#### Research paper

# "Too busy to think, too tired to learn" - the attrition of the apprenticeship model of surgical training in the United Kingdom

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# Contextualisation

Junior doctors who wish to become surgeons undertake postgraduate specialist training over a minimum eight-year period - typically between 25 and 33 years of age. This requires specified periods of employment within a range of surgical training posts within the National Health Service (NHS), and completion of a continuous process of in-training assessment plus two formal knowledge-based examinations.

The process is problematic in that standards and curriculum are implicit, or at best minimally defined, and service needs take precedence over training. Moreover the literature of medical education is focused at the undergraduate level, with very little enquiry into the nature of professional working knowledge and clinical judgement. This has been highlighted in the findings of the Bristol Inquiry into the management of care of children receiving complex heart surgery at the Bristol Royal Infirmary between 1984 and 1995, which identified the need for a significant broadening of the notion of professional competence. This concern is accompanied by a new definition of experiential learning, in terms of a powerful discourse about "learning from failure".

These issues - some of which are recognisable across the public sector - have become critical at a time when the medical profession's claims to self regulation are increasingly being questioned, particularly by new government agencies such as the Medical Education Standards Board and the Committee for Health Improvement. The challenge to medical educators, and the agenda for research in the foreseeable future, can be summarised in three questions:

• What is surgical competence?

- How best can it be developed?
- How can it be monitored and assessed, to the benefit of the patient and the practitioner?

**Abstract:** This article examines the notion of apprenticeship as experienced by trainee surgeons within the modern NHS, and attempts to demonstrate some unintended consequences of managerial target setting upon the training process. It argues that this situation is made more critical by the lack of explicit standards and curriculum by which trainees may assess their progress, and also that the potential grafting of behaviourist competence-based training models onto older notions of apprenticeship will be inadequate to meet the need for an holistic account of the development of professional practice.

Alternative theoretical perspectives are examined, in particular social accounts of shared and collaborative expertise such as Lave and Wenger's "community of practice" and Vygotsky's thinking on the "zone of proximal development" with its emphasis on a highly active pedagogic role for both mentor and peers. A parallel is also suggested with Leder's work on therapeutic discourse, in the sense that both patient and trainee actively construct shared interpretative modes with the doctor-mentor. These accounts challenge the traditional model of medical education which assumes a linear hierarchy of learning, effectively ignoring the cyclic nature of surgical development, and the mutual learning needs of "new comers" and "old-timers".

In order to initiate the modelling of surgical development, it is suggested that:

- a dynamic and non-linear view of progress is required;
- the link between formal structured training and opportunistic learning "on the job" is crucial;
- assessment strategies are needed that promote, rather than hinder, the learning that derives from reflective practice.

# Introduction: Apprenticeship in the modern NHS

Surgery is a craft-based profession in which learning has typically taken the form of apprenticeship, reinterpreted for modern times as "hospital-based clerkship" (Federated Council for Internal Medicine, 1997, p.179). This model of apprenticeship assumes a lengthy induction, during which learning takes place through observing and doing while simultaneously providing a service, under the supervision of experienced practitioners. However, current pressures to meet waiting list "targets" set by NHS management are eroding the time available for teaching and learning. This is exacerbated by the fact that, to date, both clinical standards and curriculum have been implicit, embedded in practice. Trainees now encounter three significant obstacles:

- explicit standards and curriculum, against which trainees may assess their progress, do not as yet exist;
- even the implicit (and accordingly problematic) standards and curriculum of traditional apprenticeship are now less accessible, because of time constraints;
- traditional methods of supervision have not been replaced or reinterpreted and there are accordingly less opportunities for reflection and feedback.

Target pressures, therefore, are likely to have unintended consequences, in that they are undermining practitioners' initial professional development, which in turn will impact upon service - not only in terms of throughput, but also of quality of patient care.

It is relevant that of the thirteen priority issues that the General Medical Council (GMC) identified as arising out of the cases of those children who died while receiving complex heart surgery at the Bristol Royal Infirmary between 1984 and 1995 (Smith, 1998, p.1917) the first concerned "the need for more clearly understood clinical standards" and the second "how competence and technical expertise are assessed and evaluated". Essentially the medical profession is now in the position of having simultaneously, and for the first time, to define clinical standards explicitly, and to articulate a curriculum that addresses those standards. At the same time the profession is faced with increasing centralisation of control - via government agencies - of activities that to date have been considered to lie within the remit of self regulation. New agencies such as the Medical Education and Standards Board, the Commission for Health Improvement, and the National Clinical Assessment Authority look set to pursue a range of regulatory activities utilising their own resources, with only limited involvement from the profession.

These government initiatives focus on a version of accountability that has more to do with outcomes and audit than with developmental processes. So, for instance, in the wake of the Bristol Inquiry "experiential" has begun to acquire a new definition as "learning from failure" (cf Department of Health, 1999, p.10), but while the aspiration is to an open no-blame culture - where doctors are allowed to acknowledge and deal with error - this does not yet sit easily with either the medical or managerial establishments, both of which are typified by aggressive and competitive cultures (Davies, 1995, p. 27).

The implications for surgical trainees are considerable:

- The assumption of responsibilities for which they are not adequately prepared either in terms of supervision or experience, coupled with their indiscriminate usage as "available pairs of hands" to meet a wide range of non-surgical service demands, leads to exhaustion and alienation. In the words of a trainee at a recent surgical meeting "I'm too busy to think and too tired to learn". In the absence of sufficient time to reflect, the lessons of experience;
- Will take longer to learn, where they are learnt at all (cf Elliott, 1991, p. 66);
- Likewise, where there is no community focusing on learning and promoting the development of all its members and where, therefore, standards and an associated curriculum do not become embodied in the group's reflection on practice trainees will crucially lack feedback on their performance, and indeed any notion of what might constitute progress. The competitive "can-do" culture with a high incidence of bullying renders the trainee particularly vulnerable, and militates against effective learning; this is frequently compounded by isolation, and engenders in the trainee a reluctance to ask for help;
- Such an *ad hoc* induction into initial professional development is likely to inform trainees' views of continuing professional development, and provides a poor model for life long learning (cf Eraut, 1994, pp. 11-12).

In brief, the model of apprenticeship with which we now work is in urgent need of review. The curriculum issues discussed in this article need to be seen in the

wider context of the cultural and institutional changes that are now impacting upon this agenda.

# The key issue: surgical competence

While apprenticeship is most visible in the development of technical expertise, it also comprises a very powerful form of social induction into the ways of professional practice. This is the realm of values and ethics as they impinge upon relationships with patients, other clinicians, and the wider society - and as such is now at the forefront of the accountability debate, although treated until recently as part of a broad and largely undefined professional code in which "practice was largely self-determined" (Liam Donaldson, 1999, p. 24). In the traditional model of surgical education this professional and technical development is underpinned by the notion of "license to practise", which is accessed on the basis of a professional examination which is almost exclusively knowledge-based. On this model competence is assumed to develop during apprenticeship, and a link between competence and qualification is assumed, but unproven.

Ownership of this curriculum-embedded-in-practice has to date been solely in the hands of the profession - specifically, with the senior consultants - with no external constraints in terms of content, pedagogy or assessment. This position is now being challenged by a new competence discourse which is being introduced by government as a vehicle for its modernisation initiative. This is an agenda focused on cultural change, and provides a compelling illustration of the "transfer [of] control of services and resources from professionals to managers operating within a neo-liberal, market oriented ideology" (Jones and Moore, 1995, p. 86).

Competing definitions of competence range across a wide spectrum, in which "the broadest distinction is between a behaviourist model that focuses upon empirically defined performance standards and a structuralist one that sees competence as an underlying, generative capacity" (ibid., p.79). So, for example, there are now an increasing number of attempts to adopt a functionalist task-based approach to analysing the surgical role, as exemplified, for instance, by llott and Allen (1996). This is very similar to the National Vocational Qualifications (NVQ) and initial teacher training (ITT) models based on the dominant concept of competence based training (CBT). It is markedly different from the more holistic generic competence approach, based on

personal attributes, that is adopted by the General Medical Council in, for example, *Good Medical Practice* (1998).

The potential grafting of a CBT model onto older notions of apprenticeship holds out to trainees the worst of all possible compromises. In terms of standards and curriculum it implies a significant shift from the marked lack of clarity about purposes and methods of the traditional model, to the atomistic and prescriptive CBT approach which "silence[s] the cultural basis of skills, tasks, practices and areas of work and give[s)] rise to a jejune concept of trainability" (Bernstein, 1996, p. 67).

In particular, both models have little to say about the processes of teaching and learning - in apprenticeship because of a "principled inarticulacy about process" (Robson, 1993, p. 371) and in the case of CBT because of the narrow focus upon externally monitored outcomes. Neither model accommodates readily the notion of professional conversation, for instance about the critical incidents that embody learning, or the standards that emerge from the complexities of practice. Nor do they take account of the metacognitive processes - "the thinking about thinking which informs decisions about what to do next" (Eraut, 1994, p. 146) - that enable the practitioner to develop, to innovate, to adapt to change, and to extend the professional knowledge base.

On the assumption that "an explicit curriculum is the blueprint for educational reform" (Federated Council for Internal Medicine, 1997, p.12), what is now needed is a theoretical modelling of a trainee's progress that addresses the complexities in the development of surgical competence, and provides useful ways of thinking about key questions such as:

- How the acquisition of competence may best be characterised in terms of standards and criteria?
- How it may best be developed in terms of appropriate educational experiences?
- How it may best be assessed both to assist in the trainee's development, and to ensure high standards of patient care?

# Some theoretical perspectives on the current situation

At this point it may be helpful to focus down on some current assumptions and purposes that underpin the notion of surgical training - not all of which sit easily with each other. In the first place, the power structures that operate within any particular apprenticeship may be expected to have a significant impact on the nature of the learning that takes place. Over the full period of training (which is in the region of 10 years) a surgeon is likely to work with up to sixty consultant teachers, with a consequent exposure to a range of very different styles and practices. At least some of that experience is likely to have been highly positive, and trainees typically describe a process of imitation in terms of "picking and mixing" the best of what they observe *en route*, in order to develop their own personal technique and repertoire.

However, the downside is illustrated by Lave and Wenger's warning that "the exchange of labour for opportunities to become part of a community of mature practice can be fraught with difficulties" (1991, p.76) - and specifically they cite (albeit as a worse case scenario) exploitation of an easily available source of labour, denial of "legitimate participation" in the activities of mature practice, and the ascendancy of other motives over the provision of learning opportunities. In such situations, where "implicit pedagogy ... contributes to ... social reproduction, by enabling the possessors of the prerequisite cultural capital to monopolise that capital" (Bourdieu and Passeron, 1977, p. 47) - trainees are likely to acquiesce by trading their skills and labour for the "cultural capital" that will guarantee their career progress. In the longer term they may well reproduce the ethos that they have experienced - incidentally illustrating the claim by Lave et al. (1991, p. 41) that "what gets learned is problematic with respect to what is taught".

In striking contrast with the highly active process of "learning by doing" within the world of apprenticeship, trainees are simultaneously undergoing "didactic exposure" (Bruner, 1996, p. 54) to a critically overloaded and ever-increasing knowledge base. This can be characterised, after Bernstein, as "strongly classified" in terms of the distinct boundaries between domains and "strongly framed" in terms of limited teacher and trainee control over content. Eraut's critique (1994) is apposite, focusing as it does on the problematic nature of the link between propositional and working knowledge, and its use in developing an individual's understanding of practice. This implies the need for:

- identifying and articulating the components of the "clinical working [as opposed to prepositional ] knowledge central to performance in practice" (Cox, 1992, p. 836) so as to reveal the curriculum-in-use;
- reducing the load of propositional knowledge, only introducing it when "there are many opportunities to [use] it in practice-related processes (Eraut, 1994, p. 21);
- providing opportunities for activities which "repeatedly demand the use of such knowledge within a range of professional contexts" (Newble and Entwistle, 1986, p.174);
- recognising the transformative potential of reflection coupled with authentic action which, as in Freire's notion of praxis, "constantly and mutually illuminate each other" (1976, p.149).

For the present, the knowledge-based qualifying examination comprises "objective testing" in the form of multiple choice questions - the archetype of "Westist, Testist, and Bestist" (Gardner, 1993, p.12). As Bruner comments, on this didactic model "knowledge put into the mind is taken as cumulative, with later knowledge building upon priorly existing knowledge" (1996, p. 56). Thus the continuing professional development of the consultant is seen as a (quite separate) process of "topping up" and "adding on", to a static, central core and (in spite of lip service to the "continuum of medical education") a sharp divide is maintained between initial and continuing professional development.

This model does little justice to the daily experience of doctors themselves for whom knowledge - in both its theoretical and working forms - is inevitably problematic and provisional, inhabiting "the indeterminate, swampy zones of practice" (Schon, 1987, p. 3). In particular there is an assumption, reminiscent of Piaget, that development is linear and incremental - with little recognition of how the doctor's environment, both social and technological, may drive more opportunistic learning.

Superimposed on this traditional model of "apprenticeship plus specialist knowledge" is the discourse of modern medical education. To date this has almost exclusively been concerned with debates around the feasibility of

extending the "objective structured clinical examination" (OSCE) from undergraduate into postgraduate usage, although now this is beginning to broaden into a discussion about the assessment of surgical competence in its entirety. The behaviourist underpinnings of both agendas are manifest in the terminology of cognitive, affective and psychomotor domains (cf Bloom's *Taxonomy*, 1965) and in the "Skinnerean" (Moore, 2000, p. 5) conception of the role of teacher, as the provider of educational resources and learning packages.

There is a school of thought, however, that suggests these approaches are inappropriate for clinical tasks which require eclectic, responsive, context-specific skills controlled by clinical judgement: "Variability of the clinical task has been seen by OSCE examiners as a vexing problem to be solved by standardisation. But variability is the name of the clinical game, whether it be the patient, the illness or the context" (Cox, 1990, p. 543). At the heart of this conflict lies the enduring problem of designing a system that can simultaneously promote the development of the practitioner, while also acting as a quality assurance mechanism. Tensions - and ambiguities - between the formative and summative uses of assessment have some unintended (and often deleterious) consequences for trainees' learning "in terms of the activities they engage in and the intentions they bring to bear on their study" (Jolly, Wakeford and Newble, 1994, p. 235). Essentially, new demands on a markedly traditional and hierarchical profession are giving rise to "mismatches between educational purpose and learning theory" (Moore, 2000, p. 36).

The impasse calls for some quite different theoretical approaches, to open up new possibilities and solutions. Bruner, in particular, draws attention to the "situated" nature of cognition, and the ways in which intelligence is "distributed" in the rich network of colleagues and resources that support the individual (1996, p.132). This also suggests a critical enquiry agenda, in so far as there are issues around how such socially owned expertise - "the potential curriculum" - is embedded in a "community of practice", and how this affects not only the development of the individual learner, but also the reproduction and transformation of the learning community as a whole (Lave et al., 1991, p. 55).

The problems within the current situation are the service pressures that are threatening that community, the limited access of the trainees ("newcomers") to the consultants ("old timers"), and the hierarchical barriers to shared learning. On this latter point, Meyer notes that "democratic practice is not always a feature

of health care settings" (2000, p. 62), and comments on how this may compromise the "collegial" nature of learning and research - a situation which is exacerbated by the sharp divide drawn between initial and continuing professional development. Therefore, the ability of consultants and trainees to generate collaboratively new ways of thinking about practice and training will be critical. Already there are the beginnings of an account of surgical competence as a collaborative venture - "highly specialised knowledge and ability shared with colleagues" (Senate of Surgery, 1997, p. 2) - which in turn raises fundamental questions about the nature of expertise, what can be shared and replicated, what is unique to the individual practitioner, and how new practice is to be developed.

These are problematic issues that are highly "context specific" and resistant to notions of CBT categorisation. Lave et al. go so far as to suggest that:

Becoming a 'member such as those' is an embodied telos too complex to be discussed in the narrower language of goals, tasks and knowledge acquisition. There may be no language with which to discuss it at all - but identities of mastery ... are there to be assumed (in both senses). (1991, p 85)

That is unlikely to suffice as an account for the wider society at the present time, and it could also be open to the charge that - in so far as such activity is intuitive and non-explicit - it will be resistant to any sort of critical review by practitioners themselves. However, the particular emphasis on learning as an integral and inseparable aspect of social practice, in all its complexity, is highly relevant to the "lived experience" of the clinical team. As such it provides a valuable frame of reference within which to develop and test emerging curriculum strategies.

In this context, another model of social learning offered by Vygostsky ("all the higher functions originate as actual relations between human individuals" - 1978, p. 57) may be particularly relevant. Vygotsky's thinking on the "zone of proximal development" (ZPD), with its emphasis on a highly active pedagogic role for both the mentor and other more experienced peers, is already beginning to influence current thinking about on-the-job training. So, making the case for a structured approach to training, Hargreaves, Bowditch and Griffin explain that: "Learning how to coach means learning how … to provide scaffolding for the

skills and knowledge that are, without help, just outside the apprentice's reach, but with help, within it" (1997, p. 4).

More recently Dunphy (2000, p.186) has distinguished four stages within the ZPD process - the first being to "transit from other-regulation to self-regulation", the second where "performance is assisted by itself ... adults assist themselves in all ways possible", the third where performance is "automotised and distant from the social and mental forces of change" and the fourth where "de-automisation of performance" spirals back to the first stage, as a function of lifelong learning. The interesting point about this analysis is the cyclic view of development that is implied, suggesting the reinterpretation and realignment of working knowledge and skills throughout the surgical career.

Culturally, too, this is an approach that is suited to the surgical profession on a number of grounds, not least because it conceives of human beings as vigorous agents, actively realising and changing themselves and their environment. For a field of practice which primarily engages with the world in terms of visual-spatial relationships and speech, a theory which examines how the analytical qualities of speech are called upon to organise the visual-spatial field (and how this links to pattern reconstruction in the memory, and even to intentions and moral judgements) has the potential to yield useful insights.

# The implications for practice

Three key issues that emerge from a review of the educational theory have particular implications for curriculum development:

#### Therapeutic discourses: healing and learning

The supremacy of both the patient and apprenticeship relationships are key values for the medical profession, enshrined in the Hippocratic oath. Nevertheless, doctors are now regularly accused of arrogance and the inability to communicate, and the image of the "failing doctor" is projected by the media on more or less a daily basis. Back in the 1980 Reith lectures lan Kennedy was already suggesting that society must "unravel the rhetoric of modern medicine" (p. 600). In particular he argued that while the Hippocratic tradition was founded on concern for the whole person within the environment, the modern conception

of the doctor purely as scientist and problem solver is profoundly reductionist, and ignores the essentially interpretative - and therefore social and cultural - nature of the process of clinical judgement. And Greenhalgh comments (1998, p.250) that "Those who have studied the phenomenon of clinical disagreement ... know all too well that clinical judgements are usually a far cry from the objective analysis of a set of eminently measurable "facts"

In similar vein, Bruner (1996, p.149) contrasts "the enormous amount of pedagogical effort ...[we devote]... to teaching the methods of science and rational thought" with the fact that "we live most of our lives in a world constructed according to the rules and devices of narrative". Leder, in an analysis of the hermeneutics of medicine, argues that the consequences of this technicist mind-set impacts directly upon the key relationship...

Physicians have searched for an ideal of perfect presence - the immediate gaze, the unambiguous number... Yet in its attempt to expunge interpretative subjectivity, modern medicine threatens to expunge the subject. (1990, pp. 21-22).

whereas:

Careful listening and explanation are ... crucial ingredients of the clinical encounter. Thereby doctor and patient construct shared interpretative modes." (ibid., p. 17).

Leder concludes by asking how the ill person, both as text and as cointerpreter, can be restored to centrality in the clinical encounter. A similar question might be asked about the surgical trainee within apprenticeship. "The enemy of reflection is the break neck pace" (Bruner, p.129) - hence the dilemma for trainees who are "too busy to think and too tired to learn". Technical skill and propositional knowledge may be acquired (and lost) quickly, but judgement, and the development of an ethical consciousness in regard of the patient and the wider society, are slow growth attributes which are still poorly conceptualised within apprenticeship. Doctors do, however, already have their own narrative traditions - including the notion of "the case". A critical analysis of the discourse around these aspects of medical practice could provide the basis of a professional conversation between "newcomers" and "oldtimers" about substantive learning issues, and an opportunity to reflect on the critical incidents that embody learning.

#### The learning community

A trainee-centred approach presupposes a supportive and nurturing learning culture. To this end, a group of learners, at various stages in their careers, might set out to investigate collaboratively their various understandings about the characteristics of good practice and, in the light of their findings, to reflect on the development needs of each individual within the group. The acknowledgement that large areas of clinical working knowledge are problematic, but crucial, and that they have largely still to be articulated, could be seen as a starting point for a discussion about the learning that takes place at all points throughout the career. The fact that even "junior" trainees are already practising doctors might be used to generate an approach in which the whole team worked together to discover the meaning of their clinical experience, and to uncover the theories underlying the curriculum-in-use.

This approach, in which consultants and trainees view themselves simultaneously as apprentices and also agents of change who are continually evolving their practice, presupposes a reflexivity such that "agent, activity and the world mutually constitute each other" (Laveet al., 1991, p. 33). It is also essentially democratic in its assumption that the learning of the "newcomer" and the "old-timer" are highly interdependent. It therefore challenges the *status quo* and is in sharp contrast to the traditional model of medical education which - conceived more in terms of building blocks than the "spiral curriculum" - implies a logical, progressive hierarchy of learning, effectively ignoring the cyclic nature of surgical development, and the mutual learning needs of the community.

Involvement in the search for consensus about the nature of professional competence - especially the notion of sharing specialised knowledge and ability with colleagues as a collectively held account of competence - might also offer trainees a powerful induction into the nature and purposes of standard setting, and the implications for patient care. It has the potential, for instance, to promote new ways of talking about "personally-experienced difficulties and systemic failings" (Moore, 2000, p.138). This, in turn, might generate a new concept of accountability that in the words of Michael Power in his investigation of audit culture (1994, p.43) is "both loosened and tightened"- by placing more emphasis on local, facilitative forms of rigorous face to face accountability, and less on long distance, quantitative regulation.

#### Starting from where the trainee is

Vygotsky's ZPD model assumes an active programme of stimuli/planned learning experiences under the guidance of a mentor and/or in collaboration with more capable peers. This is a useful model of social learning for the multiprofessional team with various levels of experience. Moreover, in that it entails a diagnosis by the mentor of "those functions that will mature tomorrow but are currently in an embryonic state" (Vygostky, 1978, p.86), it focuses upon the particular needs and abilities of the individual, rather than adopting a standardised approach. This is critical within surgery where it is important to anticipate how each trainee's differing profile of experience and particular abilities will develop in relation to the individual's intended future repertoire - this being both a developmental and a safety issue. The notion sits well too with the idea of "multiple intelligences" (Gardner,1993, pp.8-9) and the implications for identifying different learning styles, and different rates of development for various aspects of practice.

"Where the trainee is" may also be interpreted more literally. The Federated Council of Internal Medicine (FCIM), which oversees accrediting processes for US physicians, comments revealingly that:

Residency training can have a dehumanising effect ...[which]... reflects a training environment that is ...inhumane. In fact, the shift of training from inpatient to ambulatory settings presents an opportunity to avoid some of the harshness associated with training environments of the past. (FCIM, 1997, p.19).

The FCIM, in setting out a curriculum "blueprint" intended for local adaptation, describes also the venues of learning, for two purposes:

The first is to illustrate how these venues provide access to the competencies in the curriculum. The second is to identify the critical determinants of learning within each venue: resident responsibility, faculty-resident interactions, patient selection, resources for learning...and...opportunities for acculturation.(FCIM, 1997, p. 179).

There are paradoxes within this concept - not least to do with the notion of continuity of care. Before the era of the internal market the inpatient service was a "total" (albeit harsh) learning environment, because virtually all patients were hospitalised until they recovered completely. This allowed trainees to participate in the complete continuum of diagnosis and treatment. Nowadays, when it is increasingly difficult to provide trainees with this kind of educational experience, the very deliberate, structured approach suggested above is an attempt to make this good by other means. In this context it becomes even more important for trainees to learn how to tap the experience of peers and mentors within the "community of practice" - and for their access and induction to be actively supported and encouraged by the more experienced members of the team.

# **Conclusion: developing new models**

Returning, therefore, to the key questions identified earlier in this paper, the agenda that is unfolding for professional education, calls for research on a number of fronts.

In the first place, any discussion about standards and criteria for training will require a characterisation of the nature of "progress" - a term which to date has been identified with trainees, but which (as this article attempts to argue) is relevant throughout the career continuum. A dynamic, non-static view of competence implies the ability of the practitioner to innovate, to adapt to change, and to extend the professional knowledge base. This might, for example be expressed in terms of a matrix drawn on the following axes:

- an expanding repertoire of skills, being a function of the point that practitioners have reached in their career, and the expectations associated with that point within a particular specialty;
- increasing proficiency in those skills, being a function of practice and a range of highly context-specific abilities;
- the development of clinical judgement, being a function of the acquired experience of the practitioner and the accompanying growth of a working knowledge base, arising from the individual's repertoire, reflected upon and theorised.

The relationship of self-reflection to progress is a critical point, and the challenge to the expert practitioner of articulating the knowledge which is embedded in practice (cf. Eraut, 1994, p. 50, "tacit knowledge") has the potential to raise critical awareness in both expert and novice alike. It also has potential to open up discussion around new or experimental techniques, challenging any proprietorial "hold" on expertise (such as might deny access to newcomers), and also any premature attempts to utilise new techniques on the basis of "learning through trial and error".

For the present, there is no sustained explanation of how judgement regulates the process by which the individual's repertoire is developed over time, nor how the more holistic competencies - in particular ethical and professional awareness, and interpersonal skills vis a vis patients and colleagues - bear upon the development of judgement itself. Yet it was clinical judgement that was lacking when keyhole surgery was first introduced in the UK in the early 1990s, and the example demonstrates how the development of expertise requires constant monitoring on both a personal and a societal basis.

Secondly, with regard to the nature of the educational experiences that may support the development of surgical competence - the relationship between opportunistic learning on the job and more formal, structured training activities has yet to be modelled. This is a broad continuum. At one end is the complexity of practice - characterised by the Federated Council of Internal Medicine (1997, p. 21) in terms of "dealing with uncertainty", "engaging in healing behaviours", "recognising when to refer". This is mediated by the mentor/coach "taking advantage of teachable moments", "addressing the value-laden aspects of medical care", and generally seeking to foster and promote the learning experience. And then, perhaps removed from clinics and wards, there are the opportunities for group discussion, exploration of personal experiences, critical incidents and the like.

Drawing on the theoretical perspectives that have been discussed here, some principles for designing a supportive learning environment might include:

• the continuity of the learning process throughout the surgical career from junior trainee to senior consultant - should be recognised in curriculum design, and in the arrangements for licensing to practise, focusing on:

- a. development of the individual's potential to respond skilfully, knowledgeably and creatively to the problems posed by practice;
- b. the specific skills needed for safe practice in particular procedures, reviewed and updated as appropriate;
- emphasis should be placed on experiential learning, and on the construction of personal meaning and working knowledge;
- propositional knowledge should be introduced in such a way as to inform and assist this process;
- learning opportunities should be related to changing patterns of health care delivery; in particular they should not be confined to hospital wards and operating theatres, but involve day case surgery and practice in the community;
- the approach to curriculum design should be collaborative, recognising the interchangeable roles of teacher and learner throughout the surgical career;
- practitioners should be encouraged to develop a capacity for critical selfreflection and assessment, which in turn should inform their professional role as creators of new knowledge and practice;
- the multi-professional nature of current clinical practice should be addressed by involving other clinicians in the teaching, learning and assessment processes; patients and the wider community should be involved, as appropriate.

Thirdly, if this more collaborative account of competence and development is adopted, significant implications follow for assessment strategies. Jolly et al. comment (1994, p. 231) that testing methods currently tend to be concentrated on factual knowledge or basic skills, and rarely address important issues like ethics or interpersonal skills; that feedback to candidates after assessment is ignored and sometimes even banned; and that "the amount of assessment which takes place is totally inadequate to support the judgements derived from

it". In addition, Newble (1992, p. 504) points out that, given the evidence that the level of competence does not always correlate highly with performance in practice, there is a particularly strong case for the assessment of performance rather than competence in medical training.

By contrast, a diagnostic approach in the manner of Vygotsky would start from "where the trainee is" and would then aim to characterise the individual's particular profile as it changed and developed, in order to provide the specific assistance and guidance required. This would imply submitting habitual performance in real clinical settings to a continuing process of developmental assessment, reflection and feedback (from various viewpoints, including that of the trainee, and of the group). As Feletti (1994, p. 153) points out, this has the potential to allow observation and discussion of many areas of clinical practice that cannot readily be assessed in formal examination settings, such as: "procedural skills, interpersonal skills, professional attitudes to patients, application of socio-cultural knowledge and ethics to health care; critical appraisal and self-directed learning skills; ability to work in teams; and crisis and practice management skills". There are also possibilities here to report on "overall rather than individual progress" and "works in progress [that represent] shared and negotiable ways of thinking in a group" (Bruner, 1996, p. 23).

In the context of career progression within training, the development of such an approach would be necessarily be complex and problematic, because it would involve both formative and summative aspects. It would also need to address controversial issues around the context-specificity (or otherwise) of various abilities and skills. And it would be particularly important to design assessment strategies in such a way as to assist, rather than hinder, learning.

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