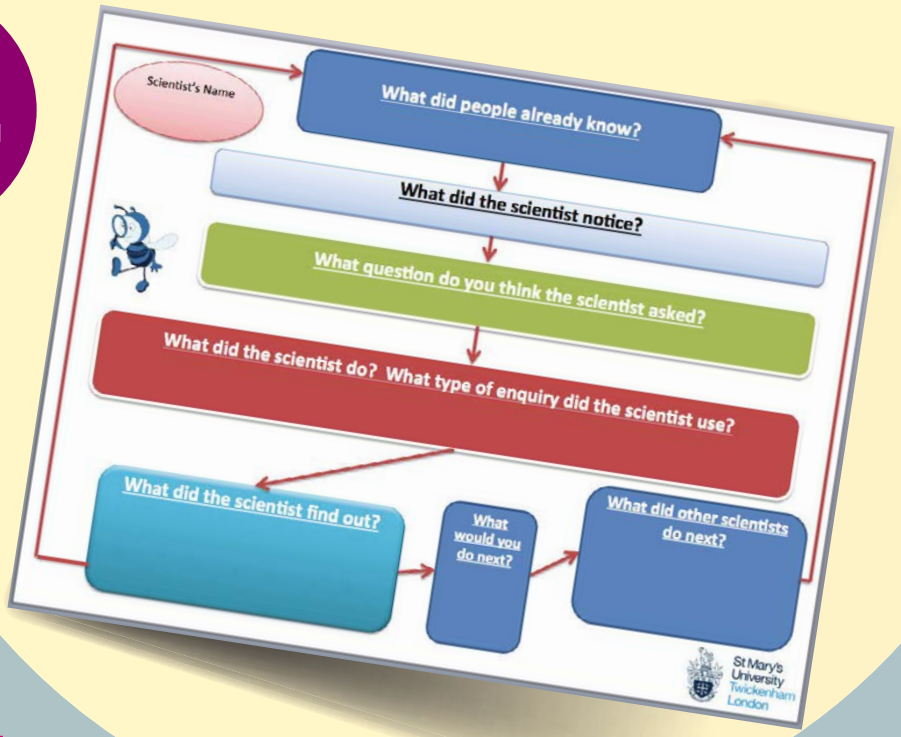


Figure 1 A model to explore enquiry types used by famous scientists (adapted from Sinclair and Strachan, 2016)

Relating school science to real-world scientists

Helen Spring considers how making scientists relevant to children supports learning

The approach to teaching children about scientists, described in an article by Alex Sinclair and Amy Strachan in a recent issue of *Primary Science* (Sinclair and Strachan, 2016), inspired me. The key thing for me was that the children do not need to know the life history of the scientist (they have been married three times and had seven children, they were struck by lightning and love cats etc.); what they really do need to know is what the scientists' contributions were to science.

I have adapted Sinclair and Strachan's model to ask which of the five types of enquiry a scientist might have used (Figure 1). This really makes children think about how the science they are doing in school is similar to the science that 'real' scientists do.

Once I had read the article, I contacted the authors to find out more; they very kindly sent me some teaching resources relating to their work focusing on Mary Anning and Charles Macintosh (Figure 2). I used these with my student teachers at York St John University; they enjoyed being involved in the evaluation process, and the resources were very well received.

Women in science

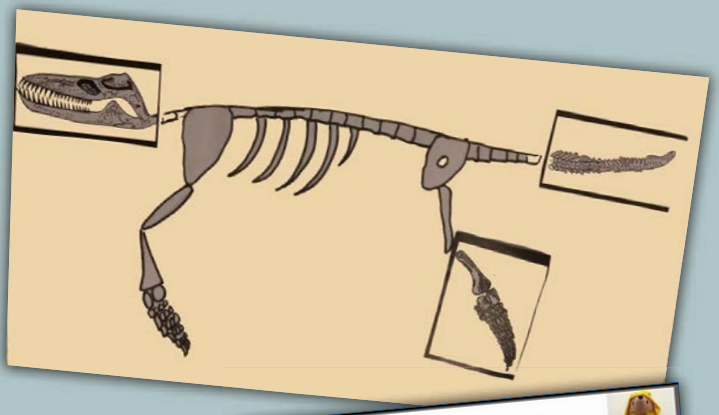
Some time later I was asked to deliver a day's professional development at the National STEM Learning Centre in York on behalf of Northern Lights teaching school alliance (see *Websites*). The course title was Supermarket Science and it was all about using simple, easy-to-obtain resources to support science teaching. One of the things I wanted to do was to explore how readily available materials could be used to make science relevant to young people. I shamelessly shared Alex Sinclair's work with the group, but on this occasion, as I had already planned to focus on women in science and the need to challenge the preconceived ideas that some children (and adults) have of who can be a scientist, I was particularly keen to focus on a female scientist.

During this session, and many others, I showed a lovely video-clip called 'Redraw the Balance' (see *Websites*) from the MullenLowe Group (which actually made a student cry in one session!). It is an excellent clip and it certainly made me think about the expectations I have of people in different roles. It shows children being asked to draw a fighter pilot, a firefighter and a surgeon; the outcome was that 61 of the children depicted men in these roles and only five drew women. Females in these roles were then introduced to the children.

Women scientists in the curriculum

The English National Curriculum identifies a number of male and female scientists to study, but when I explored the year 2 (age 6–7) topic of 'materials', there were only male scientists listed (John Dunlop, Charles Macintosh and John

Key words: Enquiry | Women in science



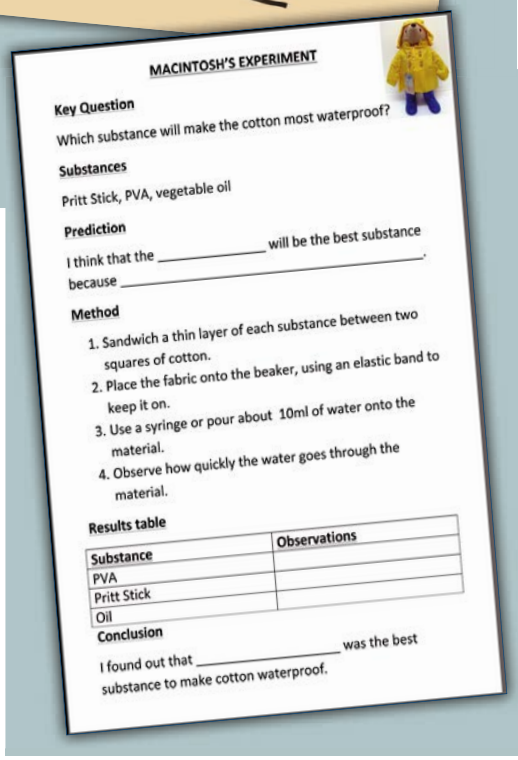


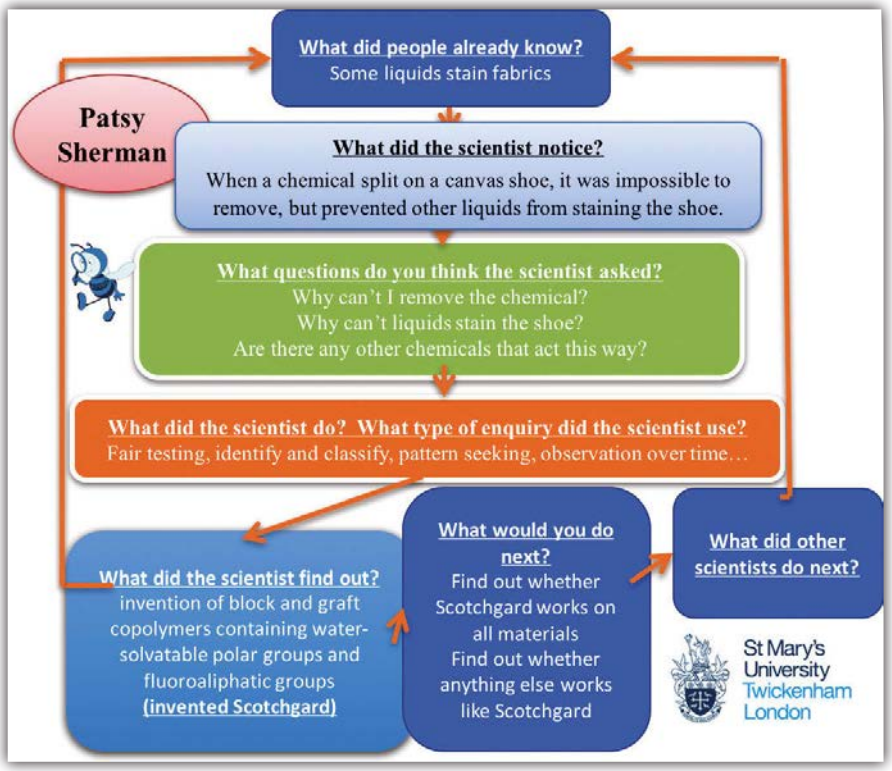
Figure 2 Teaching resources relating to work focusing on Mary Anning and Charles Macintosh shared by Alex Sinclair and Amy Strachan

McAdam). Therefore, I set out to find a female scientist whose work could be replicated (more or less) in a primary school classroom. On a useful website listing women inventors (see *Websites*), I discovered Patricia Billings, who invented Geobond®, a material that is heat-resistant, non-toxic and indestructible – the world's first workable replacement for asbestos. I also found Stephanie Kwolek, who discovered a liquid crystalline polymer solution that led to the invention of Kevlar®, a synthetic material that is five times as strong as steel. There is definitely some potential for developing a children's investigation based around the work of these two scientists.

Patsy Sherman and Scotchgard™

Eventually I settled on Patsy Sherman, a research chemist who, while working on fluorochemicals for jet aircraft fuel lines, made discoveries that led to the invention of Scotchgard™ stain repellent. I used Sinclair and Strachan's flow diagram template to introduce Patsy Sherman to my group (Figure 3).

I asked the teachers on my course to plan their own fair test. Some groups compared the effectiveness of Scotchgard (other brands are available!) with other similar substances. Other groups compared the effectiveness of Scotchgard on different materials. One innovative group did both (Figure 4)! In our example, we put a drop of ink on material that had been treated with Scotchgard, hairspray, hair conditioner or PVA glue; however, our investigation could be adapted in many ways. Children could be asked to compare which products Scotchgard protects against (for example, does it stop Ribena stains?) or whether it could be used to remove stains. But it is also a prime opportunity for children to develop and explore their own questions.



We were all surprised by how effective the Scotchgard was. We were also quite impressed with how well hair conditioner prevented stains – although a little concerned about what it might be doing to our hair! In a school setting, this could have led nicely on to fruitful discussions about whether you would want your clothes to be covered in hair conditioner.

I have found two videos that are really helpful when considering 'what scientists did next'. They are for Ultra-Ever Dry®, a superhydrophobic coating that repels liquids (see *Websites*).

Figure 3 Introducing Patsy Sherman by using the model to explore enquiry type

Figure 4 Teachers' investigations of Scotchgard at the STEM Centre course

Role models in science

There are many male and female scientists out there who deserve to be recognised: you do not just have to stick to those that are listed in the National Curriculum (remember this is a minimum entitlement!).

Depending on your cohort and their aspirations and preconceptions, you may want to focus on people from the local area, female scientists, people from ethnic minority backgrounds or disabled scientists.

Young *et al*. (2013) explored the way that an absence of female role models in STEM may contribute towards young women choosing not to study STEM subjects in later life. I would also argue that it is just as important that we give our boys role models: it is important that *all* children see science as a possible future career, not one that is only open to one particular group of people.

References

ASE (2011) *Be safe! Health and safety in school science and technology for teachers of 3- to 12-year-olds*. Hatfield: Association for Science Education.

Sinclair, A. and Strachan, A. (2016) The messy nature of science: famous scientists can help clear up. *Primary Science*, **145**, 21–23.

Young, D. M., Rudman, L. A., Buettner, H. M. and McLean M. C. (2013) The influence of female role models on women's implicit science cognitions. *Psychology of Women Quarterly*, **37**(3), 283–292.

Safety: Pre-spray fabric with Scotchgard (or other stain protector), rather than allowing children to do it. Always refer to *Be safe!* (ASE, 2011) when using chemicals in science lessons.

Websites

Northern Lights teaching school alliance: **www.Northernlightstsa.org**

Redraw the Balance video: **www.youtube.com/watch?v=qv8VZVP5csA**

Women inventors: **www.women-inventors.com**

Ultra-Ever Dry® videos: **www.youtube.com/watch?v=IPM8OR6W6WE; www.youtube.com/watch?v=BvTkefJHfC0**

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