

Response to Tapping All Our Talents Review 2018: Women in STEM

Introduction

When published in 2012, *Tapping All Our Talents* presented a comprehensive analysis of the challenges facing women entering and being retained in STEM education and employment, whilst noting the significant, adverse economic impact of losing highly trained and talented women in these areas. The Royal Society of Edinburgh (RSE) was rightly celebrated for this important piece of work, and Colleges Scotland supports the ambitions in the first report and subsequent efforts to redress this imbalance.

As Scotland looks to more closely align enterprise and skills agencies, with inclusive growth and innovation as two of the four strands of the Scottish Government's economic strategy, and with a global focus on developing a workforce ready for the challenges and opportunities presented by industry 4.0, this review presents a timely opportunity to reflect on progress made and challenges still to overcome.

Colleges Scotland is the membership body representing all 26 of Scotland's colleges. Sited in our local communities, colleges offer education, skills, and training in the right place and at the right time to support the needs of individuals, their communities, and the labour market. Colleges are the first-choice destination for school leavers and provide the second (or more) chance at education for adult returners. Colleges Scotland is grateful to the RSE for the opportunity to respond to this call for evidence. Our response is set out below.

Response to Section One: *In Brief*

While it's clear that since 2012 a greater focus has been put on strategies and activities to progress gender equity in STEM education provision and employment, evidence would suggest this must be driven faster and further to achieve impactful change. Both Skills Development Scotland (SDS) and the Scottish Funding Council (SFC) have published action plans for tackling gender imbalance, with Scottish post-16 education institutions implementing policies aligned with the ambitions of these plans and of the wider STEM strategy for Scotland. While we aspire to a time where this is not notable, it should not be overlooked that the [STEM Education and Training Strategy for Scotland](#) was introduced by two women – the Minister for Further Education, Higher Education and Science Shirley-Anne Somerville, and the Chief Scientific Advisor Professor Sheila Rowan MBE.

In furthering progress to tackle the 'leaky pipeline', Colleges Scotland believes it is essential for cultural change to be embedded throughout the education sphere and would recommend that a holistic and joined-up approach is taken to tackling gender inequality in STEM. This approach should include all aspects of the education and training sector from early years, primary and secondary schools, colleges and universities, as well as industry.

The challenge in recruiting and retaining talented women in STEM education and employment begins long before they arrive for the first day of post-school education, training or work. While Curriculum for Excellence (CfE) (which begins in the ante-preschool year when children are aged 3) should provide a rich learning environment for children to self-direct learning according to their knowledge, it is critical that those leading the learning environment are comfortable and confident in supporting STEM learning activities and have had unconscious bias training as part of their continual professional development.

In *Tapping All Our Talents*, a recommendation was made that universities should be expected to develop a strategy to bring all their STEM departments up to the Athena SWAN Silver award or equivalent level. It should be noted that an equivalent charter and principles does not currently exist for the college sector to benchmark against. Such a development would be welcomed by the college sector in Scotland.

Response to Section Two: *In Detail*

Women in STEM in Scotland in 2018

The issue of gender inequality in STEM is recognised as a national priority, with high expectations set for the post-16 education sector by the Minister for Further Education, Higher Education and Science, Shirley-Anne Somerville, who introduced the Scottish Government's STEM Education and Training strategy for Scotland, and by the SFC. The [Ministerial Letter of Guidance to SFC](#) for 2018/19 reinforces the national economic importance of developing STEM talent and capability and notes the Minister's key themes of equality and fairness for the college and university sectors with gender equality highlighted as a priority. The Ministerial Letter of Guidance lays out the expectation on colleges and each post-16 education institution will now have an Outcome Agreement with SFC which sets targets for activity and underpins the funding allocation for the year.

In the political context, it is clear that the Scottish Government sees STEM as a critical area of focus given the activity across government directorates. Clear support for STEM from Cabinet Secretaries with a variety of responsibilities include (but are not limited to):

- Education – where the focus is on recruiting and retaining students with talent and passion for STEM.
- Economy – where the focus is on increasing productivity and developing the STEM economy by ensuring employers can access a highly trained and educated workforce.
- Social Justice – where inclusive opportunities to access education and training in STEM provides a pathway into employment and therefore upwards social mobility.

These different perspectives on the value of STEM overall, and gender equality in STEM, has been translated into defined targets and expectations across and beyond the education and training sector.

The debate about gender equality in STEM education and employment is regularly expressed as one of economic necessity in the way it was discussed in *Tapping All Our Talents* – that is, the talents and skills of women must be harnessed within the STEM field to make best use of the human resource available in Scotland. Setting such a clear, undiluted message is helpful in explaining and furthering the gender equality in STEM agenda, but it is important to be mindful of the wider positive societal and cultural impacts of gender equality.

There have been significant cultural shifts both large scale and more nuanced which have worked to tackle stereotypes and assumptions within STEM education and employment. As an example, smaller scale cultural shifts include a more considered approach to photographs illustrating prospectuses and reports about STEM opportunities to include women. This easily-made change cannot be underestimated in normalising women's presence in what have become stereotyped as men's working and learning spaces.

Moving forward, action is required on careers information, advice and guidance (CIAG) made available to school pupils, students and adult returners to education as well as to individuals already in work but looking to retrain. A national CIAG offer should work from the intended destination and offer a variety of pathways to achieve that goal, including flexible and work-based learning.

STEM Education in Colleges

While *Tapping All Our Talents* presented a comprehensive analysis of the challenges in STEM in universities and industry, the review presented no recommendations which analysed the status of colleges or which made recommendations for colleges. Colleges are ideally situated – both literally and in the education and training landscape – to increase STEM provision to ensure that learners can harness their interest and learn in the most advanced practical skills settings. Scotland's college sector is already committed to expanding STEM provision in a considered and inclusive manner.

It is important to note that 28% of all higher education in Scotland is delivered by colleges and that they consistently recruit students from areas of deprivation as assessed by the Scottish Index of Multiple Deprivation, embedding inclusion into our practice. At the same time, through local and regional school-college partnerships and the expansion of the new Foundation Apprenticeship, colleges are delivering STEM curricula to school pupils in the senior phase of school. Thus, when considering the role of education, it is crucial to reflect on the benefits derived from the activity of a buoyant and inclusive college sector.

Within the college sector exists examples of good practice for recruiting and retaining women at the earliest stages of their post-compulsory education, which could be replicated and scaled up. These examples include the provision of courses for women-only STEM study such as this example of the [HNC Mechanical Engineering](#) offered at City of Glasgow College which partners with Equate Scotland to build women's soft skills, confidence and networks while they progress through their course.

School-college partnerships, local Developing the Young Workforce groups and the new Regional Improvement Collaboratives, all offer a platform for STEM learning opportunities which offer exciting and appealing opportunities for practical application of STEM skills. Projects like [Bloodhound](#) which encourage children and young people to compete to build a model rocket car and [Greenpower F24](#) which motivate young people to build and race a Greenpower kit car are brought into the school setting by their local college to offer exciting and engaging STEM opportunities which inspire and encourage young people to consider a STEM pathway. While these projects are not targeted only at girls, they are delivered in an inclusive manner which supports all children to reach their full potential.

Other activities include the [This Ayrshire Girl Can](#) campaign, initiated by the students' association at Ayrshire College and delivered in partnership with the college; this project is working with local schools with the aim to inspire girls and women to consider careers in STEM. The project includes an event which brings together female school pupils from both primary and secondary school with female college students and interviews women college graduates now working in STEM employment to tackle misconceptions and encourage the audience to consider STEM subjects.

A notable industry-education partnership project focusing on girls and STEM is the [Shell Girls in Energy course](#). Run over the course of a year, girls are introduced to the range of career opportunities in the energy sector with lessons, field trips and workshops for girls in the senior phase of school. The course also gives participants the opportunity to apply for a two-week industry placement at Shell's office in Aberdeen.

School-college partnerships provide the opportunity for young people to study in a college as part of their senior phase timetable. Bringing school pupils into Scotland's modern college estate with cutting edge technical equipment and techniques is an effective use of public space and public funds, providing a rich learning environment using tools that are unlikely to be available in the classroom.

It is also important to note, given the current focus on expanding provision of early years education, that it is the college sector carrying the responsibility for training the next generation of early years professionals and ensuring that they're equipped with the skills and knowledge – and confidence – to provide high quality and inclusive learning opportunities from the earliest stages.

Ensuring a pipeline exists to bring women into STEM careers must start long before they graduate – indeed, there has been a notable focus on STEM through CfE, ensuring that even our youngest

learners are engaged in exciting and innovative learning opportunities which underpin STEM learning in an environment which is inclusive of all learners.

There are a myriad of innovative and impactful projects and practices in colleges working in partnership with local schools and nurseries. Many of these exist locally or regionally. In continuing to tackle issues of gender disparity in STEM subjects, it would be useful to have a national oversight of activity with the opportunity to expand provision where it works. This is particularly important in the college sector where education and training provision is aligned with local and regional labour market needs, as this may present an opportunity to review current practice in this regard and consider reflecting national skills gaps in STEM related provision.

In continuing to encourage more young women and girls to engage with STEM subjects from early years, through school and into post-16 education, it is essential that learning opportunities are rich, engaging, and tailored to meet different learning styles and needs. Considered projects partnered between industry, colleges and schools in the vein of the Shell Girls In Energy project, or the Bloodhound activity, should continue to be developed and disseminated to education providers for delivery.

Cultural Change

Since the publication of *Tapping All Our Talents* in 2012, the college sector has seen enhanced partnership working with industry as has been demonstrated elsewhere in this paper. Organisations working alongside the college sector, for example Equate Scotland, provide support and relationship building functions between employers and providers of education and training which has been embraced by some employers.

With this stated, and in full knowledge of the importance of female role models to encourage female participation in STEM, it is important to note the additional expectation on women in STEM employment and especially those women in senior positions, to take on responsibility for encouraging more women into STEM education and employment. Tackling gender inequality is not only the responsibility of women.

Challenging and tackling deep-rooted attitudes and institutional culture will only be possible through strong leadership embedded at every level of institutions and organisations. Making a positive case study of organisations which are particularly and notably effective will also bring the added benefit of profiling these organisations as employers of choice for talented STEM graduates.

Measuring cultural change will be difficult – quantifying qualitative experiences is almost impossible. However, indicators may include the proportion of the workforce returning after maternity or parental leave, the gender ratios in senior levels within individual employers, the gender pay gap and employee retention analysed by gender. Some employers will already gather some (if not all) of this data, but supporting SMEs to record and report on this would be meaningful and impactful.

Conclusion

Using the same logic that sees women's participation in STEM education and employment as a mechanism to tap into the talents of all our population, focusing on the positive change made possible by colleges working in partnership with universities, employers, schools and early years settings will enhance and accelerate intersectional efforts on gender equality in STEM which includes all protected characteristics.

Colleges Scotland
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