

A zoologist at school: my pupils and other animals

Silvia Boi, a science teacher from Italy, explains how her fascination with science led her to study ant behaviour, worm reproduction and the human genome – and how she now tries to awaken that fascination in her pupils, using somewhat unusual techniques.

From the field to the laboratory

“Science is fun!” I thought, aged seven, when I first read Konrad Lorenz’s *King Solomon’s Ring*. “I want to be a scientist when I grow up!” I didn’t change my mind during my time at school, and so, many years later, I found myself as a biology student at the University of Milan, with the impossible mission of writing a thesis on a mathematical model to describe the formation of armies in slave-maker ants.

After a couple of months filming ants in a national park in northern Italy, sleeping in a tent and walking hours every day to reach the ant nest, I spent countless hours analysing my data in front of the computer screen. Then, in the summer of 1996, I received my biology degree and, thinking that nothing could be better than being paid to have fun, I happily started a PhD in invertebrate biology.

My new research was on sperm in small annelid worms called *Tubifex tubifex*, commonly found in polluted and smelly streams. I spent most of

my time playing with immunocytochemical techniques, fluorescence and confocal microscopes, and getting excited about pictures of worm sperm. But my first passion, the ants, had not been forgotten, and in 1998, I took a break from my PhD to spend six months at the University of Bath developing a mathematical model of activity patterns in ant nests.

As often happens, the project turned out to be quite complex and the available time was very short, but I was lucky to find a good research group to work with, and I learned a very important thing: the collaborative nature of science. Discussing ideas and distributing work according to individuals’ different abilities is indeed the basis of research.

In 2000, I earned my PhD on annelid reproduction and, after another year working on the same subject, my curiosity led me towards molecular biology and the study of the human genome. But (in every good story, there is a ‘but’), after many stimulating years of research,

travel and meeting people, I wanted to spend more time with my family. Furthermore, it was clearly going to be very difficult to find a permanent position in academia: it was time to move on.

In the same period, I became interested in the public perception of science. I first thought about teaching science at school, because I would be able to enjoy science together with my pupils. Although I would miss research, the curiosity and wonder of young people would add a new zest to science. I was lucky enough to be awarded a permanent position as a science teacher and, almost before I knew what had happened, I found myself standing for the first time in front of a classroom of 15-year-olds in an Istituto Professionale, a vocational Italian high school.

Into the classroom

“Science is fun,” I thought, as I smiled confidently at the pupils. But I wasn’t smiling a few minutes later as, during the usual first-day interview, I



asked the pupils to introduce themselves and their opinions of science. "Science is boring," they replied. "Science is difficult," and, more dangerous than any other criticism, "science is useless"! In less than half an hour, I was involved in a discussion about why they should learn some science even though their professional curriculum did not specifically require any scientific knowledge.

The second day was better. I began to lecture and, as the pupils were quite prepared to deal with boredom, they happily occupied themselves while I tried to communicate the exceptionality of living systems.

One surprise for the scientist moving to teaching is the amount of bureaucracy: forms to fill in for every pupil and for the whole class, evaluating their knowledge, behaviour and needs; tests and questionnaires for the pupils, all written in incomprehensible jargon. Schools often seem to be more concerned with bureaucracy than with how much their pupils learn. Sometimes, even the pupils

seem to be interested in the teacher only as a marking machine: "What's my mark for this answer?"

Where to start? How to convince students that science is useful, accessible and fun? The school where I work, like many in Italy, has no science lab, and for safety reasons, no experiments may be performed in the classrooms.

There are no microscopes, no globes, no stellar maps, no anatomical models or tables. The only resources available are a computer lab, a TV and a projector. The first idea I had was to use simple models to explain things. I showed my students an atom made out of little coloured balls of Plasticine®. I represented a cell with a box of different components (a battery representing mitochondria, an instruction manual representing the DNA in a plastic bag to represent the nuclear membrane and so on...). And I let them act out the Big Bang.

Then I tried to talk less and let the pupils try to solve a problem. For example, I gave them a balloon and

asked them to identify the position of a point drawn on it, hoping they would draw a system of lines similar to the latitude and longitude. I also tried to make the tests more fun, as when I asked an astonished class of teenagers to pretend to be the digestive or circulatory apparatus. After the initial shock, they accommodated themselves to the demands of an absolutely mad teacher and made costumes to play the part of the liver or the heart.

Does this work? Honestly, I have no idea. The pupils learn some science, some of them even learn quite a lot, but I cannot say whether these techniques are better than traditional lectures. What I know for sure is that we all enjoy the science classes! That's a first step, and an important one. I'm still new to this, but you have to learn fast when you awaken students' interest.

Of course, some things about teaching would be easier if we had the latest equipment and more time dedicated to science in the curriculum. But my school is probably typical of many across Europe, where every day, teachers make use of what they have – if it's your hands and feet, you can still gesture and dance. What I miss most is a community of science teachers to discuss and compare methods.

For me, the most rewarding thing about teaching is not the equipment, but the creativity you can express in this work, which is stimulated by your pupils. In every class, you can discover science through their eyes and try a different method to approach the same concepts. And as a trained scientist, I think I can transmit the taste and excitement of doing science!

