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**Tapping All Our Talents Review 2018: Women in STEM
Primary & Secondary Education Roundtable
10 May 2018, 13.00-15.00**

Note of Meeting

Roundtable Participants:

Janet Brown, Chief Executive, Scottish Qualifications Authority
Joan Davidson, Education Manager, Edinburgh International Science Festival
Heather Earnshaw, Institute of Physics
Tracy Geddes
Rebecca MacLennan, Programme Manager, Young Engineers and Science Clubs,
Scottish Council for Development & Industry
David Maxwell, Education Officer, Children, Young People & Lifelong Learning,
Dumfries & Galloway Council
Colm O'Riordan, Aberdeen Volunteer, National Parent Forum Scotland
Dawn Pirie, Physics Teacher and Head of Careers, Robert Gordon's College
Judy Robertson, Professor of Digital Learning, Moray House School of Education
Jim Thewliss, General Secretary, School Leaders Scotland
Fiona White, Deputy Head of Junior School, St George's School for Girls

Working Group Members:

Dr Fiona McNeill, Assistant Professor of Computer Science, Heriot-Watt University;
member, Young Academy of Scotland.
Professor Eileen Wall, Professor of Integrative Livestock Genetics at SRUC; Vice
President of the British Society of Animal Science.

Secretariat

Morven Chisholm, RSE Fellowship Manager

Resources / Reports mentioned:

https://ssir.org/articles/entry/ending_teacher_shortages_with_network_mapping

Discussion Topics

1. What support, if any, are primary school teachers given to improve their own ability and confidence in teaching STEM? Is specific guidance on how to encourage interest from girls in STEM included in this, or could it be? How can good practice best be shared amongst teachers?
 - Have developed plans for school teachers who do not have a STEM background to be able to teach STEM topics. Can step in if teachers do not feel comfortable with a certain topic.
 - Need to overcome fear and discomfort some teachers feel about teaching STEM, which then transfers to pupils.
 - Fun with Science days. Identify areas teachers are not comfortable with and talk through teaching plans with them. Seems to be working.

- Some schools are very proactive, but suspect STEM is still marginalised in schools where there is not a dedicated STEM lead (and resources).
- Confidence is an issue. Lack of experience and no background in STEM is a problem (particularly for upper primary where concepts become more complicated).
- Raising Aspirations in Science Education (RAiSE) Programme provides funding to employ staff to train teachers and work with teachers.
- It seems to be acceptable to admit that you are not good at maths, but it is not seen as acceptable to admit that you are not good at English.
- If Higher English is required to get in to teaching, why not Higher Maths?
- Making Maths Count is trying to do something in this area. However, being able to teach numeracy does not necessarily come from having a maths qualification.
- Not being good at maths can sometimes make you a better teacher (better understanding of why people struggle with concepts).
- Recognition that individual universities are responsible for their own teacher education programmes. It is difficult to increase the time dedicated to STEM, particularly in Primary ITE programmes, given the range of other priorities.
- Teacher training is accredited by the General Teaching Council for Scotland. Need to be careful that we are not too restrictive re. qualifications to get in to teacher training as we may end up with very few applying. Can CPD do more in this area?
- Nursery staff and childminders are also delivering STEM education.
- Role of Regional Improvement Collaborations in supporting teachers, including CPD.
- Education Scotland STEM hubs can be useful.
- GLOW, yammer feeds etc can be useful to share information, and are accessible anywhere and any time.
- Issues can be different in small, rural schools where there are only a couple of teachers.
- Are teachers supported to understand/tackle gender issues?
- There is some work on this, but scale and pace is not great. Some local authorities and schools are taking the Institute of Physics package and developing that into messages for different stages. However, this relies on having dedicated staff to do so.
- It is not just about STEM, but all gender stereotypes. This gives it a more wide-reaching relevance. How do we share knowledge among teachers? They are already overworked. Need to be able to free up teachers' time to focus on STEM and equality activities.
- Difficult, because it is easy to argue that everything they teach is a priority.
- Institute of Physics work is great, but those without time to commit to it will not benefit from it.
- We need to sell STEM to teachers. Show them what the data looks like at the local level to persuade them of the need for a focus on this.

- Are gender issues included in teacher training? Inclusive learning is a focus across the board.
2. At what point (age) do teachers see the gap in interest in STEM open up? What do teachers perceive to be the key influences on children's interests at this stage?
- There is a theory that the best teachers teach upper school. If this is true, what level of STEM ability to teachers at the lower levels have? If girls are not interested by age ~12 then we've lost them.
 - ASPIRE report showed that girls felt that scientists are important, but did not want to be one. Enjoying science experiments does not lead to girls identifying as wanting to be a scientist. Need to encourage the link with career opportunities at an early age.
 - It is about outcomes, not just enjoyment.
 - Points of transition are where choices are made. More of a focus on skills, rather than being subject specific, is useful.
 - It is harder to get girls to engage from upper primary, and where they do, they tend to get directed into more 'feminine' roles (for example presenting the findings, drawing the posters, rather than doing the experiment).
 - We already see the gap in nurseries – toys, activities, learning experiences.
 - Links between STEM and the Developing the Young Workforce strategy need to be made clearer.
 - So much influence comes from the home.
 - Toys and marketing are gendered.
 - RSE should make a recommendation around not gendering toys and marketing for children.
 - Stereotyping is much rarer in single-gender schools. Icelandic schools are mixed-gender, but have single-gender classes.
 - Most of what we've talked about is societal. We need to influence the parents.
3. How does the influence of parents, peers and careers advisers impact young people's choices and how can they be encouraged/supported to champion STEM to both genders?
- Could the curriculum be set in a way that requires parental involvement? There seem to be more opportunities for parents to engage at primary level, but not secondary.
 - However, we need to avoid increasing inequalities because of socio-economic issues.
 - Should there be something on gender issues in the Baby Box?
 - There is probably more (and more regular) dialogue between parents and nursery teachers, than primary or secondary.
 - However, nursery teachers do not have time built into their day for planning, so need to think differently about how to engage with them.
 - In the USA, parents are seen as a resource for schools to use.
 - Experience in the USA where teachers came in to the labs for 6 weeks. Upskilled teachers and gave them a different view of potential career paths.

- Could the established relationships with STEM Ambassadors be used in this way (with teachers going to the Ambassador's place of work?)
- Primary teachers have access to subject experts in secondary schools. We should ask primary teachers to identify gaps and use secondary teachers to help fill these (including sharing equipment). It is in the interest of the secondary schools to support their primary counterparts to ensure pupils have the right skills when coming in to secondary.
- Many of the programmes available attract those teachers that are already interested and engaged. Need to target those who are not already engaged.
- STEM ambassadors need to be well-trained to help address gender stereotyping.
- Do our young people know that they are going to be a life-long learner? They are likely to have several careers.
- Language used in schools around skills is not the same as in STEM industry, so people do not see themselves as having the necessary skills to fill these roles.

4. What are the key barriers to girls continuing to study STEM?

- Going from 8 to 6 subjects at school is a massive barrier to girls taking STEM subjects.
- Evidence that single-sex teaching can work (including for example boys learning English). However, would caution against advocating for single-sex teaching, as research is not conclusive. Single-sex schools are also not representative of industry.
- Need to use system that works for the circumstances you find yourself in. Not one solution for all.
- Girls can benefit from having peer support in their class.
- Need to build resilience to be able to cope as a minority in industry. Need to equip females for this.
- Need careers advice which explains the options available with a certain degree, as there is a lack of understanding.
- Careers advice needs to be built into subject learning.
- Need to look beyond physics, chemistry etc to those subjects (technology, mathematics) that take you into a broader STEM career, as these are the least understood.
- Children do not know what STEM careers really are.
- Have we asked younger people? We should ask every child in a school cluster (secondary, primaries and nurseries).
- Wellcome report includes young people's views of STEM.
- Scottish Government Young People in Scotland Survey results might be useful.
- We do not have enough computing science teachers.
- Concern that the only people studying STEM subjects are those that want to work in STEM. We want those that have an interest to study STEM subjects too (as they do with other subjects)

5. What initiatives are aimed at encouraging girls to study STEM? What do they perceive as having been successful/unsuccessful? Best practice case studies?

- Dare to be Different programme.
- Science Grrl.
- Smallpeice Trust events.
- Shell programmes.
- Specific girls into engineering days are great, but if the school environment does not provide the ongoing support, then these days do not have a lasting impact. Also, subject teachers often do not attend these days with their pupils.
- Curriculum for Excellence focuses on personal development. Is there something around gender and developing self-confidence for those working in non-gender-typical subjects?
- 1000 Girls, 1000 Futures project.
- Connecting girls interested in STEM for peer mentoring and access to more established mentors. However, this is for outstanding girls, and we need something for everyone.
- Skills Development Scotland Marketplace connects industry with schools.

6. What have been the lessons learned from delivering and evaluating outreach programmes such as science clubs and festivals?

- Focus on inspiring, but also supporting teachers. Showing science in real life. Building confidence among teachers. Also, providing resources that teachers can tap in to for future learning. Definitely a need for this at the moment.
- Focus on supporting teachers and providing resource kits. All gender-neutral context. Increasingly now working with whole classes, so engaging with a wider group. Embedding careers messaging into all projects. Key thing is to influence teachers.
- Teachers do not have time for one-off events. Need to ensure everything links to the curriculum. While there is a limited number of STEM Ambassadors, parents will work in STEM and could be better harnessed.
- Need to take advantage of Developing Young Workforce and different pathways into STEM.
- Moving to frame careers fairs around subjects/industries and all the pathways within that, rather than grouping universities together, colleges together etc.

7. Anything else you want to raise?

- So much jargon. We assume teachers know what STEM really means.
- Definition of STEM is growing - digital and medicine are also now being included.
- We probably do not have a common definition/understanding of STEM.
- The range of priorities in Scottish education mean that STEM may be overlooked. The National Improvement Framework should specify STEM.
- While education involves developing among learners a broad understanding of the world. The employment and economic argument for STEM is important for influencing policy makers.
- There are also issues around the level of literacy of boys.