

Going Public

Projecting microbiology to primary schools

■ Emma Sheppard

When Emma Sheppard's final year undergraduate project involved teaching microbiology to 10-year-olds she didn't know what to expect. Here is her account of what happened when schoolchildren found out that not all micro-organisms are 'gross'...

BELOW:
A poster designed to educate 10-year-olds in some of the roles that good and bad bugs play in our daily lives.
COURTESY EMMA SHEPPARD

What do 10-year-olds know about bacteria, fungi and viruses? I thought their response might be limited to the odd adjective, like 'gross' or 'yucky' and facts, like 'germs make you feel sick'. However, I was surprised to discover that some could draw me pictures of how a virus injects DNA into a cell while others understood vaccination. Who would have thought it?

My project title was *Introducing Microbiology to Schools* and I was to prepare a lesson, school book, poster and teacher's guide to teach this small section of the National Curriculum to Year 6 pupils. Viruses aren't covered in the National Curriculum so I decided to include them as honorary micro-organisms so that the children wouldn't miss out.

To prepare for this daunting task I decided to go into schools and find out what pupils already knew about the subject. The amount different classes had been taught varied from absolutely nothing to full practicals and theory lessons on the subject. One class had undertaken projects on their own, researching prominent microbiologists.

At the first school I sat in on a microbiology lesson and watched how the teacher recapped on the previous lesson and then set tasks for children of all abilities. I wanted to observe how a class was taught so that I could use the techniques when it was my turn. Somehow I was roped into a practical session and got involved in a flour

fight after an experiment to show how yeast makes dough rise went horribly wrong!

Having taken part in a practical class I felt quite prepared to face talking with children in small groups. First, I asked them what a 'microbe' was and found that I was confronted by a lot of puzzled faces. But when prompted with the word 'germ' the children could recall a vast amount. Every pupil could name an illness that was caused by microbes, usually because someone they knew had contracted an ear infection, food poisoning or some other disease. One child warned me never to re-freeze food because his friend got sick when he ate some refrozen ice cream. He knew that this was because there were 'bad microbes' in it that had woken up when the ice cream had defrosted. What struck me was that the children all knew of the

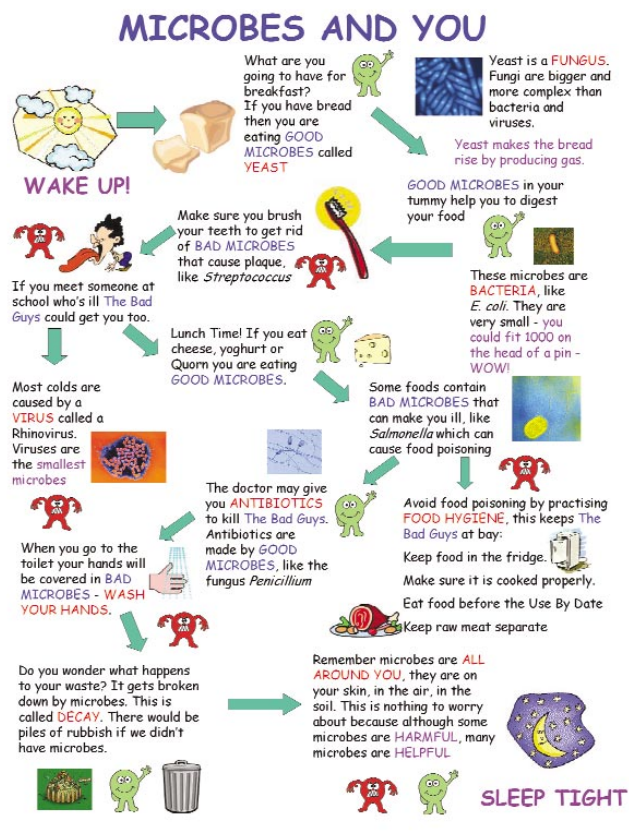
ways in which microbes could be harmful, but few knew of their advantageous traits. We sat around in a circle and created colourful spider diagrams from everything they knew about microbes. I was very pleased to see that one boy wrote that injections were made from 'bits of the bug', and another knew that 'moulds make a medicine called penicillin'. I came away from my session feeling astounded by the children's awareness, but it was still clear to me that they had remembered more about the bad aspects of microbes than the good. They needed to learn about these to fulfil this part of the National Curriculum, so I decided to cover this in my lesson.

Eventually I had compiled enough information for my school book. My time with the children had made me realize that they were more advanced than I had thought and were able to grasp what I assumed were complicated concepts, like vaccines and antibiotics. I was very lucky that my friend, Bob Rawlinson, was able to create some cartoons to make the book more colourful. I asked him to draw a 'good' microbe character and a 'bad' microbe one, which were used in different sketches. I also decided to show children how microbes influence their daily lives by developing a poster called *Microbes and You*. This illustrated how microbes were with you right from when you ate bread for breakfast (made with the help of yeast) to how you avoided plaque by brushing harmful bacteria off your teeth at night.

It was then time for my lesson – the part I was most dreading! I constructed a PowerPoint presentation with colourful diagrams for a class who had not yet learnt anything about microbiology. The children were enthralled with the laptop and how the projector created an image on the white board, but managed to settle down for my talk. I made the lesson very interactive, starting off with questions to see if the class knew that microbes could be beneficial as well as harmful. I then focused on the use of microbes in food. To make the next 15 minutes more interesting I took in blue cheese, bread, Quorn™, beer and mushrooms to demonstrate how microbes feature in our food and most of the children were very surprised! When I asked if there were any questions, several hands shot up. Most asked very intelligent questions, showing that they had grasped the concept that microbes were good as well as bad. Some children wanted to know more than the short lesson had covered, and asked about mould and decay – the 'gross' factor appealing once more! I left feeling as if I could have covered so much more, if only there had been time. Unfortunately, the National Curriculum only suggests a maximum of 8 hours on the subject, hardly doing justice to the exciting world of microbes.

I enjoyed my final year project so much; it gave me a chance to show the children how exciting micro-organisms can be. It is such a fun subject to bring to children of that age and their responses were amazing; they were genuinely enthralled with the topic and wanted to know more. For me it was an ideal project in science communication. Hopefully the children benefited from it as much as I did. Who knows, maybe I have inspired a new generation of microbiologists! I hope so.

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Practical microbiology course for post-16 students on Merseyside



Helen Smalley

In the spring of 2000, a high school in Warrington contacted the School of Biomolecular Sciences, Liverpool John Moores University (LJMU), with a plea for help with the microbiology component of A-level Biology. The school had insufficient resources for the suggested practical activities. As a result, we ran a 2-day course in our teaching labs for six pupils, covering much of the microbiology syllabus. A little market research identified a demand for this locally, and in January 2001 we offered a course to schools and FE colleges throughout Merseyside. The response was so great that we ran the course twice, for a total of 90 pupils from nine institutions. To cover costs, we charged pupils a £5 fee. Feedback indicated that the fee, together with travelling expenses, was off-putting for many of the students. This January we ran another course, with the backing of a PUS grant from the SGM, enabling us to waive the £5 fee.

This course was tailored to the AQA A-level Biology specification B, A2 Option Module 7 (Microbes and Disease). This module is studied in the second year of the A-level course and is not compulsory. It includes most of the microbiology content of the specifications. Pupils practised basic microbiological techniques, such as pouring agar plates, streak plating, spread plating, total and viable cell counting and antibiotic sensitivity testing, on their first visit. The uses of selective and indicator media were studied. The pupils made predictions about antibiotic sensitivities of a variety of bacteria and designed their own experiments to test these out. There were opportunities to investigate bacteria present in the environment and several pupils were surprised at what was lurking on their own skin! Pupils returned 2 days later to discover how good their aseptic technique had been and to investigate what had grown using staining techniques.

The course was attended by 92 pupils from 11 schools, accompanied by four teachers. One school sent two laboratory technicians along to see what was involved in practical microbiology, with a view to running its own microbiology classes in school next year for the

first time. Half of the pupils were at AS level and had not encountered microbiology before. One school sent AS students along because the school did not offer the Microbiology option at A2 and it was felt that the course would go some way to remedy this by offering an introduction to the topic. We taught groups of 10 or fewer pupils and kept pupils from individual schools together, so that those with no prior knowledge of microbiology could be introduced to it at a more basic level. Interestingly, several students comment-

ed that they would have liked more interaction between the schools – we will take this into account in any future events.

We ran the event in January. This was a compromise between the best time for us (i.e. during the break between Semesters 1 and 2 when our teaching labs are free) and the best time for schools. AS exams and some other A-level modular exams are held in January and we altered the start times of one session to accommodate this. The timing was unsuitable for some schools, but on the other hand, several schools were embarking on the Microbiology module after the Christmas break, so the timing was ideal for them.

Information about careers in microbiology was available as posters and leaflets during refreshment breaks and academic staff were on hand to answer any specific queries. Quick feedback about the course was gathered by asking pupils what the best and worst aspects of the course were. Generally, comments were very positive and included the opportunity to use equipment not available at school, to design their own experiments and to investigate their own microbial flora. One boy was disappointed that the organism he had isolated already had a name, so he could not call it after himself! Additionally, pupils were asked to fill out a detailed questionnaire giving their opinions, plus information about their proposed career destinations after A-levels. Participation in the questionnaire was voluntary, but encouraged by a prize draw! 98% of pupils said they had enjoyed the course and 74% stated that it had helped to develop an interest in microbiology. Suggestions for improvement included lengthening the course and inclusion of activities more relevant to everyday life.

At the end of the course, all students were given a pack of SGM posters, a certificate of attendance and an LJMU pen.

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SGM Public Understanding of Science Grants of up to £1,000 are available to members wishing to promote microbiology. See www.sgm.ac.uk for details and an application form.

LEFT AND BELOW: A-level students learning about microbiology in practical sessions at LJMU. PHOTOS CHRIS THEOBALD

