Interpreting the science

Although the chances of predicting a preventable fracture by bone densitometry may be small, it is also important that two thirds of patients can be reassured that fracture is less likely and therefore long term treatment is not needed. That there is overuse, overdiagnosis, and overtreatment for osteoporosis is due not to bone densitometry or to epidemiological reports but to various factors, including pressure of some competing pharmaceutical companies and the uncritical medical society relying more on technical instrumentation than on clinical skills and reasoning. As Wilkin and Devendra assert above, effectiveness is critical in daily clinical practice.—Jan Dequeker, Frank P Luyten

Competing interests: None declared.

1 Dequeker J. Osteoporotic fractures, ageing, and the bone density T-score. *Clin Rheumatol* 2000;19:171-3.
2 Huopio J, Kröger H, Honkanen R, Saarikoski S, Alhava E. Risk factors for perimenopausal fractures: a prospective study. *Osteoporos Int* 2000;11:219-27.
3 O'Neill TW, Marsden D, Silman AJ. Differences in the characteristics of responders and non-responders in a prevalence survey of vertebral osteoporosis. European Vertebral Osteoporosis Study Group. *Osteoporos Int* 1995;5:327-34.
4 Genant HK, Cooper C, Poor G, Reid I, Ehrlich G, Kanis J, Nordin BE, et al. Interim report and recommendations of the World Health Organization task-force for osteoporosis. *Osteoporos Int* 1999;10:259-64.
5 Jones G, Nguyen T, Sambrook PN, Eisman JA. Thiazide diuretics and fractures: can meta-analysis help? *J Bone Miner Res* 1995;10:106-11.
6 Dawson-Hughes B, Harris SS, Krall EA, Dallal GE. Effect of calcium and vitamin D supplementation on bone density in men and women 65 years of age or older. *N Engl J Med* 1997;337:670-6.
7 Chapuy MC, Arlot ME, Delmas PD, Meunier PJ. Effect of calcium and cholecalciferol treatment for three years on hip fractures in elderly women. *BMJ* 1994;308:1081-2.
8 Faulkner KG. Bone matters: are density increases necessary to reduce fracture risk? *J Bone Miner Res* 2000;15:183-7.
9 Hildebrand T, Laib A, Müller R, Dequeker J, Rüegsegger P. Direct three-dimensional morphometry analysis of human cancellous bone: microstructural data from spine, femur, iliac crest, and calcaneus. *J Bone Miner Res* 1999;14:1167-74.
10 Aerssens J, Van Audekercke R, Talalaj M, Geusens P, Bramm E, Dequeker J. Effect of 1α-vitamin D₃ and estrogen therapy on cortical bone mechanical properties in the ovariectomized rat model. *Endocrinol* 1996;137:1358-64.
11 Mashiba T, Hirano T, Turner CH, Forwood MR, Johnston CC, Burr DB. Suppressed bone turnover by bisphosphonates increases microdamage accumulation and reduces some biomechanical properties in dog rib. *J Bone Miner Res* 2000;15:613-20.
12 Aerssens J, Boonen S, Lowet G, Dequeker J. Interspecies differences in bone composition, density and quality. Potential implications for in vivo bone research. *Endocrinol* 1998;139:663-70.
13 Dequeker J, Nijs J, Verstraeten A, Geusens P, Gevers G. Genetic determinants of bone mineral content at the spine and radius: a twin study. *Bone* 1987;8:207-9.
14 De Laet CE, van Hout BA, Burger H, Hofman A, Pols HA. Bone density and risk of hip fracture in men and women: cross sectional analysis. *BMJ* 1997;315:221-5.
15 Cummings SR, Black DM, Thompson DE, Applegate WB, Barrett-Connor E, Musliner TA, et al. Effect of alendronate on risk of fracture in women with low bone density but without vertebral fractures. *JAMA* 1998;280:2077-82.

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Complexity science
Coping with complexity: educating for capability

Sarah W Fraser, Trisha Greenhalgh

Recent high profile scandals in the United Kingdom have highlighted the changing values by which the National Health Service is judged.[1] The public expects, and the government has promised to deliver, a health service that is ever safer, constantly up to date, and focused on patients' changing needs. Successful health services in the 21st century must aim not merely for change, improvement, and response, but for changeability, improvability, and responsiveness.

Educators are therefore challenged to enable not just competence, but also capability (box). Capability ensures that the delivery of health care keeps up with its ever changing context. Education providers must offer an environment and process that enables individuals to develop sustainable abilities appropriate for a continuously evolving organisation. Recent announcements in the United Kingdom of a "university for the NHS,"[2] a "national leadership programme,"[3] and "workforce confederations"[4] raise the question of what kind of education and training will help the NHS to deliver its goals

> **Capability is more than competence**
>
> **Competence**—what individuals know or are able to do in terms of knowledge, skills, attitude
> **Capability**—extent to which individuals can adapt to change, generate new knowledge, and continue to improve their performance

> **Summary points**
>
> Traditional education and training largely focuses on enhancing competence (knowledge, skills, and attitudes)
>
> In today's complex world, we must educate not merely for competence, but for capability (the ability to adapt to change, generate new knowledge, and continuously improve performance)
>
> Capability is enhanced through feedback on performance, the challenge of unfamiliar contexts, and the use of non-linear methods such as story telling and small group, problem based learning
>
> Education for capability must focus on process (supporting learners to construct their own learning goals, receive feedback, reflect, and consolidate) and avoid goals with rigid and prescriptive content

The principles of complexity theory introduced earlier in this series (box) are explicitly or implicitly espoused in a series of NHS documents covering continuing professional development and lifelong learning[5]; learning networks[6]; quality improvement and organisa-

tional learning[7]; evidence based practice[8]; information and knowledge management[9]; and interprofessional working.[10] This article highlights specific areas where complexity theory can inform the development of new educational approaches.

Developing capability: transformational learning

Individuals and systems change because they learn.[11] Indeed, pedagogical research has shown that adults choose to learn because they want to change.[12] The process of developing new behaviours in the context of real life experiences enables individuals to adapt to or co-evolve with new situations, thereby supporting the transition from individual competence to personal capability.[13]

Learning takes place in the zone of complexity[16] (figure), where relationships between items of knowledge are not predictable or linear, but neither are they frankly chaotic. Learning which builds capability takes place when individuals engage with an uncertain and unfamiliar context in a meaningful way. Those of us who recall trying to prepare for house jobs by reading the textbook beforehand will know that capability cannot be taught or passively assimilated: it is reached through a transformation process in which existing competencies are adapted and tuned to new circumstances. Capability enables one to work effectively in unfamiliar contexts.

For example, suppose a doctor is doing a locum in a contraceptive clinic and the patient is a sex worker who speaks little English and is suspected of being HIV positive. The task has changed from the typical "textbook" pill check requiring merely competence (familiar task in a familiar environment) to a complex

Competence and capability in complex adaptive systems (based on Stacey[14] and Stephenson[15])

consultation testing the doctor's capability (somewhat unfamiliar task in a somewhat unfamiliar environment). The doctor best able to cope with this is one whose training provided continual opportunities to be stretched by the uniqueness of each context, where knowledge had to be applied in ways the textbook did not anticipate, and where "expertise" was seen as the ability to access knowledge and make connections across seemingly disparate fields and life experiences.

In complex adaptive systems the behaviour of the individual agents, and therefore of the system of which they are part, evolves in response to local feedback about the impact of actions. Similarly, the basis of transformational learning is the information that is fed back to learners about the impact of their own actions and those of others. An education process that provides feedback about performance as it takes place will enhance capability. One such initiative based on feedback is the Norwegian continuing medical education system, where doctors in a peer group state learning needs, discuss ways forward, take action, and then report back on the feedback from the action.

Reflective learners are receptive to feedback and able to adapt appropriately, while poor learners are either unreceptive to feedback or they adapt inappropriately.[17 18] Reflective learners transform as the world around them changes: poor learners simply complain about it.

Relational learning

Not so long ago, knowledge was hard to come by and experts were people with a lot of it. These days, there is so much knowledge available that we risk drowning in it.[19] The official exhortation to "feel good about not knowing everything"[20] resonates well with complexity theory's acknowledgement of the uncertain and unknowable and with the need to be alert to emerging information from different sources. The modern expert is someone who knows how to access knowledge efficiently and judiciously and who can form conceptual links between seemingly unrelated areas. The successful diabetologist, for example, is not necessarily the individual who is au fait with the latest research on insulin kinetics but one who is able to draw appropriately on the wider literature of pharmacology, nephrology, ophthalmology, cardiovascular epidemiology, psychology, anthropology, economics, and informatics.

Learning how things are interconnected is often more useful than learning about the pieces. Traditional curriculums, based on a discrete and simplistic taxonomy of disciplines that focus on the acquisition of facts, usually highlight content without helping learners understand the interrelationships of the parts. Without this understanding of the interactions and relations between the pieces it is difficult to apply the learning in a unique context.

Non-linear learning

"Checklist driven" approaches to clinical care, such as critical appraisal, clinical guidelines, care pathways, and so on, are important and undoubtedly save lives. But what often goes unnoticed is that such approaches are useful only once the problem has been understood. For the practitioner to be able to make sense of problems in
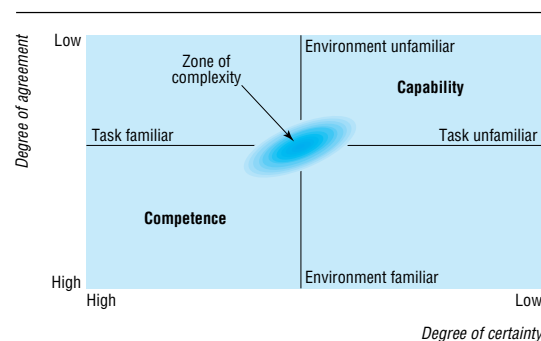
the first place requires intuition and imagination—both attributes in which humans, reassuringly, still have the edge over the computer.[21] Education that makes use of the insights from complex systems helps to build on these distinctly human capabilities.

The complex real world is made up of messy, fuzzy, unique, and context embedded problems. Context and social interaction are critical components of adult learning.[22] Adults need to know why they need to learn something and they learn best when the topic is of immediate value and relevance.[23] This is particularly true in changing contexts where capability involves the individual's ability to solve problems—to appraise the situation as a whole, prioritise issues, and then integrate and make sense of many different sources of data to arrive at a solution. Problem solving in a complex environment therefore involves cognitive processes similar to creative behaviour.[24] These observations are directly opposed to current approaches in continuing education for health professionals, where the predominant focus is on planned, formal events, with tightly defined, content oriented learning objectives.

For example, a typical course on asthma management for nurses might include a series of talks from experts on drugs, devices, monitoring, emergency care, and audit. Participants might be told that "on completion of this course, we expect that you will be able to advise a patient on the benefits and limitations of different inhaler devices," and so on. This approach, while providing helpful information on content for the prospective delegate, ignores the fact that learners actively build, rather than passively consume, knowledge, and that learning simply does not progress via neat "building blocks" of factual content or skills training.

In reality a nurse who attended this asthma course might find that she didn't really understand the lecture on the use of steroids until a colleague explained some key points to her in the coffee queue, using examples drawn from her own patients. A more imaginative programme might have included a problem solving workshop on the broad theme of medication, with case studies brought by participants to stimulate group discussion, prioritise learning needs, and expose particular ambiguities ("what exactly don't you understand about this topic?") before any specific content is introduced. Inclusion in the timetable of a structured reflection period towards the end of the workshop (for example, addressing the question "what have we learnt?") enables the key learning points to be consolidated. A challenge for the proposed initiatives in the NHS will be to deliver vocational and learning oriented programmes without taking on the rigid features of more traditional "academic" curriculums.

We believe that the imaginative dimension of professional capability is best developed through non-linear methods—those in which learners embrace a situation in all its holistic complexity. The most straightforward example of a non-linear method is the story.[25] Doctors and nurses have long used story telling in professional training, and there is some evidence that clinical knowledge is stored in memory as stories ("illness scripts") rather than as discrete facts.[26] There has, however, been remarkably little formal research into how stories might be used more effectively in professional education and service development. More work needs to be done on the formal use of story tell-

ing in particularly complex situations where a holistic view is essential—such as significant event audit,[27] exploring the extremes of illness experience (such as that of the profoundly disabled or traumatised patient[28]), and the management of patients from other cultures.[29] The story can be told (as in a conventional case presentation), in the first person (as in a patient's own illness narrative[30]), or enacted (as in role play[31]).

Another well known non-linear method is small group, problem based learning, in which a case history forms the basis of an exploratory dialogue facilitated by the tutor, and an emerging action plan is worked out by a group of participants.[32] The group is encouraged to share ideas, divide up any necessary research work, and reconvene after a few days to add emerging data to what is already known. Problem based learning is no panacea: while it is valued and enjoyed by students and improves their ability to solve problems, perhaps unsurprisingly it does not improve their content knowledge as assessed in written examinations,[33] and it is debatable whether problem solving skills developed through artificial classroom situations will reliably transfer to behaviour in the real world. Clearly, the situation is not an "either or" choice but rather a dynamic balance, characteristic of a complex adaptive system, in which both content learning and non-linear learning methods are needed.

Process techniques

Complexity thinking maintains that an emergent behaviour, such as capability building, can be aided by some minimal structure (for example, minimum specifications and feedback loops). As education moves away from the potentially over structured "table d'hôte" menu of the predefined, content oriented syllabus designed for the mass market to the more "à la carte" menu designed for the complex, individual, self directed learner, attention needs to be focused on the process of learning.

The use of process techniques is the crucial distinction between learning which has a flexible and evolving content and learning which is simply disorganised and
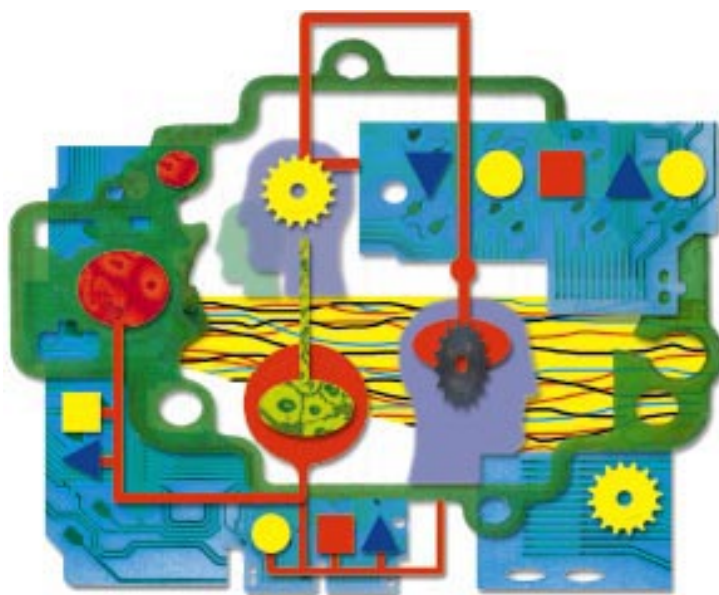
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Process-oriented learning methods[29]

Informal and unplanned learning

Experiential learning—shadowing, apprenticeship, rotational attachments

"Networking" opportunities—during formal conferences and workshops, through open plan poster exhibitions, or extended coffee and lunch breaks, for example

Learning activities—in structured course materials, such as reflection exercises, suggestions for group discussion

"Buzz groups" during intervals in lectures—the lecturer invites participants to turn to a neighbour and undertake a short task before the lecture resumes

Facilitated email list servers for professional interest groups

Teachback opportunities—newly skilled workers training others in new techniques and sharing their understanding

Feedback—responses that provide the learner with information on the real or projected outcome of their actions

Self directed learning

Mentoring—named individuals provide support and guidance to self directed learners

Peer supported learning groups—the small group process is used for mutual support and problem solving

Personal learning log—a structured form for identifying and meeting new learning needs as they arise

Appraisal—a regular, structured review of past progress and future goals

Flexible course planning that explicitly incorporates input from learners at key stages—using a 'Post-it' note exercise to add new learning objectives or amend a draft programme, for example

Modular courses with a high degree of variety and choice

Non-linear learning

Case based discussions—grand rounds, clinical case presentations, significant event audit

Simulations—opportunities to practise unfamiliar tasks in unfamiliar contexts by modelling complex situations

Role play

Small group, problem based learning (see text for definition)

Teambuilding exercises—activities focused on the group's emergent performance rather than that of the individual

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is unstructured, disjointed, and driven only by convenience or coincidence. When process techniques are used, learning is driven by needs and is characterised by a dynamic and emergent personal learning plan with explicit goals, protected time for reflection and study, mentoring or peer support, and perhaps a written learning log or record of achievement.[34] Process oriented techniques such as those listed (box) provide boundaries for the learning and the opportunity for prompt and relevant feedback from tutors or peers. Tutors adopt the role of facilitator, rather than lecturer or trainer.

As noted above, a small group can be a powerful educational structure for solving complex problems and promoting capability. In a small group the combination of individuals can achieve more than the sum of the parts (non-linear effects in a complex system), as social interaction between members stimulates learning, raises individuals' confidence, and increases motivation.[31] The group can also be a powerful source of both positive and negative feedback on an individual's actions. Discovering ways in which personal behaviour impacts on the system, focusing on and assessing relationships, and finding ways to harness skills of individuals and teams to increase the amount of feedback, and thus learning.

But being part of a poorly functioning small group can be an unproductive, intimidating, and even traumatic experience. The biggest mistake made by facilitators of such groups is to assume that because the task is intended to be emergent and learner focused, there is no need for attention to process. In reality, a group will feel sufficiently secure to take risks and be creative only if clear boundaries and ground rules have been set. In particular, minimum specifications for a small group might cover such items as the nature and scope of the task, the rules of confidentiality, the time limit, any differentiation of roles (who will chair, keep notes, and so on), and the group's responsibility to its external stakeholders—the budget for a project or the details of what needs to be handed in at the end of the session, for example.[31]

Attention to process is the distinguishing characteristic of productive, non-linear learning. Future educational efforts, such as the university for the NHS or the leadership centre, almost certainly need fewer content experts and more tutors, mentors, and facilitators. The development of expertise in the learning process is itself a complex learning experience, and preliminary guidance has recently been published for both individual mentoring[35] and group based learning.[31]

The future of learning in healthcare systems

The word "university" conjures up images of lecture theatres, files of notes, and examinations designed to test retained skills and knowledge. As the table shows, and the stirring rhetoric of recent policy documents acknowledges, the new university for the NHS will need to break from the bonds of this image and adopt learning processes that are coherent with the complex adaptive experience of health care. The "learning outcomes" in the new curriculum should focus on capabilities, not competencies.

1 Smith R. All changed, changed utterly. British medicine will be transformed by the Bristol case. *BMJ* 1998;316:1917-8.
2 Thomson A, Sanders C. Labour pledges NHS university. *Times Higher Educ Suppl* 2001 May 18:1. www.thes.co.uk/ (accessed 16 Aug 2001).
3 Department of Health. *The NHS plan.* London: DoH, 2001.
4 Department of Health. *A service of all the talents: developing the NHS workforce.* London: Department of Health, 2001.
5 Department of Health. *Continuing professional development: quality in the new NHS.* London: Department of Health, 1999.
6 Department of Health. *Welcome to the NHS learning network: spreading good practice.* London: NHS Executive, 1999.
7 Secretary of State for Health. *A first class service: quality in the new NHS.* London: Stationery Office, 1998.
8 Department of Health. *Promoting clinical effectiveness: a framework for action in and through the NHS.* Leeds: NHS Management Executive, 1996.
9 Secretary of State for Health. *Working together with health information.* London: Stationery Office, 1999.
10 Department of Health. *"In the patient's interests": multiprofessional working across organisational boundaries.* Leeds: NHS Management Executive, 1996.
11 Senge P. *The fifth discipline: the art and practice of the learning organization.* New York: Doubleday/Currency, 1990.
12 Greenhalgh T. Intuition and evidence—uneasy bedfellows? *Br J Gen Pract* (in press).
13 Hite J. *Learning in chaos.* Houston, TX: Gulf Publishing Company, 1999.
14 Stacey RD. *Strategic management and organizational dynamics.* London: Pitman Publishing, 1996.
15 Stephenson J. Capability and quality in higher education. In: Stephenson J, Yorke M, eds. *Capability and quality in higher education* London: Kogan-Page, 1995.
16 Plsek P, Greenhalgh T. The challenge of complexity in health care. *BMJ* 2001;323:625-8.
17 Hull C. *Principles of behavior.* New York: Appleton-Century-Crofts, 1943.
18 Thorndike E. *The fundamentals of learning.* New York: Teachers College Press, 1932.

Increasing complexity in higher education[36] [37]

	Traditional education and training	The future for education and training
Knowledge	Knowledge is static, finite, linear, and private	Knowledge is dynamic, open ended, multidimensional, and public
Learning	Instructivist model ("facts" are transmitted from teachers to students)	Constructivist model (concepts are acquired, built and modified through social discourse, incorporated into appropriate schemes, and tested in action)
The university	Machine bureaucracy whose greatest resource is its stock of high-status knowledge	Adapting, dynamic and evolving organism whose greatest resource is its staff and the networks they maintain within and beyond its boundaries
The teacher	"Sage on the stage"	"Guide on the side"
Student population	Homogeneous (young, intellectually elite, full time)	Heterogeneous and shifting (wide range of ages, social and educational backgrounds, abilities, aims and expectations)
Student experience	Generally precedes definitive career choices and personal relationships	Lifelong learning means that education converges with (and is influenced by) work, family, and personal development
Assessment	Based on reproduction of facts	Based on analysis, synthesis, and problem solving
Course timetable	Teacher-centred, "Fordist" model lacking choice and flexibility	Learner centred model in which students mix and match options from different courses, departments, and even universities
Curriculum development	Historical model (students learn X because it's always been included)	"Outcomes" model (students learn X because employers require it as a competence)
Time and space utilisation	Synchronous, mass, single location learning (eg, lecture theatre, laboratory)	Asynchronous, individualised, with networked learning support
Quality assurance	Paperwork exercise that is resented by staff	Ongoing process of personal, professional, and organisational learning that is owned and driven by staff
Evaluation	Teacher focused ("what is being provided?")	Learner focused ("what are the learners' needs and are they being met?")
Relation between research and teaching	Discrete and hierarchical separation; addressed by different individuals, teams, and funding streams	Integrated model in which a major research question in any discipline is the nature of knowledge and how it can be effectively and efficiently acquired and utilised.
University funding	Mainly from block grants to institutions from a few official sources	Increasing reliance on diffuse and decentralised sources—including support for individual students, industrial sponsorship for bespoke courses, and partnerships with local businesses and services

19 Wyatt JC. Reading journals and monitoring the published work. *J R Soc Med* 2000;93:423-7.
20 Slawson DC, Shaughnessy AF, Bennet JH. Becoming a medical information master: feeling good about not knowing everything. *J Fam Pract* 1994;38:505-13.
21 Dreyfus HL, Dreyfus SE. *Mind over machine: the power of human intuition and expertise in the era of the computer.* Oxford: Blackwell, 1986.
22 Lave J, Wenger E. *Situated learning: legitimate peripheral participation.* Cambridge: Cambridge University Press, 1990.
23 Knowles M. *The adult learner: a neglected species.* 3rd ed. Houston, Texas: Gulf Publishing, 1984.
24 Langley P, Simon H, Bradshaw, G, Zytkow J. *Scientific discovery: computational explorations of the creative processes.* Cambridge, MA: MIT Press, 1987.
25 Greenhalgh T, Hurwitz B. Narrative based medicine: why study narrative? *BMJ* 1999;318:48-50.
26 Cox K. Stories as case knowledge; case knowledge as stories. *Med Educ* 2001;35:862-6.
27 Pringle M, Bradley CP, Carmichael CM, Wallis H, Moore A. *Significant event auditing: a study of the feasibility and potential of case-based auditing in primary care.* London: RCGP, 1995. (Occasional paper 70)
28 Crossley ML, Crossley N. "Patient' voices, social movements and the habitus; how psychiatric survivors "speak out." *Soc Sci Med* 2001;52:1477-89.
29 Skultans V. Anthropology and narrative. In: Greenhalgh T, Hurwitz B, eds. *Narrative based medicine: dialogue and discourse in clinical practice.* London: BMJ Publishing, 1998.
30 Herxheimer A, McPherson A, Miller R, Shepperd S, Yaphe J, Ziebland S. Database of patients' experiences (DIPEx): a multi-media approach to sharing experiences and information. *Lancet* 2000;355:1540-3.
31 Elwyn G, Greenhalgh T, Macfarlane F. *Groups: a hands-on guide to small group work in health care, education, management and research.* Oxford: Radcliffe Medical Press, 2000.
32 Bligh J. Problem-based, small group learning. *BMJ* 1995;311:342-3.
33 Vernon DTA, Blake RL. Does problem-based learning work? A meta-analysis of evaluative research. *Acad Med* 1993;68:550-63.
34 Challis M. Personal learning plans. *Med Teach* 2000;22:225-36.
35 English National Board for Nursing, Midwifery and Health Visiting. *Preparation of mentors and teachers—a new framework of guidance.* London: Department of Health, 2001. http://tap.ccta.gov.uk/doh/point.nsf/publications (accessed 24/8/01).
36 Daniel JS. The knowledge media. In *Mega-universities and knowledge media. Technology strategies for higher education.* London: Kogan Page, 1996: 101-35.
37 Rowley DJ, Lujan HD, Dolence MG. *Strategic choices for the academy: how demand for lifelong learning will re-create higher education.* San Francisco: Jossey Bass, 1998.

A memorable patient
Compliments

During my specialist registrar rotation in obstetrics and gynaecology last year, I was posted to a busy district general hospital in Northern Ireland. One on call session was particularly busy. From Friday morning I attended more than 10 deliveries and performed four caesarean sections. By the early hours of Saturday morning, I was exhausted and praying that there would be no more operative deliveries before my replacement arrived. Unfortunately, a patient arrived at 6 am who needed almost immediate caesarean section. I hurriedly gulped a cup of tea while the spinal anaesthesia took effect and braced myself for another section.

The patient and her husband were told about the need for the operation and the risks involved before the procedure started. The husband was present in the operating room, sitting beside his wife and reassuring her. At the same time he was watching the operative procedure enthusiastically, though I did not notice his keen observation until he started talking to me.

Over the next half hour, he complimented me on my operative skills, starting with my preparation of the patient to the aesthetic wound closure using subcuticular stitches. He praised my speed of opening the abdomen, technique of delivering the baby, detailed knowledge of the anatomy, meticulous haemostasis,

handling of instruments, tying of knots, and cosmetically beautiful closure. He was most impressed by my gentle tissue handling. Although tired, I was delighted with his explicit and generous compliments. His comments not only boosted my morale but also seemed to enhance my prestige among the other theatre staff, who were also listening to him.

With his knowledge of abdominal organs, I was sure that he belonged to the medical profession but could not tell what branch of surgery he was in. In my experience, surgeons are rarely so appreciative of other surgeons' technical skills, and I was pleasantly surprised by his kind gesture. At that moment, genuine appreciation by the patient and her relatives was possibly the biggest reward for an overworked and tired junior doctor like myself.

After completing the procedure, I had returned to the doctors' rest room when the husband walked in to thank me for a final time. I thanked him in return but could not resist asking him whether he was a doctor and which specialty he practised. Slightly embarrassed, he replied, "Oh no. I'm a butcher."

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