

Boundary Layers and Comfort Blankets

Many organisms rely on a subtle layer of air for thermoregulation. This boundary blanket is invisible and external; not part of the organism but rather part of its environment, although often encouraged by ingenious trichomes, hairs and waxes. Some creatures construct these layers socially, bunching together to generate better conditions. Without this collective, abstract architecture, spun from air, they might die.

The sociologist Richard Titmuss used the term 'gift relationships' for a special class of socially constructed interactions. These depend on reciprocity, trust and shared values, not the bounds of contract, the self interest of the market or the bonds of blood. Such relationships take care to make and are easily destroyed. Like boundary layers they can be encouraged by physical things (the layout and size of a room, the tone of a voice) but remain dependent on and responsive to their wider environment. Whilst no set of prescriptions can guarantee their development, making them happen is a key task for the university teacher.

Why should these 'social boundary layers' be our concern? First, because "to be a student is to be in a state of anxiety" (Barnett, 2007). Proper higher education challenges students' identities and opens them to self-doubt and uncertainty; to a creative anxiety. But without sufficient collective trust only the most confident students will benefit; the rest will refuse to jump in, only paddling in the shallows of education. Second, because higher education should be a 'conversational journey' in which dialogue between different learners – among students and between students and their teachers – transforms how they see the world. Such dialogue requires trust: "The more honest, trusting and open the dialogue and the less distorted by money and power, the more effective the learning" (McLean, 2006). Third, although most of us might agree with these sentiments, there are many things we do – collectively and individually – that make establishing that boundary layer more difficult.

Constructing teaching with a narrow focus on technical and measurable 'outcomes', worrying about the (often spurious) precision and 'objectivity' of marks to the exclusion of the validity and authenticity of what we are

testing, addressing students as anonymous matriculation numbers and entering into quasi-legal contracts with them, with implied threats should either side fail. None of these examples of 'ensuring quality' help the boundary layer; they help blow it away. So why do we do these things? Because our managers ask us to; but that cannot excuse us from the responsibility to argue for the need for dialogue and trust and to demonstrate this in our teaching whenever we can. So perhaps we acquiesce a little too often because it is just easier? Good teaching might place students in a state of anxiety, but teachers too must stand open to all the dilemmas that focused personal engagement brings. To borrow thinking from the world of psycho-therapy: "This kind of engagement demands that I will remain accessible, attentive, ethically aware and knowledgeable in as many ways as I am capable of; that I present myself clothed in my expertise and transparent in my limitations" (Hayes, 2009). Hiding as a functionary in a maze of quality rules is often easier than to stand 'transparent in my limitations' – but it won't lead to transformative teaching.

A 'social boundary layer' might sound like a comfort blanket, but its effect is the opposite. Like garter snakes that hibernate communally, and thus occupy harsh northern latitudes, these social spaces allow students to take the kind of creative risks that open up new possibilities. Asking the question: 'will this help open dialogue?' of all changes in the management and conduct of teaching might help us keep and grow these boundary layers.

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2 | Working Together to Inspire Young People

The Royal Society's Partnership Grants scheme is at the forefront of initiatives seeking to ignite enthusiasm for science among young people, develop skills and interest in genuine scientific investigation, and support teachers and scientists learning from each other. Grants of up to £3000 are available for teachers and scientists or engineers to work together on creative investigations involving 5–16 year olds.

Over the past eight years Partnership Grants has awarded over £1 million to 568 projects giving pupils and their teachers the opportunity to work on stimulating and inspiring projects in partnership with a scientist or engineer. All across the UK primary and secondary schools are benefiting from the funding of the Partnership Grants scheme. Schools directly supported by the Royal Society so far stretch from the Shetland Islands to the Isle of Wight, and have forged links with partners from many universities across the UK, as well as with organisations such as GlaxoSmithKline, British Telecom, and Rolls Royce.

The Partnership Grants Scheme has funded a range of bioscience related projects including; Measuring ascorbic acid in plants, Crafty caterpillars and A fishy tale. Crafty caterpillars was a project that partnered Framwellgate Secondary School in Durham with Dr Phil Gates in the Department of Biological Sciences at Durham University. The project investigated whether caterpillars can learn to avoid predators. The team made artificial caterpillars (Fig. 1) and attached them to damaged and undamaged leaves. They were then able to measure the extent to which each set of leaves is attacked by birds.

As well as working with academics, schools also enter into partnerships with scientists and engineers from industry and other organisations. Scourie Primary School (working with Kinlochbervie, Durness and Achfary primary schools) in Scotland was awarded a Partnership Grant to work with a fisheries biologist, Dr Shona Marshall, from the West Sutherland Highland Fisheries Trust (WSFT) and the Highland Council Ranger Service on a project called A fishy tale. The project focused on the life cycle of three indigenous fish – salmon, trout and eel. The pupils worked alongside the biologist in the field and in the classroom as they researched the different aspects of fish ecology. Pupils were involved in various activities including, monitoring and sampling the indigenous species from local rivers and studying the habitat of the riverbank (Fig. 2).

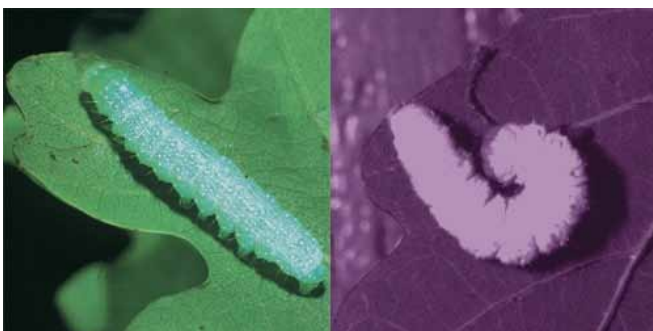


Figure 1. Crafty caterpillars



Figure 2. Pupils from Scourie Primary School sample the local river

Projects such as these give pupils an insight into the working lives of researchers and how science is conducted and funded. They also give the pupils an appreciation of the planning and preparation that goes into practical work. As students from St Michael on the Mount Primary School, Bristol enthused, '[It's] the best bit of school we've ever had'. Graeme Poole, Director of Science at Simon Langton Grammar School for Boys in Kent is under no illusions that the Partnership Grant has provided a vital contribution to the school and science as a whole. 'Students have endless opportunities to expand their knowledge and communication skills. It has also increased the students' thirst for scientific knowledge and senior students are now passing on this knowledge to junior students'.

Researchers benefit by having the opportunity to communicate their science to a wider audience and helping to develop the scientists of the future. Professor Steven Rose at Imperial College has been involved in the Partnership Grants Scheme for a number of years and is very impressed with what he has seen. 'What is exciting is the idea that school students can make a real contribution to scientific research'.

A dedicated team at The Royal Society supports all stages of the application process, including advising on investigations and guidance in finding a suitable scientist/engineer partner. The next round of Partnership Grants applications opens on 7 September 2009 and closes on 6 November 2009.

For more information and application forms visit: www.royalsoc.ac.uk/education/partnership.htm or contact The Royal Society directly at education@royalsociety.org

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eFeedback Gets Personal

Does this seem familiar? You feel that you do all you should to give good feedback. Yet some students comment that the marker's annotations were "unfair". On looking at the "offending" comments in one of our large 1st year biology classes, we just couldn't see why. Then a hypothesis formed: perhaps comments were misconstrued, rather as emails sometimes are, by the curt nature of written feedback and the lack of other cues, which normally dispel offence. But how to solve it?

Our attention was drawn to work by Russell Stannard (Westminster) on using Camtasia Screen Capture software to give feedback in English as a Second Language. Screen capture is most commonly employed for help on using software, providing a movie and a voice-over to take someone through which menus to open and which buttons to click. However correcting grammar and spelling is easier to do in this way than, for example, to assess in one take an Honours Biology Dissertation, which would be impossibly stressful. Nevertheless, an overall summary of work is better suited to continuous speech, particularly once the evidence has been marshalled. Thus we wanted to have a blended approach in which comments were made in writing on the body of the essay, as normal, employing the video at the end to give the summary of the work as a whole. This is where the quality normally comes, addressing what was good (and crucially why), less good and why, and what the student should do to improve. With both oral and visual cues, the student might be less likely to misinterpret remarks when they could hear the marker's tone of voice, and could see exactly which part of the work was being referenced.

We integrated control of screen capture into a menu in Microsoft Word, shielding the marker for having to know anything other than "Start/Stop/Pause". It was tried in the next run of the large first year class. To obtain their video, students click a link to see their essay at the same resolution as the marker saw it as s/he takes them through the work, summarising, highlighting and explaining. The video version was very well received, remarkably so as we had no precedents on how to do this sort of feedback. Interestingly the number of words delivered by video was equivalent to typing an A4 page in two minutes (150 wpm). One might argue that a conversational tone packs out the total word count with "verbiage", but perhaps this is precisely the element that is missing in written feedback that leads students to misconstrue.

A reality check. Is this just technology for its own sake? Wouldn't it be better just to meet the students face to face? No! Apart from the logistics, the quality of feedback, made at the time is so much better, when the marker's mind is really in the zone, a place almost impossible to regain afterwards. In addition students have to engage with the feedback to find out its content. Remarkably they don't perceive this as a burden (in fact some said they even took notes from it!), in contrast to much research that says that in general many students don't read feedback. We have now extended such feedback to other forms of work. Think, for example, about how you would give feedback on a website with paper and pen?

What of the future? To scale these ideas, the hurdles are not the marking software itself but how to more easily manage the flow of "paper". One would like to replicate the ways journals/grant awarding bodies send work to reviewers (markers/second markers, in our case) and control its return flow towards editors (moderators/externals) and back to authors (students). Unfortunately such proprietary software is hideously expensive. But it would not take much skill to write a database with a web interface to do this, to the benefit of many areas of HE.

Finally, does all of this save time? Of course not! Technology rarely does – but it helps us do a better, more professional job. The questions are "are we prepared to let other things go in courses to make time for better feedback?" and "are we training students best to appreciate and act on our considerable (and costly) input to their learning?"

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Further Reading

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New Lecturers Folder – Updated

The New Lecturers Folder has been updated for 2009/2010. The Folder is designed for staff new to teaching (experienced lecturers may find it useful too) and is intended to complement the largely-generic information delivered in staff development courses. It is produced so you can supplement the information with documents you find useful, so with time you will have a personalised resource of information.

For more information and to order your copy visit www.bioscience.heacademy.ac.uk/resources/resourcepack.aspx

Travel Bursaries

We are pleased to announce we are now offering travel bursaries of up to £150. The funding will be available to help colleagues attend UK Centre for Bioscience Professional Development Events and Regional Forums. There will be up to two bursaries available per event. The funding is intended only for individuals who do not have access to other travel or development funds. Visit www.bioscience.heacademy.ac.uk/funding/travel.aspx for more information.



4 | ICR for Streamlining Assessment

In Level One Biology at the University of Glasgow we have around 700 students per year, and are constantly on the lookout to streamline our assessment systems. In the beginning God gave us OMR (Optical Mark Recognition), the shading bubble lottery ticket technology which was fast and reliable but not very flexible. Then we swapped the M for a C and lo OCR (Optical Character Recognition) was born. It was more flexible than OMR but the results were somewhat patchy. Finally, after a further several million years we evolved an I and ICR (Intelligent Character Recognition) sprang forth and God smiled and saw that it was good.

The reason the system is called Intelligent is because rather than the OCR software being thrown images with an unknown layout, the package itself is used to create the forms that it is attempting to interpret. In much the same way that notes scribbled on the back of an envelope are clear to the person who scribbled them. The key to both is understanding the layout and context. Validation rules are set before marking begins. There is also the facility to check that the system is converting hand written answers into electronic text correctly. If necessary it is possible to go back and fine tune the validation rules to enhance the systems accuracy. Once the operator is happy with the system's performance the results can be outputted to a wide variety of file formats, from plain text files to ODBC databases.

The ICR system has been invaluable to us (we use Cardiff's TeleForm package; www.cardiff.com/products/teleform/). We took the view that the system allowed us to be flexible in the assessments that we could design. In addition to traditional multiple choice forms, we have moved to a hybrid system that allows a mixture of completely automated, and part-manual marking to take place. We have a bank of assessments that include diagram labelling, sequence questions, short answer questions, and extended writing exercises. The first two examples of assessment are completely automatically marked by the ICR system. As we move to the extended writing, we still use markers, but the amount of time taken to process the assessments has been markedly reduced. We do this by having 'for office use only' margins, with ICR-boxes that markers can enter grades or marks. The markers mark as normal, and returned scripts are then processed automatically. We use double-sided documents, and also have the option of A4 and A3 – an A3 sheet can be used as a four-page exam booklet which is large enough for most exam or essay answers, which also cuts down on the amount of paper that needs to be moved about between the office and markers.

Probably the best illustration of the use of the ICR technology is in the Level One Biology exam. This year, every part of the exam was handled by the ICR system. In addition we pre-print the ICR forms with each individual student's details, which are laid out in the exam hall in pre-assigned seats. The students are emailed their exam hall details in advance and seating maps are available outside the exam halls.

Multiple choice questions, a sequencing question, a diagram labelling question and calculations appear on a double-sided A3 sheet. The first three question types are completely automatically marked, with the calculations hand marked by three members of staff (about 200 each). The two

short answer essay-type questions are printed on double-sided A4 paper, giving the students the freedom to write what they wish, and are marked by circling a grade which is picked up by the ICR technology. As a cross check, we use the Speech-to-text function in Excel to check the grades. The system also allows the external examiner to view all of the exam papers online, and choose to view either one candidate's entire paper, a selection of components or look at special cases in their entirety.

The ICR system has been of benefit in so many ways. The amount of time spent marking and the amount of paper that we use has decreased, and the ideas for assessment formats can be shared throughout the faculty, and with other faculties and institutions. Colleagues in other courses can modify our ideas or come up with their own question designs, helped by Ian, who has driven the development and use of the system since that first OMR machine fourteen years ago.

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Discipline-focussed Learning and Technology Enhancement Academy 2010

The Higher Education Academy is introducing a discipline-based organisational development programme as part of its Enhancing Learning through Technology programme. Participating subject departments in HEFCE funded higher education institutions will be supported in the use of technology to enhance learning, teaching and assessment practices with a view to increasing institutional capacity in alignment with HEFCE's policy statement: Enhancing Learning and Teaching through the use of Technology (ELTT).

The intention is to focus on enhancements that are strategically aligned with their institution's development needs and mission. Direct funding for the project is not provided to the departmental teams who are successful. Each team will receive consultancy support throughout the 12 month period of the programme in the form of an expert 'Critical Friend' who will be a member of the team and will bring in external expertise from relevant agencies such as Centres for Excellence in Teaching and Learning (CETLs), the Joint Information Systems Committee (JISC), Benchmarking and Pathfinder projects, etc. as the projects progress. In addition, project teams will be supported by their respective Subject Centre and through participation in 'Change Academy' type events. A modest grant will be made available to encourage cross-institutional collaborations and the cultivation of communities of practice using an established model (CAMEL). Deadline for proposals is 16th November 2009.

Further information available from <http://tinyurl.com/hbio-dltea>

Science Learning and Teaching Conference

The bi-annual Science Learning and Teaching Conference (SLTC) brings together those interested in teaching and learning from the Bioscience, Materials and Physical Science disciplines to share practice, hear about developments and meet and network with colleagues from across the UK. The 3rd SLTC, held at Heriot-Watt University on the 16th and 17th July this year, brought together 142 delegates to hear about topics ranging from “using student ambassadors to improve retention of first year students” to “enquiry based learning in a multi-disciplinary group”.

Feedback from the Conference was positive, with many delegates valuing the time available for discussion and networking.

- “This was a good platform for sharing experiences in an informal & friendly atmosphere”
- “Some very novel ideas in use and lots of opportunity to network.”
- “Reassuring that there are many staff who are active in subject research and have an interest in learning and teaching.”

The Conference website (www.sltc.info) brings together the proceedings, presentations and posters from the Conference, with full papers from a number of presentations available soon.

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A Delegate Reflects

I had missed the SLTC last time round (2007 in Keele) and so was determined to attend and present at this one. Heriot-Watt has a purpose-built conference centre and everything from accommodation and conference rooms to catering was really handy. This helped to encourage a friendly feel to the gathering, and ensure people’s faces quickly became familiar.

The conference programme was packed with talks, workshops, interactive presentations, and posters (with well-spaced refreshment breaks though; thanks!), and at times it was difficult to choose between parallel sessions. Presentations that particularly interested me included those on student projects and lab work. Jane Saffell’s talk on student lab experiences and their perceptions of research was revealing, and an excellent insight into bridging gaps between teaching and research. Vivien Rolfe’s presentation on VAL, a Virtual Analytical Laboratory designed to supplement student lab work and build skills and confidence, was extremely useful. According to Vivien the pages on spectrophotometers and serial dilutions are among the most popular, and as this has direct relevance for classes I teach, I will certainly be investigating this further. Debbie Bevitt presented a novel practical alternative to final year projects, and it was encouraging to see how some resource issues actually can be overcome.

Other areas of interest to me include plagiarism, and a session on this after lunch on the first day, when my colleague Barbara Cogdell and I were presenting, was crowded. This was pleasing (no-one wants to speak to an empty room) but also a little worrying (is there so much of this about?). Several people asked questions after my talk and it was encouraging to see we are thinking along the same lines regarding what the important issues are. Kate Tobin then spoke about such

issues in international students, who face incredible hurdles to overcome with academic writing. I particularly liked her approach of involving the library in the design of strategies and resources, and is something I will think about in my continuing development of class workshops. Kate and I spoke after her talk and we have since been in touch; some colleagues of mine at Glasgow University are doing similar work with international postgraduates and it could be useful for them to talk.

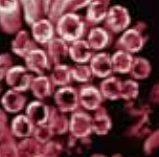
The Conference Dinner was a great experience; the food was lovely, wine was flowing, and conversations very varied! I sat next to my colleague Barbara (someone I know) and Paul Green (someone I don’t know), whose talk I had heard earlier in the day. We started off discussing this but then moved on to international travel and living in different places, as the wine bottles mysteriously kept emptying. The after-dinner speaker was Dr Mark Lewney, a guitar-playing physicist, who entertained us with various talents comic, musical, and indeed scientific. The Ed Wood Teaching Award was also presented here; 6 runners-up were given certificates, and the winner was Mark Huxham of Edinburgh Napier University. The Teaching Awards had been re-named after Professor Ed Wood, a fitting tribute to someone who had dedicated much of his professional life to encouraging students and inspiring those who heard him speak. I myself had heard him recently at a Centre event in Glasgow, and realise now how privileged I was.

The networking opportunities at SLTC 2009 were fantastic, and the conference was an excellent means of validating the importance (and indeed essence) of learning and teaching, which is often overlooked. Practical suggestions and ideas were invaluable, interspersed with more theoretical aspects to give a powerful blend. Both conference organisers and participants contributed to the success of this event, and I for one will look forward to the next SLTC in 2011.

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David Adams, Centre Director, addressing the conference



6 | The Ed Wood Teaching Award 2009 – Finalists’ Reflections

The Ed Wood Teaching Award provides an opportunity for bioscience academics to receive national recognition for their outstanding learning and teaching practices. The Award is open to all UK bioscience academics who work in higher education or who teach higher education in a further education establishment.

The 2009 Award received 19 applications, of which 6 were short-listed. Short-listed applicants worked with a member of the Centre team to develop a 2 page case study based on: observation of the teaching practice; interviews with the applicant; student questionnaires; and student focus groups. These case studies are available on our website www.bioscience.heacademy.ac.uk/funding/recognition/award09.aspx.

The Centre would like to extend their congratulations to all six finalists and the overall winner, Mark Huxham of Edinburgh Napier University who was presented with his award and received £500 towards future professional development activity. Here the finalists reflect on their participation in the Award.

Debbie Bevitt

Applying for the Ed Wood Teaching Award has been a really worthwhile process for all sorts of reasons. Why did I apply? Firstly, the new practice which I described in my application (a final year practical project module) seemed to be working well for us here in Newcastle and the Award Scheme seemed a good way to share that with others. Secondly, I liked the idea of getting some independent evaluation of the practice. And finally (and honestly!) it seemed a good way to get evidence of my attempts to innovate my teaching practice. Achievements in science research are relatively easy to evidence, but it seems less straightforward to “prove” your worth in teaching. The process was surprisingly straightforward and undemanding in terms of time commitment. The application process itself was brief and uncomplicated and once I made the short-list the time involved was again minimal, amounting to two enjoyable visits from Jackie Wilson (my Centre contact) and a few email exchanges to fine-tune the student questionnaires and case study. The feedback from the students (positive and negative) was enormously helpful and I’ve made several changes to the module for the coming year in direct response to comments and suggestions made. Having the chance to present my work at the Science Learning and Teaching Conference in June was another bonus and prompted some really useful discussion with other delegates. The final icing on the cake was that I was able to use my short-listing for the award as evidence in my recent (happily successful) promotion application – proving the worth of the Award Scheme in providing participants with some concrete evidence of achievement in teaching.

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Momna Hejmadi

Being in the final short-list for the Ed Wood Teaching Award did wonders to my confidence. It is always reassuring to have one’s peers appreciate your teaching. The next stage of the process was the case study put together by Steve Maw, based on his observation of my teaching and feedback from students. I found it to be an enriching experience, mainly because Steve’s astute observations helped me reflect on aspects of my teaching I had not considered before. I have always enjoyed the Science Learning and Teaching Conference and it never fails to be inspirational. As usual this year, I came away from the conference buzzing with new ideas and meeting like-minded colleagues who genuinely love their teaching. The formal award presentation was a lovely surprise and I was really pleased Mark Huxham received the Ed Wood Teaching award. His presentation on using verbal assessments to create conversations was one of the inspiring sessions I attended. Personally, the recognition of being a finalist was a surprising but not unpleasant experience. It has opened new doors, I have made new friends along the way and it certainly has helped me develop as a teacher.

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Mark Huxham

“What sort of person enters a national teaching award? A vainglorious self-publicist looking for CV padding? A teacher lacking confidence with something to prove? Or a practitioner convinced of the central importance of teaching and of the need to raise its profile and status? These were my thoughts when I saw the Centre’s teaching competition advertised. Well, I convinced myself I was closer to the latter than the former types, but something else worried me; just how much work and stress might an entry entail? Inevitably some, but equally I welcomed an incentive to think hard about my teaching and to articulate a clear pedagogical philosophy. So after considerable dithering I pressed the ‘send’ button.

What happened then confirmed my expectations of challenge, but none of my fears of stress. Developing a succinct case study with Sheryl (assigned as my ‘guide’ from the Centre) made me focus on my core approach. Welcoming Sheryl for a teaching observation made me think again about class room dynamics and the practical constraints of large group teaching. And seeing the feedback from my class reminded me how teachers and students are engaged in a collective enterprise that should be based on mutual respect. The whole process was stimulating, supportive and fun. So are you the sort of person who enters a teaching competition? If you care about teaching, enjoy a challenge and have something to share with like-minded colleagues, then why not?

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Dave Lewis

Why did I apply? You may think what you are doing is good practice or innovative but there is a particular satisfaction to be gained when it is recognised as such by your colleagues or in particular, your students. The only hard part was completing the application form, trying to convey in a few short paragraphs what you did, why you did it and its effectiveness. The process made more difficult in my case because I was trying to describe a complete course running from Level 1 to postgraduate. Once this was done, the rest of the process was a pleasure. What was particularly gratifying was the interest and support shown by my students once they knew I had been short-listed. Has it affected my teaching? It has made me reflect on all my teaching to see whether I am delivering it in the most effective and interesting way for students. It has also encouraged me to continue with developing new innovative teaching which meets the ever changing needs of our students; I'm now focusing on developing alternative final year research projects. I would certainly go through the whole process again and would also encourage others to consider applying themselves.

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Katherine Linehan

What did I gain from being short-listed for the Ed Wood Teaching Award? Well a 20ft model of the digestive system made from old bed sheets for one and a lot of constructive feedback on my teaching for another. Having to explain the approach I take to teaching anatomy to an advisor from the Centre made me reflect upon why I do what I do in the classroom.

Many of my teaching strategies are founded upon the theory that all students have a preferred learning style, be that kinaesthetic, linguistic, visual, logical, musical, interpersonal or intrapersonal. I've always been clear in my own mind that teaching in a manner that incorporates as many of these different learning styles as possible will make the curriculum more accessible to all students. Having a third party from the Centre come and observe my teaching has corroborated that indeed the students are aware my approach to teaching is fundamentally different from many of my colleagues, and the strategies I use enable the students not only to learn anatomy more effectively, but also the other subjects they are studying for their degree. This was gratifying to know as I have always had suspicions my 'alternative' approach to teaching may have got lost in translation and the students view the activities we do in class as a bit of fun but that they don't always understand or appreciate the plethora of educational theory that underpins my teaching.

Despite not winning the award I have at least been left with a 20ft digestive system which my Mum and I spent many an

industrious hour crafting on my sewing machine. This model, married with a lovely pair of net curtains, was used to challenge students' misconceptions about the development of the gut. It will be brought out again this Autumn for the benefit of the new cohort of students. In the meantime Fred, the skeleton that resides in my office, is sporting it in much the same way that one would wear a feather boa!



Award Trophy

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Jane Saffell

It has been a privilege to have been part of the very well organised, enjoyable and immensely useful process that has been the Bioscience Teaching Awards this year. The experience certainly surpassed my expectations and the various stages of the award process that unfolded after short-listing have been helpful in several ways. First was the experience of working with my very supportive Centre assignee, Dr Julian Park, to write a case study on the teaching for which I was short-listed. This involved Julian coming to Imperial to talk to me about the rationale for my module, observe the interactive teaching sessions, and lead a focus group discussion with students. The two of us then corresponded by e-mail to write the case study entitled 'Experiencing research through creative design and ownership of laboratory practicals'. It was invaluable to have the chance to discuss teaching practice and philosophy with an informed independent observer. Next was the opportunity to attend the STLC conference in Edinburgh and give a talk called 'Recipes or revelation? Influence of laboratory experiences on students' perceptions of bioscience research.' The first education conference I had attended, this was an excellent opportunity to meet, learn from and share ideas with members of the UK science learning and teaching community. Finally, since the Centre publicises award short-listing with candidates' institutions, I have received unexpected recognition and appreciation for my learning and teaching development efforts from Imperial. The key words that sum up my experience of the Teaching Award process are: encouragement, affirmation, support and community. Thank you very much Centre for Bioscience!

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8 | Support for Numerical Methods – NuMBers



It is widely recognised that bioscience undergraduates need good quantitative skills (Tariq, 2004; Tariq et al. 2005). The NuMBers (Numerical Methods for Bioscience Students) project was funded by the UK Centre for Bioscience Departmental Teaching Enhancement Scheme and aimed to strengthen the integration of statistical and other numerical methodologies into the biosciences curriculum. This project built on a highly successful module and text book called 'Biomeasurement' (Hawkins, 2005) was designed to improve these skills through the creation of a web based resource centre containing technique specific "toolkits".

The approach taken was to produce "toolkits" for each technique, in total 30 are included within the resource. The toolkits were initially accessible through a central intranet access point (WebCT) to facilitate the collection of usage statistics. The toolkits were then moved to a stand alone web based resource available at <http://web.anglia.ac.uk/numbers/>. This is an open resource available to the wider bioscience community.

A key aim of the resource design was not only to provide guidance on how to apply a specific technique, but also to help with the decision over which suitable technique should be applied to a data set. To achieve this each toolkit can be accessed via either an alphabetical list of techniques or a 'test selector' which helps students choose the appropriate statistical test.

Each toolkit consists of six main sections:

- When to use or apply: A summary of when it is appropriate to use the technique.
- How to use or apply: Instructions on how to perform the technique.
- Example data sets, relating to modules: Datasets explicitly supporting class work and assessment exercises involving the technique across a range of biomedical discipline areas.
- Self-assessment: Self tests which can be used for formative assessment.
- Further Information: Links to other sources of information and support such as Mathtutor (www.mathtutor.ac.uk/)
- Links to a glossary.

The key features of the toolkits are:

- Consistent and familiar environment to promote ease of use.
- Emphasis on when and how to do the techniques rather than why they work to promote the idea of maths as a tool for biologists.
- Specific subject and precise examples to promote motivation to learn.

- Explicit links to modules to promote integration of support of statistical and other numerical methodologies into the bioscience curriculum.

The project was monitored and evaluated over a full academic year to gather the views of students and staff together with usage statistics. The project had a positive impact on the staff and students in the Department of Life Sciences where it was trialled. This evidence came from a number of formal and informal sources including discussions with staff and students and qualitatively from WebCT access data. Eighty five per cent of the toolkits were identified as being used in at least one bioscience module.

The most popular resources relate to the biostatistical part of NuMBers particularly the Mann-Whitney U test and the Two-way Chi-square test toolkits. This was the first material produced and so was available for the longest and promoted more effectively by staff. Other popular toolkits were simple topics such as measurement, solving equations, variables, concentrations and powers.

The evaluation of the NuMBers resource highlighted two key issues. Some of the numerical techniques being provided for the students in the Department of Life Sciences were equally applicable to a range of other disciplines. Additionally some students were impeded from using numerical methods because of a lack of confidence in core basic skills, such as solving equations or understanding logarithms or powers. We have added some extra resources to the NuMBers site however cannot address all topics and the needs of potential users within this project. On this basis we are developing a cross- discipline numerical support package, the Students Upgrading Maths Skills (SUMS) project to address these issues (www.step-up-to-science.com/SUMS/).

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Engaging in Ethical Thinking

We have designed an e-learning package as an exciting and innovative solution to engage students in bioethics, using a grant awarded by the UK Centre for Bioscience. The package is designed to encourage student driven simulated debate within an e-learning environment. Unlike other topics studied that rely on the understanding of theories and concepts and applying them to further scientific discovery, ethics is not ruled by proven theories and facts, but values and conscience. Most courses already endeavour to teach ethics to their students, however with varying success. Many students can find ethics unexciting particularly if the subject is taught in a non-interactive and disengaged way. Further, the skill to exercise cognizant thinking is underdeveloped in the majority of students since assessment driven education allows for little time to engage in debatable topics.

Most researchers agree that case studies are an important tool in ethics teaching. Many tutors have tried to embrace this approach into ethics teaching by engaging students in debates and mock ethics committee meetings. These exercises attempt to connect students, possibly for the first time, with the issues and potential conflicts of interests presented in ethical debates first hand. These however are not always ideal. Many students are reluctant to contribute to such groups and remain marginalised throughout the exercise. For example, we know it is common for at least half of students not to engage with collaborative learning exercises for a variety of reasons (Kuljis and Lines, 2007). Furthermore, students with different cultural backgrounds may not identify with the issues being raised, or be familiar with the western style of critical thinking employed in European universities. This package tries to engage all students. Many students find it difficult to contribute to a classroom discussion due to feeling intimidated by other students, language difficulties or other problems. The package also allows students to undertake the exercise asynchronously, remotely, at their own pace and independently of moderating tutors which is usually a limiting factor when leading a large class. Additionally, this package encourages collaborative approaches with the use of discussion forum to stimulate further debate between students, which enhances the on-line learning experience. We suggest that this package be used as part of a blended learning environment that supports both face-to-face teaching and computer-mediated teaching.

The Package

The package invites students to attend simulated panel debates that have been asked to make a decision about a case or project. These panels could represent a university ethical committee, a patient management team or the management team of a company considering contentious ethical issues. Each case is presented in video format (or in textual format to assist students who are hard of hearing). The student can attend three different panel meetings within the package. The virtual meeting progresses through a number of stages depending on the case, addressing various ethical questions e.g.: Should the project or treatment be

undertaken in this way? What are the potential risks involved? Are adequate procedures in place to manage these risks? Does the potential negative effect outweigh the potential benefit made by the project or patient treatment? In each of these stages the student can watch videos of the virtual panel members, played by actors, as they put forward their views on these matters. At the end of each stage, the student has to select one out of a number of potential decisions. To assist the student in making their decisions there is a discussion forum which student can use to formulate their views.

Depending on their selection, they will be able to watch a video putting forward a counter argument, a further consideration to be debated or the video of the next stage. At the end of the debate, the student will be asked to make a decision about the case and with or without any changes. The students are made aware that in ethical dilemmas there is not a correct answer but instead, one requiring personal judgement. The simulation ends with a video reflecting on the process and the actual ethical implications as described in the case study.

The package is freely available from <http://ethicssim.brunel.ac.uk/>. We are keen for people to evaluate it by completing a short questionnaire and if you are interested in doing so please contact Annette Payne.

We would like to thank staff and students at Brunel University for their assistance in the development of the package.

References

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Spring 2010 Bulletin: Call for Articles on ESD

The next edition of the Bulletin will be a themed edition on Education for Sustainable Development (ESD). We are keen to include articles on; getting students to engage with aspects of sustainability, the inclusion of ESD in bioscience curricula and teaching sustainability in disciplines where it is not always considered part of the curriculum. If you are interested in writing an article please send a brief outline of your ideas to Katherine Clark (k.a.clark@leeds.ac.uk) by 1st December 2009.



10 | How to Walk Before You Run

– and making sure that your students know the difference

Imagine the scene: “where’s the string?” – “what string?” – “in my lab book it says suspend the bacteria in the broth: so where is the string, then?” The result of getting students to prepare on their own for practical classes by reading schedules may never have been very successful but with today’s undergraduates, who are much more likely to download videos to find out how to do things, by providing large manuals full of long words. Are we providing appropriate materials to facilitate learning for today’s undergraduates? And yet, Collis et al. (2007) report a shortage of appropriately skilled graduates in some areas of bioscience, particularly with regard to their laboratory skills; a point underlined by the 2008 report into 1st year practicals (Wilson et al. 2008). This report resulted from a workshop held in 2008. A highlight was a demonstration by staff from Bristol Chemlabs (www.chemlabs.bris.ac.uk/) of their Dynamic Laboratory Manual: an on-line interactive resource for promoting practical teaching. The Dynamic Laboratory Manual arose from a project worth in excess of £15 million. Could we emulate this with a budget of £15k. To quote Bob the Builder – “YES WE CAN”!

The University of Leeds introduced a new virtual learning environment for the academic session 2008-9. Bids were invited from staff who wished to explore its capacity for innovative delivery of learning resources. Being acutely aware of the problems faced by undergraduates in the Biological Sciences, especially at Level 1, we bid for funding. Using the Bristol Chemlabs model we wanted to optimise practical training for our students, engaging them with on-line exercises designed to support learning and skills development, being freed from the temporal and spatial constraints imposed when material is delivered “live”. Progress of individual students can be monitored and any student who has difficulty with the subject may be offered access to supplementary learning resources to ensure that all students have attained a competence with the subject before engaging in practical work. Our intention was to provide support for exercises that previously students



Figure 2. Videography of running

had found unfamiliar or challenging and to support them before they begin hands on work. Four practical exercises, drawn from across the Faculty of Biological Sciences, were chosen for development. This is because they were either intellectually or technically challenging for students or both. Bespoke on-line introductory material was prepared for each exercise, mostly using the “Articulate” studio of programmes (www.articulate.com/) but also using simple HTML pages. Integral to these exercises was the development of on-line formative assessments to track progress and to ensure competence.

Initially, work focussed on developing online support for a test practical, delivered to a small number of students, to develop “proof of concept”. The use of chemostats in Bacterial Physiology was chosen. This involved development of a range of resources from simple web pages through presentations made using the Articulate studio and suitably focussed formative assessments (Fig. 1). This topic was developed with the help of Chris Jones. Following this, two existing exercises, delivered to large groups of students, were identified for development; one in measuring respiration rates, developed by Stan White and Tim Lee; the second, developed with Kenny McDowall, devoted to bacterial gene transfer. The fourth exercise provided the opportunity to develop online support along with a brand new practical exercise, on videography of running and walking, allowing an integral approach to the development of both the exercise (Fig. 2) and the online material to support it. This was developed by Neil Messenger and Danni Strauss. During development of the pilot practical, demonstrators who were to teach on the module had a significant input into evaluation of the resources. This was particularly important since all of the demonstrators had taken the practical exercise as undergraduates. Feedback from staff, demonstrators and students was universally outstanding. Comments included “I liked that I was able to do it at my own pace and in my own time. It really helped me to understand better what I had to do in the labs. Much easier to follow than a normal practical

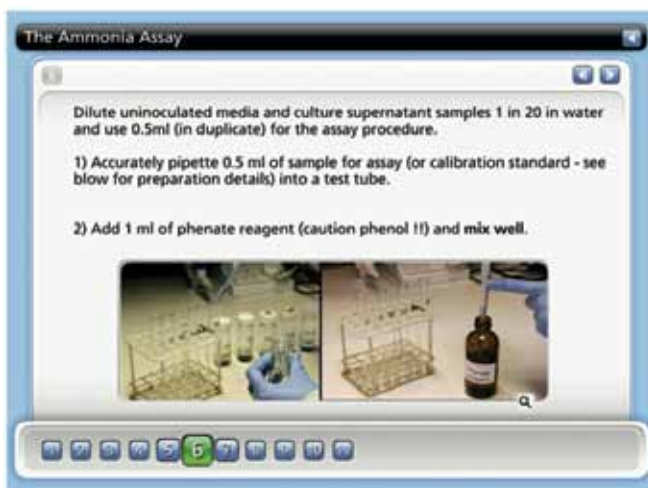


Figure 1. Screenshot of an explanation of one step in an assay procedure

introduction” and “This particular virtual learning resource was well structured, clear and presented in a visually stimulating way”. Perhaps the best comment, however, was: “[I] ...would like to see if this can actually be done to all other experiments. It might be costly and time consuming, but stop and think for a moment, once it is done, it can be used over and over again for the coming years. So why not?” Why not, indeed!

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Website: Engage in Feedback

This website (www.reading.ac.uk/engageinfeedback) aims to enhance student learning by providing staff with ideas, tools and resources they can use to enhance the feedback they provide. The website is structured around 8 sections:

Why is feedback important? Outlines why providing high quality and timely feedback is important, drawing on research evidence and comments from staff and students.

Staff concerns about feedback provides an overview of the challenges facing staff in relation to feedback and of what constitutes high quality, timely feedback.

Getting students to engage discusses the important issue of student use of feedback and provides a range of tips for engaging students with feedback and feed-forward.

Evaluating feedback provision provides tools to enable lecturers to evaluate and reflect on the feedback they currently provide and to consider ways in which it can be improved.

Feedback on written assignments includes a number of mechanisms for providing good quality and timely feedback on written work.

Feedback on presentations is notoriously difficult to assess. Resources and tips are provided, including proforma sheets.

Rapid feedback to first years is important to both aid transition and support learning. This section covers a range of techniques and ideas to support feedback provision, taking into consideration the often large class sizes involved.

Quick tips and links provides a number of short printable pages and relevant links relating to feedback provision.

Contact: Julian Park (j.r.park@reading.ac.uk) or Anne Crook (a.c.crook@reading.ac.uk)

Intute's Virtual Training Suite

The Intute Virtual Training Suite (www.vts.intute.ac.uk/) offers free tutorials, written by lecturers and subject specialists from UK universities, on using the Web for education and research.

Aimed at students, there are 62 tutorials covering most degree subjects, and the content and design of about half has been completely overhauled. Of particular relevance to Biosciences are the updated tutorial on Agriculture, and new tutorials on Biodiversity and Microbiology.

Intute is a national Internet service from JISC aiming to help students make more discerning use of the Internet. The tutorials focus on academic Web resources, and stress the importance of critically evaluating material found online. They were revised as part of a wider programme of improvements to the Intute website.

Whilst the Virtual Training Suite has been continually updated since its inception in 2000, this revision has been a fundamental one in light of Internet developments, particularly the impact of Web 2.0 technologies in higher education; academic Web trends (changes in online academic publishing); and extensive user feedback. The rest of the tutorials will be similarly overhauled in the coming year.

Feedback from university staff suggests that they find it useful to point students to the tutorials from course handbooks, VLEs and library web pages. There is also evidence that the tutorials are used to support courses in research methods, study skills and information literacy.

The new design makes tutorials shorter and easier to read online. Interactive features include quizzes, exercises, a 'links basket' to record URLs mentioned in the tutorial, and an online feedback form. Each tutorial takes around one hour, allowing the user to work through the material at his/her own pace.

Each tutorial has the following sections:

- **TOUR** – focusing on the academic information landscape
- **DISCOVER** – focusing on finding scholarly information online
- **JUDGE** – focusing on the critical evaluation of resources
- **SUCCESS** – providing examples of students using the Internet

Market research suggests that the Virtual Training Suite is one of the most highly used parts of Intute. Please let students know about these tutorials by linking to them from course handbooks, VLEs and library Web pages.

For further information please contact Carol Collins.

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12 | Centre News

Funding

We are currently accepting bids for our Departmental Teaching Enhancement Scheme which offers up to £15,000 to bioscience schools and departments to develop and implement some aspect of practice that will lead to an improved learning experience for their students. Deadline for expressions of interest: January 15th 2010. Deadline for full proposals: 7th April 2010.

We are currently holding round 12 of our Teaching Development Fund which provides support of up to £4000 to individuals to encourage the development, establishment or validation of innovative learning, teaching and assessment materials or methods. Application deadline: 29th January 2010. For more information on both funding calls see our website www.bioscience.heacademy.ac.uk/funding/

Events Roundup

The **Representatives' Forum** was held at the University of Birmingham on the 10th and 11th September 2009.

The Centre expresses its appreciation and gratitude to the Reps and their role of support for the Centre at their home institution. The event report is available at www.bioscience.heacademy.ac.uk/events/repforum09.aspx

Learning through Assessment was hosted by the University of York on the 29th September 2009. The event report is available at www.bioscience.heacademy.ac.uk/events/york290909.aspx

Upcoming events

The following events are from our Winter programme:

- Environmental Ethics – Cardiff, 9th December 2009
- Learning Through Web 2.0 – Leicester, 16th December 2009
- Exploring promotion and CV enhancement and discussing the implementation of an e-mentoring scheme in the biosciences – Leeds, 7th January 2010
- Innovation in microbiology learning and teaching, joint event with the Society for General Microbiology – Edinburgh, 30th March 2010
- Field and Practical work – Spring 2010

Details of all Centre events can be found on our website www.bioscience.heacademy.ac.uk/events/bioevents.aspx.

Comments Box

The Centre would love to hear your opinions and views on issues within our Bulletin.

- Do you agree/disagree with the editorial on page 1? How can we encourage students to take creative risks and improve their 'conversational journey'?
- What is your experience of giving eFeedback? Is this something you already do or would be interested in starting to do? See page 3.
- Did you go to the Science Learning and Teaching Conference? Do you want to add your reflections to those of Dorothy Aidulis' on page 5?

If so, please visit www.bioscience.heacademy.ac.uk/resources/bulletin.aspx to share your views.

Centre Resources

Bioscience Education

We have recently published a hard copy of collected papers from volumes 1-8 of our online journal Bioscience Education. The journal aims are to promote, enhance and disseminate research, good practice and innovation in tertiary level teaching and learning within the biosciences disciplines. The journal publishes a range of articles on tertiary level biosciences education, including peer-reviewed research and practice papers. To order your copy, please contact the Centre.



Report: Developing Problem Solving Skills in Bioscientists

This report is based on a workshop held in December 2008 in Manchester. Further information and additional materials can be found on our website www.bioscience.heacademy.ac.uk/resources/problemsolving/



How to... include sustainable development in your teaching

Sustainable development (SD) is a wide ranging, multi-disciplinary topic, and within some discipline areas it can be difficult to find links to SD. This sheet aims to bring together some ideas for introducing Education for Sustainable Development (ESD) into teaching within different bioscience disciplines. www.bioscience.heacademy.ac.uk/resources/esd/howto.aspx



Short Guide: A Bioscience Degree – Why and What Next?

Newly published this guide is aimed at bioscience students and brings together some ideas on what a bioscience course can give them, where it might take them and get them thinking about the skills they could develop during their time in higher education. www.bioscience.heacademy.ac.uk/ftp/resources/shortguides/whatsnext.pdf



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