Kelly Dalkin's Development Work
Engaging students in science learning: the power of the practical
at Barclay School, Stevenage

Kelly was in her second year of teaching when she began a development project focusing on students' attitude to their learning in science. She was concerned about the obvious lack of enthusiasm on the part of some students. It was clear to her that students reacted very positively to practical lessons but Kelly was concerned that the introduction of the new GCSE in science, 21st Century science, might reduce the time available for practical experiments, focusing instead on moral and ethical debates.

Kelly wanted to understand more about the impact of practical lessons on learning in science and began by going back to the literature. Her reading reminded her of the importance of enabling students to act as scientists in order to learn through experience the nature of scientific method (Parkinson, 1994; Toplis, 2007). Practical science activities such as experiments provide a context for the sharpening of logical and analytical thinking as well as developing manual dexterity and the skills of observation, and recording (Woolough, 1998). Research by Scott and Jewitt (2003) underscored the importance of using a variety of different styles of teaching and learning in order to take account of the different ways in which students prefer to learn and the different ways in which their thinking is supported. Understanding is nourished through many different ways of expressing ideas including active and visual ones. She discussed these issues with her science colleagues and invited them to collaborate with her to explore the value of practical activities more systematically.

One teacher was particularly keen to collaborate with Kelly to learn more about the impact of practical lessons on student learning. They decided to work together to plan and evaluate a variety of contrasting ways to teach the next science topic to their Year 9 students. The strategies would include some very active, practical activities and some more verbal and visual approaches. The two collaborators planned to evaluate these activities by gathering feedback from students and examining both the students' work and their responses

to a quick test at the beginnings and ends of the lessons. Kelly asked her students to feed back to her orally and to write on post-it notes to share their reactions to both science lessons generally and to the particular lessons on UV light. They would then reflect together on the evidence and clarify their thinking about how best to develop the use of practical activities.

The topic chosen for this project was the effectiveness of various suntan lotions as protection against UV light. One activity involved the students using a UV detector to shine light onto cling film stretched over a beaker. Different types of sun lotion were smeared onto the cling film and the results identified by the UV detector recorded and compared. Another activity required the students to write a report in the style of a newspaper article revealing what they had found out having tested a range of products.

What did Kelly and her colleague learn from the evaluation of these activities? The first message was that the students enjoyed undertaking practical activities, particularly those students who found science more difficult. They were highly motivated to learn when involved in active ways and seemed more secure in their understanding than when they had been taught in more verbal and visual ways. The students had expressed their views on post-it labels which they were invited to post up on a notice board. Below are examples of the students' responses.

Experiments are better than just listening to a teacher talking at it. You learn a lot more and your have more fun.

Experiment is better than writing.

I like practicals. But sometimes they are boring. I do learn from them. Better than writing boring stuff.

This was as Kelly had expected. However, some unexpected issues were also raised. One issue was that some students expressed anxiety about the social side of practical work as the following comment indicates.

Practicals are OK but sometimes I don't like to work with the people in my class.

Kelly and her colleague reflected on the need for careful management of the groups formed for the purposes of practical experiments and on the need to achieve a balance of types of learning strategies to match the variety of preferred learning styles.

Another interesting point was that some classes had been taught the topic when the weather was hot and sunny. The ability of the teacher and students to relate discussion of the impact of UV rays to the real world outside of the classroom window appeared to have a big impact on the students' understanding. Kelly and her colleague resolved to think about how this insight might be reflected in their planning of future modules.

Another unexpected insight concerned the importance the students placed on having an immediate indication of progress in their learning. Kelly had devised a simple check list of questions which she gave the students at the beginning of the unit of work. This helped Kelly and her colleague to have a better idea of what prior knowledge they could build on. However more interesting was that when students were asked to respond to the same questions at the end of the unit, many of them were amazed to see how much they had learned. They were very enthusiastic with comments such as:

Miss I've learnt loads today, look!

This is amazing.

Kelly and her colleague also reviewed the work produced by the students and were impressed by both the depth of learning and the interest and enthusiasm it demonstrated.

Kelly learned a great deal through this development work and she had drawn her colleague into a valuable collaboration. She went on to champion the use of practical activities in science teaching both within her school and more widely and to work on further strategies for helping the students to have an instant picture of how much they are learning.

References

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