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PRACTICAL SKILLS

– TIME FOR A RETHINK?

A recent survey (Brown *et al.*, 2005) asked graduates to identify three things in their current occupation for which their university course had prepared them well and three things for which their course had prepared them poorly. Lack of practical work and experience stood out as the aspect of courses to receive most criticism (second was career development skills).

There has undoubtedly been a reduction in the provision of practical work in university courses in response to:

- Staff pressures (available time and the drive to research priorities);
- Resource pressures (both from the increasing cost of consumables and the reducing unit of resource per student);
- Increased student numbers (since what can be done with 8-12 students cannot necessarily be done with 50);
- Increased Health and Safety issues;
- Increasing sophistication of experimental method in the biosciences;
- Reduced hours for which students are expected to attend classes; and
- The need to make time available to teach generic skills.

Quoting from a recent HEFCE consultation paper (HEFCE, 2003), "Employers expect bioscientists to have significant practical experience, and so there is pressure to ensure that the amount of practical work is not reduced". "Reducing practical work in the biosciences would undoubtedly have an adverse effect on HEFCE employability objectives". The responses from the survey reported here suggest we have already arrived at this situation! This is supported by recent reports from the Biosciences Federation *Enthusing the next generation (http://www.bsf.ac.uk/responses/enthusing.pdf)* which recommends that "practical work be given greater prominence in the curriculum" and the Association of the British Pharmaceutical Industry *Sustaining The Skills Pipeline (http://www.abpi.org.uk/publications/pdfs/2005-STEM-Ed-Skills-TF-Report.pdf)* also identifies practical skills and *in vivo* skills (among others) as requiring action, in some cases immediate, to improve the situation.

There are a number of options which would increase the practical abilities and experience of graduates. For example:

- Increase total teaching time;
- Reduce time spent teaching generic skills;
- Increase the provision of sandwich courses, vacation work experience and placements in industry;
- Give students options for 'practical light' or 'practical heavy' modules;
- The diversification of the mission statements of universities might allow institutions to establish themselves as providers of practically orientated courses; and
- Provision, by employers, of training courses for newly-employed graduates to bring them up to speed.

None of these are without problems but the most important thing is for us to take on board student and employer concerns about the practical work to which students have access at university. The question then becomes how, within the constraints under which we operate, can we deliver a more satisfactory student experience?

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CONTENTS

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2 SAME JOB, DIFFERENT CONTINENT

I'm away for three months, broadening my mind'. The note on my neighbour's door neatly displayed the typical Australian virtues of brevity and straight talking. It contrasted poorly, I thought, with the ponderous email I had circulated before leaving. Full of phrases about 'an enriching cultural exchange' and 'refreshing my academic perspective', the apologetic sub-text had been 'no, this isn't a holiday'.

And no, it isn't. It is an academic exchange with a colleague from the Australian Catholic University in Sydney. We have swapped jobs and houses for six months. We are following in a long tradition of exchanges that at one time were encouraged and facilitated by the Commonwealth and other organisations. Those formal channels seem largely to have dried up – broadening one's mind is no indicator of esteem in the RAE. So this exchange was a blind date following a query on an education discussion list, and it was possible only with the support of our colleagues and managers. Having spent two months down under, I would like to share with you some of my initial reflections on the similarities, and differences, between teaching biology in the two countries.

It is easy to feel at home in Australia. I walk past oak trees lining Norwich and Oxford Street, on my way to Epping and work, and can read how Hibs and Hearts are getting on in the weekend paper. But the raucous screeching of sulphur-crested cockatoos careening overhead will suddenly rend my thoughts, and remind me that this is really a very different country. Australian higher education presents similar contrasts between the familiar and the novel. The first universities (Sydney, Melbourne and Adelaide) were based on UK models, and that legacy is still strong in the 44 major Australian HE institutions of today, and in wider HE policy. Australian academics are anticipating, with justified trepidation, the introduction of their own 'Research Quality Framework', inspired by the RAE. There is talk of greater differentiation within the sector, with the 'gang of eight' (elite, older universities) pushing for this, and a fear that some institutions may become 'teaching only'. In some respects, the UK is following Australia. Students here have paid into the Higher Education Contribution Scheme (HECS) since 1989, with repayments through tax after an income threshold. Since 1997, universities have been permitted to make up to 25% of the enrolment in a course from full fee paying students; in some cases, this has meant lowering the entrance requirements for such students, and worries that the rich can buy their way into university. Australia realised the potential of overseas markets many years ago, and now has the second largest percentage of overseas students – mainly from China and India – of any country.

And what of the differences? There are many, some of which involve subtle changes in perspective that have radical implications for how things feel. Take the dead hand of health and safety, revived by the bright southern sun into a gentle protector. The risk assessment forms are similar to those required at home before taking our students for a walk in the park. But the content throbs with uniquely menacing possibilities. Australians love to tell tales of the many miserable ends that might befall you in the outback and the sea. The best of these are embellished with details of how Uncle Keith, or a friend's cousin, lost his leg to a redback spider or was chased across a field by a tiger snake. And the most worrying aspect of these tales is the suspicion that they might be true. Australian biologists conduct fieldwork in a country with the most venomous animals on earth; they respond with a refreshing mixture of planning and optimistic acceptance of risk. Suddenly the risk assessment process makes sense, and I wonder if this is not its natural niche, and it has spread like a noxious weed to the UK? Then there is that famous Australian confidence, a kind of positive, secular fatalism that asserts 'She'll be right, mate'. Australians appear to believe the opening lines of their wonderful national anthem: 'Australians all let us rejoice, for we are young and free.' My students exude a languorous optimism, with much less apparent anxiety over assessments than I would find in Scotland. The ability is the same, but the attitude is different; the success of the schools in fostering such confident young people surely has lessons for us in the UK. Part of that confidence might stem from the job prospects for environmental biologists. Most of my students here expect to leave with ordinary degrees after three years (unlike in Scotland, where the fourth honours year is now routine) and to find relevant work with regulatory bodies and local authorities.

So how would I describe the benefits of this exchange? It has re-introduced me to the creative anxiety of teaching new subjects in a different place, and of making new friendships with colleagues and students. It allows me to see my work and institution from a different perspective, to reflect on my strengths and weaknesses and those of my university. But I can summarise it for you in a pithier, and more Australian, way – it helps to broaden my mind.

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E-LEARNING NEWS

UPCOMING EVENT
Effective E–Learning: IT's about pedagogy as well as technology, Manchester Metropolitan University, 13 December 2006

FUNDING AVAILABLE
Grants up to £4000 are available. Deadline for applications 13 September 2006

http://www.bioscience.heacademy.ac.uk/eLearning/

STUDENT SKILLS

Recent articles have made it increasingly apparent that expectations of students' skills are mismatched, both from university admissions and graduate employers' perspectives (Blair, 2006; Shepherd, 2006). In the above context, skills have been defined as those that are transferable and include communication, team working, self-management, IT, numeracy, information handling and problem solving, to name but a few. However, all undergraduate courses have skills learning/teaching embedded within them – we all expect students to turn up to lectures on time and submit their coursework on a stated date and lectures are becoming increasingly interactive with a degree of team work and group interaction required. By their very nature, coursework, assessments and exams test the application of transferable skills – oral presentations supported by visual aids, exam questions assessing problem-solving capabilities and literature reviews reliant on sourcing, understanding and criticising texts.

Universities have further invested in skills support over the past few years. For example, at the University of Reading, central providers (including IT Services, Study Skills Advisers, the Library and the new Mathematics Support Centre) offer regular courses and learning resources to help develop students' skills. A search on the Web found that most universities offer similar types of support. For example, the University of Bournemouth has its KeySkills website *(http://keyskills.bournemouth.ac.uk/lskills/tltp3/entersite.html)*, Manchester Metropolitan University has a dedicated Study Skills section on its Learning Support Website *(http://www.mmu.ac.uk/academic/studserv/learningsupport/)* and the Department of Lifelong Learning at the University of Exeter has an on-line Study Skills Series *(http://www.education.ex.ac.uk/dll/studyskills/)*, all of which give advice and guidance on how to develop and effectively apply transferable skills. In addition, the Academy website *(http://www.heacademy.ac.uk)* currently lists several ongoing skills-development projects and many of the Centres for Excellence in Teaching and Learning (CETLs) have a skills focus.

The CETL in Applied Undergraduate Research Skills (CETL-AURS) at the University of Reading is currently piloting a 'skills audit tool', which will enable skills to be 'mapped' within and across degree programmes. One important feature of the tool is the differentiation of the skills into either:

- Transferable skills: communication, team working, self-management, IT, numeracy, information handling and problem solving; or
- Discipline-specific skills: those that represent the core skills associated with a particular discipline (e.g. laboratory skills, fieldwork skills etc.) and which will enhance the skills set of students, thus aiding their future career prospects.

The purpose of the audit tool is twofold – not only will it identify what skills are being taught and/or assessed in a given module, it will also allow staff to reflect on the methods they are using to teach and assess a range of different skills. By collating data across modules, degree programme co-ordinators will be able to map where and how skills are being taught and assessed, thus facilitating a systematic review of skills teaching, assessment and learning across an entire programme. Where appropriate and possible, when audits are completed for an undergraduate programme, employers will be invited to review this information and to then discuss with staff the range of skills being supported to see how this compares to their own expectations of what graduates 'should' have to offer. The audit tool approach, therefore, provides not only a basis for staff to discuss skills teaching, assessment and learning within an institution, but can also be used to engage staff in skills discussions with industry.

The skills audit tool has now been piloted using the core modules of the BSc Rural Environmental Science programme at Reading. Core module convenors were willing to participate and several staff commented not only on the ease of use of the audit tool but also its usefulness in terms of encouraging them to think more deeply about skills teaching and assessment. When data were compiled, the results of the audit concluded that overall, the range of transferable skills are being taught and assessed using a range of different, and often innovative, methods. The discipline-specific skills information will now be presented to potential employers to examine the extent to which this matches their expectations.

This initial hard copy pilot of the audit tool was deemed a success and it has now been decided that an on-online version will enable more staff to have access to this resource. Working closely with the PROFILE team *http://www.profile.ac.uk* at the University of the West of England, an interactive version of the audit tool has now been developed by the CETL-AURS team at Reading. Module convenors will be able to 'log-on' and fill out the audit tool at their convenience (taking about 15 minutes per module) and PROFILE allows programme co-ordinators to quickly and easily collate and summarise data across an entire degree. The online version of the tool is currently being piloted by staff in the CETL-AURS with the aim that it will be more widely available to other staff across the University later in the year.

We would like to hear from you if you have had any experience of auditing skills and/or have been involved in the development of similar resources. If you would like more information on the CETL -AURS or the skills audit tool, contact Gillian Fraser, details below.

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4 THE PASSPORT SCHEME

– BRIDGING THE GAP BETWEEN SCHOOL AND UNIVERSITY

The Crichton Campus of the University of Glasgow is part of a multi-institutional campus located in Dumfries in the southwest corner of Scotland. In common with the other Institutions on the campus (University of Paisley and Bell College) the majority of students are drawn from the local area (Dumfries & Galloway and Cumbria). As part of the process of building links to the secondary sector, the Crichton University Scholarship Agreement has been established whereby students from regional secondary schools are entitled to an annual scholarship if they attend the Crichton Campus.

Other initiatives have also been undertaken to build close links with the secondary sector, of which the PASSport scheme is a notable example. The standard university entry qualification within the Scottish system remains the Higher, gained after the fifth year of secondary schooling. This means that many pupils can gain university entrance at the age of 16. Even if qualified at that age, the majority intending to proceed to higher education opt to return to school for a further year (primarily due to maturity issues), to pursue Advanced Highers and/or other Highers.

Demotivation has been identified in schools as a problem in the sixth year. For those pupils who receive unconditional offers in the course of their sixth year on the basis of their performance in fifth year, the incentive to achieve good grades in their sixth year is clearly diminished. In practice this means that they often perform well below their capacity, or indeed leave school. Both of these impact on league tables and the funding for the school. As Julian Park discussed in his recent article (Park, 2006), student motivation is also an issue in HE and John Green in his recent reports to the Centre (Green 2005a, 2005b) highlights some of the Scottish-based projects encouraging students to take bioscience.

The Crichton Campus was approached by the head teacher of a well-performing school to explore the development of a special programme that would create links between the school and the Campus. As well as addressing the issues identified above, the discussions also focussed on the increasing difficulties encountered even by well-qualified pupils in making the transition from secondary to higher education.

A pilot of 11 pupils, drawn from one rural and one urban school, was initiated in academic session 2004/5. The pupils enrolled on one of a variety of courses, ranging from Contemporary Art to Environmental Studies. The pupils were fully matriculated students of the University and had access to all facilities and were, to all intents and purposes, indistinguishable from any other student. Tutors and lecturers did not know their status and to rule out any bias in the pilot programme no arrangements were made for special treatment of these pupils.

Pupils electing to take Environmental Studies have a choice of three courses at Level 1:

1 **Our Changing Environment:** covers topics such as global warming, acid rain, ozone depletion, biodiversity loss and outlines the state of scientific knowledge in these fields.

2 **Environment and Sustainability:** outlines ethical, socio-economic and technological considerations integral to environmental sustainability. Lab and field work – wind farm case study; one week's research on their personal water consumption; field classes to local peat bogs to investigate problems with implementing conservation measures (in conjunction with the Forestry Commission and Scottish Natural Heritage); measure and present their ecological footprint.

3 **Investigating the Environment:** looks at scientific principles and methods by which scientific investigation occurs.
Lab and field work – SEPA field class on river flooding; saltmarsh radioactivity lab; mapping the global climate lab; Experimental Design Project where students investigate an hypothesis.

Investigating the effect of acid rain on plant growth

One difficulty that arose from the pilot study was conflict between the demands of the university course and the demands of the programmes being pursued within the school context. In particular, since the pilot was running in the second semester, there were problems with the timing of examinations. Scottish national school examinations are held in May at roughly the same time as the examinations for the university courses. The resultant pressures meant that one pupil withdrew from the programme. Apart from that the scheme proved popular and was successful with the other ten pupils all gaining 20 credits under the Scottish Credit and Accumulation Transfer Scheme.

In the light of the difficulty identified above, the timing of the programme was changed for academic session 2005/6 and the scheme was opened up to all regional schools. Many schools joined the scheme and a liaison team was established embracing schools, university and the Local Education Authority. The financial support of the Local Authority is perhaps a contributing factor to the positive achievements of the programme. Other universities and colleges wishing to initiate something similar may need to consider this option or that of creating a bursary to fund the course fees. The success of the scheme in the first semester meant that a number of pupils elected to return in the second semester despite the known difficulties!

Feedback from a current pupil stated "Being a sixth year student I found the PASSport scheme very helpful. University life is really different from your school years and as you are coming to the end of school life it can become quite daunting. The PASSport scheme enabled me to get a taste of university life and helped me take on more responsibilities. You have to take it upon yourself to do the work because nobody is going to chase you for it . . . One of the best things, I felt, was that you were treated as a university student by both the teaching staff and the other students. You do not get a lighter workload because you are still at school, you have to put in as much effort and work as the other students."

The scheme is only in its second year of operation, but already the signs are of expanding subscription in the coming session. Indeed, one of the pilot schools is in the process of shaping its timetable around that of the university to allow maximum pupil participation!

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For information on the Crichton University Scholarship Agreement: http://*www.cc.gla.ac.uk/layer1/cusa.htm*

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BIOSCIENCE IN ACTION

PHOTOGRAPHIC COMPETITION 2006

A chance to win £500, and an opportunity for your images to be included in ImageBank. ImageBank is an online collection of bioscience images provided by the Centre for Bioscience free and copyright cleared for use in learning and teaching. All major bioscience subject areas are covered and there are images of representatives of most taxonomic groups. From algae to elephants, from laboratory equipment to agricultural techniques – all these and much more are available for you to download from ImageBank.

We now have almost 5000 bioscience images, in ImageBank, with new submissions being added all the time. We recognise the importance of our collection being up-to-date and covering a wide range of topics, so we are running a photographic competition which reflects current themes in bioscience. All images entered for the competition will be considered for inclusion in ImageBank, so why not enter our competition and help us enhance our image collection?

The theme of the ImageBank 2006 Photographic Competition is: **Bioscience in Action.** We are asking entrants to the competition for high quality images which illustrate an aspect of bioscience in which they are involved. The images may be of laboratory or field work; they may show methods or processes used for collection of data; or the relationship between an organism and its habitat. Or you can create an image showing aspects of learning and teaching bioscience. In fact you can enter any image which you consider captures the excitement and interest of **Bioscience in Action.**

We are offering some seriously tempting prizes – a first prize of £500, and second and third prizes of £200 and £100, so it's well worth having a go. In addition all images entered in the competition will be considered for inclusion in ImageBank, so this is an opportunity to share your images with the bioscience community.

The competition is open to anyone with an interest in bioscience. You can find further details, the competition rules, and an entry form on the ImageBank web site at:

http://www.bioscience.heacademy.ac.uk/imagebank/

So why not take this opportunity to share your interest in bioscience with others, and perhaps win one of our prizes?

BIOSCIENCE EDUCATION E-JOURNAL VOLUME 7

The articles listed below are available on our website at *http://www.bioscience.heacademy.ac.uk/journal/vol7/*

- The findings of an assessment audit: an NTFS project report
- Blues for the lecture theatre – the pharmacology songbook
- Written feedback for students: too much, too detailed or too incomprehensible to be effective?
- Why am I here? Student choice in the biosciences
- Correlates between bioscience students' experiences of higher education and the neurobiology of learning
- Educational modules in tissue engineering based on the "how people learn" framework
- Using online microassessments to drive student learning
- Never again shout, "that WOULD have been useful for my teaching!" at the TV

We also invite submissions for volume 8. See the website for further information, layout and submission guidelines.
http://www.bioscience.heacademy.ac.uk/journal/

6 BLOGS, PODCASTS AND WIKIS – PUBLISH AND BE DAMNED?

"In the beginning, there was nothing, and it exploded"

– Terry Pratchett

Recently 'Webs within Webs' seem to be appearing, each supporting different communication methods and gathering their own communities. These common interest networks are a foundation for a collection of applications and services now being loosely described as Web 2.0.

It is timely to consider if we are sufficiently aware of these and their learning and teaching potential. You may think that this might be yet another technical hurdle to overcome but this is not the case, quite the opposite in fact; it is their ease of use that is making them so attractive.

BACKGROUND TECHNOLOGY

Underlying these new sub-networks is a communication method that advertises new content automatically. This is called RSS (Really Simple Syndication). These are called 'feeds'. RSS newsfeeds have been around for a while in many guises and special newsreader software was usually required to browse it. However, it has recently become incorporated into some web browsers. This year, RSS is about to be given a significant boost with the release of version 7 of Internet Explorer which will present RSS to the non-technical mainstream. It becomes very easy to see 'What's new' without fuss or the need to frequently update bookmarks.

BLOGGING

Blogs are We**b logs** kept by individuals or projects to record thoughts, ideas, work notes or outcomes onto the Web chronologically. You may think it sounds self-indulgent but once you engage with the process it does not turn out that way. It is *not* identical to publishing just another page on the web because of its syndication features and its community potential: Blogging links activity.

The blogging habit has been around for a while and many teaching staff may be blogging already. Many students are already blogging their activities, including their experiences in HE. Prospective students can search these to uncover further information about the institutions they intend to apply to. Some institutions are already using this medium to enhance their profile.

Note that tagging of entries in blogs is common practice. A tag is a personal keyword for the item; tags themselves can be browsed to discover common interests.

A few example blogs;

Nature Blogs A collection of subject-based blogs started in late 2005. *http://www.nature.com/blogs/*

Mortarboard The Guardian's blog around educational issues. *http://blogs.guardian.co.uk/mortarboard/*

Studential An aggregation of student-run websites, blogs and diaries. Experiences in the UK and working abroad. *http://www.studential.com/blogs/*

As new blog entries appear, RSS automatically alerts others who have subscribed their interest in the blog. Communities of practice can be kept up-to-date *without* broadcast email. A blog can be from a group or a role; it does not have to be an individual's diary.

For any organisation, there is a risk that blogs kept by its staff contain comment that is not desirable to have in the public domain. There have been a number of incidents in industry where an offhand comment has had significant consequences for the employer and employee. It is likely, therefore, that many HE institutions would support or establish a blogging facility that enables blogs to be kept in-house, to enable secure comment from closed groups which should not be public as they could be misinterpreted. This should offer a safer environment as entries can be 'scoped' for levels of access.

If you would like to start blogging, *check with your institution to see if a suitable service is already offered.* Failing that, a free service like blogger.com or eponym.com will offer all the basic features. Creating a blog is free and can be done within a few minutes.

Searching the **blogspace** (the web-within-web of bloggers) uses specialist tools. Google and Yahoo offer specific blogspace search services but Technorati (*http://www.technorati.com/*) seems to have gained the respect of the blogging community . Current interest topics in blogs are also monitored in Blogpulse (*http://www.blogpulse.com/*).

PODCASTING

Digital music is sold and shared in the Internet using many software tools but the CD medium is being replaced with hard-disk or memory devices. One of these is the iPod™ – the market leading device which has spawned the term 'Podcasting'. Podcasting is broadcasting *audio material* on-demand; it does not have to be music, it could be presentations, lectures or revision guides.

Most students will have an iPod™ or equivalent MP3 player. It is probably duplicated in their mobile phone too so, receiving and playing the audio is no longer a problem; producing, advertising and delivering it is, but now only a minor one.

Recording and editing audio can be achieved with free software like Audacity (*http://audacity.sourceforge.net/*) which allows the simple manipulation of the content by dragging and dropping sections of the recording onto a timeline. Distribution is achieved by syndication of the URL to the Podcast by an RSS feed. Free or low-cost websites exist which can quickly upload, mount and syndicate a Podcast.

Podcasting lectures may be an easy route to engage in the process but students may soon tire of the novelty and it may even be counterproductive leading to low attendance. However, as slides can assist revision, recall is more

likely to be improved with the accompanying audio. Of course podcasts are permanent records of events hence care needs to be taken, as with blogs.

Search tools designed specifically for Podcasts are growing and the remarkable PodZinger (*http://www.podzinger.com/*) can seek out and transcribe a talk, indexing the content automatically. Note that the security of copyright is more difficult as the content is copied to the listener, not streamed i.e. the original cannot be switched off at source any more.

Yahoo offer a popular service for podcasters (*http://podcasts.yahoo.com/*) and sites like Pod-o-matic (*http://www.podomatic.com/*) provide a walkthrough to publication and syndication. As this medium is expanding so rapidly, it has dedicated sites to host events (http://www.higheredblogcon.com/index.php/teaching/) and developments. (*http://www.podcastingnews.com/*).

Getting students to produce short talks may be a route to podcasting and an easy way to build a valuable library of content with minor technical support. It may also provide a more novel form of assessment.

Recent improvements in text-to-speech software are noticeable and many tools are available to convert any written document into audio e.g. TextAloud. It may be that podcasting can serve accessibility needs, or provide instruction in the field where paper notes are inconvenient. Personally, I find aggregating podcasts onto an MP3, CD or memory-stick is ideal for car journeys.

The induction process may present many opportunities where the same information is presented repeatedly and a convenient library of this may be quite useful as a Podcast.

Here are a few examples which illustrate a range of material and qualities exhibited in podcasting.

Nature A weekly podcast produced by Chris Smith at the University of Cambridge (Chris spent six months with a broadcaster in Australia learning how to utilise radio and the professional quality is evident). Each episode is a collection of stories from the current issue of the journal.
http://www.nature.com/nature/podcast/

New scientist The popular science weekly.
http://www.newscientist.com/podcast.ns

Media podcasts The BBC report a huge increase in podcasts (up 1m to 3m for March 2006) and offer a range of programmes.
http://www.bbc.co.uk/radio/downloadtrial/subscribe.shtml

Example lecture podcasts 'Stanford on iTunes' became available in late 2005 and offers lectures and events from around the campus.
http://itunes.stanford.edu/rss/

University of Bath –
http://www.bath.ac.uk/podcast/

The Royal Society –
http://www.royalsoc.ac.uk/page.asp?id=3966

Blogging software may also host and syndicate podcasts.

WIKIS

A wiki comes from the term wikiwiki, which means 'very quick' in Hawaiian. The idea is to provide a service which enables anyone to publish on a website without the use of specialist software for editing HTML, the code of the web. All you need is an authorised account and knowledge of a few basic formatting rules for layout and linking. Moderators of the content can be established to check new content as it arrives but open permission can be granted if desired.

The power of the wiki is the ease of production and linkage within the site. Each page is automatically consistent within the site so presentation problems are minimal. To see what a wiki can do visit WikiPedia (*www.wikipedia.org*) which now holds over 500,000 pages in its wiki encyclopedia. It has scored fairly well against other online encyclopedias as it has a huge contributor base who can update entries immediately. Some quality issues remain but the lack of delay in revising and adding material seems to counterbalance this.

Many wikis offer a MS-Word-like entry page in the browser window where contributors can create content without having any local software installed. This makes it incredibly easy to use. Cross references within a wiki are provided by very simple techniques like running words together with capitals like TitleCase or enclosing a term within square brackets. Test areas (called sandboxes) are provided to practice basic skills without embarrassment.

There are clearly opportunities for students to utilise wikis to work on collaborative projects with less dependence on technical skills support – attention can be given to content.

Many wiki 'packages' are freely available on the internet as most of the software is written for the open source platforms. A good comparison site of wiki features can be found at the WikiMatrix site (*www.wikimatrix.org*).

Projects across institutions can use wikis to manage collaborative documentation and information. For example, the JISC are using a wiki to coordinate the Digital Repositories Programme in the UK (to reduce the email burden of its members and hold the key information in one place) (*http://www.ukoln.ac.uk/repositories/digirep/index/JISC_Digital_Repository_Wiki*)

New entries appearing in a wiki can be syndicated to others automatically, using RSS of course, so that subscribers know when an item is added or revised. Wikis differ from blogs in that it is the subject or project topic that leads the wiki, not the individual, group or role. The wiki approach lends itself to starting topics at a broad level and letting the contributions themselves set the granularity as they grow.

CONCLUSION

These new Internet solutions for discovery and publication are offering spaces on the Internet where the teacher-learner interaction can be supported in different ways. The technical barriers are reasonably low for the new user and each service adds collaboration opportunities which can bring together ideas from groups with similar interests and requirements. If you have experiences of these tools which you feel would be of interest to other bioscientists we would love to hear from you.

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REPORT ON PROBLEM-BASED LEARNING WORKSHOP

I arrived at Canterbury on the Tuesday morning for this one day workshop not having been a part of the larger Society of Experimental Biology (SEB) meeting. The workshop, jointly organised by SEB and the Centre for Bioscience, attracted me as I felt it might address Problem-Based Learning (PBL) specifically from the point of view of a biological sciences teacher. I was somewhat surprised, therefore, to discover the morning session to be run by Sarah Symons from the Department of Physics and Astronomy at the University of Leicester. Their PBL credentials were soon made evident to us as we were told of the experience gained through the HEFCE funded Project LeAP at the University of Leicester in collaboration with Physical Science departments at the University of Sheffield, and my own University of Hertfordshire. Despite my involvement with PBL on an MSc programme which I organise, our department had not made any contact with our colleagues in Physics and Astronomy to share experiences in this educational method that was new to us. It is surprising how often when you travel to outside meetings you discover useful information of what is happening in your own institution. As a result I will be contacting the LeAP leader at our University.

The morning session proved to be most useful, in spite of my initial misgivings, as it was an informal exchange of ideas prompted by specific group exercises. Being a diverse collection of biologists lead by a physicist meant we could focus on the generic question around the use of PBL rather than specific nature of problems relating to our disciplines. This process was aided by a broad, science-based, PBL exercise which we tackled in small groups of 3-4. The problem had significant biological aspects, along with physics and chemistry, and a bit of Hollywood thrown in to keep it interesting. Groups came up with a varied response to this exercise reflecting the differing backgrounds of participants, and illustrating one of the advantages of PBL group work; that the varied experiences of the individual group members assures you will consider a number of different approaches to solving a problem. Some groups alternatively discussed the process, and came to the conclusion that insufficient time and resources were available in this artificial situation to come to a decision on the tasks set for the groups. This too was useful information when planning a PBL activity in a genuine learning environment for our students. Our small groups also had the opportunity to develop questions around current news stories that could become PBL exercises. Again the diversity of interests of the participants came through in the many different questions that these news stories generated and illustrated the usefulness of this source of topics. Throughout this morning session there was an excellent level of participation both in the small groups and when we all met to discuss issues. It seems most had some experience with PBL and were very willing to share their opinions.

The afternoon sessions promised us some 'real life' uses of PBL. The first session presented by Jeremy Prichard from Birmingham was an example from the overarching molecular biology role in biosciences, and more specifically use of on-line bioinformatics. We were presented a most impressive run through of informatics data bases to link DNA sequences to specific functions, using a website developed by the presenter to bring together the massive information freely available through the web to solve a very specific problem. This highlighted for me the importance of informatics and the availability of ICT to the success of PBL in higher education today. The immediacy of information gives the students the means of quickly gathering all they need to know to carry out a meaningful discussion and consider many alternatives to solving the problem at hand.

In the second session of the afternoon we were presented examples of how to enhance engagement of the group in the problems set. This was presented by Chris Willmott of Leicester and focused on bioethics and more generally the impact of science on society. In addition to highlighting the importance of making the content relevant to your PBL students, we were given some very useful links to resources, from a simple card based systems to multimedia that can be used to define a case study, role play or current problem. Of course we strive to make all learning relevant to the present day world we inhabit, but perhaps it is necessary with PBL and other student self study methods to make even more explicit the currency and importance to society of the topics they are exploring.

In some ways this PBL workshop did not address many of the concerns I had about my own use of this learning method, such as assessment, effective group working, and organising the whole process of PBL. If as it seemed the intentions of the organisers was to more broadly consider the perceived objectives of the use PBL in science teaching, then I came away satisfied that this had been achieved, and that I had greater appreciation of what I could do with my own use of PBL.

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SCIENCE LEARNING AND TEACHING CONFERENCE

A fully searchable version of the proceedings from the inaugural conference (University of Warwick, June 05) is now available from:
http://www.bioscience.heacademy.ac.uk/events/reports/scilt2005.htm
Contributions are invited for the second conference in 2007 (Keele University, 19-20 June).
http://www.sltc.heacademy.ac.uk/Contributors.aspx

TechDis HE CONFERENCE

The first TechDis Higher Education Conference took place on October 27-28th 2005 in the Leeds Centre Novotel Hotel. More than 60 people took part, drawn from the UK higher education sector, in particular the Higher Education Academy Subject Centres and the Centres of Excellence in Teaching and Learning. Full proceedings from the conference are now available online at *http://www.techdis.ac.uk/index.php?p=4_1_1_1&id=88* including detailed coverage of all of the workshops and subsequent discussions, and both keynote addresses.

The primary focus of TechDis is to support practitioners and managers in carrying out their organisational roles, promoting the use of technology to encourage inclusivity and address disability in education. One of the main aims of the conference was to introduce the work of TechDis to key people in the higher education sector who are involved in taking forward messages about technology and disability. This is especially relevant as we move towards a better understanding of the importance of accessibility and usability in education as the basis of good practice for all.

ROLE OF STAFF DEVELOPMENT

The conference opened with a lively and thought-provoking keynote from Sally Brown, Professor of Higher Education Diversity in Learning and Teaching, Leeds Metropolitan University. Sally's session, entitled "How can we make the Higher Education Learning Experience Inclusive? The role of Staff and Educational Development" highlighted drivers for creating more inclusive learning experiences, and in particular assessments, and showed how information contained within the QAA Code of Practice can be translated into achieving actual change within academic departments. The role of staff and educational development was shown to have particular impact through four foci. We should:

- Include robust requirements for inclusive practice in institutional assessment and learning and teaching strategies;
- Consult and involve students and staff with disabilities in our programmes of activity, and build in alternative assessments at the design stage;
- Make best use of University Disability Officers and informed colleagues to build a knowledge base of the needs of disabled students, and ensure that disability committees and working parties are fully integrated into the institution's systems; and
- Lobby national agencies, Professional and Subject Bodies to keep disability issues foregrounded.

This keynote set the tone for a range of workshops encouraging some deep thinking about the role of the teaching community in making the education experience as a whole more inclusive.

WORKSHOP SESSIONS

Delegates attended a range of workshops, including:

- Benevolent Bill: an exploration of the accessibility features in Microsoft Word and Windows for all staff;
- An introduction to applying accessibility principles to 'home-grown' e-learning resources, and how simple techniques can greatly add to the learning experience of many students;
- A hands-on session showing how assistive technologies can be used to enable students to access e-learning and online materials;
- A focused look at technologies used by and to support students with dyslexia;
- An exploration of an holistic approach to web accessibility, utilising existing guidelines as a means to an end rather than an end in themselves;
- Guidance on getting started with accessible e-assessment: the potential of e-assessment to meet different accessibility needs and the potential barriers it can create; and
- In-depth discussion of how widening participation strategies impact upon institutions and the work of individual staff.

THE DISABILITY EQUALITY DUTY

The closing keynote on "The Disability Equality Duty and Higher Education" was delivered by Yvonne Dickinson, then Acting Director of the National Disability Team, and now the Higher Education Academy's Adviser on Disability. Yvonne introduced the new legislative framework and highlighted some of the issues likely to arise when institutions implement disability equality policies.

The starting point for an institution should be a review of current disability provision and strategy, an audit of current practice and procedures, seeking out existing experience within the institution and building on existing mechanisms before creating new ones. The challenge for institutions lies in achieving this 'whole institutional approach' to promoting disability equality, engaging senior management, addressing staff and student disability equality, and involving disabled people in the process as opposed to 'surveying' their views.

It is important to start implementing the principles of the legislation now, so that by December 2006 the cultural shift has started towards that whole institutional journey. Each HEI is at a different point on this journey, and the key issue for each is identifying where you are and taking steps to get to where you want to be.

TechDis would like to thank all of the presenters and delegates for making the conference such a success.

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10

EXPERIMENTAL DESIGN SKILLS

The skills of designing, conducting and critically analysing experimental investigations are essential for the successful biology student and graduate (Lederberg, 1995). However, much practical work in many bioscience degrees consists of controlled exercises and highly structured investigations (Hazel and Baillie, 1998) with little opportunity to truly 'experiment' prior to the final-year project itself. While most bioscience degree programmes do contain elements designed to develop students' experimental design and data analysis skills, few offer students the opportunity to design and criticise experiments in a low risk setting prior to the final-year project itself.

To address this perceived gap, the Zoology/Aquatic Biology degree programmes at the University of Glasgow introduced a new course designed to aid the development of the skills necessary for effective project work.

THE EXPERIMENTAL DESIGN COURSE

Third-year students (of a 4-year Honours programme) participated in a series of facilitated discussions. The sessions were supported by a recently published book on experimental design for biologists (Ruxton and Colegrave, 2003) and a specially designed series of supporting problems and mini-projects. An example of these mini-projects is shown below.

> When two people approach a doorway from different sides at the same time, one must give way and allow the other person to go through first. What factors might influence how the two individuals decide who defers to whom?
> In groups, choose one of the factors that you discussed and perform an experiment to explore its effect on deferring at doorways, either in this or a nearby building.

A detailed questionnaire was administered to students at the end of the course in the first two years of the course's existence (03/2004 and 04/2005). On completion of the course over 90% believed they would be better at designing their own experiments and were more able to critique those designed by others. Unfortunately the Experimental Design course was not assessed so the 'Insect Projects' (independent, group projects and part of the Insect Biology component of the third-year curriculum) were used to gauge the impact of the course. For the years that the Experimental Design course has run, supervisors of the 'Insect Projects' reported that:

- the majority of students engaged more successfully with the projects;
- students required less direct guidance; and
- the outcomes of the projects were more successful.

These comments were reflected in considerably higher marks for this part of assessment than in previous years.

To investigate the impact of the Experimental Design course on their levels of interest and confidence when engaging with their Insect Project, 14 students were interviewed shortly after the conclusion of their projects. It was clear from these interviews that most students believed that the Experimental Design course had had a positive influence on their ability to successfully run their Insect Project. Other factors such as course length and concurrent modules also influenced student engagement. The interviews represent an investigation into bioscience undergraduates' perceptions and conceptualisations of project work (MacKenzie and Ruxton, 2006). Briefly; features that had a positive impact on the student engagement include: having an element of choice for both project topic and group makeup; the freedom to work independently while being supported by a supervisor; and assessment by oral presentation, presenting to both peers and supervisors.

We have developed and evaluated a novel teaching resource in the form of a series of structured questions and 'real-life' mini-projects supported by interactive discussion sessions. These resources have apparently equipped third-year students to engage more successfully with small group projects. The identification of factors that influence student engagement, and thus success, in project-based learning tasks within the biosciences may have important implications for the way that project work, especially final year project work, is presented and supported in most institutions.

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FINAL-YEAR PROJECTS IN SCIENCE COMMUNICATION

Public engagement is an increasingly important issue in the biological sciences. With such rapid developments in science and technology, effective communication regarding the benefits and risks of scientific progress has never been more important. UK Research Councils, industry and charitable bodies are making substantial investment to improve the communication of science by practicing scientists. Recent developments in postgraduate and postdoctoral training have also stressed the importance of science communication activities alongside the development of research skills. Clearly, it is important that the science communication agenda also penetrates the undergraduate science curriculum; the challenge is to fit it into practically-based degree programmes with competing priorities, and a very busy timetable for students and staff.

In the Department of Biosciences at the University of Kent, we have introduced science communication activities to the undergraduate curriculum as part of the final year research project. Communication Projects were introduced in 2005 to complement our existing portfolio of final year project types. Students undertaking Communication Projects complete an extended period of in-depth research on a topical, controversial or poorly-understood area of science (examples include: the use of stem cells in medical research; the use of performance enhancing drugs in sport; and the risks of biological warfare), and then develop strategies for communicating the research to a non-scientific audience. Both of these elements are assessed: students write a dissertation for a scientific readership, and also prepare an oral presentation aimed at a non-scientific audience. The former ensures that students can achieve a depth of knowledge equivalent to those undertaking more traditional projects (e.g. those based in the laboratory), while the latter addresses the unique learning outcomes of the communication project, i.e. to communicate science effectively to a general audience.

The highpoint of the Communication Projects is the delivery of the oral presentation. The talks are delivered in local schools to students of mixed ability and age as part of National Science Week. Some of these students will be studying science at post-GCSE level, but many will not; for example, talks have been delivered to students of Philosophy and Ethics, Sport and Recreation, Information Technology in addition to those studying pre- and post-GCSE science. The presentations must cover scientific concepts in an accessible and interactive manner but assume no prior scientific knowledge. The challenge for the project students is to deliver insightful scientific facts and ideas in an interesting, accessible and inspiring way without being superficial and sacrificing depth.

The schools we have approached are invariably very keen to engage with the scheme, not least because it gives their own students the opportunity to hear about topics that are not part of a rigid National Curriculum. The school teachers are also an integral part of the assessment process; they contribute to the marking of the presentations, which gives them ownership of the scheme. As part of a broader departmental and university-wide widening participation strategy, we are increasingly targeting schools with low participation rates in both post-GCSE science and higher education in general. While we are too early in the cycle to determine whether this has had any real mutual benefits, many of the teachers in the schools have been delighted with the effect the projects have had on the attitudes of their own students towards science and university. At the very least, we hope the scheme encourages people to think about how scientific issues affect their own lives, even if they choose not to study it further.

Another particularly positive outcome has been *Student Science News*, a newsletter that features topical scientific articles aimed at the 14-18 age group. Student Science News was founded by Communication Project students in 2005 and is written, edited and published by the students themselves. A new publication team is assembled each year and they publish two issues of the newsletter annually. They receive no academic credit for this work; at a time when students regard coursework marks as currency, this is a further measure of their enthusiasm for science communication. The circulation of the *Student Science News* is currently 6,000 and the fourth issue is currently in preparation.

Ultimately, the major benefit is for the students undertaking Communication Projects. They are instilled with a sense that effective communication of their subject is part of a scientist's responsibility in society. The projects allow students to be rewarded for skills that are just as important for the future of science as the ability to undertake experimental work. The students also have the opportunity to develop and demonstrate skills that are often required by graduate employers, while the projects also allow for the fact that some students who may demonstrate less ability in the laboratory can be excellent science communicators. The imagination and talent for some of our students in this regard has been inspiring, and demonstrate that our graduates can be a huge resource in raising the profile of science nationally.

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FUNDING AVAILABLE

For the trialling of technology to support student learning. See: *http://www.bioscience.heacademy.ac.uk/issues/wp/heat.htm*

STUDENT ESSAY COMPETITION 2005 – 2006

ESSAY TITLE: HOW DOES THE EXPERIENCE OF YOUR COURSE COMPARE WITH ANY EXPECTATIONS YOU MAY HAVE HAD?

We are delighted to announce Sue Willis as the winner of the second annual Student Essay Competition. Sue, a third-year Coastal Marine Biology Student from the University of Hull, wins £250 for her essay.

The essay competition gave students an opportunity to articulate their expectations prior to entering university and compare these with the reality of their course. This article highlights some of the interesting points raised by these essays. One aspect that is immediately apparent is that prior to starting university students gather information from a wide variety of sources: open days; family members; the media; films; and friends. Worrying though, was the high incidence of 'low-level' expectation, comments such as "loneliness, isolation and an uphill struggle", "entire days in the lab bent over Petri dishes" "[intention to study] biochemistry apparently signalled an open invitation for a straight jacket" suggest that many of these sources are not providing a positive image of bioscience and bioscientists, or university life in general.

'Lecturer attributes' were raised by the students, and as with last year's entries (Willmott, 2005), 'approachability' and 'enthusiasm' were key motivational factors. On arriving at university students expected lecturers to be distant and were pleasantly surprised at the approachability of teaching staff and the time they were willing to spend responding to queries outside of timetabled teaching. Equally many did not expect lecturers to be so enthusiastic about their subject yet found this enthusiasm infectious. Advocates of linking teaching and research will be pleased to hear that this too got a mention. For example, Sian McCarthy writes "...when lecturers lead you to the limit of what is currently understood and invite you to go beyond, when you participate in genuine research. This approaching the edge of knowledge in one's field is something I had not expected but is one of the most exciting things of studying physiology at university".

Readers who have fought hard to retain practical classes and fieldwork will be heartened to learn that despite initial reservations – "how could you expect to fill three hours with lab work?" asked one – these activities were universally valued. Sue Willis wrote of a field trip "...it was an incredible learning experience as all our practical work has been.". Practical work too was valued with one comment; "I am not just doing it, I am APPLYING it".

The variety of skills needed and gained in a bioscience degree was a common theme. It will come as little surprise to those who teach in these areas that the requirement for competency in chemistry and maths is an unexpected aspect of a bioscience degree for many entrants and that students are often unsure of their abilities in these areas. "I am a biology student who finds chemistry a strain, and I am not alone" is a response which summarizes the attitude of many students. However, others do recognise the need for maths, chemistry and statistics within bioscience degrees – "Maths and Chemistry are essential" wrote Sian McCarthy.

Transferable skills (particularly presentation, time-management and group-working skills) were frequently discussed. Students noted the benefits of skills they had gained (but not necessarily explicitly taught) during their degree. These were seen as an unexpected benefit and something they would be able to take with them into employment (in addition to their subject-specific knowledge and skills).

An expectation expressed by many students was the solitary nature of study and learning at university, as James Chen said "Having always assumed university was about 'self' progression I had tended to believe it was done *alone*". Many were pleasantly surprised by the support offered by peers and staff. The opportunity to discuss during tutorials, and again the approachability of staff and the willingness of those who taught them to go over theories and concepts out of teaching time, dispelled the idea that their degree was a solitary experience. This was not just confined to teaching and learning experiences, students were enthused by being able to spend time with like-minded people from their course and were amazed at the diversity of people that they met.

Engagement was an important theme noted in last year's essays (Willmott, 2005), with memorable and innovative methods of teaching singled out for praise. This year's essays were no exception, students described their lecturers using songs, getting students up on stage to act like strands of replicating DNA, interactive VLE work and audience response systems. All of these were unexpected, all of them were interactive, all of them were memorable and all of them aided student learning. Others liked the interactivity of tutorials and the opportunity to discuss ideas, these were, according to Sepideh Bazazi, "totally unscripted and always thought-provoking".

Few of these observations, of course, will come as a great surprise to any lecturer who takes their craft seriously. However, it is interesting to note the commonality with last year's entries and the frequency with which similar points are made.

The winning, runner-up and short-listed essays are available to download from the Centre for Bioscience website *http://www.bioscience.heacademy.ac.uk/publications/essay06.htm*

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