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Rachel Linfield

reflects on memories of teaching of the 'appliance of science' over the past 30 years and what we remember

Reflecting on teaching of the 'appliance of science'

When I hear the words 'appliance of science' I am reminded of a television advert for Zanussi kitchen appliances. Thirty years after first seeing it, I can still remember a spaceship arriving on Earth and the descriptions for the fridge/freezer, washer/dryer and slim-line dishwasher that were being advertised. Although watching the advert now on *YouTube* does not engender the same fascination as it did back in 1986, for me it still promotes the concept that science can be applied; indeed science *is* useful.

As a primary teacher I was always keen that the children I taught understood the use behind a science fact or process. What point was there, for example, in finding out when and how chocolate melts if we did not go on to cook with the melted chocolate? Knowledge of properties of materials needed to be put to use in art and design, physical education and design and technology. And yet now, when I talk to children, students and even scientists, I find few can instantly recall a useful science fact that they learnt at primary school. Is this due, in England, to the National Curriculum for science? Has our teaching of National Curriculum science relied so heavily on learning content that the value of science applications has been lost? Speaking to trainee teachers about their memories of the science they learnt in school has led me to believe that this may be the case.

The questions

Whenever I meet a group of trainee teachers, for their first session of learning how to teach science within an early years or primary setting, I always ask three questions:

- **What is your earliest memory of being taught science?**
- **What is the most fascinating science fact you have learnt?**
- **What is the most useful science fact that you have learnt?**

I like to gauge the trainees' experience and enthusiasm for science.

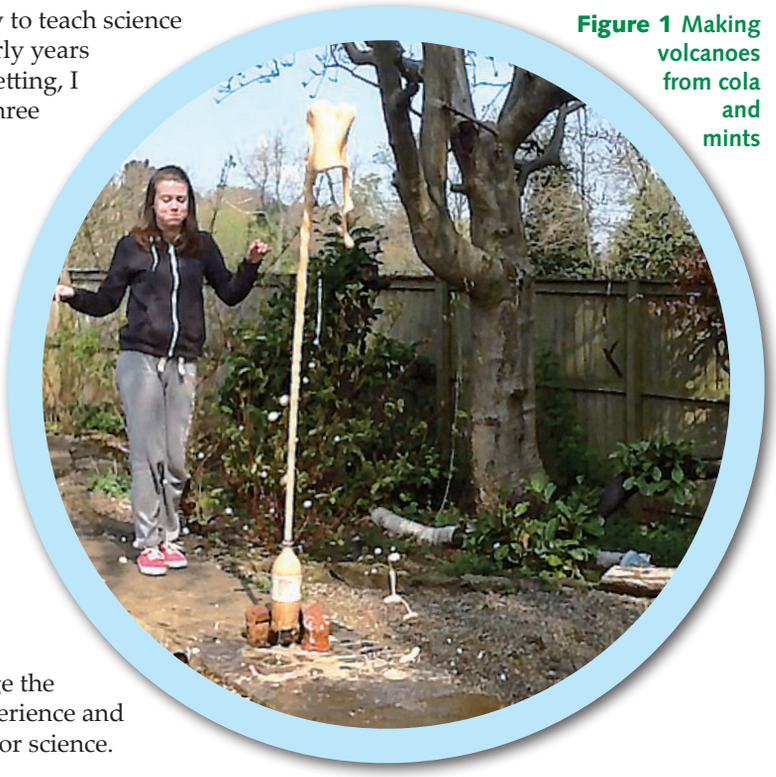

Figure 1 Making volcanoes from cola and mints

The answers

In the 1980s, many trainee teachers failed to remember ever having been taught science within their own primary school education. Any memories tended to be of nature tables, growing seeds and occasionally making a bulb light (although more often failing to!). Students fortunate enough to have been taught primary science were eager to share their memories and some wished that they had had more regular exposure to science in their early years. Fascinating facts they had learnt never originated from science taught in school but usually came from a television programme or something read. Answers included '*sharks cannot swim backwards*', '*sneezes can come out of your nose at 100 miles per hour*' and '*a single dandelion plant can release 2000 seeds*'.

> Few can instantly recall a useful science fact that they learnt at primary school.

Key words: Reflection ■ Engagement

Useful science facts learnt tended to be based on the frog life cycle, electrical knowledge about replacing fuses in plugs and wiring plugs and, once, about when to unscrew the nuts on a car wheel while changing a tyre. Answers in the 1980s were characterised by a desire to know more and enthusiasm to share what had been learnt. At times secondary school science appeared to have confused students, creating impressions that the subject consisted of complicated formulae and 'weird laws'.

The mid 1990s onwards brought trainee teachers where the majority had experienced, at some stage, National Curriculum science. Many could remember revising for Standardised Assessment Tests (SATs) using published revision guides. This in turn led to many negative feelings, limited practical experimentation and sadly a lack of enthusiasm shown in responses to my questions. However, many more students than in the 1980s could respond to '*What is your earliest memory of being taught science?*', with answers mentioning growing seeds, rotting teeth in fizzy drinks, lighting bulbs, making shadows, reducing friction, growing mould and creating

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'volcanoes' (Figure 1). Answers often referred to teacher demonstrations but again fascinating facts seldom came from taught school science: they generally arose from a television programme, the back of a cereal packet or a secondary school 'planner' where an interesting scientific/historical fact is given for each week. Few 'useful facts' emerged.

My primary science

When comparing trainee teachers' responses with my own education in science at primary school in the 1960s, I realise that I have strong memories of doing weekly experiments with my Junior 3 (age 9–10) teacher. There was no link between the topics that we covered but still I remember what

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I learnt. For example, one week we made circuits to light bulbs, the next we looked at reflections in mirrors, and in the third we marvelled at a balloon filling with carbon dioxide while wondering how our teacher would remove it safely from the glass bottle that contained vinegar and sodium bicarbonate. (The answer: Not very well – a minor 'explosion' led to a scowling Mr Lambert, covered in 'froth', and messy patches on the classroom ceiling!)

While at primary school, I developed a love of investigating and asking questions and a desire to know more. I regularly repeated experiments at home and even wrote them up with my teacher-instilled headings: '*What I used*', '*What I did*', '*What happened*' and '*What I found out*'. The skills of writing clear, concise reports and controlling variables to carry out fair tests were perhaps two of the most valuable things I learnt in primary science at school; these skills underpin study across the curriculum, from design and technology through to history and geography. Thus for me, 'the appliance of science' is about using key science skills, not only within science but in my wider life. In particular, knowledge of fair testing when my daughters have tried to persuade me of the merits of buying 'labelled goods' has saved much money. I need evidence from a fair test to compare the cheaper non-label option!

The way forward

So what can we take from my reflections on the past 30 years? Sadly it would appear that, for many people, National Curriculum primary science has not impacted greatly on their knowledge of 'the appliance of science'. Certainly few trainee teachers can remember 'useful science facts'.

In *Primary Science Review* **100** (2007) I wrote an article entitled 'Bringing imagination back to science'. The article expressed my concern that National Curriculum science had impacted negatively on my own children's learning of science. My youngest daughter at the time was in her reception year (age 4) and I sincerely hoped that proposed changes to the National Curriculum and assessment would provide a more positive experience for her than the one experienced by her sisters then in years 6 (age 10) and 8 (age 12). Sadly, I find that now, aged 14, my youngest daughter has very limited memories of science (even from lessons learnt the previous week!). She did though offer a cracker joke: '*You can't trust atoms because they make up everything*' as a useful science fact!

Has the need to 'assess' school performance corrupted our way of teaching, replacing skills-based learning with a curriculum approach geared to 'recalling' facts for testing, and in which there seems to be little 'real-world' relevance? What will develop the next generation of leaders in science and industry? Is it fact-based science knowledge or is it fascination for discovery of the science that surrounds us?

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> For many people, National Curriculum primary science has not impacted greatly on their knowledge of 'the appliance of science'.

Rachel Linfield has taught children aged 3–11 years and lectured in Cambridge and Leeds. She has over 100 publications including books for early years and primary teachers. Currently, Rachel is a senior lecturer at Leeds Beckett University where she teaches early years and primary science and DT.
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