Close the Gap briefing for Members' Business on Increasing the Participation of Women and Girls in Science, Technology, Engineering and Mathematics

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Close the Gap is Scotland's policy advocacy organisation working on women's labour market participation. For more than two decades we have been working with policymakers, employers and unions to influence and enable action that will address the causes of women's labour market inequality.

1. Introduction

Science, Technology, Engineering and Mathematics (STEM) is a key driver of economic growth within Scotland and has been identified by Scottish Government as having significant importance for the future of Scotland's labour market.[1] Employment growth in Scotland is predicted to be concentrated with STEM related occupations, with a projected 4 per cent growth in jobs in this area between 2015 and 2027, representing approximately 42,600 jobs.[2] In addition, several of the growth sectors identified by the Scottish Government, such as energy, food and drink and life sciences, rely on STEM occupations, which further highlights the importance to the Scottish economy[3]. As a result of this, Scottish Government have identified STEM skills gaps as a critical challenge, with the gender imbalance in STEM education and careers a key problem to be solved.[4]

Women's under-representation in STEM subjects, among those who have STEM qualifications, and in STEM jobs is well-rehearsed. **Evidence shows that fewer girls take STEM subjects at Higher level such as physics (27%), computer science (17%) and engineering science (11%) compared to boys.[5] In addition, 73% of female STEM graduates do not pursue a career in this area, 9% of STEM professors are women and women**

[1] Scottish Government. (2017). *Science, Technology, Engineering and Mathematics Evidence Base.* Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2017/10/science-technology-engineering-mathematics-education-training-strategy-scotland/documents/00526537-pdf/00526537-pdf/govscot%3Adocument/00526537.pdf

[2] ibid

[3] Royal Society of Edinburgh. (2018). *Tapping all our Talents 2018. A progress review of women in science, technology, engineering and mathematics in Scotland.* Available at: https://www.rse.org.uk/expert-advice/inquiries/tapping-all-our-talents-2018/

[4] Scottish Government. (2021). *STEM Strategy for Education and Training in Scotland. Third Annual Report.* Available at: https://www.gov.scot/publications/stem-strategy-education-training-scotland-third-annual-report/documents/

[5] SQA. (2022). *Annual Statistics Report – Higher*. Available at: https://www.sqa.org.uk/sqa/98566.html

account for 11% of directorships in the STEM sectors.[6] While there has been a myriad of short-term, supply-side initiatives to address the gender imbalance, this has been insufficient to disrupt occupational segregation that characterises STEM. Without wide-ranging action, there will be no substantive progress on women's and girls' under-representation.

2. Women and Girls' Participation in STEM

There are a range of barriers to increasing the number of women and girls in STEM subjects and jobs, demonstrating that breadth of action that needs to happen.

Gender Segregation in STEM subjects

Girls and young women are under-represented within STEM subjects across the skills and education pipeline. Evidence has shown that gender stereotyping from an early age impacts the decisions that girls and boys, and young women and men, make about subject and career choice.[7] As children and young people progress through the education system, **their ideas about gender and work become increasingly fixed, and results in their concentration in subjects, based on gender stereotypes.**[8] Gender stereotypes such as the perception that science, and other STEM subjects, are for boys, and perceived abilities resulting in a higher proportion of girls feeling they are not good at STEM subjects[9], prevents girls and boys from studying non-traditional subjects and heavily influences their subject choice. **The result is girls' significant underrepresentation in STEM subjects at school, with most recent data showing girls made up just 17% of computing science, 27% of physics and 11% of engineering science students at Higher SCQF levels**.

This underrepresentation of women and girls in STEM subjects continues into higher education, where women are again underrepresented within STEM degree subjects, such as engineering and science.[10] There have been some very slight increases in the number of women entering STEM degrees. For example, the number of women entering computing degrees increased from 19.9% in 2019/20 to 22.7% in 2021/22, and from 41.6% to 43.8% in

[6] Royal Society of Edinburgh. (2018). *Tapping all our Talents 2018. A progress review of women in science, technology, engineering and mathematics in Scotland.* Available at: https://www.rse.org.uk/expert-advice/inquiries/tapping-all-our-talents-2018/

[7] See Levy, G. D., Sadovsky, A. L., & Troseth, G. L. (2000). Aspects of young children's perceptions of gender-typed occupations. *Sex Roles, 42*(11-12), 993-1006; Care, Esther, Jane Deans, and Robert Brown (2007) "The Realism and Sex Type of Four- to Five-Year-Old Children's Occupational Aspirations" *Journal of Early Childhood Research*, v5 n2 p155-168 2007; and Chambers, Nick, Dr Elnaz T Kashefpakdel, Jordan Rehill, Christian Percy (2018) *Drawing the Future: Exploring the career aspirations of primary school children from around the world,* Education and Employers

[8] Van der Vleuten, Maaike, Eva Jaspers, Ineke Maas & Tanya van der Lippe (2016) "Boys' and girls' educational choices in secondary education: The role of gender ideology", *Educational Studies,* 42:2, 181-200

[9] Royal Society of Edinburgh. (2018). *Tapping all our Talents 2018. A progress review of women in science, technology, engineering and mathematics in Scotland.* Available at: https://www.rse.org.uk/expert-advice/inquiries/tapping-all-our-talents-2018/

[10] NACWG. *National Advisory Council on Women and Girls: Monthly Spotlight. Women and Girls in Education* available at https://onescotland.org/wp-content/uploads/2019/01/NACWG-Education-ASD-content.pdf

the physical sciences[11]. However, progress is extremely slow and very far from the change that is needed. Furthermore, **having a STEM qualification does not mean women will go on to work in a STEM job. There is a significant attrition rate for female STEM graduates, with the vast majority of women (70%) not working in a STEM job**[12].

STEM Workplaces

Occupational segregation is a defining feature of Scotland's labour market, with STEM jobs and sectors being male-dominated. Occupational segregation, whereby gender norms and stereotyping about men and women's capabilities and preferences results in men and women doing different types of work (horizontal segregation) and at different levels (vertical segregation). Actions to encourage women into STEM education and occupations can help address occupational segregation by tackling these gender norms. However, there also needs to be equal attention given to address workplace culture, with specific actions to influence employer practices on gender equality, in order to help retain women in STEM occupations.

Evidence shows that STEM workplaces can be a hostile environment for women, with working conditions and workplace culture affecting women's abilities to enter, remain and progress in these jobs.[13] **Women face a range of gendered barriers within male-dominated STEM jobs and sectors, which include:**

- **a lack of flexible working which makes it difficult for women to combine work and their caring responsibilities;**
- **a lack of good-quality part-time jobs, resulting in women taking jobs below their skills and qualifications level;**
- **a culture of presenteeism which wrongly equates long hours with job commitment; pay discrimination;**
- **biased and untransparent recruitment practices; and**
- **sexist cultures that create a conducive context for sexual harassment, and that do not feel inclusive to women**.

Research from Close the Gap's Women in the Renewable Energy Scotland (WiRES) project found that only 39% of women had access to flexible working; 25% felt out of the loop due to their gender; 20% felt their contributions were less valued than their male counterparts; and 11% reported working on fewer higher visibility major revenue projects than male colleagues[14].

[11] Higher Education Statistics Agency. What do HE students study? Available at: https://www.hesa.ac.uk/data-and-analysis/students/what-study

[12] Royal Society of Edinburgh. (2018). *Tapping all our Talents 2018. A progress review of women in science, technology, engineering and mathematics in Scotland.* Available at: https://www.rse.org.uk/expert-advice/inquiries/tapping-all-our-talents-2018/

[13] Close the Gap. (2018). *Submission to the Royal Society of Edinburgh Tapping All Our Talents Review 2018.* Available at: https://www.closethegap.org.uk/content/resources/Submission-to-the-Royal-Society-of-Edinburgh-Tapping-All-Our-Talents-Review-2018.pdf

[14] ibid

Research from Equate Scotland on the multiple discriminations women in STEM face, further highlights this hostile work environment. **It found that the majority (60%) of women responding had experienced sexism in the workplace or place of education; one in three women do not feel confident in reporting experiences of exclusion or discrimination to their employer; and over half of women felt efforts to support women in STEM were not fully inclusive for women who experience multiple discriminations.**[15] It is evident that STEM workplaces are currently not inclusive for different groups of women, and intersecting inequalities are entrenched in STEM workplaces.

Green Jobs and Just Transition

Green job creation in a just transition is a key priority for the Scottish Government. However, women are vastly under-represented within the energy sector and in 'green jobs', which relies heavily on STEM occupations. Achieving a just transition requires action to enable men and women to equally benefit from this shift in the labour market, with gender equality considerations at the heart of green economic policymaking. Close the Gap's response to the consultation on the Draft Energy Strategy and Just Transition Plan highlighted a lack of gender analysis within this strategy, with no mention of women, gender or the occupational segregation that characterises green sectors[16]. **The sectors identified for investment and policy focus, such as energy and manufacturing are male-dominated. Consequently, this policy direction, without targeted action to tackle occupational segregation is very likely to create more jobs for men, and thus disbenefit women.** In addition, the Scottish Government recognise the need to support education and training within the green job space, this is of particular importance for women as they are less likely to have STEM skills key to green jobs. However, there is currently a lack of meaningful focus on ensuring women and other under-represented groups in STEM-related sectors have access to opportunities to acquire the skills necessary for these jobs. The lack of consideration afforded to gender equality within the drive for green jobs is particularly concerning, as **without mitigating actions, there is the risk that women will be left behind and remain under-represented within STEM occupations in the green jobs arena.**

3. What Needs to Happen

Substantive action needs to be taken to increase the number of women and girls in STEM. It is vital that these actions are wide-ranging, gender-sensitive and intersectional, and should be focused on the education system, and changing employment practice.

A significant part of increasing women and girls' participation in STEM is tackling gender norms and stereotypes that result in subject-choice and occupational segregation. Current activity is overwhelmingly focused on supply-side activity such as taster days for girls in STEM jobs, which are insufficient to create sustainable change and encourage more girls and

[15] Equate Scotland. (2020). *Women in STEM. An Intersectional Analysis of Multiple Discriminations.* Available at: https://equatescotland.org.uk/wp-content/uploads/2020/05/Women-in-STEM-report-2.pdf
[16] Close the Gap. *Response to the Scottish Government Consultation on the Draft Energy Strategy and Just Transition Plan.* Available at: https://www.closethegap.org.uk/content/resources/Close-the-Gap-response-to-the-draft-energy-strategy-and-just-transition-plan-May-23.pdf

women into STEM opportunities. Action must be used to address the underlying gender stereotypes and discrimination that cause the under-representation of women and girls in STEM. These actions include:

- Intervention in early years settings to shift gender stereotypes and norms;
- Building capacity in careers information, advice and guidance practitioners to challenge gender stereotypes and raise awareness of opportunities in non-traditional areas for girls and young women.;
- Prioritising gender competent leadership on tackling gendered inequalities in education settings, including subject segregation, sexism in classrooms, and sexual harassment and other forms of gender-based violence in schools, colleges and universities;
- Having fair and effective reporting procedures for sexual harassment, and building capacity in line managers to competently manage reports;
- Demonstrating leadership on tackling the intersections of sexism, racism and ableism;
- Taking positive action measures to recruit more women into roles in which they are under-represented;
- Tackling discrimination and bias in recruitment and progression practice;
- Supporting women to have access to training and development opportunities to enable them to reskill and/or progress;
- Investing in affordable, onsite childcare services; and
- Gathering intersectional data to identify gendered patterns and inequalities facing different groups of women workers.

In addition, increasing women's participation in STEM occupations is tied to access to childcare. **Therefore, a key priority should be expanding the provision of high-quality, affordable and accessible wrap-around childcare**. Close the Gap[17] and a range of other organisations have called for an expansion of the funded entitlement to 50 hours a week so that women can work full-time if they need to or want to.

[17] Close the Gap (2021) *The Gender Pay Gap Manifesto: Realising fair work for women in Scotland*, available at: https://www.closethegap.org.uk/content/resources/The-Gender-Pay-Gap-Manifesto---2021-Scottish-Parliament-elections.pdf