

“Variety is the Spice of Life Science”
Dr Richard Spencer

A level Biology

Biology is intrinsically interesting, varied and relevant. I’ve never met a biology teacher who was anything other than enthusiastic! However, there are challenges. For many students the step up from GCSE science to advanced level is huge. Also, A level biology has a reputation for containing “a lot to learn”; the general perception is that you need a good memory to do well in it. The increased emphasis on application in recent years hasn’t really helped, because students still need to feel secure in their knowledge and understanding to have the confidence to apply it.

Diversity creates dimensions

My conviction is that variety in teaching and learning holds the key to interesting and memorable biology lessons, supporting students in both depth and breadth. This is about *engagement* rather than *entertainment*, and it’s certainly *not* about pandering to “preferred learning styles” (a notion now largely discredited).

In my biology lessons you will find a blend of didactic teaching, eLearning, demonstrations, practical experiments, videos, models, role play, simulations, analogies, learning games, assessment for learning, deeper questioning, fieldwork and investigations. Nothing unusual in all that, you might think, but poured into the mix are many innovative learning strategies - biology poems, songs and dances; biology tours of the college as a nephron or as a digestive system; and projects designed to help students make synoptic links between different areas of biology.

Through participation in a Gatsby Teaching Fellowship, students have applied their knowledge to the biology of cannabis (All to Pot), cystic fibrosis (Bewitched) and the nitrogen cycle (The Circle of Life). Currently, all students are participating in a SAPS Associate Award project (Plants ‘R’ Mint). The project is enriching students’ experience of plant biology as they grow and study different species and varieties of *Mentha*, whilst developing synoptic skills by exploring links between their curriculum studies and the biology of mint.

All singing, all dancing biology?

Biology lessons don’t have to be all singing, all dancing.....but there again, why not once in a while? The biology songs and dances I’ve created – a dozen or so - are a fusion of art and science. I started to write biology songs partly to help students remember complicated processes and partly because I realised that one of the challenges of biology is the number of new words students need to learn. Singing these words really does help. Here are two examples: “It had to be U, Uracil U” helps students name the nucleotides found in DNA and RNA, and “The Heart Song” helps students remember the direction of circulation through the heart.

The first biology dance I created, the Mitosis Mamba, started life when a student volunteered that, in spite of theory, the video, the animation, the root tip squash practical *and* the simulation, he still didn't 'get' mitosis. I started to explain what the chromosomes were doing, using my hands and fingers to demonstrate, and concluded "it's a bit like a dance". With some suitable music and tweaks to the simple hand choreography it became one ...and the student 'got' mitosis!

The Mitosis Mamba is a now staple of cell biology lessons. I've shared it with hundreds of teachers at workshops nationally and internationally. At the closing ceremony of Science on Stage in Berlin, I was asked to perform the Mitosis Mamba, but told "don't expect to get the audience to join in!" The whole point is that you learn by doing it (engagement), not by watching it (entertainment). Everyone did participate - I didn't expect anything less! And yes, my students really do shuffle in their seats during exams as they use the dance to recall the key events and stages of mitosis.

We have the Meiosis Square Dance, the Cell Membrane Celebration, the Latino Nerve Dance, DNA Boogie and Crazy Frog Respiration – all designed to help students to get to grips with either biological processes or structures. The DNA Boogie is a particular favourite of students and teachers alike. I've seen it performed at venues as diverse as Grenoble Ice Rink, The Royal Society, the streets of Norwich during Science Week, and at the A2 leavers' prom!

Winning Heart and Minds

My passion for effective communication and enjoyment of learning in Biology underpins my determination to support and inspire all. My lesson observations have been graded outstanding, my students are successful in their exams and my learner surveys are exceptionally positive. Equally encouraging are the messages from students on "Thank You" cards and from teachers' evaluations of workshops I've delivered at home and abroad:

"You have been an absolute inspiration! Thank you Doc!" [Student]

"You have inspired me to carry on with Biology." [Student]

"Thank you so much for a wonderful workshop. I have shared the ideas with my colleagues and we are excited to see creative ways of teaching our subject through dance and singing." [Teacher - Lithuania]

"Fantastic day – very enjoyable and I'm left feeling enthused and full of ideas." [Teacher - UK]

Conclusions

Living and working in my home town, I often bump into former students who have completed degrees in various aspects of biological sciences and have established successful, diverse careers in biology, including biotechnology, forensics, medicine, dentistry, biomedical sciences, radiography, nursing, forensics, zoology, veterinary science, ecology and conservation.

There are former students who say I inspired them to become biology teachers and there are those who ended up doing something completely unrelated to biology, but who remember their biology lessons with great fondness. Many have an uncanny ability to recite some of the songs and poems (though I've never put anyone on the spot in the local supermarket to perform one of the biology dances!).

What are my messages to other biology teachers?

Have the courage to experiment in your teaching, to stretch and challenge yourself as well as your students.

Celebrate and share your creativity. Engage your students. You will feel invigorated and they'll feel inspired.

Variety is the spice of life science!