The key to success
Alan Cann

My Lords, Ladies and Gentlemen,
Welcome to the Educational Heavyweight Championship of Great Britain!

In the red corner:

David 'Bomber' Blunkett, Secretary of State for Education & Employment and his henchmen, The Campaign for Learning (www.campaign-for-learning.org.uk)

In the blue corner:

Chris 'I could have been a contender' Woodhead, former OFSTED Chief Inspector of Schools

CARTOON BY SALLY NOBLE

'Everybody gets so much information all day long that they lose their common sense.' *Gertrude Stein*

A vigorous debate has been raging in the UK recently between the exponents of key skills ('learnacy' – the ability of students to manage their own learning) and the exponents of 'knowledge' – the old 3 'R's. After simmering for some time, debate boiled over after an article in the *Daily Telegraph* on 1 March 2001 which launched Chris Woodhead's media career with an attack on '*a misguided emphasis on utilitarian skills*'.

What might these 'skills' be? There is no universally accepted definition, but a typical set of 'key' or 'transferable' skills designed to promote career achievement would be something like:

- Communication
- Application of number
- Information technology
- Working with others
- Improving learning performance ('learnacy')

Does that sound awfully like common sense? How do you teach that?

How did we get into this mess?

The reasons are buried deep in educational theory. The work of behaviourists such as Pavlov and Skinner gave rise to a school of thought that learning is a modification of behaviour patterns which can be induced by conditioning. 'Operant conditioning' occurs when reinforcing consequences immediately following a particular response increases its future likelihood and aversive consequences immediately following the response decreases its future likelihood. No, we are not talking electric shocks here! Assessment outcomes are a powerful motivating force for most students. The difficulty with these ideas is that the reinforcement is often far divorced from the behaviour which elicited it – how long does it take you to mark your exam papers?

These difficulties gave rise to the alternative cognitive theories of learning – the preferred ways in which individuals process information. Kolb's 'experiential learning' model and Schon's 'reflective-practice' approach stress the importance of individual involvement in learning and subsequent critical reflection to build knowledge and understanding. From these, and simply from looking at the students we teach, we get the concept of 'deep' and 'superficial' learners. These alternative approaches are not inherently good or bad, they are merely alternative strategies students adopt.

So what works best?

Warning! Controversial statement follows:

'Microbiology as a discipline is almost devoid of theory.'

Once students have grasped the concept of asepsis and the universality of micro-organisms, all the rest is simply cramming facts. OK, so I'm exaggerating. Slightly. But compared with maths, physics and even chemistry, we are a knowledge-based subject. Yet few of us would maintain that we do not need to equip our graduates and postgraduates with the necessary skills to succeed in the job market – how many of them will need to know the difference between a *Proteus* and a pseudomonad after they graduate? So many bugs, so little time… The only

solution I have been able to come up with is to try to integrate key skills into subject-specific materials.

Communication. Written, verbal and electronic communication skills are all vital to professional success. Writing an essay on bacterial endospores is fine if you are heading for a career writing papers for *Spores* or whatever the latest obscure research journal is, less useful if you are destined to become a teacher or a sales rep. Conducting interviews with scientists is popular in the United States, as my groaning email inbox testifies (no, please, don't…). One of the exercises I use is to try to tie academic content to current media concerns gathered from the *Microbiology Newsroom* (http://www-micro.msb.le.ac.uk/tutorials/news/micronews.html).

Application of number. OK, so our students are maths-phobic – that's why they're microbiologists rather than biochemists! To overcome this, we must teach them microbiology, not maths. Forget the theory and how all the equations are derived (yes, I know it's difficult, but you've got to let go – you can always supply this information to the high achievers if you feel you must). Start with '*How many bugs make three?*' if necessary and move on to the probability theory behind calculating multiplicity of infection.

Information technology. Integration is the key. Communicate with them by email, bulletin boards and discussion groups as well as face to face. Insist on word processed essays containing graphics and that practical data is returned as a spreadsheet. Don't teach them IT – teach them microbiology, using IT.

Working with others. Truly collaborative practical and data collection/analysis exercises where students do not just work in cozy pairs but must first organize appropriate group structures and responsibilities, and then rely on group data for a successful outcome.

Improving learning performance ('learnacy'). I suggest that teaching for 6 or 7 months followed by a 3 hour exam is not the best way to promote optimum learning skills for the majority of students. Neither is a degree where continuous assessment is the sole measure of achievement. Goals, targets and deadlines must be set, possibly by negotiation, monitored, met and rewarded appropriately.

So what should we tell Messrs Blunkett and Woodhead or our Head of Department when they ask us what we are doing about key skills?

- That we have always taught key skills, we just didn't know we were doing it.
- That our students registered for a degree in microbiology/biology, not 'key skills', but we recognize that they want a job at the end of it.
- That usable skills come from experience, and that knowledge and experience cannot be separated.

'*It is a very sad thing that nowadays there is so little useless information.*' *Oscar Wilde*

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Microbiology education and the SGM

The SGM Education Group

What does it provide and how does this fit in with the work of the SGM HQ staff and Education Officer?

The Group, which is run by a committee led by convener Peter Wyn-Jones, organizes a series of symposia and evening workshops which address issues relevant to undergraduate, postgraduate and professional training in microbiology. Liz Sockett, the Education Officer, is the Council representative on the committee and an ordinary member of the Group to ensure continuity between HQ activities and Group activities.

Membership of the Education Group is drawn from academics in higher education and from industrial microbiologists who have public education/schools liaison duties. New members are required annually for the Group Committee so please contact the convener if you are interested in being nominated (peter.wyn-jones@sunderland.ac.uk).

Recent Education Group symposia have highlighted issues of relevance to microbiology higher education, e.g. *Bioscience benchmarking*, *Mathematics in microbiology*, *Innovative teaching methods*, *Teaching microbiology to non-specialists* and *Computer-assisted learning*.

The future programme includes:

- Autumn 2001, University of East Anglia Symposium on *Research supervision: how to get it right*
- Spring 2002, University of Warwick Symposium on *Careers in microbiology*, to include an evening workshop
- Autumn 2002, University of Loughborough Symposium on *Patents and intellectual property rights*