

Advances in Medical Education

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Surgical Education

Theorising an Emerging Domain

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Surgical Education

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Surgical Education

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Part I

Chapter 1

The Environment of Surgical Training and Education

Roger Kneebone and Heather Fry

1.1 Introduction

1.1.1 Focus

This book argues that surgical education is an emerging field, which is establishing its own identity. At present, however, the field's boundaries are not clearly drawn. This indistinctness is both problematic and productive. The book attempts to highlight the diversity of surgical education by bringing together a range of perspectives and viewpoints. Of course, these are only a selection of possible topics, since it is impossible to do more than scratch the surface in a book of this size. Yet, we hope to give an idea of the richness of a field which reaches out in many directions.

This chapter aims to introduce the reader to the scope, distinctiveness, and nature of surgical education, to show how and why areas of surgical education are of particular contemporary interest, and to indicate why the book and its chapters are organized the way they are.

The book distinguishes between 'doing' surgical education and engaging with it academically. While it is possible to be an excellent surgical teacher with only a rudimentary grasp of educational theory, effective academic engagement requires a sound grasp of educational ideas and a familiarity with relevant literature. Such an engagement is necessary for participation in high-level debate which can influence policy about training and standards, and for the innovative development

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of educational structures and policy, which make both surgical and educational sense. It is also, for those who are already sound and interested surgical teachers, a way of extending educational repertoire and understanding. Much relevant literature comes from disciplines outside surgery – indeed, from outside medicine – and will probably be unfamiliar to those whose own education has taken place within a biomedical tradition. Making sense of this literature requires at least a nodding acquaintance with the ways in which educationalists and social scientists conduct research and present their ideas.

Because of surgery's multifaceted nature, no single field of enquiry can encompass it all. Education, social science, performing arts, and computer science may all have useful contributions to make – yet each of these speaks its own language, and each has its own literature and academic conventions. Indeed, education itself is a composite field that draws on history, economics, psychology, sociology, philosophy, and so on. Linking these disparate domains and functioning effectively across them is therefore a major challenge. In this book, we will try to show how this may be done. We will highlight the dangers of gleaning a superficial knowledge of many fields but gaining mastery of none, as well as pointing out some domains whose insights may be especially fruitful.

The decision to write this book was triggered by the authors' experience in jointly creating and establishing the UK's first Masters in Education (M Ed) in Surgical Education at Imperial College London in 2004. During the initial years of the programme, it became clear that surgical education does indeed have its own character, and that surgical practice is an underresearched and undertheorized area within healthcare. It became equally clear that many surgeons are unfamiliar with the wide range of theories, methodologies, and practices needed to do justice to this field.

The authors' academic backgrounds and interests have profoundly shaped this book's structure and approach. Heather Fry is an educationalist, with extensive experience in the study and practice of higher and professional education and in educational policy and strategy. Roger Kneebone is a clinician, with a background in surgery and in primary care, as well as an academic in the field of surgical education. Their shared experience in leading the Imperial M Ed has led to their conviction that surgical education requires a confluence of approaches and fields.

1.1.2 Organization and Perspective

The book is written by authors from several disciplines and countries and is intended for a wide readership. Most contributors draw examples from their own national context, but many themes of surgical education cross-national boundaries. As authors we have not attempted to homogenize context or language, but have allowed each perspective speak for itself. At a simple level, we have not attempted to insist on a single lexicon, considering that most readers are familiar enough with the variation of usage between, for example, the American operating room and the British theatre, for this to be unnecessary. Where there is a need for terminological

explanation – from discipline or country – we have generally attempted to include this naturally within the text. We hope readers will not find this approach disconcerting.

Another issue worth drawing attention to at the outset is the use of the word ‘training’. For most UK surgeons, the term ‘surgical training’ seems unexceptionable; for many educationalists, however, the term ‘training’ implies an activity that is aimed more at a technician, involving learning about limited tasks with clearly defined boundaries. There is thus from the outset the potential for considerable misunderstanding. We use the term training where it is the word an English surgeon would normally use. By that, we are describing in shorthand the arrangements and means by which the full panoply of surgical learning is acquired – this encompasses the gaining of specific technical skills, high levels of skill in diagnosis and patient management, autonomy of professional action based on evidence, interaction with patients and other healthcare professionals, coping with the complex and unexpected, and much else besides. We contrast this type of education (which is essential for the surgeon who is to become a UK consultant or equivalent) with the preparation required by a surgical assistant or technician. This latter is or might be of more limited scope, though still often going far beyond what educationalists might traditionally (and rather pejoratively) refer to as ‘mere’ training.

The first parts of this chapter provide a historical overview of the landscape of surgery from the perspectives especially of training, teaching, and learning. Our aim is to provide the reader with a map of the terrain. The chapter then outlines the structure of the book, providing a rationale for its design and introducing the areas which will be covered by its contributors.

1.2 Why Surgical Education

1.2.1 *What is Surgical Education?*

We start by considering what is meant by the term ‘surgical education’. Of course, medical (as opposed to surgical) education is already firmly established throughout the world. So, it is legitimate to ask what makes surgery special, and whether there is really a need to consider surgical education as a branch of its own.

First, there arises an issue of terminology, as the word ‘medical’ is used in many senses. In the context of ‘medical education’, it traditionally refers to the education of doctors, distinguishing them from other professional groups such as lawyers, architects, or engineers. Used in this sense, the term encompasses undergraduate, postgraduate, and continuing professional education. ‘Medical education’ is thus a term often used to talk about the training of doctors up to initial registration, but also includes ongoing professional development for the purposes of further training, specialization, and keeping up to date. As a doctor gains experience, the training and learning may well become different in nature as well as content, taking into account

more specialized and sophisticated needs and a wider and deeper background. This has many implications for the organization and ‘delivery’ of training – and for the learning which underpins it.

In another sense, ‘medical’ is used in contrast to ‘nursing’, say, or ‘physiotherapy’, marking out a particular set of professional boundaries. And in another sense again, ‘medical’ stands in contrast to ‘surgical’, referring to a group of clinical specialties which do not involve operating. In North American terminology, this corresponds broadly to ‘internal medicine’.

In the context of this book, we are exploring the world of clinicians engaged in the practices of surgery, together with those from related disciplines (such as anaesthesia or the interventional specialties) where craft is a central element. Since most surgical training takes place at postgraduate level, the current use of the term ‘surgical education’ implies a primary postgraduate focus. Yet, undergraduate surgery is of great interest to educators too: it is here after all that students are first exposed to the operating theatre and start to learn simple technical skills. Moreover, while it may be tempting for an educationalist to view the whole of ‘surgery’ as a single field, surgeons see this differently. Plastic and orthopaedic surgeons, for example, can and do point out clear distinctions in the skills, expertise, and culture found in these two specialties.

For us as authors, surgical education stands at an intersection between several traditions of practice and enquiry. At one level, the issue is about ensuring that surgeons master their profession and provide the best possible care. From a surgeon’s point of view, this is obviously of immediate interest and practical importance; from the patient’s perspective, even more so. In the current climate of continual change and relentlessly increasing demands, finding the best ways for surgeons to learn and teach is clearly a priority. Yet, at another level, the *process* by which surgeons learn is also of great interest – not only to surgeons themselves but also to those outside surgery. For educationalists, for example, surgical learning is a special case, taking place within unique circumstances.

To make sense of such complexity, this book uses the primary lenses of surgery and education. But, these represent very different cultures and traditions, both of practice and of research (see Chap. 4). Few practitioners and scholars are fluent in the languages of both, and the ways of each often seem mysterious to an outsider. Moreover, surgical education (as with both surgery and education) must draw on other disciplines and practices for insight and illumination. Although no other profession has an identical profile to surgery, many involve parallel forms of expertise and may provide useful metaphors for exploring surgery (Reddy 1979). For example, surgeons and musicians both require high levels of dexterity and technical mastery; surgeons and motor racing teams both depend on expert team work; surgery and aviation both demand rapid, high stakes decision-making; and so on. This book draws on these wider fields to provide insight about surgical education.

1.2.2 *What makes Surgery Special?*

So, is there something unique about surgeons and surgical practice? In our view, the answer is yes. More than anything, it is *operating* which distinguishes surgeons from other clinicians. This apparent truism highlights that although surgery demands the integration of many skills and qualities, *craft* lies at the heart of what surgeons do. This craft is more than just another component of a surgeon's day – it is central to a surgeon's professional identity and to the mystique which to many still surrounds the surgical specialties (see Chaps. 6 and 11).

Yet although dexterity is crucial to any successful procedure, no operation takes place in isolation. Surgeons work within teams; operations take place within operating theatres; and, as we have already intimated, operative technique is inseparable from team working, communication, decision making, professionalism, and a host of other aspects which together constitute clinical expertise. Moreover, the process by which this expertise is mastered and maintained is highly complex. Much is tacit and implicit, and even more is explicit yet unspoken, taking place outside conscious awareness in ways which may seem mysterious or inaccessible even to those within the profession (see Chaps. 11 and 12).

Of course, education takes place in all of the many settings of surgical care – from the outpatient clinic to the bedside, from the operating theatre to the intensive care unit. In order to make our scope manageable, however, we will focus in this book on the learning that takes place in the operating theatre. This environment offers unique affordances, balanced by unique constraints. We acknowledge that this perspective privileges the surgeon's point of view, inevitably painting a partial picture where some voices in the theatre team (such as those of anaesthetists and nurses) are heard less clearly than others.

The book therefore posits that surgical education has its own identity, separate from the more widely established field of medical education, but of course sharing many common elements. As has already been suggested, there is probably more commonality between all branches of 'doctoring' at early, introductory levels than at more specialized and senior levels; this is true in terms of early acquisition of a broad palette of knowledge and skills, with the former often being considerably more and complex than the latter. But, as a trainee doctor specializes in surgery, distinctive elements emerge. Perhaps, most notably (and in contrast to the trainee physician), these include mastery of complex technical skills, detailed anatomical knowledge, a sense of 3D and spatial awareness, and adaptation to the operating theatre environment and culture.

Unravelling these processes and formulating them in educational terms is therefore a major challenge. The task requires a synergy between surgeons (and their teams) and those whose expertise lies in analysing educational activity within complex settings and making sense of what they see (Chap. 13). Especially for those who are familiar with the setting of surgery, much that happens is taken for granted and becomes invisible. Paradoxically, therefore, surgeons themselves may not be

best placed to analyse their own educational practices. The ‘new eyes’ of an outsider may be needed to render visible what has disappeared from view.

Profound changes (in the practice of hospital medicine and the ‘empowered patient’, for example) are shaking long-established patterns of learning and forcing new approaches, and it is impossible to divorce local practices of education from such wider developments. These changes make it necessary to interrogate traditional educational practices and identify ways to make them more effective. To be constructive and rigorous, such interrogation requires a deep understanding of what surgical education is, and how it can evolve to meet the needs of a fluid and ever-shifting world.

1.3 A Historical Overview of Medical and Surgical Training in the UK

1.3.1 The Evolution of Surgical Training

The historical context of healthcare has exerted a powerful influence over more recent developments in surgical training. This historical background helps to explain a large part of why some features of surgical training (e.g., shorter training) are currently attracting more attention than others. Education may offer ideas and solutions that are helpful to surgery as it contemplates these changes. Educationalists may also look at the landscape of surgical training from the other end of the telescope, considering which educational ideas and theories might usefully be explored in a surgical context.

A brief historical overview may therefore be helpful here, especially for readers outside the UK and for those who are not surgeons. This initial scene setting provides a UK viewpoint, since that is the environment with which the authors are most familiar. It focuses on the training of hospital doctors (especially surgeons), as opposed to family physicians (‘general practitioners’ in UK terminology). In many cases, readers from other countries will be able to make comparisons and draw parallels with developments in their own settings. The account makes no claim to comprehensiveness, nor can it begin to do justice to a highly complex issue, but highlights what the authors see as some key factors affecting the topic of the book.

For centuries, surgical training in the UK was based on a traditional apprenticeship model. From the inception of the National Health Service (NHS) in 1948 until the 1980s, training was extremely protracted, often lasting up to 12 or 15 years after initial qualification as a doctor. During that time, trainees would be attached to a series of ‘firms’, in each of which they would join a clinical team led by a consultant surgeon (who had final clinical responsibility for all patients under his/her care). Attachments would often be in different parts of the UK, and might encompass a range of urban teaching hospitals as well as generally smaller and less specialized District General Hospitals (DGHs).

Training progressed through a series of training grades from Senior House Officer (SHO) to Registrar and Senior Registrar levels, with trainees assuming increasing levels of responsibility as they progressed. Until they were appointed to a consultant post, surgeons in training were referred to as ‘junior doctors’, even though many were extremely experienced clinicians in their thirties and even forties.

Within the system at that time, even relatively inexperienced trainees would be given high levels of practical responsibility, particularly at DGHs. Learning took place as part of the process of providing clinical care, usually on an opportunistic basis. This was especially so during the night and at weekends, where much of the operating was carried out by trainees without a consultant being present. The prevailing culture was physically demanding, with an expectation that junior doctors would work for many hours at a stretch without sleep. Firmly grounded in longstanding practice and hallowed by tradition, this arduous training was regarded as a rite of passage within the profession.

One consequence was that surgical trainees accumulated extensive experience and were exposed to a wide range of operations and associated complications. By the time they were appointed as consultants, many were extremely proficient operative surgeons. However, this learning was usually seen as a byproduct of the clinical job, without a clear educational framework. Assessment at this time was not formalized and was often idiosyncratic. Although trainee surgeons were required to pass the Fellowship of the Royal College of Surgeons (FRCS) diploma, this knowledge-based examination contained no assessment of operative ability. Judgements about trainees’ skills were largely unstructured and opaque.

Although the benefits, drawbacks, and rigours were widely recognized within the profession, patients were generally unaware of the system’s details. Rooted in an earlier age of deference, hierarchy and loyalty to the NHS, the *status quo* was generally accepted.

1.3.2 *Changes Within the Profession*

Under the system outlined above, the endpoint of training was marked by appointment to a consultant post, endowing considerable status and lifelong job security. Selection into such posts was underpinned by informal judgements by senior colleagues rather than on measurable performance within a transparent and explicit training programme. In particular, operative skill was never formally tested.

At that time, intake into surgical training was unregulated. A large number of SHOs with limited career prospects propped up the clinical service, while a bottleneck in the system developed at the Senior Registrar level. Limited consultant posts acted as a *de facto* brake, and many trainees found themselves after many years of surgical training in a position which many found demoralizing, being unable to achieve a consultant position but equally unable to move into a different specialty.

In the 1980s, Calman (the then Chief Medical Officer) introduced radical changes (Calman 1993, 2007; Calman and Downie 1988), aiming to rationalize the

training structure across the whole of postgraduate training (including medicine and surgery). A new training grade was introduced – the Specialist Registrar (SpR) – with entry being strictly controlled through a competitive selection process, which aimed to align the numbers accepted for specialist training with projected consultant vacancies. Although reducing the number of ‘perpetual Senior Registrars’, this had the effect of shifting the bottleneck further down the system and creating even larger numbers of less experienced trainees at SHO level, with no clear career path ahead of them. The absence of clear progress markers, coupled with a lack of career counselling, resulted in a further drop in morale at the early stages of training.

In the twenty-first century, Donaldson (Calman’s successor as Chief Medical Officer) introduced further changes, with the Foundation Programme and Modernising Medical Careers (MMC). This aimed to rationalize the early years of post-qualification training by providing a structured programme which would eliminate the so-called ‘lost tribe’ of SHOs and prepare trainees for specialist training. For the first time, a formal system of workplace-based assessment aimed to map and document clinicians’ skills across a range of dimensions (Department of Health 2007). The introduction of MMC caused the surgical colleges in the UK to combine forces and draw on the combined expertise of their senior members to establish a curriculum for all the specialities of surgical training (the Intercollegiate Surgical Curriculum Project) (Surgeons 2010).

The introduction of MMC gave rise to much controversy and opposition, exacerbated by spectacular malfunctioning of the system for selection into training posts. This debacle triggered a widespread loss of public and professional confidence in the system of postgraduate education, culminating in an influential independent review by Tooke (2008). As well as identifying deficiencies of the newly introduced system, Tooke’s review recommended a change in emphasis from competence to excellence, signalling an important philosophical shift. More recently, Collins’ report on the Foundation Programme has highlighted both strengths and limitations of the initial 2 years after graduation (Collins 2010).

1.3.3 Wider Changes

At the same time as these events were taking place within the profession, a series of highly publicized cases began to shake public and professional confidence in the healthcare system as a whole, and to challenge long established patterns of care. These developments took place against a wider backdrop of profound social change and instability, detailed discussion of which lies outside the scope of this book. This discussion highlights a small number of landmark events which triggered major shifts in established practices and relationships relating to surgery.

As highlighted above, surgeons were traditionally held in high regard, both by the medical profession and the public (Becker et al. 1961; Cassell 1991; Katz 1999;

Ludmerer 1999; Millman 1976). For many years, a culture of individualism allowed surgeons to embrace and adopt new techniques with minimal accountability or external control.

The introduction of minimal access (keyhole) surgery (MAS) in the 1990s highlighted the perils of an unmonitored and unmanaged approach to new technology. MAS requires a completely different set of skills from 'open' operations. Although now firmly established within many branches of surgery, the difficulties and hazards of this new approach were insufficiently recognized at first (Surgeons 1991). Some practitioners embraced the new techniques without adequate formal training. During an initial flurry of uptake by enthusiastic but inadequately trained early adopters, patients were injured and many needless complications ensued. This led to a growing sense of unease within the profession at the uncritical pursuit of new techniques without adequate training or supervision.

Although this crisis of confidence in MAS was largely confined to the profession, a series of high profile incidents then began to erode the public's relationship of unquestioning trust. The case of the Bristol heart surgeons showed that some surgeons continued to operate, despite being known to have a higher mortality and complication rate than their colleagues (Smith 1998). The retention of children's body parts by pathologists at Alder Hey Hospital generated a perception that doctors' agendas were not always aligned with their patients' best interests. And the case of Dr Harold Shipman (a respected general practitioner who was found to have systematically murdered hundreds of patients over several decades) further shook the public's previously uncritical confidence in the medical profession.

At the same time, a growing awareness of patient safety began to permeate the debate on both sides of the Atlantic. A series of influential documents (Kohn et al. 2000; Vincent et al. 2001) highlighted the hazards of healthcare and the disturbingly high incidence of unintended harm, further challenging the *status quo*. All this contributed to a profound change in the dynamic between the public and the profession. Consequences have included greatly increased scrutiny of the processes of surgical training, increased attention to assessment, and a growing belief in the importance of educational design. As part of this process, the value of professional educational expertise started to become more evident.

1.3.4 Current Drivers

More recently, a series of powerful forces has fuelled further change. Crucially, the introduction of working hours restrictions across Europe has brought about a radical upheaval in professional practice in the UK, which is having profound educational repercussions.

As outlined above, a culture of personal responsibility for patients within a structure of surgical 'firms' was traditionally underpinned by extremely long working hours, especially for so-called 'junior' doctors. These long hours continued though the Calman changes and into the twenty-first century, with doctors regularly

working more than 80 h/week and sometimes as much as 120 h. The phased introduction of the European Working Time Directive (and similar restrictions in other parts of the world) has brought about a major change in how care is provided. Further drastic reductions (culminating in a maximum 48 work week from 2009 in the UK) have disrupted continuity and triggered a change to shift working, eroding traditional 'firm' structures and profoundly altering the landscape.

Although offering clear benefits in terms of reducing fatigue and improving working conditions, this change is having far-reaching consequences in terms of education and training. A widely-quoted reduction in training from 30,000–6,000 h means that surgeons, when appointed to a consultant position, will have had much less clinical exposure than formerly (Chikwe et al. 2004). This is giving rise to considerable disquiet within the profession and beyond, raising the possibility that newly appointed consultants will no longer be confident and competent across a full range of clinical challenges and will be insufficiently experienced to cope with the unexpected.

At the time of writing, impassioned debate centres around the impact of reduced working hours upon the quality of surgical training. While the 2010 Temple Report concluded that high quality training can be delivered in 48 h/week, it highlighted the need for fundamental changes in the way training and service are delivered (Temple 2010). It remains to be seen how increasing financial austerity and radical funding cuts to public services will affect surgical education.

In the face of dwindling opportunities for clinical exposure, the case for a training structure which includes clear outcomes and endpoints is becoming increasingly compelling. Of course, much is already taking place, including extensive work on the assessment of a wide range of surgical skills and attributes. Formal training structures are well established and, as alluded to above, the Intercollegiate Surgical Curriculum Project now presents in detail what is required of trainees by the UK Royal Colleges of Surgeons.

At the same time, however, an extensive informal network of web-based learning resources is becoming available to surgical trainees at all stages. Much of this learning takes place outside the formal frameworks referred to above, constituting a parallel universe which reflects developments in the wider worlds of technology, education, and social networking. This learning operates 'below the radar' of more formal educational systems.

It is against this background that surgical education as a field is developing both an identity and a momentum. External events have ensured that surgeons' traditional ways of learning cannot survive unaltered, but must respond to a constantly changing environment whose hallmarks are instability and unpredictability. The question is not *if* surgical education should respond to this change, but *how* it should respond. Such uncertainty offers great opportunity, but also a need to ensure that any response is grounded in clear thinking, good science and a critical openness to new ideas.

1.4 Researching and Using Theory to Extend Knowledge and Innovation in Surgical Education

How then should the profession respond to such profound changes within and beyond its immediate scope? Perhaps even more importantly, how can surgeons (and others) establish a rigorous, scholarly basis for influencing policy as well as investigating specific questions of educational importance and interest?

We suggest that knowledge and research based within what is broadly called ‘surgical education’ can and does provide such a basis. Yet, conducting high quality surgical education in the face of such complexity and instability poses major challenges. Partly this is because the field is by nature composite and wide reaching. For example, there is no single database of literature that covers all relevant areas, and almost any question of interest may require the researcher to search the literatures of surgery, education, psychology, social science, and the humanities. But, on a wider canvas, there is a fundamental philosophical tension between biomedical research (with which surgeons are usually most familiar) and educational research. In the former, research questions are usually framed as hypotheses which can be tested. In the latter, the challenge is more often to *illuminate* an area of practice than to find ‘the right answer’. Theory in education is not about establishing immutable laws, but about developing models with explanatory power. Indeed, the questions which are of most interest may resist being categorized in the manner of the so-called ‘hard’ sciences. There may not *be* a right answer, but rather a set of alternative viewpoints.

This raises important issues, which we address in detail in Chap. 4. In summary, because learning, teaching, and training have to do with human actions and responses, it is rarely possible to control variables as one would in the research laboratory. Even in apparently similar circumstances, it may be impossible to predict how different people (e.g., the learners and trainers that are at the heart of this book) will respond. Because of this variability and contingency, traditional notions of evidence-based practice have less purchase and surety in education than many might wish. Although ‘theory’ and ‘evidence’ may offer useful lines of explanation and suggestions for innovation and change, their nature and effects will be less certain and predictable than a natural scientist might expect.

In the complex unruly world of individuals, it may for example be impossible to tell if an educational approach ‘works’ or not – certainly not in the sense in which a new drug or operation may be said to ‘work’. The principles of minimizing variables, generalizing to large populations by sampling, and generating and testing hypotheses may not be appropriate ways to address the questions which education most wants to answer (Regehr 2010).

A further challenge relates to accessing and making sense of work in fields outside surgery. A multidisciplinary approach can be extremely fruitful, especially when looking at how the cultural practices of surgery are built. Here, an exclusively ‘insider’ perspective may result in important practices being taken for granted and therefore overlooked (see Chap. 10). Yet, in order to make sense of what is written about these surgery-related activities and to understand how educational research

can and does offer useful insights, knowledge is needed of the wider research traditions within such work is conducted and the methods which they employ.

Examples of boundary-crossing research include work on operative surgery (Koschmann et al. 2007; Lyon 2004; Schwind et al. 2004/2002), case presentations (Haber and Lingard 2001; Lingard and Haber 1999; Lingard et al. 2003a, b), the complexities of hospital communication (Iedema 2007) and the workings of academic seminars (Rendle-Short 2006). The challenges of integrating, interpreting, and making sense of research from disparate fields are considered in more detail in Chap. 4.

Any area of enquiry that tries to make sense of real world practice is beset with challenges. For example, many aspects of surgical practice change extremely fast, and new clinical technologies can be introduced at a dizzying speed. Some become established, while others fall by the wayside and are quickly replaced. Educational technologies demonstrate similar characteristics – innovations in simulation, for example, are apt to be taken up enthusiastically and equally readily discarded (see Chaps. 3 and 8). Fashion exerts a powerful influence, and there is often a mismatch between the adoption of new approaches and their systematic evaluation.

By contrast, educational evaluation moves at a much slower pace than the innovations it is expected to judge. Evaluating impact requires protracted observation, and educational interventions may take years to evaluate – by which time the interventions themselves will have been superseded and become obsolete. In the rapidly changing environment of contemporary surgery, therefore, traditional approaches to evaluation may simply not be appropriate. A major challenge for surgical education is to address such tensions.

1.5 About this Book: Rationale and Organization

This book therefore frames questions rather than providing answers. Already it will be seen that this is not a textbook or a ‘how to do it’ manual. Rather, it is an attempt to highlight the diversity of surgical education by presenting a range of perspectives and viewpoints. Of course, in this short space, it is possible to provide only a selective introduction to the field, barely scratching the surface. Yet, we hope to give an idea of the richness of a field which extends in many directions. The book’s structure is as follows.

Part One sets the book’s frame, providing a general introduction to educational ideas, educational practice, and educational research. This part gives the authors an opportunity to contribute their personal views and expertise on areas they consider to be especially important.

The first part of Chap. 1 has already set out general points about surgical education as an emerging field, locating it within events and developments which affect contemporary healthcare. The chapter continues with an overview of how the book is arranged, outlining the broad terrain of each chapter.

In Chap. 2, Fry summarizes key theories of education which bear upon surgery. Building on her experience in various branches of higher and professional education, she identifies important currents of literature and thought. By encapsulating these theoretical positions and marshalling their arguments, Fry presents a background for the nonspecialist in education and a guidebook for making sense of what is to come.

In Chap. 3, Kneebone introduces concepts of simulation, which plays a key role in surgical education. In this chapter, he lays the foundations for more detailed consideration by other contributors later in the book. Rather than addressing the details of simulation design and implementation, Kneebone takes a philosophical standpoint and asks ‘what is simulation and how can it reflect the complexities of real world clinical care?’

In Chap. 4, the authors join with Sevdalis to examine the methodologies and methods which can be used for researching surgical education. The chapter aims to arm the reader with an understanding of the breadth of possible approaches, providing a compass for making sense of them and the types of knowledge and evidence they generate. Benefits and limitations of qualitative, quantitative, and mixed methodologies are outlined, putting the case for an integrative approach which uses the most appropriate tools for a given question.

Part Two consists of a series of chapters by invited scholars. Each was asked to give a personal perspective on a selected topic within their field of expertise. Most chapters link explicitly or implicitly to matters relating to learning and teaching surgery and developing surgical practice and expertise. Rather than imposing consistency, our aim as authors was to illustrate the wide range of approaches which surgical education can draw upon, courting controversy and stimulating debate. The contributors are international, chosen because of their expertise and the originality of their thinking. The authors have not aimed for comprehensiveness – that would be a hopeless task. The book’s intention is rather to illuminate selected aspects of surgical education, demonstrating the multifaceted nature of the field and illustrating a wide range of approaches and styles.

In Chap. 5, Schurwirth and Van der Vleuten consider surgical assessment from their perspective as psychometricians. They are among a handful of world leading experts in the assessment and measurement of medical education; here they use their knowledge to show the importance of key principles and methods to surgery.

In Chap. 6, Land and Meyer apply their work on threshold concepts to surgery. Based on recent interviews with a variety of surgeons, they explore the applicability of their innovative ideas (rooted in other professional domains) to surgeons and surgical practice, exploring issues around ontology and identity.

In Chap. 7, Ericsson brings his widely acknowledged experience in the field of expertise to bear upon surgical practice. In addition to summarizing the current state of knowledge about elite expert performance, he considers how the unique characteristics of surgical expertise are played out in a professional context.

In Chap. 8, Bello and Brenton consider simulation and e-learning technologies in detail, outlining the key characteristics of each. After describing a case study based on their own work, they elaborate the concept of a ‘simulation journey’

which progresses throughout medical and surgical training and brings together complementary elements of e-learning and simulation.

In Chap. 9, Nestel and Bentley address the central role of the patient in surgical education. After considering how the patient's perspective is (and is not) represented within current practice, they discuss how Simulated Patients (professional actors playing the role of patient) can be used within surgical and procedural simulation.

In Chap. 10, Moulton and Epstein explore the world of the autonomous surgeon, proposing self regulation and self monitoring as key to such autonomy, and to continued expertise and professional development. They introduce the idea of 'mindful practice' as an essential feature of self monitoring.

In Chap. 11, Bleakley examines how surgeons' identities are constructed. Drawing on a wide range of theoretical positions (including activity and actor network theory), he considers the complex area of surgical identity in an unstable and rapidly changing workplace.

In Chap. 12, Lingard postulates that communication is both descriptive and *constructive* of social settings, such as the surgical team in the operating theatre. This perspective, and her own research of communication in surgical teams, points to several implications for the concept of the expert surgeon, and for the associated training regimes, objectives, and curriculum designs aimed at their formation.

In Chap. 13, Kress writes from the perspective of a nonclinician who has been investigating the curriculum and pedagogy of the operating theatre from the viewpoint of social semiotics. He frames teaching and learning as social practice, exploring surgical education in terms of multiple modes and affordances. His controversial view of communication as interpretation of prompts highlights the responsibilities of teacher and learner.

In the Afterword, the authors attempt to make sense of these individual and divergent contributions, considering how they can shape a view of surgical education as a whole. The authors conclude by summarizing their views of surgical education, its emerging identity as a distinct field, and the challenges which it faces. They argue that progress will depend on a wide conceptual grasp, an openness to new ideas, and a sound footing in rigorous research.

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