors especially that of the Tech Sector.

Nicola Wilson, Head of Economic Development, outlined that business initiatives start from a young age: "We want to show the importance of career choices to our young people, specifically through our "Enthuse Partnership" programme which offers eight schools in the borough the opportunity to be partnered with private sector industry partners and help students learn about STEM careers.

"There is also a very proactive health and life sciences forum that is invaluable in helping young people develop the essential skills required for future recruitment into the tech sector. We also work closely with SRC (South Regional College) on their higher level apprenticeship programmes to ensure students are fully equipped with the knowledge and ability required to succeed within this field."

Participants on the ABC Council's Enthuse Partnership progamme

We asked Nicola why people should consider moving to the ABC district. She said: "We already have the highest number of tech companies outside of Belfast –which continues to grow. An exciting development is the establishment of The Centre of Excellence for Digital Skills and Technology which is currently being constructed in Banbridge by SRC, which will draw tech enthusiasts from across Northern Ireland to experience second to none training.

"Additionally, Banbridge-based Linen Mill Studios has been selected for the Game of Thrones formal studio tour, which will attract fans world-wide creating a huge tourism boost for the borough.

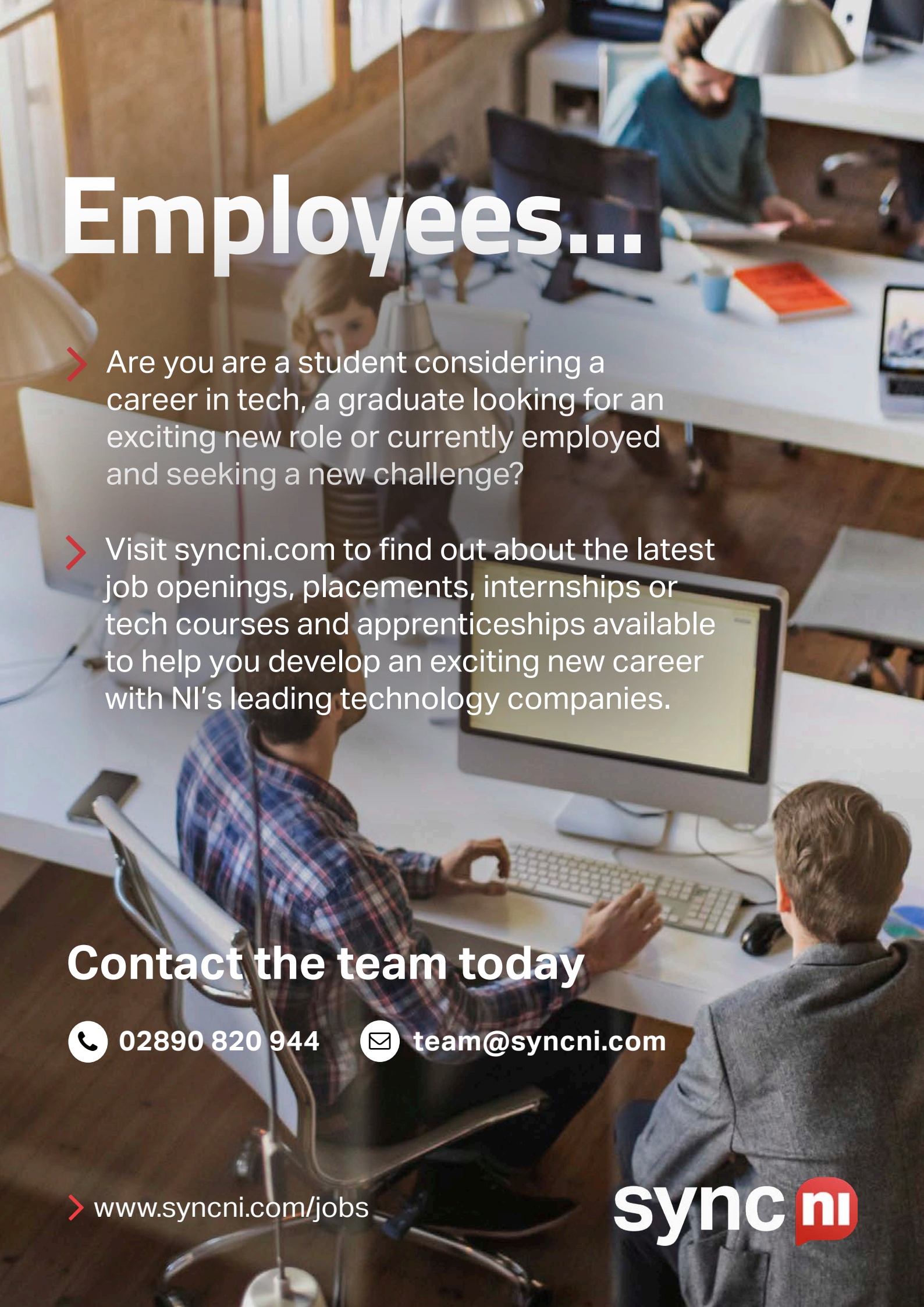
"Our geographical location is extremely accessible from Belfast and provides simple and direct routes to the South of Ireland. The borough is served by an excellent public transport infrastructure with direct access from Dublin to Belfast. We have fantastic, welcoming town centres that offer an enviable working and living environment, and provide levels of connectivity with further plans for improvement."

Nicola stressed how important tech workers are to the community and the range of roles available for those thinking about relocating to the ABC area: "We have pharmatech firm Almac based in Craigavon, which is the largest employer in NI. There's also GCD Technologies – both business continue to grow and will be looking to expand their workforces. And of course, Tech plays an important role within all the business sectors."

"A lot of blue chip companies based outside of Belfast are established within our borough and are now requiring tech talents. Engineering companies are looking for skills in AI and robotics and tech requirements will always be needed in our hospitals and health provision services plus the future is looking very bright for those providing much sought after digital skills as the borough becomes a tech hot spot."

To learn more about ABC Council's opportunities & initiatives, visit the website below.

Armagh City, Banbridge and Craigavon Borough Council
armaghbanbridgecraigavon.gov.uk



Employees...

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Decision Makers, influencers and thought leaders

- Advocating for and serving the local NI technology community
- Shining a spotlight on the success stories and achievements of local technology heros
- Encouraging and highlighting the opportunities available to all who wish to forge a career within the local technology sector
- Supporting initiatives that promote the uptake of STEM education at every level
- Showcasing jobs for those wishing to work within the technology sector
- Promoting major events and casual meet-ups to build an exciting community of innovators for future generations

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Sync NI is Northern Irelands leading technology focused multi channel media platform combining Print, Digital and Social Media to reach a captive audience of over 100,000 local IT professionals and tech enthusiasts