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Teaching Awards

- a. dressing the criteria
- b. airing your beliefs

By Peter O'Donoghue

Peter O'Donoghue was joint winner with Lynne Hunt, of the Prime Minister's award for University Teaching in December 2002. In the last issue of HERDSA News Lynne wrote about her approach to teaching.

Peter now contributes his personal look at teaching, which fits very nicely with the reflections of the five HERDSA fellows on addressing criteria about teaching, which appear in this issue.

When I was nominated for an Australian University Teaching Award in 2002, I was asked to prepare a submission addressing ten selection criteria. Thus began a highly introspective and reflective journey into what, for me, constituted best teaching and learning (T&L) practice. Obviously, my circumstances are quite personal and not necessarily applicable to others due to the unique nature of each T&L encounter. I would like to share my experiences with colleagues by exploring the selection criteria. All too often, we do something intuitively which works well but it can be difficult to analyse and document, particularly in educational jargon. Nonetheless, such analyses are prerequisite to self-discovery through reflection and feedback, to validation of T&L objectives and outcomes, and also to sharing best practices.

I began academic life as a trainee teacher over 30 years ago but followed the allure of a research career for 20 years. I worked as a postdoctoral fellow in Germany and then as a scientist in a government laboratory in Adelaide. I joined The University of Queensland in 1994 and rediscovered my lust and penchant for teaching. Despite my enthusiasm, I realized there was much to learn to become more effective and realize better student outcomes. I used my scientific training to pursue knowledge, skills and experience in education through teaching grants, postgraduate projects, Faculty service and interaction with students and colleagues.

Essentially, I am a scientist employed to teach and research infectious diseases. My background allows me to provide vocational context within my teaching programs by invoking relevant case studies and topical examples. Microbiology has become fundamental to many science programs due to the deconstruction of conventional disciplines through the biotechnology revolution. More than ever before, students are required to understand biochemical and genetic processes which underpin life sciences, biomedical research and industrial applications. I consider it essential that students learn about the microbes themselves to understand how they interact with their hosts and cause disease as well as to appreciate the logic behind diagnosis, treatment and control.

Within universities, there has been a gradual transition towards problem-based learning, so integrative rather than platform curriculum models must be implemented. My roles in this transformation have essentially been those of 'planner' and 'presenter'. I believe teaching must be planned to meet each particular learning circumstance and content must be presented in context. Successive cohorts of students appreciated my T&L efforts and circumstances led to my selection for a university teaching award culminating in my nomination for a national award.

The selection committee required nominees to provide documentation addressing ten criteria. My approach was to identify 'forests' then 'trees', that is, to provide a position statement and then give relevant exemplars highlighting scope, quality and impact.

Criterion 1. Interest and enthusiasm for teaching and promoting student learning

For every task, it is important to define outcomes as well as addressing approaches. I began by defining the scope and variety of my teaching and then outlined strategies to involve students as active learners. I am a utilitarian teacher, providing foundational and vocational education at all university levels. My workload includes over 250 hours of contact with some 1,500 students in 13 courses in four Faculties (medicine, dentistry, science and veterinary science). Classes range in size from 250-300 first year students, 100-160 second year students, 30-80 third year students, 10 graduate medical students and individual postgraduate students.

Each student group has different requirements so I tailor my teaching to facilitate appropriate learning outcomes. I use multiple modes of delivery: including lectures, seminars, readings, videos, tutorials, practicals, peer-assisted study sessions, problem-based and self-directed learning experiences. Lectures are integrated with practicals to link theoretical knowledge with practical skills. Problem-based learning is used to stimulate social interaction, activate knowledge, challenge concepts, construct meaning and encourage reflection. I make educational processes transparent so students become engaged and understand course imperatives.

Students learn best when they develop a rapport with course material. I am fortunate because microbes help sell themselves. They come from a hidden world and students appreciate their unique intrinsic beauty. I reinforce this by using many props, including slides, photos, charts, videos, museum specimens, models and live material. Students have a morbid fascination for infectious diseases, especially those characterized by disfiguring lesions. Students appreciate honest and professional portrayals of disease states and we work together to overcome negative attitudes. Students diagnose infections during practicals to provide vocational context, introduce clinical reasoning and demonstrate links to other fields of biology. Students become most excited when they work in clinical context and make decisions affecting outcome.

Despite careful planning, courses can be destroyed by poor presentation. Students are quick to judge academics on the basis of their performance. Dissatisfaction detracts from desirable learning outcomes so teachers must enthuse and motivate students. With the information technology (IT) available today, students are surrounded by slick presentations of all things commercial. How can we think they expect anything less in the classroom? I model effusive, earnest, inquisitive behaviour directed towards course objectives. Classes are exciting and fun to attend. Enthusiasm is infectious and stimulates students to become involved but it must be genuine and sincere. A little charisma goes a long way!

Criterion 2. Ability to arouse curiosity, stimulate independent learning and develop critical thought

I challenge students to challenge science. Current knowledge is the compilation of theories, many of which have yet to be tested for reproducibility. We teach students hypothetico-deductive logic which underpins scientific methodology but often do so superficially or implicitly. I endeavour to be explicit and constantly stress that knowledge is not cast in concrete but rather prevailing theory based on observation and experimentation. I humanize science by using historical anecdotes of how theories were developed and how we often learnt from disasters. Challenge students to be critical but to go beyond negative criticism and develop alternative explanations. They must add to scientific knowledge, not detract from it.

Students vary greatly in their independence depending on their stage of learning and confidence. I use small-group exercises (such as puzzles, games, quizzes, brain-teasers) to foster communication, challenge ideas, stimulate curiosity and build confidence. Some groups quickly develop camaraderie whereas others require considerable schooling to become active participants. Groups must activate prior knowledge, reassess it in the light of additional information and then formulate relevant learning objectives. These objectives form the basis for independent study and engender ownership. There is no ideal route or time to independence so teachers must be versatile and allow each group their own path and pace.

Postgraduate students are generally well motivated but rather undisciplined with regard to work habits, especially desk work. Most are unused to the rigid structure underpinning scientific methodology and often attempt to take short-cuts or develop procrastination activities in lieu of writing. These problems are overcome by building their confidence and communication skills. I negotiate schedules with individual students and adopt a de-constructionist approach to work; breaking down large jobs into smaller 'do-able' components with specified time-lines. It is important to provide constructive feedback on draft material as quickly as possible and to arrange group sessions with students to discuss their work and develop peer networks.

Criterion 3. Ability to organise course material and to present it cogently and imaginatively

The golden rule for course organization is 'be prepared!'. Appropriate resources must be developed in timely fashion and careful thought must be given to their scope, sequence and schedule to provide substance, structure and effect. Teachers have a holistic overview of the curriculum and know how their material relates to other sections. I meet with each teaching team to review performance, resolve problems, schedule tasks and develop best practice. I ensure course material is contemporary, relevant and aligned with course objectives. I ensure that all teaching activities are integrated and not separate entities with different agendas. I give at least triple exposure to information but from different perspectives, e.g. concepts given in lectures discussed in small group tutorials and applied in laboratory practicals. I use discrete weekly themes within courses to structure material, demonstrate logic and provide focus.

I employ theatric devices (comedic and dramatic) to engage and involve students and have a repertoire of rehearsed and choreographed anecdotes. I write my own course guides, as most biology textbooks dismiss parasites in less than one chapter while most parasitology texts have far too much detail. The guides are not substitutes for lectures and the material is presented differently. They are greatly appreciated by students and we use them for preview and review. I archive all course material on an intranet site where students may download material at their convenience.

Laboratory practical sessions focus on developing diagnostic capabilities in students. The practicals are task oriented where students can obtain and practice descriptive skills (qualitative data), analytical skills (quantitative data) and interpretive skills (hypothetico-deductive logic or clinical reasoning). I use live material in practicals and make extensive use of videomicroscopy to show organisms to students (a picture can be worth a thousand words). I try to include other senses as appropriate and get students to touch specimens feeling for lesions, smell fomites for aromas and even taste impacted waters. Learning is experiential!

Universities offer many other resources to students but they need guidance in utilizing them. I devise tasks which involve performing CD-ROM database searches, viewing multi-media products, visiting websites, finding research papers, obtaining pamphlets, attending research seminars, visiting laboratories and other departments. I take final year students off-campus to visit diagnostic laboratories, hospitals and government utilities to give them vocational exposure.

Criterion 4. Command of subject matter, including incorporation of recent developments

Science is constantly changing as new information and technologies emerge. Teachers must keep pace with recent developments to demonstrate they are serious contemporary scientists. In my discipline (parasitology), I practice as a diagnostician. I identify parasites associated with clinical disease and study their morphology, transmission, pathogenicity, treatment and control. I remain contemporary by mentoring a postgraduate school working on emergent diseases and applied problems. My research complements my teaching by providing vocational context, technical skills, problem-based and self-directed learning experiences. I do not consciously distinguish between teaching and research activities because I believe they form a logical continuum, where current effort is based on prior knowledge.

Students must be taught 'cutting-edge' science to be contemporary and relevant. I collaborate with many individuals and organizations throughout the world and ensure my students obtain local, national and international perspectives. While Australia is fortunate in that many tropical diseases do not occur here, I teach human and animal health to a broader Australasian community where serious diseases are endemic. Their importance is best highlighted to students when I demonstrate personal knowledge and show evidence of recent research.

Parasitology continues to evolve as distribution patterns change due to travel and globalisation, organisms become resistant to drugs, new species emerge as serious pathogens and control programmes become compromised. Studies have moved from organismal to cellular to molecular biology and exciting advances are being made in diagnosis, genetics, drug and vaccine development. Students have unprecedented access to current information via electronic and print media and we must conscientiously keep pace with recent developments to remain credible. Each semester, I produce relevant resource packages using multimedia software and desktop printing to give the required level of coverage in lecture guides, practical books, videos, checklists and bibliographies. I consult with industry and government and have been widely interviewed by the media on topical public health issues. I use these interviews in courses to personalize my science and show its relevance to society. Students get immense satisfaction and gratification when they work on problems depicted in the evening news or current affairs programs.

Criterion 5. Innovation in design and delivery of content and course materials

We live in an information rich society with sophisticated technological aids for communication and data access. Nonetheless, we must provide structure to all this substance. I am a keen advocate of constructive alignment models which link curriculum objectives with teaching and learning activities and assessment criteria. Students are not well versed in educational paradigms so it is important they realize teaching is not an *ad hoc* whimsical process but rather an orchestrated series of interactions designed to facilitate learning. I translate educational jargon to students and explain teaching and learning models so they understand and appreciate course structures, learning objectives, resource issues, assessment criteria and grading systems. Engagement empowers students, facilitates self-determination, engenders ownership, generates enthusiasm and stimulates communication.

The information technology and biotechnology revolutions have created greater complexities in science than ever before, but they have also provided valuable tools to assist in science teaching and learning. Sophisticated multimedia products are becoming available but many have simply repackaged conventional material without addressing formative intellectual processes and desirable learning outcomes. At present, I advocate a cautious approach to the internet as it is largely a 'medium for mediocrity', being swamped by sites with unedited superficial material. Students must become discerning and apply stringent filters when accessing information. As an alternative, I provide intranet sites for each course where relevant information is readily accessible. I have developed interactive random-access taxonomic keys, image-banks, data-bases, mini-quizzes and career guides to provide diagnostic tools, complement course material and facilitate revision.

Criterion 6. Participation in effective and sympathetic guidance and advising of students

Students often have idealistic notions about higher education and employment. They require honest impartial advice about programs and courses, careers in science and university life in general. As a middle manager within the University, I am involved in student advising at three levels: for providing courses and careers advice at Faculty level; student counselling at School level; and pastoral care at Departmental level.

I advise prospective students at Expositions and Open Days and give public addresses promoting Science. I interview enrolling students and help them select courses, a process becoming more complex as increasing numbers now seek double majors or dual degrees to improve employment opportunities. I counsel undergraduate students and interpret School rules relevant to examinations, withdrawal, remarking and misconduct. I have a high level of contact with students experiencing difficulties and pride myself that we have always negotiated acceptable solutions.

Supervision of postgraduate research students is a particularly rewarding experience. I vest intellectual property to my students and lead them to accept ownership and responsibility. We meet regularly to discuss progress, negotiate milestones, provide feedback and contemplate direction. I consider it imperative that they do not work in isolation but participate in collaborative ventures and group discussions to obtain a better perspective for their work. This promotes better project management, resource utilization, multi-skilling, interdisciplinary networking and personal development. I lead postgraduate students to accept responsibility for their actions as professional scientists and sponsor their attendance at national conferences as part of their apprenticeship and social induction.

Criterion 7. Provision of appropriate assessment, including worthwhile feedback

Educationalists recognize that assessment, to a large extent, drives student learning. It is imperative that assessment tasks are well defined, relevant and practiced. I make extensive use of formative assessment to foster generic graduate attributes such as critical thinking, problem solving, communication skills and IT competency. I criterion-reference higher cognitive level performances in summative assessment and, where appropriate, align criteria with professional standards in consultation with industry and vocational authorities. I assess for understanding within Bloom's educational domains (cognitive, affective, psychomotor) using a 'SACK' alignment model (Skills, Attitudes, Concepts, Knowledge). In particular, I use 'relational' assessment tasks involving 'compare/contrast' questions so students develop interdisciplinary perspectives.

Students require timely and constructive feedback in order to progress or remediate learning. I give students the opportunity to discuss material in small non-threatening PASS (Peer-Assisted Student Study) groups to clarify conceptions, share knowledge and participate. I provide feedback on all assessment tasks including final examinations. All too often, students are given a cumulative mark or grade without knowing what they got right or wrong. I annotate all exam scripts with constructive comments and make them available for scrutiny.

Criterion 8. Ability to assist students from equity groups to participate and achieve success

As student adviser, course coordinator and administrator, I interact with some 1,500 students annually. They comprise different genders, ages, races, religions and originate from diverse local, national and international communities. I endeavour to afford them equitable treatment in keeping with a personal and corporate code of conduct. While embracing student equity, I am nonetheless cognizant and appreciative of their diversity as ignorance can cause just as much offence as intolerance or bigotry.

The age spectrum of students in science is broad, comprising recent school-leavers and mature-age students. I assist students experiencing difficulties acclimating to university life by establishing peer support networks and by mentoring individual students. Students rapidly overcome their problems when they realize they are not alone and can share experiences. I pay particular attention to student demographics when forming groups so they are as cosmopolitan as practicable. I pro-actively address gender and sexuality issues, because parasites are not equally distributed between sexes due to differing physiological states, reproductive cycles, sexual and social behaviours. I ensure such discussions are not personalized or trivialized but are conducted sensibly and professionally.

I have found a major limitation to effective learning to be student language proficiency. I teach many students from non-English speaking backgrounds, including just as many Australians (ethnic minorities, recent immigrants, Aboriginal and Torres Strait Islanders) as international students. I identify students in need of help and offer them additional resources in the form of writing classes, IT courses and journal clubs to promote interaction and understanding. I believe we must foster greater human interaction within universities to counteract the solitary and impersonal consequences of the IT revolution.

Criterion 9. Professional and systematic approach to teaching development

By training, scientists are methodical creatures so it is paradoxical to me that they do not apply the same logic to science teaching. Lecturers are generally recruited on the basis of their research performance and while most possess good communication skills, they usually do not have any formal training as teachers. Scientists tend to focus on course content and teaching issues more than on effective student learning. I recognized this paradox in myself so I actively sought training through teaching grants, training courses, curriculum development and student interaction.

When developing courses, I conduct components analyses with staff and students to define content, outcomes analyses with employers and graduates to identify desirable student attributes, and procedural analyses with colleagues to identify best practice. I then bring it all together in constructive alignment models linking curriculum objectives with instructional activities and assessment tasks. Similar alignment models have been used in curriculum development for physical, biological and earth sciences, including the FAST model (Foundational Approaches in Science Teaching). The resultant courses are very successful in practice. Participating teachers and students appreciate their holistic nature and transparent structure. Course evaluation highlighted strong student ownership, contemporary content, targeted assessment, relational thinking and vocational guidance.

Teachers must participate in course development and review to remain relevant and topical. I regularly convene stakeholder meetings to contemplate direction, focus, resources, staffing, assessment, evaluation and student liaison. I obtain student feedback through questionnaires, interviews and focus groups. I receive many suggestions regarding class organization, problems with specimens and the relevance of assignments. Students alert me to new resources (esp. websites and multimedia software) and we evaluate them together.

It is important for teachers to communicate and share experiences. I participate in teacher training through our academic induction and tutor training programs and presenting workshops on problem-based learning. Colleagues genuinely appreciate these courses as we introduce them to new methods, change their orientation from teaching to learning and show them they are not alone.

10. Participation in professional activities and research related to teaching

I provide senior service to Department, School, Faculty, University, profession and community. Many activities relate directly to teaching and learning by facilitating resources, infrastructure, interdisciplinary liaison, industrial relations and public awareness. I strive to model corporate and community citizenship and serve on various committees, hold office with professional societies and act as spokesperson for health, industry and community awareness programs.

All universities have staff development programs and we should access these resources to promote T&L. I have been involved in several action learning projects examining the formative intellectual processes involved in the creation and manipulation of biological data sets for secondary, tertiary and postgraduate students. I attend local and national Teaching and Learning Conferences and speak on issues involved in studying biosciences. I act as examiner for internal and external postgraduate theses and serve on two committees for international exchange programs. I provide vocational training for practitioners, researchers, diagnosticians and technicians and assist industry comply with national standards.

I am fiercely loyal to my discipline and seek to promote government and community awareness of emerging parasitic diseases. I have made representation to government through an Occasional Paper to Ministers to improve education in health sciences and contributed to the recent State of the Environment Report. I promote parasitology through media coverage (consultant for two television programs) and community education (public exhibitions). I believe scientists must develop interdisciplinary awareness and see their science as part of the larger community.

Concluding remarks

Academics are appraised on the basis of their teaching, research and service portfolios which attempt to provide holistic coverage. It is often difficult to differentiate between these activities and it was hard to address ten T&L criteria with considerable overlap. My responses summarized my current situation with some historical background but with a heavy emphasis on personal motivations. In essence, addressing (or dressing) the criteria was much a case of 'show-and-tell' by baring (or airing) personal beliefs. Institutionally, I help provide quality programs in science whereas personally, I share with students my fascination for a remarkable group of micro-organisms affecting human and animal health. My core business is that of sharing information and I am constantly learning new and exciting ways to do so!