LEARNING TO TEACH IN THE OPERATING ROOM

by

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A thesis submitted to
The University of Birmingham
for the degree of
DOCTOR OF PHILOSOPHY

School of Education
University of Birmingham
March 2008

ABSTRACT

The focus of this study is how anaesthetic trainees teach and learn to teach within the operating room (OR) and how this might be improved.

Methods of study included interviews, action learning groups (ALG), and a questionnaire. The data were collected within the confines of a case study drawing on the principles of action research.

The anaesthetic trainees taught mainly in the OR and interacted with three types of learner, defined by their relation to the anaesthetic community of practice. The primary responsibility for patient safety presented a significant challenge to OR teaching and required the clinician-teacher to balance the needs of the patient and the learner.

The ALG acted as an effective educational initiative for anaesthetic trainees to enhance and develop good educational practice in the OR. The experiences of a group surgical trainees lent support to the wider generalisability of the use of ALGs. The survey of 36 anaesthetic and surgical trainees confirmed that the OR was a good place to learn although teaching was challenging and patient safety an issue.

Results are distilled into a new model which places the patient at the centre of teaching and learning in the OR.

Word count: 79,863

DEDICATION

I wish to dedicate this thesis to my wife Jane and my three children, James, Simon and Emily

ACKNOWLEDGEMENTS

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ABBREVIATIONS

Action learning group	**ALG**
Anaesthetic action learning group	**A-ALG**
Anaesthetic community of practice	**A-COP**
Association of Medical Education in Europe	**AMEE**
Best Evidence Medical Education	**BEME**
Clinical teaching assessment form	**CTAF**
Community of practice	**COP**
Ear Nose and Throat	**ENT**
ENT action learning group	**ENT-ALG**
ENT community of practice	**ENT-COP**
Evidence based medicine	**EBM**
General Medical Council	**GMC**
General practitioner	**GP**
Intensive care unit	**ICU**
Learning styles inventory	**LSI**
Legitimate peripheral participation	**LPP**
Operating department assistant	**ODA**
Operating room	**OR**
Postgraduate Medical Education Training Board	**PMETB**
Randomised controlled trial	**RCT**
Standing Committee of Postgraduate Medical Education	**SCOPME**
Senior house office	**SHO**
Teaching effectiveness score	**TES**
Teaching the teachers /Training the trainers	**TTT**

1 SETTING THE SCENE

1.1 Introduction

The interest of my research is how medically qualified doctors learn to teach medicine. The teaching, training, supervision and education of postgraduate trainee doctors is primarily undertaken by medically qualified doctors. Currently much of the teaching takes place within hospitals in both clinical and classroom settings. Those responsible for the teaching come mainly from two groups of doctors. The first have completed their training and are independent medical practitioners. The second are still trainees but have responsibilities for teaching and supervising more junior trainees. Doctors also have wider responsibilities for teaching other healthcare professionals, patients and the public.

This introduction explains how I came to undertake research for a PhD within education. I approach this from two trajectories. Firstly, I trace how my own interest in the theory and practice of education has evolved from being a medical practitioner to one with an interest in teaching other doctors. Secondly, I explore how national initiatives to improve the teaching skills of doctors have been implemented.

1.2 Personal trajectory

I qualified in medicine in 1976 and completed my anaesthetic and intensive care training in 1986. During this time, I became interested in the teaching of other doctors and healthcare professionals. While I used a variety of different formats for teaching, I received no training in how to teach, either formally or informally. In 1994, I agreed to organise and deliver a formal classroom based programme of teaching, for anaesthetic trainees, on behalf of six hospitals within the West Midlands. I rapidly discovered that I was woefully unprepared for this task. Furthermore, I was unable to find other anaesthetists who had expertise in this area.

I therefore enrolled on the Masters programme in medical education run by the University of Wales College of Medicine in Cardiff.

The consequences of completing this degree in 2000 are interesting. While I still organise and oversee the training programme for the anaesthetic trainees, I have diversified my educational interests in a number of ways. At a local level, I organise and participate in the supervision of novice anaesthetists and education modules for experienced anaesthetic trainees. At regional, national, and international levels, I participate in courses teaching trainees and consultants how to improve their teaching and the educational environment for trainees in all specialties. My role has evolved into being responsible for the training and education of both undergraduate and postgraduate medical trainees within a large University Hospital. Like many things in life, this was not planned but serendipitous and was influenced by changes at a national level.

1.3 National trajectory

The teaching of postgraduate clinical medicine has traditionally taken place within an apprenticeship model: '…*apprenticeship is the tested way'* (SCOPME, 1992, p.18). The workplace, for the apprenticeship, has been the hospital wards and clinics while the 'teachers' have been more senior members of the medical profession. While the workplace has not changed, there has been a move away from the apprenticeship model towards more structured training. This has been due mainly to the implementation of government initiatives (Calman, 1993; Department of Health, 2003; Four UK Health Departments, 2004).

In 1990, the employment contract of hospital consultants was modified to include teaching. Prior to this date, there had been no obligation for hospital consultants to teach, unless employed by a teaching hospital. In 1992 the Standing Committee of Postgraduate Medical Education (SCOPME, 1992) identified that the way trainee doctors learnt in hospitals was

based mainly on clinical experience within an apprenticeship model. Furthermore, the majority of those responsible for the teaching had received no training in how to teach. This was in contra-distinction to other healthcare workers, such as doctors in general practice or public health, and nurses, who did receive training in how to teach. A further report in 1994 concluded that: '*Hospital doctors and dentists need training in order to teach better'* (SCOPME, 1994a, p.2). This report recommended that the aim should be to improve the educational environment within which doctors are trained. The importance of doctors being able to teach is now included within the requirements of being a registered medical practitioner within the UK (General Medical Council, 1999).

These SCOPME reports (1992; 1994a) made the assumption that teaching by hospital doctors was inadequate but these reports did not provide empirical evidence to support this assumption. These reports implied that because these doctors had received no formal training, their teaching skills were inadequate. One needed to look elsewhere for the evidence of the inadequacies of teaching within medicine (Lowry, 1992; Coles, 1993; Chastonay et al., 1996). The SCOPME reports also noted that there was no quality assurance of the teaching delivered and implied that there should be. Despite these assumptions and limitations, a questionnaire survey of 384 doctors and dentists reported that the majority of the responders felt the time was right for change (SCOPME, 1994b). These SCOPME reports (1992; 1994a; 1994b) stressed the importance of evaluating the effectiveness of any new schemes introduced to improve teaching.

A follow up report identified that the main approach to improving training in teaching had been to set up a large number of short courses (SCOPME, 1999a). This report also emphasised that it should be part of the process to evaluate their impact:

'Those responsible for commissioning and providing programmes for developing educational roles should ensure that evaluations are built in and that these should include the views of consultants and other clinical teachers, doctors and dentists in training and patients.' (SCOPME, 1999a, p.ii)

However, the evidence for evaluation of the effectiveness of short courses in the UK is sparse. A Medline literature search conducted in August 2001, using the keywords faculty development, teacher, trainer, teaching, training, evaluation and assessment found only two papers providing empirical evidence on the effectiveness of 'teaching the teacher' (TTT) courses for UK doctors. The first evaluated the satisfaction of their participants immediately after the end of the course (Rayner et al., 1997). The second evaluated their course using a self-reporting questionnaire 12 months after the end of the course (Whitehouse, 1997). The participants reported that they were using the principles they had been taught on the course 12 months later. However, neither study evaluated the effect on their learners or patients.

Two further papers from a single organisation, Nottingham medical school, reported longer term affects of attending TTT courses. Dennick (2003) surveyed 94 participants of the TTT courses using a self-administered questionnaire. The 72 (77%) respondents reported significant perceptual improvements when they self evaluated their teaching skills. Godfrey et al. (2004) asked two groups of consultants to self evaluate their teaching skills twice with an 8-10 month interval. They found that the 54 participants who had attended a TTT course felt that their teaching skills had improved, while a control group of 23 who had not attended, felt that their teaching had not changed.

Although little published literature of the UK experience was found, personal contacts indicated that most of the TTT courses did undertake some sort of evaluation. These, however, were for local use, usually undertaken at the time of the course and did not explore impact on practice. A further Medline search conducted in December 2007, with the same keywords as in 2001, has revealed no further UK papers evaluating TTT courses.

There is evidence of the effectiveness of short TTT courses within the North American medical training system. For example, Wipf et al. (1995; 1999) introduced six hours of compulsory structured teaching, on how to teach, for all their senior trainees who were responsible for teaching junior trainees and medical students. This large study extended over six years to include 446 trainees and 3,964 evaluations. Their baseline for the teaching quality was measured over the three years before the TTT course was introduced. This was compared to the teaching quality during the three years following the TTT course. They were able to show a consistent and steady increase in the quality of the teaching, as assessed by the learners, following the introduction of TTT courses. The quality of the teaching was evaluated by the learners using the Clinical Teaching Assessment Form (CTAF) developed by Irby and Rakestraw (1978; 1981). The CTAF was used to score the quality of teaching against nine criteria: organisation/clarity; group instructional skill; enthusiasm/stimulation; knowledge; clinical supervision; clinical competence; modelling professional characteristics; accessibility; and overall teaching effectiveness. Each item was rated against a six point Likert scale. A limitation of this study is that it was conducted in a single institution, for a single specialty and taught by a limited number of faculty.

The studies of Wipf et al. (1995; 1999) were confined to trainees training to be physicians in general medicine. The courses concentrated on skills related to teaching in the classroom and conducting teaching ward rounds. There was nothing related to teaching in the operating room (OR) or to teaching practical skills.

1.4 *Motivation and environment*

It is reasonable to assume individuals entered medicine with the anticipation of becoming doctors and being involved directly in patient care, or at the very least, this formed part of their reasoning. Thus, when doctors are required to perform a different function, such as

teaching, they may not necessarily perceive this as part of being a doctor. This may apply particularly to the older members of the profession who entered medicine before teaching was a requirement. Indeed, there used to be a separation of teaching and non teaching hospitals within the UK. Unless doctors perceive teaching as important then the motivation to learn to teach may be low. When motivation is low then one of the main driving forces for success has been lost from the principles of adult learning (Knowles, 1990).

The importance of teaching for the medical profession is not new, indeed teaching was included in the classical Hippocratic oath as one of the covenants required of the physician (Lloyd and Chadwick, 1978, p.67):

> *'I will regard his sons as my brothers and teach them the Science, if they desire to learn it, without fee or contract. I will hand on precepts, lectures and all other learning to my sons, to those of my master, and to those pupils duly apprenticed and sworn and none other.'*

In general terms motivation is a powerful tool for enabling learners to learn, particularly when it is internal. In the present context, the learners are the teachers of other doctors. However, engendering enthusiasm and motivation to learn to teach is not an easy task. Within medicine teaching is not given the same status or rewards as those associated with research or clinical skills (SCOPME, 1994a; Seabrook et al., 2000). This is reinforced by a common practice that when there is a shortfall within the clinical areas it is the teaching that is cancelled first. While it is entirely reasonable to place treating patients before teaching, it does imply that teaching should always take second place or even third place after research. Part of the difficulty of improving the status of teaching is that there is no easy way of defining or measuring the excellence or adequacy of teaching.

Medical teaching and learning takes place in a variety of environments, including lecture theatres, classrooms, operating rooms, clinical skills laboratories, hospital wards, or even the corridors. The mode of delivery varies from lecturing, running small groups, facilitating

problem-based learning, teaching practical skills or communication skills, to observation. Furthermore, both the teachers and learners move between these environments several times each day. For instance, their day might begin with a departmental seminar, continue with learning how to assess patients prior to anaesthesia and then move to the OR. For the teachers this might be interspersed with working in other contexts such as within the management structure of the hospital.

At the time of the study most of the TTT initiatives concentrated on classroom teaching (SCOPME, 1999a), but are these techniques and skills, learnt in a classroom setting, transferable to the workplace? My concern and inquisitiveness about this link between learning to teach in the classroom and teaching in the workplace motivated me to search for a deeper understanding of how doctors learn to teach in the workplace. As part of my search, I enrolled on a PhD programme. This introduced me to many new people, experiences and paradigms. It necessitated I revisit my understanding of ontology and epistemology. Through this exploration I have been able to crystallise and evaluate my concerns over the challenges of teaching in the workplace. The issues surrounding the importance of the environment, such as the OR, where clinical education takes place is encapsulated by the following quote (Lyon and Brew, 2003, p.54):

> *'Strategies to improve teaching and learning in theatres need to take account of the messy and unpredictable reality of the operating theatre as a workplace where patients' needs and not the needs of medical students are the focus of attention.'*

A key development in my understanding has been initiation into the interpretative research paradigm and the challenge of managing the effect of personal bias. My initial task was to review the literature and use this information to design a small scoping exercise to explore the extent of teaching undertaken by anaesthetic trainees. This preliminary exercise helped me to focus on the aspect of how they learnt to teach in the workplace. As with the investigation of

any series of human interactions, the moment one asks questions then the individuals may start to view things differently and perhaps change how they do things. The study needed to acknowledge this and at the same time make use of it to guide future learning. Hence the research questions were both explorative and concerned to improve practice. I chose to start my exploration within the world of anaesthetic trainees because this is my background.

1.5 Summary

This chapter has identified the importance of teaching our doctors of the future although it appears teaching is seen as a secondary concern to most medical practitioners. While many of the approaches to medical education have evolved in parallel with advances in medical practice, the evidence for the effectiveness of the 'new' educational approaches does not match the quality or quantity of evidence available for the introduction of new medical treatments. This study is about understanding the complexity of teaching in the workplace and increasing the quality and quantity of evidence, all be it primarily in a limited area of anaesthesia, to support developments in medical education.

2 LITERATURE REVIEW

2.1 Introduction

This chapter has five main sections: doctors as learners, doctors as teachers, teaching doctors to teach, what constitutes evidence of effectiveness of educational interventions and the workplace context. As the TTT initiatives have been targeted at developing experienced doctors as teachers, I start by considering how doctors have learnt to be doctors. I suggest that doctors are expert learners and that an understanding of how they learn can be used to explore how they might be helped to 'learn' to become better teachers. Their learning is positioned within an historical perspective of apprenticeship and the chapter explores how learning styles relate to doctors. The evolution of the TTT courses is described together with a critique of the evidence of their impact and effectiveness within the context of workplace teaching.

While teaching teachers how to teach is not new, the uniqueness of this project relates both to its research participants and to the learning environment. The participants are expert and experienced doctors and learners but are novice teachers. The environment for learning is the OR complete with real patients. As discussed in the previous chapter, the focus on developing doctors as good teachers has centred on delivering TTT courses based in the classroom and concentrated on teaching them skills used in the classroom. This contrasts with doctors' day-to-day experiences, where doctors learn to be doctors in the workplace while being involved with patient care. This is particularly apparent in anaesthesia where much of the teaching and learning related to becoming an anaesthetist takes place in the OR and involves the use of real patients who are having operations. As delivering care to the patient takes precedence, any of the teaching and learning that occurs has to be cognisant of the needs of the patient. This contrasts with classroom teaching and learning where the needs of the learner are at the

forefront. This chapter compares and contrast the differences between teaching in the classroom and the workplace.

The issue of teaching and learning anaesthesia in the OR is complex because anaesthetists may have concurrent and sometimes conflicting roles as clinician, teacher and learner. Thus, an individual trainee anaesthetist may be the clinician in charge of a patient while teaching a more junior colleague while at the same time being supervised by a consultant. This multiplicity of roles blurs the boundaries between teaching and learning in the OR. It differs from the classroom setting where the roles and boundaries of teacher and learner are more clearly defined. Included within this blurring of boundaries is consideration of how doctors make the transformation from newcomer to an accepted member of the world of medicine or to a speciality area such as anaesthesia, a transformation that has similarities to some apprenticeship approaches to learning and is encapsulated in the concept of becoming a full member of a community of practice (Lave and Wenger, 1991).

In the first section, doctors as learners, I begin by looking at workplace learning from the perspective of apprenticeships. I develop this into situated learning by drawing upon the work of Lave and Wenger (1991) who looked at how novices learnt and became masters or experts within their communities of practice. I then explore how learners can identify and learn from their experiences by focusing on the experiential learning model proposed by Kolb (1984). While there are other models, some of which can be traced back to Kolb's work, it is selected because there is a substantial literature related to the application of this model both outside and within medicine. I also have personal experience of its use, both as a learner and teacher, within the context of TTT. The key message from this section is that doctors vary both in the way they recognise relevant experiences and how they develop them.

In the second section, on doctors as teachers, I explore the challenges posed when trying to describe what is meant by good teaching. There are the various different roles that doctors are expected to fulfil as teachers and expectations of undergraduate and postgraduate trainees differ with postgraduate trainees believing that key aspects of the teaching role occurred in the clinical environment of the clinics, wards and OR. An understanding of what constitutes good teaching in these environments should help set the overall aims of initiatives to improve teaching.

The third section, teaching doctors how to teach, suggests that approaches to teaching have sometimes lacked an acknowledgment of educational principles. I explore a selection of models of teacher development from outside medicine as illustrative that the challenges associated with improving or changing the teaching of individuals who are already teachers are not specific to medicine.

The fourth section considers what is acceptable as evidence of the effectiveness of TTT. This is explored in some detail because doctors, who are well used to assessing and utilising evidence in their clinical practice, do not seem to use evidence to guide their medical teaching. Yet, unless the evidence for the effectiveness of TTT is understood and accepted by doctors who teach, it is likely to be ignored. The reasons for this are explored and include challenges surrounding different methodologies and what constitutes evidence. Schemas for assessing the quality of the evidence of effectiveness are explored and the challenge of comparing studies within these schemas are discussed, and illustrated by selections from the TTT literature. The approach taken is to illustrate these challenges rather than provide an exhaustive account.

The final section, the workplace context, considers how teaching within the clinical environment might be considered as a competency in a similar manner to gaining competency

with a clinical skill. This approach highlights the difficulties of teaching when patients are integral to the process. I suggest that transferring teaching skills from the classroom to the clinical workplace is problematic.

One of the challenges in this chapter has been the selection of literature. Potential readers may come with backgrounds in education or medicine. Those from an education background are likely to have an understanding of educational theory and practice but not within the context of clinical medicine, while doctors interested in teaching and learning may not necessarily be conversant with theories underpinning specific educational interventions. In trying to reach a balance between these two perspectives, I have selected examples from areas of the literature that I feel offer practical value for a study concerned to improve the education of doctors. This is illustrated in the section on learning style, where I introduce the work of Kolb on experiential learning (1984), which comes from the genre of educational psychology. This is placed in the context of those authors who have suggested that learning styles might be used to influence career choices. In the illustrations from the medical literature, I have selected papers which I believe will be helpful to those unfamiliar with the clinical workplace. The result of this approach has led to a selection that is indicative of a range of issues and is only a partial view of contemporary debates. However, I have tried to set my choices within the wider context of the education literature by explaining where the education and medical education literatures overlap or diverge.

2.2 Doctors as learners

This section explores the educational pedigree of doctors and the specific learning characteristics of successful doctors. It considers how doctors manage their professional clinical learning to stay up to date. The section concludes by drawing together the characteristics of successful doctors as learners.

2.2.1   Doctors - historical learning

In order to become an independent medical practitioner, doctors undergo an extensive period of training and education. This begins with school education where a high level of academic attainment is required because the competition to enter medical school is intense. Once at medical school, the medical students have to adapt to further learning experiences and teaching methods. The length of this period varies from five to seven years depending on their route of passage through medical school. During this period there is an increasing emphasis placed on the students gaining experiences with real patients and interacting with other healthcare workers. As undergraduates, they are assessed both within the workplace and more formally within the classroom setting.

Having achieved a medical degree, they undergo a further period of training and education, varying between three and twelve years, before they become independent practitioners. However, even then they continue to learn in relation to the particular branch of medicine in which they specialise. Recent changes, introduced in the UK by the General Medical Council (GMC), require doctors to demonstrate, on a five yearly cycle, that they remain still fit to be on the general and specialist medical registers (Donaldson, 2006).

This extensive period of learning, over many years, suggests that successful, independent practitioners have become expert learners. A key feature that runs through the learning of medical practitioners is the importance of learning while being involved in patient care. This generates many experiences related to delivering care to real patients. These experiences form the basis of good medical practice. This approach of learning in the workplace is often referred to as an apprenticeship and is expanded further in the next section.

2.2.2 Apprenticeship

The term apprentice/ship is widely used when discussing medical education. There has been extensive discussion around the role of apprenticeship in the postgraduate programmes as they have developed in the UK over the last 15 years (SCOPME, 1992, 1994c; 1994b; 1994a, 1999b; 1999a; Foundation Programme Committee, 2005). As indicated in the introduction, the general feeling from these documents was that apprenticeship needed replacing with more structured and managed learning. However, there was a lack of clarity around the term apprenticeship. In many respects, it seemed to be a 'shorthand' term for workplace learning in medicine. In order to understand its meaning, I review the historical evolution of apprenticeship within the UK. I then consider its use within medicine in general and within anaesthesia in particular.

2.2.2.1 General historical perspective

A review by Aldrich (1999) provides a general historical perspective. Over the centuries, apprenticeship has meant different things to different people. In mediaeval times:

> *'Apprentices (who were usually male) were bound by indentures to a master for a term of years, commonly seven, and invariably between five and nine, while they were initiated into the theory and practice and other mysteries associated with a particular occupation.' (Aldrich, 1999, p.15)*

As part of this contract, the 'masters' were paid to take on the apprentices. They were also responsible for their food, lodging, and general well-being. The apprenticeships were usually undertaken within the crafts such as blacksmiths or carpenters. This style of apprenticeship depended on an individual master and its success depended on the quality of the individuals involved.

The Poor Law Act of 1601, consolidated a very different form of apprentice, known as the parish apprenticeship. At this time, the parishes in the UK had responsibility for children with

no homes i.e. illegitimate, orphans, paupers or criminals. Under the Poor Law, parishes could enforce these children into an apprenticeship. These apprentices tended to end up in dangerous or low status positions, such as farm labourers and menial household servants. This notion of an apprenticeship was in stark contrast to that of apprentice to a 'master'. Even by the end of the 17th century, the term apprenticeship had widely differing meanings.

The industrial revolution saw a number of new laws related to apprentices. However, it remained that there were still different sorts of apprenticeship. What this period did see was the move to apprentices being apprenticed to organisations, such as cotton mills or the building industry, rather than to individual masters.

Fuller et al. (2005) described two types of apprenticeship found in modern industrial companies. They equated to the two historical apprenticeships discussed above. The first was the expansive apprenticeship in which there was well structured on and off the job learning. The status of this apprentice was transparent and unambiguous. The second was the restrictive apprenticeship, which enabled the apprentice to make rapid progress to full mastery. However, these restrictive apprenticeships had focused training with limited new learning experiences. Thus, while they completed defined apprenticeships, these were limited in the extent of longer-term progression. In addition, some had ambiguous purposes and their trajectory had little opportunity for wider learning.

A common theme running throughout these uses of the term apprenticeship has been the intention to teach, train, or educate the apprentices to be able to undertake a job of work. The apprentices were expected to learn within the workplace. At the highest level, an apprentice expected to become a 'master'. At the lowest level it was used as a way of enforcing cheap labour with apprentices having no chance or expectation of becoming anything other than a worker.

2.2.2.2 Medical and anaesthetic perspective

Sinclair (1997) gives a historical perspective of apprenticeship within medicine. The physicians selected their apprentices only from male graduates with degrees. The surgeons and apothecaries, on the other hand, took their apprentices from non-university men and their apprenticeship was essentially practical. These apprenticeships were binding on both sides. When the apprentices finished their indentures, they could then set up in practice. As the amount of medical knowledge grew, particularly with the evolving subject of anatomy, and the treatment options increased, the organisations for learning changed.

The London medical schools came into being in the middle of the 19th century and so evolved an apprenticeship to an organisation rather than an individual master. Following graduation from medical school, the doctors could immediately set up in practice. Indeed many of the general practitioners set up directly from medical school. However, to gain prestigious general practices or work as a surgeon more experience was needed. One mechanism of gaining this postgraduate experience was to win an attachment to a named doctor working in the hospital and so apprenticeship reappeared in a different form. Initially there was no further formal assessment after qualifying from medical school. The main 'assessment' came in the form of patronage and recommendations from their 'master'.

These are the historical roots of apprenticeship within medicine. There are now, arguably, two sorts of apprenticeship. There is the undergraduate apprenticeship to an organisation, which in many ways has not changed in format since the formation of medical schools in the 19th century. However, the postgraduate form of apprenticeship has changed. In the current system, doctors are apprenticed to an organisation or a training scheme, which have national standards and assessments.

The nature of the present day medical apprenticeship is in important respects similar to its historical conception. Specifically, a large amount of learning takes place within the work place. The apprentices, doctors, expect to progress to become masters as consultants or general practitioners. However, the intention of a medical apprenticeship is to prepare them for practice as professionals in accordance with the GMC's 'Good Medical Practice' (2001; 2006). As can be seen from the dates, the constituents of 'Good Medical Practice' continue to evolve. The process focuses on preparing these 'apprentices' for the future rather than just replication of their master. These 'new apprenticeships' or training schemes focus on teamwork and developing life long learning skills. There are no longer masters in the traditional sense.

Apprenticeship is more complex than an individual gaining personal knowledge and skills to become a master of their chosen craft. There is also the issue of how they learn to behave so that they can integrate and contribute to the community, which they are striving to join. The complexity of newly qualified doctors learning in the clinical arena is highlighted by Bleakley (2002). He emphasises the importance of paying attention to the cultural dimensions of learning and their relationship to the development of doctors as professionals for the future. There is more to the process than the mere transmission of skills and knowledge. The next section addresses the cultural aspects of apprenticeship.

2.2.2.3 Legitimate peripheral participation and situated learning

Lave and Wenger's (1991) ideas on situated learning have been influential in shaping the thinking around learning in the workplace. Their interest in situated learning arose from observations of craft apprenticeships in West Africa. They studied how novices entered new communities of practice and became full participants or experts through the acquisition of

skills, knowledge, and attitudes. They have tried to make sense of the meaning of apprenticeship and how it is related to situated learning.

Lave and Wenger (1991) provide a theoretical way of looking at learning in the workplace. Their approach accommodates both the social process of joining a community of practice (COP) as well as the role of the learner in its future development. They explore the notion that while the apprentices are learning the necessary knowledge and skills, they were also learning how to participate in the sociocultural practice of the community. They suggested the term 'legitimate peripheral participation' (LPP) as a way:

> '….to speak about the relations between newcomers and old-timers, and about activities, identities, artefacts and communities of knowledge and practice.' (Lave and Wenger, 1991, p.29)

The LPP descriptions of Lave and Wenger (1991) took place in environments where there was no formal teaching or examinations. They used examples such as tailors in Liberia and Yucatec Mayan midwives in Mexico. When a novice joined a new COP, they started on the periphery. As they spent more time within the community, they began to take part in the activities or participate. At first, their participation was limited to simple tasks. As they spent longer in the community, they progressed to undertake aspects that were more complex until they became experts and had fully joined the community.

Since 1991, Wenger has continued to explore the development of learning within the context of COPs (Wenger, 1998a). In addition Wenger (2002) has gone on to explore how COPs can be successfully set up within the business world in companies as diverse as Hewlett-Packard and Shell. His approach starts from the perspective of considering how learning occurs rather than what is effective teaching. He suggests that learning is not a purely individual process as might be assumed by some approaches to teaching and training in the classroom. He gives four premises as a starting point (Wenger, 1998a, p.4): humans are social beings, knowledge

is a matter of competence with respect to valued enterprises, knowing is a matter of

participating in those enterprises, and meaning is what learning produces. He considers *'…the*

primary focus of this theory is on learning as social participation' and refers to this as 'a

social theory of learning'. He refines his understanding of a COP by identifying three key

elements: mutual engagement, a joint enterprise and a shared repertoire. In addition, he

suggests there are 14 indicators that a COP has formed (Wenger, 1998a, p.125-126):

1. sustained mutual relationships – harmonious or conflictual
2. shared ways of engaging in doing things together
3. the rapid flow of information and propagation of innovation
4. absence of introductory preambles, as if conversations and interactions were merely the continuation of an ongoing process
5. very quick setup of a problem to be discussed
6. substantial overlap in participants' descriptions of who belongs
7. knowing what others know, what they can do, and how they can contribute to an enterprise
8. mutually defining identities
9. the ability to assess the appropriateness of actions and products
10. specific tools, representations and other artefacts
11. local lore, shared stories, inside jokes, knowing laughter
12. jargon and shortcuts to communication as well as the ease of producing new ones
13. certain styles recognised as displaying membership
14. a shared discourse reflecting a certain perspective on the world.

The value of these indicators becomes apparent when trying to analyse what social

interactions should be considered as COPS. For example, as an anaesthetist I interact on a

frequent basis with surgeons but I would not consider myself a member of a surgical COP.

This is confirmed by several of the above indicators being absent in my interactions with the

surgeons particularly when it comes to learning. These indicators include a lack of mutually

defining identities (8), specific tools (10), and different perspectives on the world (14).

Further examples of the value of using these indicators are given below.

The value of using COPs as a framework to conceptualise workplace learning has also been applied to groups working within the formal education system. Boud and Middleton (2003) interviewed individuals who were responsible for teaching, including members from four workgroups: teachers, educational planners, human resources and those who taught offsite. They reported that these groups did not meet Wenger's 14 indicators that a COP had formed. The main areas of divergence from Wenger's indicators were that: *'In one or more groups there were differences of function, absences of common activities and shared ways of operating.'* (Boud and Middleton, 2003, p.200). They suggest that learning in the workplace is more complex than the COP model suggests. However, despite these reservations, they felt that COP still provided a useful conceptual tool for looking at workplace learning.

Within medicine, Parboosingh (2002) suggested, in a personal view, that physicians/doctors naturally work in COPs because of the way patient care is delivered within a team structure. The membership of a COP depends on a clinician's reputation and ability to contribute effectively. In addition, recent graduates are welcomed into the COP and have the opportunity to learn and contribute in turn. He also suggests that there are aspects of continuing medical education which could effectively be managed through acknowledging and utilising COPS. He calls for further research in this area which goes beyond observational studies. Bleakley (2002) proposed that new doctors learn through an apprenticeship model when they start to work on the wards and suggests this can be considered as: *'…a socialisation into varying 'communities of practice' through work-based experience, that serves to construct a professional identify.'* (Bleakley, 2002, p.9)

Continuing in this theme, Goodwin et al. (2005) explored how anaesthetic teams might be viewed as COPs. They observed 34 sessions of novice and experienced anaesthetists, newly qualified and experienced operating department assistants (ODAs) and nurses while they were

engaged in anaesthetic work for surgical operations. They interviewed 20 of these staff and concluded that in this COP there was unequal status between members of the community with limits set on what ODAs or nurses could contribute to this COP. A consideration of Wenger's indicators (1998a, p.125-126) suggests that this set of social interactions does not meet the criteria to be a COP.

Dornan et al. (2007) used the concept of COP to explore how 24 junior and 12 senior medical students from Manchester learnt from their clinical experiences. The students felt they learnt best when were able to participate in practice and found their learning to be more effective when they were welcomed by the teachers and made to feel part of the system. An underlying theme was that they were preparing to join the COP known 'as being a doctor' while at the some time moving out of the COP of medical students. They felt that: *'The core condition for clinical workplace learning is 'supportive participation', the various outcomes of which are mutually reinforcing and also reinforce students' ability to participate in further practice'* (Dornan et al., 2007, p.84). They learnt about being practically competent as a doctor by being involved in patient care, enabling them to develop their confidence, motivation and professional identity.

This section has explored some of the complexities underlying apprenticeship learning, particularly with respect to terminology. It is apparent that apprenticeship-style training in medicine has evolved over many decades; while medical education in the workplace has commonalities with LPP (Lave and Wenger, 1991) as described for craft apprenticeships, it also has some important differences. These include issues related to assessment and formal educational activities. However, the theory does address the key elements of learning knowledge, skills, and attitudes while working with more experienced colleagues. In addition, however, an overarching challenge for medical education is to provide doctors who can

function as experts within a rapidly changing world because the experts and masters of the future are likely to differ from those of today.

The next section continues to explore the world of situated learning. It considers the differences in how learners learn and how learners make sense of their experiences within the workplace.

2.2.3   Learning styles

A characteristic of medical training is that much time is spent working with patients and other healthcare professionals in the real world. This exposes the learners to an enormous number of experiences. However, it is not just the number of experiences but how the learners make use of these experiences that determines the quality and quantity of their learning. As learners view and interpret the world in different ways, an understanding of how they recognise and use their experiences can help devise approaches for their teachers to guide them. This can bring structure to what otherwise appears to be little more than a random series of events.

2.2.3.1   Kolb's learning modes

Kolb's (1984) seminal book on experiential learning describes a cyclic model of learning. He emphasises the importance of experience in his definition of learning:

'Learning is the process whereby knowledge is created through the transformation of experience.' (Kolb, 1984, p.38)

His approach was heavily influenced by the ideas of Piaget, Dewey, and Lewin. He developed the model from the information gained from a learning styles inventory (LSI) given to 1,933 men and women from a variety of occupations and lifestyles. He described four different modes of learning as making up a cycle of learning: concrete experience, reflective observation, abstract conceptualisation, and active experimentation (Figure 1).

Figure 1 Kolb's learning modes
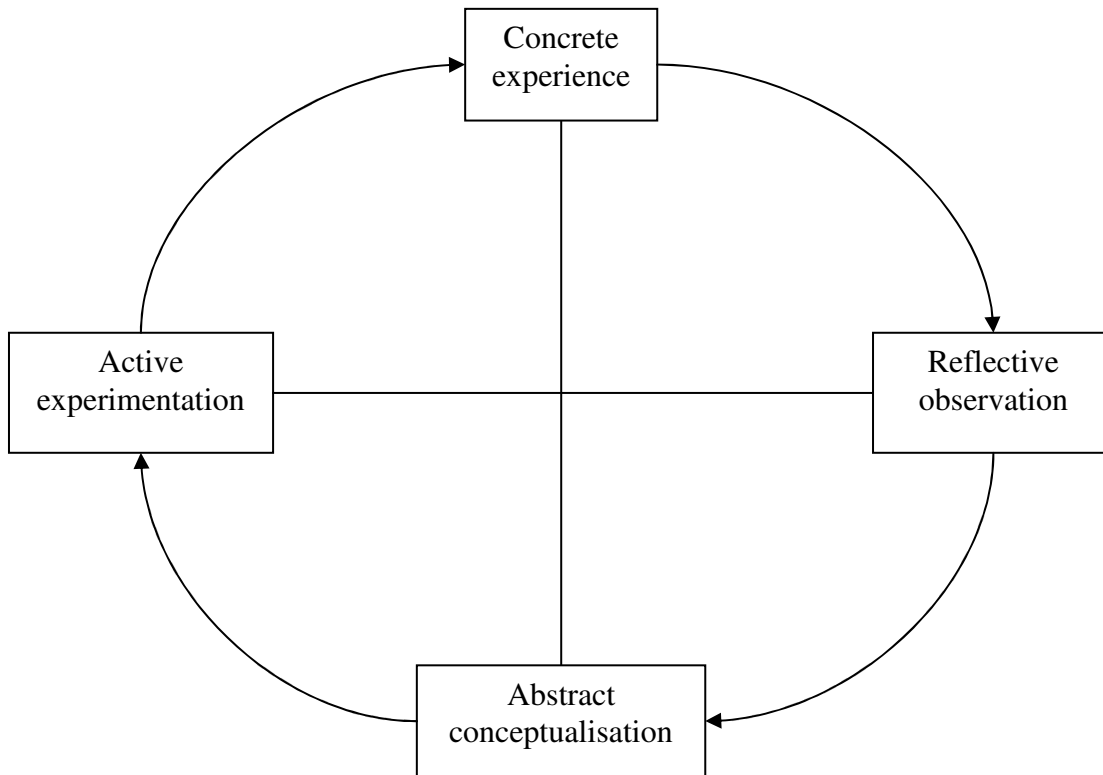
Kolb used these four modes as the basis for identifying four styles of learning. His theory

suggests learners start with an experience, which can be either concrete or abstract. With a

concrete experience, the learner is involved with real life experiences and deals with the

situation in a personal way. Here the emphasis is on being in the situation and how the learner

feels about the situation. This is in contrast to a scientific approach to learning where the

emphasis is on objectivity. Being in the OR is an example of a real life concrete experience.

With abstract conceptualisation, the emphasis is on thinking rather than feeling. Using logic,

ideas and concepts, the learner tries to build general theories. The learner tends to concentrate

on systematic planning and quantitative analysis. Abstract concepts may come from many

sources such as reading, attending lectures, or discussions with colleagues.

The learner's utilisation of the experiences determines learning. This consists of either

reflection or action. Reflection includes careful observation and description of experience.

Understanding, rather than finding a practical solution, is emphasised with the learner focusing on understanding the meaning of experiences and concepts. Active experimentation focuses on actively doing things or influencing others. The emphasis here is on practical application rather than reflecting or trying to understand. It is about getting things done.

Learners usually have a preferred way of identifying experiences, either concrete or abstract. In a similar vein learners also have a preferred way of translating these experiences into learning, either through action or reflection. In general, expert learners can work within all four modes although the argument is that they do have their preferred modes.

2.2.3.2 Kolb's learning styles

The combination of concrete experience, reflective observation, abstract conceptualisation, and active experimentation gives four identifiable learning styles. Kolb labels these styles as accommodating, diverging, assimilating and converging (Figure 2).

Figure 2 Kolb's learning styles

Concrete experience

Accommodating style

Diverging style

Active experimentation

Reflective observation

Converging style

Assimilating style

Abstract conceptualisation
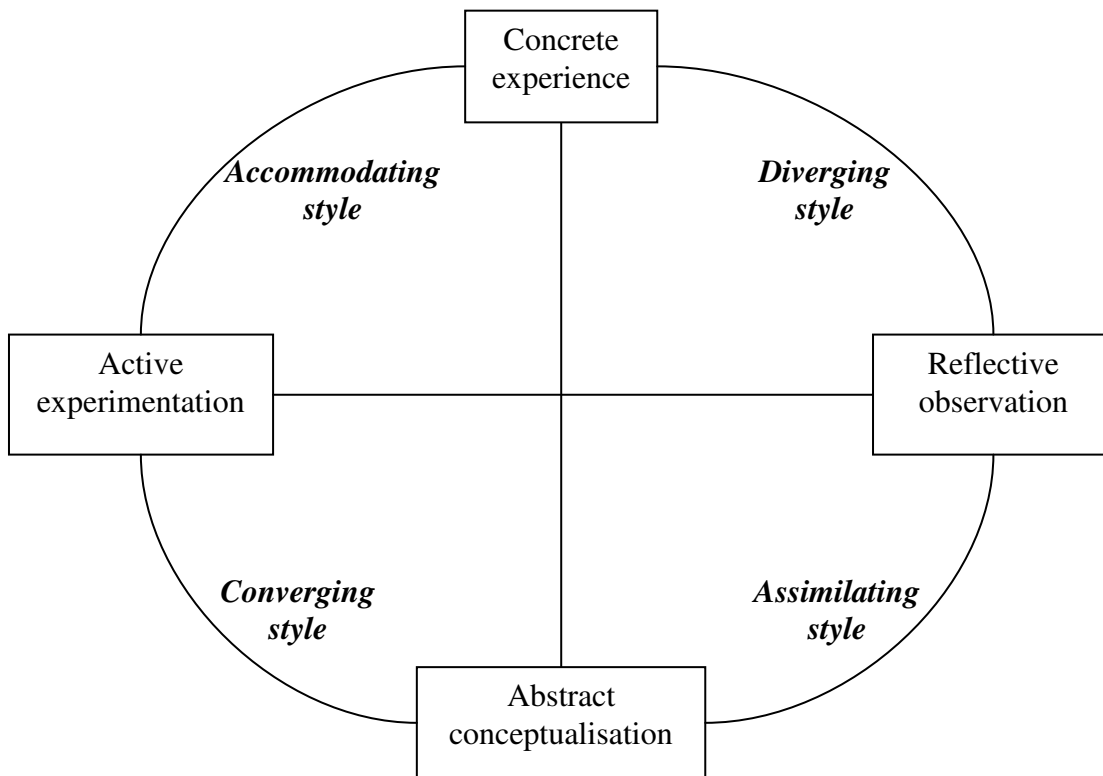
The accommodating style starts with a concrete experience which the learner uses to engage in active experimentation. The learner's strength lies in doing things such as carrying out plans or tasks and getting involved in new experiences. These learners tend to solve problems by trial and error and seek opportunities which often involve risk and action. They are at ease with people but may seem impatient. They like to 'get on with it'.

The diverging style also starts with a concrete experience on which the learner reflects. This learner views their concrete experience from many different perspectives with their strength being in imagination and their awareness of meaning. They like to observe, are interested in, and prefer to deal with people.

The assimilating style starts with an abstract conceptualisation on which the learner reflects. The learner's strength lies in inductive reasoning and an ability to create theoretical models

with the emphasis on ideas and abstract concepts. They tend to be more interested in abstract ideas than in people. They like to 'think about it'.

The converging style starts with an abstract conceptualisation which the learner uses this to guide active experimentation. This learner likes a single correct answer. Their strength lies in problem solving, decision making and the practical application of ideas. They prefer to deal with technical issues rather than with personal or social issues. They like to find practical uses for their ideas.

Measurement of learning styles

Kolb measured learning modes and styles using a brief and simple self-description questionnaire, the LSI. The first version of the LSI had nine sets of four words, which the learner placed in rank order and scored, 4 for most descriptive to 1 for least descriptive of their learning preference (Kolb et al., 1971, p.23-27) (Appendix 1). Each set of words had one related to each of the four modes of learning. For example, one set of words were feeling (concrete experience), watching (reflective observation), thinking (abstraction conceptualisation), and doing (active experimentation). The LSI has now reached version 3.1, which has expanded to 12 items (Kolb, 2007). The principle is the same as the first version except that the ranking applies to statements rather than single words. This is commercially available either in paper or electronic format (Appendix 2, www.haygroup.com/tl). The scores are plotted on to a diagram to give an overview of the preferred learning mode and style of the learner. This is illustrated by my own LSI undertaken in 2006 shown in Figure 3. As can be seen my preferences lie in abstract conceptualisation and reflective observation which gives me a preferred learning style in the assimilation quadrant. As can be seen learning styles are not 'either/or' but preferences. In my case, this means I can also learn within the other quadrants.

Figure 3 Learning style inventory (MC)
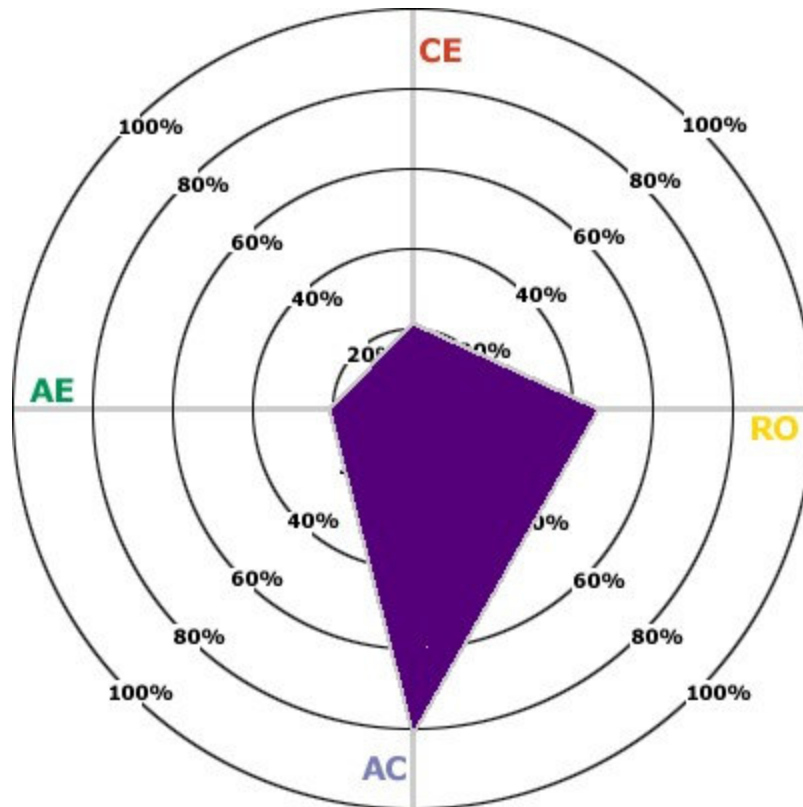
Measuring and understanding the variability of an individual's learning preference has several potential uses in education. Knowles (2005) suggests teachers can use an understanding of learning styles to improve experiences for their adult learners. On the one hand they can design learning experiences to play to the learner's strengths. On the other hand they can design learning experiences to encourage the learner to use other learning styles. Armstrong and Para-Parsi (2005) have argued that educational encounters should be designed so that all four styles of learning are utilised and built in.

Application of learning styles within medical education

Several groups have used Kolb's LSI to study the types of learners during various stages of their medical education. These studies have produced varying and conflicting results that make conclusions difficult.

Plovnik (1975) measured the learning styles of 47 medical students. Plovnick was a co-worker of Kolb's and used the first version of the LSI (Kolb et al., 1971), which explains why this paper pre-dates Kolb's book (1984). His small study, in a single institution suggested a degree of correlation between learning styles and the students' stated choice for their specialty career. His results suggested there tended to be attractions between primary care and accommodators, psychiatry and divergers, medical specialties and convergers, and academic medicine and pathology, and assimilators. These findings were not replicated by Wunderlich and Gjerde (1978), who repeated the study with a larger sample of 200 trained doctors, 470 trainees and 66 medical students. They had response rates of 55%, 23% and 67% respectively. The low response rate for the trainees (23%) means that any comment on this group should be made with caution. The authors chose to amalgamate the trainees and the doctors into a single group for their analysis. They noted that convergers were the most common learning style (52%) across all specialties except psychiatry. Interestingly those with concrete learning modes (convergers and accommodators) were more frequent in the surgical specialties. There were only three anaesthetists who responded, all of whom had abstract learning modes. Overall their results showed no correlation between learning style and career choice.

Baker et al. (1985) used the LSI with 39 surgeons and found a predominance of convergers (46%). However, the three other styles were also present (accommodators 26%, assimilators 20%, and divergers 8%). Contessa et al. (2005) repeated the study 20 years later, in a small group of 16 surgical trainees and six trainers. They also found a preponderance of convergers. On this occasion, the trainees consisted of 44% convergers, 31% accommodators, 19% assimilators, and 6% divergers. The trainers had 66% convergers and 34% divergers. In addition, this study looked at trainees' results at the national American Medical Education

exams. The convergers achieved considerably higher scores than the others. These findings should be viewed with caution as the numbers in the study were small.

While these studies report a preponderance of convergers amongst surgical trainees and trainers, there were still more than half of the trainees who had different learning styles. One approach to specialty selection might be to choose trainees based on their learning preference. However, this does not address the greater proportion of the trainees (55%) who have different learning styles. Nor do these studies directly address the relationship between the quality of the surgeon and their learning style (Contessa et al., 2005). It is a potentially dangerous leap from these small observation studies to using the LSI as part of the criteria for selection in a specialty. Looked at differently, the majority of surgical trainees are not convergers but they still succeed to complete their surgical training. Perhaps a more important message is for the trainers to appreciate that their trainees learn in different ways.

This variability in learning styles has also been reported for anaesthetic trainees and trainers (Baker et al., 1988). In some preliminary work Baker and Marks (1981) studied 21 trainees and trainers, and found mostly accommodators and least frequently divergers, but did not report actual numbers. Baker et al. (1986) extended their studies and measured the learning styles of 50 anaesthetic trainees who passed through a single department over 10 years. They found a mix of styles, 45% accommodators, 29% convergers, 21% assimilators, and 5% divergers. As part of this study they had four trainers, one with each learning style, identify who they felt were their 10 best trainees. In total they selected 40 trainees of whom 65% were accommodators, 20% convergers, 12.5% assimilators and 2.5% divergers. Baker et al. (1987) then amalgamated the results of learning styles measured in four institutions. This confirmed their earlier reports of a preponderance of accommodators (36%) and convergers (38%) with a

minority of divergers (13%) and assimilators (13%). However, they noted that there was variability in the distribution of learning styles between the institutions.

This diversity of learning styles is also present in medical education teachers and leaders. Armstrong and Parsa-Parsi (2005) surveyed 372 medical participants attending Harvard's Medical International development programmes in 2003 and 2004. These expensive programmes are run in Boston for an international audience. In order to gain a place on these courses, the participants have to be successful medical practitioners who can demonstrate a real commitment to medical education. All learning styles were present in this diverse group of individuals who came from different specialties, hospitals, and countries. They reported their 372 participants consisted of 37% convergers and 22% accommodators, but gave no percentages for divergers or assimilators. Personal communication with Armstrong (2005) revealed that she has since expanded this database to 640 participants which shows 35% convergers, 21% accommodators, 26% assimilators, 9% divergers and 9% balancers, who did not have preference.

There are several messages to consider from this section. The papers reviewed showed a diversity in the learning styles of doctors. Overall the converger and accommodator styles of learning seem to be dominant. There are also significant numbers of doctors who are assimilators and rather fewer divergers. While it might seem attractive to use the LSI as a part of career selection, the variability is too great to recommend this. Furthermore this could become a self fulfilling prophesy if, for example, only convergers were allowed to be surgeons. When considered from the perspective of designing and delivering educational encounters, learning styles have much to offer both teachers and learners.

In a one-to-one educational encounter teachers can use information from the LSI to select experiences, concrete or abstract, to match the learner's preferred learning style. This

approach can help maximise the likelihood that learning will be successful. Learners can also use the information to select the types of learning experiences that are most likely to be effective. When teaching in groups, teachers can use the LSI information to select a variety of experiences so that all the learners are more likely to be involved. Likewise, the learners' appreciation of the variability will enable them all to gain from the encounter. In addition, a mixture of experiences and ways to utilise these experiences will enable the learners to gain by moving outside their comfort zones.

The next two sections consider how doctors use their experiences to drive learning.

2.2.4 Identification of 'experiences'

In following this argument forward, a key stage in experiential learning is identifying the experiences which will help a learner to enter the cycle of learning. Throughout a normal day a student, trainee or trainer has hundreds of experiences any one of which has the potential to act as a starter experience. As suggested above, a key task of a teacher is to help the learner select relevant experiences. This is because having the experience itself is insufficient. What is important is how the learner uses the experience to develop their learning. At a simple level the teacher acts to interpret each experience for the learner. The teacher acts as the guide on a one-to-one basis.

However, these learners are adults, who like to take some responsibility for their own learning. Indeed one of the six core assumptions underpinning adult learning is their capacity to direct their own learning (Knowles et al., 2005). Part of medical education is concerned with developing learners who can identify relevant experiences for themselves. So how do doctors select their experiences? An understanding of this process can help trainers to develop their trainees as self-directed learners.

Slotnick et al. (1999; 2000; 2002) have undertaken a number of studies to investigate how doctors manage their learning. In the first two papers (Slotnick, 1999; 2000) he explored the self-directed learning activities of doctors in independent practice. The participants were selected from 84 members of the Royal College of Physicians and Surgeons of Canada. This grouping was relevant because this college accepted learning portfolios as evidence of continuing medical education. All those who used portfolios were invited to participate and a random selection of non-portfolio users, to produce a balance between the two. He conducted semi-structured interviews with 32 volunteers and reached saturation of new ideas while interviewing the last eight of these.

He suggested that there were two main types of experiences that might trigger learning. The first was a specific incident such as a problem with an individual patient. His example was a psychiatrist changing a patient's medication to prevent movement disorders. An example from anaesthesia might be around the choice of which prophylactic antibiotic to use for a patient who is allergic to penicillin. In terms of Kolb's approach this experience could be considered a concrete experience where active 'experimentation' would produce a rapid and satisfactory outcome. The second was a more general problem. An example from anaesthesia might be learning about the use of total intravenous anaesthesia in contrast to the more widely used inhalational anaesthesia. In terms of Kolb's approach this experience might fall into the concrete or abstract experience. If it had arisen through direct observation of the new technique in the OR it might be considered a concrete experience. If it was through reading, discussion or attending a meeting then it would fall into the abstract experience. However, doctors in independent practice do not usually work directly with peers and may be more likely to identify general problems through abstract experiences.

Overall, Slotnick (1999) described four stages associated with how doctors processed their self-directed learning episodes. The process of these stages was the same for both specific and general problems. The stages progressed sequentially requiring completion of the previous stage before moving to the next.

Stage 0   scanning - for potential problems

Stage 1   evaluating - deciding whether to take on the problem

Stage 2   learning - the required skills and knowledge

Stage 3   gaining experience

The doctors approached learning episodes differently depending on whether their learning need was a specific or a general problem. The episodes with specific issues tended to be those that needed rapid resolution. These tended to include the management of particular patient problems. They looked for a quick fix, for direct application to solve the issue. This might be as simple as asking a colleague. The approach to learning episodes related to general issues was more extensive in manner. There was evidence of wide reading, finding and undergoing courses and then working out where and when to apply the new knowledge. This might be learning a new surgical technique or improving their teaching skills.

In the context of Kolb's learning styles, stage 0 is critical. Unless the learners select appropriate experiences then progression is difficult. Learners that are accommodators and divergers are likely to identify and start with concrete experiences. While they are comfortable using concrete experiences, they might need assistance to use abstract concepts as a starting point for learning. On the other hand, assimilators and convergers might need assistance in utilising concrete experiences effectively. In the context of Kolb, stage 1 relates to how the potential learner deals with an experience. When an individual patient needs urgent

treatment then there may not be time for reflective observation and so active experimentation is more likely.

This description or model of how practicing clinicians learn has been confirmed with a further questionnaire based survey (Slotnick et al., 2002). This extended earlier work to demonstrate the use of this approach on a wider scale to help doctors to identify areas of weakness.

2.2.5   Selecting experiences in the OR

The OR is a *'…complex and highly charged workplace…"* (Lyon and Brew, 2003, p.53) and is thus a challenging environment for learners to make sense of their experiences. Lyon and Brew investigated the OR as a learning environment from the perspective of medical students attached to surgical specialties. They claimed this as the first empirical study to examine how medical students learnt in the OR. They used a mixed methods approach. They twice interviewed seven medical students as a group, observed in the OR on 12 occasions and undertook in-depth interviews with 15 medical students and ten surgeons. They also surveyed 197 out of 237 medical students.

Their data illustrated the many challenges faced by the students when they visited the OR for teaching. They grouped these challenges into three domains. The first related to the demands of the working environment, which was unpredictable and disorientating. The second related to managing the educational tasks, when they needed to form a clear idea of their objectives and relevance. The third related to how they managed their learning and the social interactions while working in the OR. The challenges posed to the medical students learning in the OR is summarised here.

> *'Students who reported successful learning experiences from the operating theatre had a measure of social competence to negotiate an active role to play in the surgical team. They had learned to negotiate the social relations of work in the operating theatre to find*

a legitimate role to play in order to participate in the community of practice constituted by the operating theatre and its personnel.' (Lyon and Brew, 2003, p.58)

The students' first challenge was to negotiate their way though the physical and mental aspects of a new and perhaps alien environment. They were newcomers to a different community of practice and they were very much on the periphery (Lave and Wenger, 1991). The OR could be a frightening environment for the students. They were intruding into an area of medical practice where most of the staff already had defined roles. As the staff were all dressed similarly, in scrubs, it was sometimes difficult for the students to identify who was who. They encountered new protocols and local traditions. Until the students had successfully negotiated these challenges and hurdles they were unlikely to make good use of their experiences. Put another way, until the basic aspects of Maslow's (1943) hierarchy of needs were met, namely physiological and safety, the student was unlikely to learn effectively.

Once they had come to terms with the environment, the students with clear learning objectives had more useful learning experiences than those who did not. One observation was that students sometimes spent a long time waiting for things to happen in the OR. Some students viewed this as wasted time that could have been used more effectively for other parts of their course, particularly when it had direct relevance to their formal assessments. At the time of the study the students had not been given specific learning objectives related to the OR. Their perception of the importance of learning in the OR was related to their perception of the relevance of the experience. For example, some students planning to become general practitioners could see the relevance as it would help them in the future when they explained surgical procedures to their patients. In addition it would help them in their initial postgraduate hospital training. Stark (2003) also reported the variability in the views of medical students as to the value of teaching in the OR. Some felt OR teaching was pointless particularly if they could not see what was going on. On the other hand when they were

scrubbed up and could see the operation it had some value. This finding emphasised the importance of learners identifying experiences relevant to their needs (Kolb et al., 1971). Until they identified an experience as important they were unlikely to make use of it to drive learning.

The third domain in the Lyon and Brew study (2003) highlighted the challenges of learning in the OR related to how the student interacted with the surgeon. The students who got involved in patient care, for example scrubbing up, found the OR experiences valuable. One interesting aspect was how the impetus for interaction seemed to have to come from the students rather than from the surgeons: *'You have to show interest to get them to teach – you have to be pro-active.'* (Lyon and Brew, 2003, p.60) Not surprisingly there was variability in how confident students were to initiate teaching from the surgeons. The less confident students tended to rate their OR experiences as less valuable than the more confident. This contributed to how valuable students found their OR experiences.

Lyon (2004) has built on this model of OR learning and suggested three ways of improving student learning. She labelled the three phases as trust, legitimacy and peripheral participation. Her first suggestion was that students should have a proper induction and orientation to the OR. This would enable them to feel less an outsider and less likely to make mistakes. This should help with their confidence and enable them to actively engage. Likewise the surgeons are then more likely to trust them and let them participate.

Secondly, she suggested that surgical units should have clear and coherent expectations of the medical students. The role and right of the student to be in the OR should be defined and agreed i.e. their legitimacy to be in the OR should be established. Her third suggestion relates to the negotiation of the learning opportunities available on an individual basis. The suitability of OR sessions for teaching is variable and depends on the types of the patients, their

operations, and number of trainees and students present. For example, on occasions the case may be so complex that the surgeon will not be able to pay attention to the student's learning. She recommends that the learning opportunities should be negotiated at the start of the operating session. This approach is sensible and appears simple. However, the challenge is to transfer these ideas into action in the real world.

Part of negotiating learning opportunities requires the teacher and the learner to agree their educational objectives. A taxonomy of educational objectives was described by Bloom et al. (1956) and can be used to provide a structure. They constructed a classification separating educational objectives into the cognitive, affective and psychomotor domains (Bloom et al., 1956; Krathwohl et al., 1964). The cognitive domain contains those objectives concerned with remembering or reproducing something that has been learnt. It has six hierarchical levels: knowledge, comprehension, application, analysis, synthesis and evaluation. While an objective such as 'knowledge of facts' can be defined at one level and may be an end point in its own right, at a higher level of complexity it becomes a tool or a means to a more complex objective. This concept of objectives crossing levels of complexity is equally applicable to the other domains of learning. Examples relevant to anaesthesia training for the various cognitive hierarchical levels are shown in Table 1.

Table 1 Examples of anaesthesia objectives within the cognitive hierarchical levels

Cognitive Domain Level	Anaesthesia related examples
Knowledge	Learn a list of the causes of sudden hypotension during anaesthesia
Comprehension	Explain the meaning of hypotension during anaesthesia
Application	Record the blood pressure and tell me when the patient is hypotensive
Analysis	Classify the causes of hypotension during anaesthesia
Synthesis	Summarises different treatments and matches them effectively for different types of hypotension occurring during anaesthesia
Evaluation	Explain the reliability of your measurements of blood pressure

Classifying the affective domain was more difficult, partly because there were few evaluation techniques in regular usage. It contains objectives related to feelings, attitudes and emotion and is separated into the five levels of receiving, responding, valuing, organisation and characterisation (Krathwohl et al., 1964). Examples relevant to anaesthesia training of the various affective hierarchical levels are shown in Table 2.

Table 2 Examples of anaesthesia objectives within the affective hierarchical levels

Affective Domain Level	Anaesthesia related examples
Receiving	Agrees to listen to what the trainer has to say about pain related to anaesthesia
Responding	Discusses the affect of pain on the patients
Valuing	Sympathetically attends to the pain requirement of the patients
Organisation	Discusses the benefits of protocols for pain therapy
Characterisation	The trainee's approach to intensive care reflects the importance placed on a logical and humanitarian approach to management of pain

Bloom et al. (1956) did not consider it appropriate to set hierarchical levels for the psychomotor domain since very little was written about psychomotor objectives within the education literature at that time. However, since the psychomotor domain contains objectives related to performing practical skills, which are fundamental to all medical practitioners, this domain is also relevant. Simpson (1972) proposed a taxonomy of four levels namely perception or awareness, simple motor skills, complex motor skills and the ability to communicate. An alternative approach to viewing the psychomotor skills, particularly related to their assessment, was proposed by Miller (1990, p.s63) when he described a four stage pyramidal model: *knows about, knows how, shows how* and *does*. This is covered in more detail in section 2.6.2.

The importance of medical students having learning objectives for their OR attachment, as highlighted by Lyon (2004), has been explored by Fernando et al. (2007). They surveyed the

views of 46 final year medical students and 42 surgeons using a short questionnaire and identified five skills and competences that were deemed essential by most of the students and surgeons. These included: appreciation of standard OR etiquette and protocols; being able to adhere to sterile procedures; being aware of risks to self and staff; being aware of risks to patients; and appreciating the need for careful peri-operative monitoring. These findings were mainly about preparing students to participate in a new environment and community of practice. They confirm the suggestions made by Lyon (2004) that students need an orientation and specific learning objectives to be able to make the most of their OR experiences. Fernando and colleagues have gone on to develop a DVD and learning guide (summer 2007) to act as their induction package.

The importance of defining learning outcomes and identifying learning experiences was also reported by Cox and Swanson (2002) when they were exploring teaching excellence in surgeons. The surgeons, who were rated as excellent teachers in the OR, had two discriminating behaviours. The first was that they demonstrated sensitivity to the trainee's learning needs. The second was that they provided direct feedback to their learners.

This section has considered some of the challenges associated with learning within the complex world of the OR. The general principles to guide good learning are the same as elsewhere. These include having clear learning objectives and exposing the learner to appropriate experiences. The challenge relates to introducing the learner into a new community so that they can participate and learn effectively. Only then can they make good use of the multiplicity of experiences available in the real world that is the OR.

2.2.6   Professional reflection

Schon's (1983; 1987) work on reflection started with a consideration of how professionals such as doctors and lawyers solved problems. In principle, Schon argued that one way

professionals solved problems was by applying scientific knowledge in a rigorous and logical manner, which he called technical rationality. This model of technical rationality was comparable to Kolb's converger (1984), who used theory to help solve problems. It can also be equated to the principle of evidence based medicine (Sackett et al., 1996) where the doctor bases their patient care on evidence.

Schon also viewed that professionals functioned in more complex ways than just the application of knowledge and logic. He understood that many of the day-to-day problems, with which patients present to doctors, did not fit into the simple logical model of technical rationality. Furthermore, doctors could not always explain the how or why of many of the decisions and judgements they made everyday. Many of their decisions were tacit. It was his attempt to understand what underpinned these tacit decisions, which led him to describe the importance of reflection. He divided reflection into two categories, reflection-in-action, and reflection-on-action.

He suggested that a feature of being a professional was an ability to modify actions in 'real time', while a situation was ongoing. Professionals were able to reflect during the action and used this immediate reflection to modify their action. He called this reflection-in-action. The analogy he used was that of a jazz musician who is able to improvise at the same time as playing. An example from anaesthesia might be the ability to adjust the depth of anaesthesia to the changing condition of the patient and the requirements of the surgeon as an operation proceeds.

He also identified a separate process of reflection, which took place after the action or the event, which he called reflection-on-action. This reflection-on-action equated to the reflection suggested by Kolb. Schon's ideas and suggestions have had a major influence on how many people view professionals, how they work and what they do.

Others have expanded Schon's ideas on the difference between in and on action. Eraut (1995; 2004) revisited Schon's work and queried the difference between in and on. He suggested that the difference was not as simple as Schon implied and continued by illustrating that Schon's examples of the differences were not necessarily conclusive. Nevertheless, he acknowledged that Schon has had a large influence on thinking about professionals.

Eraut (1995) also suggested that Schon's ideas could be reframed by changing the prepositions in and on. He considered the element of time scale should be explicitly acknowledged. The idea of the 'in' action was that it was an on-the-spot reflection. However, the more deliberate longer-term type of reflection affected future actions but that this might be over several time spans. There could be the 'immediate' reflection after the action or a reflection that took place much later. He suggested expansion of the process by thinking in the three dimensions of context, focus, and purpose. The context related to both the immediate and the wider aspects of the action. The focus of reflection related to the group to which the action referred. The purpose related to the use of the reflection in improving both current and ongoing actions.

Others too have developed the work of Schon. Bengtsson (1995) suggested that Schon could be expanded and developed into four categories, reflection as self-reflection, reflection as thinking, reflection as self-understanding and the distancing function of self-reflection. Van Mannen (1995), again looking at and acknowledging the importance of Schon, emphasised that it should be accepted or acknowledged that there is a difference between practical knowledge and reflective practice when applied to pedagogy.

This illustrates that when using the word reflection we need to be mindful of its variable interpretation.

2.2.7 Summary

Learning is a complex process. Doctors spend their professional lives learning and can be considered experts in the field of learning. In order to make their learning more effective, an understanding of the underlying process is a good starting point. Some studies, which measured Kolb's learning styles (Kolb, 1984), suggest there are preponderances of certain learning styles in different specialties of medicine. However, the preponderances do not exceed 50% indicating that at least half have different styles.

A training programme that addressed the learning needs of less than half of the audience or learners would exclude the remainder. Teachers, who understand both their own and their learners' learning style preferences, will be well equipped to select experiences appropriate for their individual learners The experiences should be selected on the preference and need of the learner rather than the teacher. However, in the workplace the teacher does not have the same degree of control over the experiences as in the classroom. This unpredictability of experiences is particularly evident in the OR because of the variability in the patient requirements.

The number of experiences that an individual has each day may be overwhelming. An important early first task of a teacher is to help the learner identify the relevant experiences. In addition, Kolb would argue that the teacher should try to match the experience to the learning style of the learner, concrete or abstract. This would be followed by the teacher facilitating the learner's reflection or action on the experience to enable the learner to utilise their learning strengthens. However, whichever is their preferred style, on occasions, it will be necessary for them to adopt a different style. Perhaps it is this ability to adapt that makes the best learners. Rather than hunting for learners with a particular style to teach, perhaps teachers should enable learners to be adaptive.

In relation to this, teachers may need to teach their learners how to learn and to become self-directed learners, an aspect emphasised by the GMC (1999) in their publication 'The Doctor as Teacher'. The next section addresses this role of the doctor as a teacher.

2.3 Doctors as teachers

This section considers doctors as teachers. It starts with a review of the use of terms surrounding teaching, training and supervision. It looks at the doctor's various roles as a teacher and how these relate to trainees learning to teach. These roles are examined by consideration of the characteristics of ineffective and excellent teaching, from the perspectives of undergraduates and postgraduates.

2.3.1   Terminology

In the introduction (section 1.3) I reported the development of teaching the teacher (TTT) courses in the UK. For some of these TTT courses the letters stand for 'Training the Trainers'. While the words teacher and trainer have specific meanings in educational contexts, they are used interchangeably in the medical world and are generally accepted to mean the same. In addition, in the North American literature the term faculty development is more common. Brookfield (1986, p.17) defines training as *'…the transfer of clearly identified skills'*. This implies that a learner will merely learn to replicate predetermined skills. However, there is more to the development of professional doctors than skill replication. Brookfield (1986, p.17) goes on to define education as *'…the facilitation or encouragement to look at the assumptions underlying the skills'*. Perhaps a better term might be 'educator' rather than 'teacher' or 'trainer'. Even so, the development of a doctor requires a combination of training (e.g. how to insert an intravenous cannula), teaching, (e.g. when and why to insert a cannula) and education (e.g. how to manage a patient who is very difficult to cannulate).

A further complexity is the use of the term supervisor within medical education. One definition comes from the online Oxford English Dictionary (http://dictionary.oed.com):

> *'At the University of Cambridge: one appointed to give tutorial instruction to an undergraduate student, a tutor. More widely, one who directs and oversees the work of a postgraduate research student.'*

This encompasses some of the aspects of both teacher and trainer but includes an added dimension of overseeing their work. Supervision is a word used widely in the literature and documents surrounding postgraduate medical education in the UK (Foundation Programme Committee, 2005; PMETB, 2007a; Royal College of Anaesthetists, 2007a). However, this has a wider context than that described above and is separated into two types, educational and clinical (The UK Foundation Programme Office, 2007, p.63). The Postgraduate Medical Education Training Board (PMETB), the body that oversees and validates postgraduate medical training in the UK, has defined a difference between clinical and educational supervision (PMETB, 2007a, p.48-49):

> *'Clinical supervisor: A term used in UK postgraduate medical education to describe an individual, almost invariably a senior doctor, responsible for overseeing a trainee's clinical work and providing guidance and feedback.*
>
> *Educational supervisor: The person who is responsible for the overall supervision and management of an individual student or trainee's educational programme.'*

This suggests that clinical supervision is related to teaching trainees in the workplace when the teaching involves a patient. The clinician is responsible for patient care while at the same time being the teacher.

Anaesthesia in the UK has defined three different types of supervision, direct, indirect local and indirect distant (Royal College of Anaesthetists, 2007a, p.26-27). I include all three descriptions to illustrate the complexities of the supervisory role:

'Direct supervision

This means the trainee is working directly with a supervisor senior to themselves who is actually with the trainee or can be present within seconds. This proximity maintains patient safety but when appropriate allows a trainee to work with a degree of independence in order to develop confidence.

Indirect supervision

Indirect supervision falls into two categories: local and distant:

<u>Local supervision</u>

This means that the supervisor is on the same geographical site, is immediately available for advice and is able to be with the trainee within 10 minutes of being called.

<u>Distant supervision</u>

This means the supervisor is available rapidly for advice but is off the hospital site and/or separated from the trainee by over 10 minutes.'

In general usage, supervision is used to describe one doctor taking responsibility for the actions of another. A supervisor may be either an independent medical practitioner or a more senior trainee, who is in turn under the supervision of someone more senior. This is complicated because until a trainee completes their training they are unable to undertake independent medical practice and should be supervised at all times. The level of supervision varies depending on their experience, the patient, the operation and the location. It also varies between specialties and the duties undertaken.

I use the term doctor to encompass all those who hold a medical qualification and are still in current medical practice. These doctors fall into two groups. The first are the independent medical practitioners, who have completed their training. This group I refer to as trainers. The second are doctors are not entitled to practice independently because they are still training. This group I refer to as trainees. While the term 'teacher' has varying definitions and uses, I take it to mean those doctors who have responsibility for helping or facilitating others to learn

effectively. Both trainers and trainees have teaching responsibilities. Thus senior trainees are in the unique position of being both teachers and trainees.

2.3.2   Roles of the 'doctor as teacher'

Harden and Crosby (2000) delineate 12 functions of teachers within medical education (Figure 4). They do not expect all doctors to exhibit all these roles or indeed that a good teacher will or should. However, it is useful in bringing the various aspects of the 'doctor as teacher' into a single model.

Figure 4 Roles of doctor as teacher (Harden and Crosby, 2000)
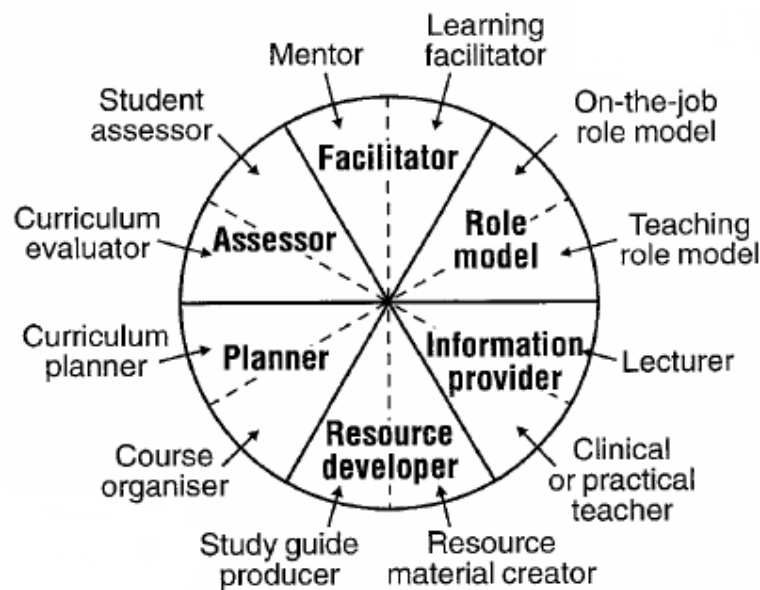
These roles emerged from an extensive review of the literature, medical education texts, and an analysis of medical student diaries. They grouped these 12 roles into six areas of activity: (1) an **information provider** in the lecture and in the clinical context; (2) a **role model** on-the-job and in more formal teaching settings; (3) a **facilitator** as a mentor and learning facilitator; (4) a student **assessor** and curriculum evaluator; (5) a curriculum and course **planner**; and (6) a **resource developer** as material creator and study guide producer.

The facilitator roles merit further explanation because the term mentor has many interpretations. In this context, a learning facilitator provides and structures appropriate learning opportunities, particularly in the clinical setting. The facilitator as mentor is more of a personal advisor or tutor.

Harden and Crosby (2000) validated their 12 roles by administering a questionnaire to 251 teachers at a single medical school. They asked these teachers to rate the relevance of each role within the medical school (on a five-point Likert scale, 1 as low and 5 as high). All the roles were rated as important, with mean scores varying from 3.5 to 4.2. The highest ranked roles were 'clinical or practical teacher' (4.2), 'on-the-job role model' (4.2), 'course organiser' (3.9) and 'student assessor' (3.9). These ratings related to the teaching of undergraduate students within a medical school. However, do these findings extrapolate to postgraduate training? For example, in the postgraduate arena few trainers and even fewer trainees would be involved in course organisation, which was rated as an important role by the undergraduate medical teachers.

These roles also relate to trainees because they need to become competent teachers as part of their training programme (Donaldson, 2002; Department of Health, 2003; Four UK Health Departments, 2004). All postgraduate doctors need to learn to teach, be involved in teaching, and have their teaching competency assessed in the workplace as teaching is now included in the curriculum for the first two years of postgraduate medical training (Foundation Programme Committee, 2005, p.29). It is expected that the young doctor:

> *'Understands principles of educational method and undertakes teaching of medical trainees, and other health and social care workers*
>
> *• demonstrates an understanding of how adults learn*
>
> *• supports and facilitates the learning of other students and trainees*

• is willing and able to undertake teaching of students and other healthcare trainees in a one-to-one setting

• demonstrates appropriate preparation for teaching

• is willing and able to undertake a presentation to a small group, using a variety of teaching materials

• demonstrates a learner-centred approach.'

The inclusion of teaching competencies at this early stage of a doctor's career has helped to raise the profile of teaching.

The curriculum for anaesthetic training also includes teaching and education (Royal College of Anaesthetists, 2007b; 2007c). This includes the competencies of planning teaching, small group teaching, preparing and delivering lectures, supervising more junior colleagues and giving feedback. However, there is no requirement for the formal assessment of these competencies other than a certificate of attendance at a TTT course.

Before considering the effectiveness of TTT courses I explore the characteristics of ineffective and excellent teaching.

2.3.3   Clinical teaching

2.3.3.1 Ineffective teaching

The quality of medical teaching varies on a continuum from poor to excellent. At the worst end, humiliation, bullying, or harassment encompasses all the characteristics of bad teaching. This type of behaviour, in respect of learners, does not deserve the label of teaching. However, as illustrated below, the students perceive this behaviour as 'bad teaching'. Some of the features of these behaviours may be attributed to teachers' lack of awareness of educational skills and knowledge (Lowry, 1992; 1993), compounded by an inability to promote a good supportive educational climate for trainees in which to learn (SCOPME, 1992; 1994a).

There are, sadly, many examples in the literature of bullying and harassment of trainees and medical students. Such studies show the practice is widespread, and on the individual level, illustrate the destructive nature of bullying and harassment. Wolf et al. (1991) carried out a questionnaire study when 87 out of 143 medical students responded, in the Louisiana State University School of Medicine, and 98.9% reported mistreatment, with shouting and humiliation being most frequent. Over half this sample, mainly the females reported sexual harassment. There was a high number of remarks degrading doctors and medicine as a profession.

In Manchester, Guthrie et al. (1995) used a postal questionnaire to measure the psychological morbidity, nature and sources of stress in 204 first year medical students. Half the students reported a least one stressful incident, most of which related to medical training and the styles of medical teaching. They described being upset by the attitudes of tutors, including humiliation, shouting, ridicule, exposure of ignorance, and a confrontational nature. Metcalfe and Matharu (1995) used a postal questionnaire to study medical students, also in Manchester, to investigate their perceptions of good and poor teaching. They randomly selected 20% of the students with a response rate of 147 out of 223. Examples of good teaching were when there was active learning and teachers let students 'run the session'. Poor teaching examples related mainly to bad behaviour of teachers towards students, such as humiliation, sexism, and ridicule.

In the 21st century, are all these problems behind us? The answer is probably no. The medical literature still reports bullying and harassment. An anonymous author (2001) described repeated bullying of a junior surgeon by a consultant. A questionnaire study by Quine (2002) of junior doctors reported such behaviours are still common. Thirty seven percent of 594 doctors identified they were bullied in the previous year, and 84% had experienced one or

more bullying behaviours. Black and Asian doctors fared worse than white doctors, and women fared worse than men. The commonest bullying strategies were attempts to belittle and undermine work, unjustified criticism, humiliation in front of colleagues and intimidatory use of discipline and competence procedures.

Musselman et al. (2005) explored the reasons for bullying within surgical training. They found that surgeons did acknowledge intimidation and harassment, and gave harrowing examples. The authors considered that intimidation and harassment were not isolated events but were part of '...*an ongoing powerful cycle that is deeply rooted, endemic and affects all levels of practitioner.'*(Musselman et al., 2005, p.926) They identified four thematic categories: the context of the behaviour, the characteristics of the behaviour, the outcomes related to the behaviour, and the reason for the behaviour. While intimidation and harassment were usually negative, many of the surgeons felt their behaviour was acceptable and rationalised it by claiming it was in the interest of patient safety.

One editorial called for an end to a culture of bullying which, was argued, set in place a self perpetuating culture of abuse, in which the victims become the perpetrators in the next round (Spencer and Lennard, 2005). They suggested the teaching the teachers movement should encourage teaching based on sound educational principles. This, they argued, should be combined with monitoring of teachers' performances and assessment by the whole team, not just the trainees' consultants, who appeared to be the main perpetrators of abuse. A national UK survey (PMETB, 2007b) reported that 10.5% of trainees (n = 23,198) reported being subjected to persistent behaviour in their current post that undermined their professional confidence and/or self-esteem.

The features of poor teaching exhibited in bullying and harassment do need an interaction between the learner and the teacher. The main opportunities for these interactions occur when

in the teaching roles of facilitator, role model or information provider (Harden and Crosby, 2000).

2.3.3.2 Good or excellent teaching

Much of the literature relating to clinical teaching is descriptive of how various individuals, groups, or institutions teach their students. Some papers look specifically at the how learners characterise good and poor teachers. This section considers the similarities and differences between undergraduate and postgraduate learners.

Undergraduates

Irby (1978) provided early empirical data about clinical teaching in the USA. He emphasised the difficulty of using standardised classroom rating forms for assessing good clinical teaching because of the unique aspects of clinical instruction. He reviewed the literature and identified seven elements of teaching: organisation/clarity, group instructional skill, enthusiasm/stimulation, knowledge, clinical supervision, clinical competence, and modelling professional characteristics. He validated these elements by using a sample of 160 undergraduates, postgraduates, and teachers taken from a single medical school, by random selection from 480 in the total population. They scored the characteristics of good and poor teachers. The results demonstrated that the first six elements could be used to distinguish good from bad teachers. The seventh element, modelling, did not distinguish and so was subsumed into group instructional skill, which they felt to be a global perception of the clinical teacher's ability. He did not report whether there were differences between undergraduates and postgraduates. He summarised the difference between best and worst clinical teachers as follows:

> *'Respondents described best clinical teachers as being enthusiastic, clear, and well organised in presenting material and skilful in interactions with students/residents. Worst*

clinical teachers lacked these skills and were characterised by their personal attributes.'
(Irby, 1978, p.813)

Metcalfe and Matharu (1995) separated good and poor undergraduate teaching into three domains: interpersonal behaviour of teachers, planning and preparation, and their ability to run a teaching session well. In particular, they found clinical interactive teaching, such as ward rounds, generated more positive reports than lectures or practicals. A key finding was how much the quality of the teachers varied, from excellent to appalling.

McLean (2001) used in-depth interviews with second year undergraduates to describe teaching characteristics. The most important attribute of a teacher was to be a good communicator in relation to the learner. In addition, the findings demonstrated they should be friendly, approachable, and able to relate to learners. Some valued the attributes of enthusiasm and knowledge. Steinert et al. (2004) also reported the importance of the personal attributes when teaching small groups. As part of this, teachers needed to develop a non-threatening atmosphere and provide clinically relevant materials.

A group of third year undergraduates highly rated those teachers who treated students with respect, inspired confidence in their medical skills, explained their decisions and provided a role model (Elnicki et al., 2003). They also valued those who allowed learners the opportunity to improve their clinical skills, practice ethical medicine and encouraged evidence based practice.

Undergraduates on a surgical attachment felt an important aspect was to be observed interacting with patients and to receive constructive feedback (van der Hem-Stokroos et al., 2003). These students valued their on-call duties, providing they were fully involved in patient care, assisting in the OR, writing medical reports, and presenting cases. A further group of undergraduates, while in the OR, identified the importance of the surgeon's attitude

as a positive role model and an environment that was conducive to learning (Schwind et al., 2004). These students reported there needed to be sufficient quantity as well as the quality of the interactions.

One group of undergraduates, as they left medical school, ranked the role of the teacher more highly than those of physician or supervisor (Paukert and Richards, 2000). While Stern et al. (2000) reported a positive correlation between the undergraduates' rating of their teachers and a knowledge test score. From this, they concluded that a good faculty increases learning. This conclusion needs cautious viewing because the teaching quality was assessed using a single global rating. Furthermore, it was not clear if the undergraduates knew their test scores before rating their teachers. When this comparison was repeated for postgraduate trainees, with the same teachers, no such correlation was present. Despite these reservations, the study did suggest that good teaching improves learning.

These papers looking at undergraduate perceptions of good teaching related to the roles of facilitator, role model and information provider (Harden and Crosby, 2000). In the facilitator role the main area of importance was that as a learning facilitator where the teacher provided and structured their learning opportunities. The undergraduates did not seem to attach as much importance to the mentoring role. There was an expectation that there needed to be good teaching in both the classroom and the clinical arenas. There was a suggestion that as the undergraduates began to spend more time in the workplace of clinical medicine, then clinical teaching became more important than classroom based teaching.

When considering role modelling, the undergraduates rated these aspects of the teaching role model more highly than the on-the-job role. The relative importance of the teacher and learning facilitator may relate to the way the reported medical courses were constructed. The courses were initially in the classrooms and mainly teacher led. As they progress into the

clinical arena the emphasis shifted to learning in the workplace. However, there remained a degree of control of their experiences by their teachers. They were reliant on their teachers to guide them through the complexities of the clinical arena.

Postgraduates

Do postgraduate learners desire different characteristics in their teachers?

Irby and Rakestraw (1981) identified four main elements to good teaching for obstetric and gynaecology postgraduates. These were in contrast to the seven elements Irby (1978) had described earlier for a cross section of both undergraduates and postgraduates. The four elements were supervisory skills, which included providing direction, feedback and actively involving students and accessibility; knowledge and clarity, which included incorporating being knowledgeable and clear/organised; interpersonal relationship, which included establishing rapport and being enthusiastic and stimulating; and demonstrating clinical skills.

Matthews (2000) described four key roles for teachers of postgraduates: behaviour towards patients, behaviour towards junior colleagues, effective presentation of content, and encouragement to take part in patient care.

Cox and Swanson (2002) looked at the teaching delivery of a group of 16 surgeons in a single institution longitudinally over five years. The postgraduate trainees rated the surgeons' teaching in the OR and clinics. In the OR, the discriminating features between superior and mediocre teaching were 'demonstrates sensitivity to resident learning needs' and 'provides direct feedback'. For clinic teaching, it was 'gives residents positive reinforcement' and 'provides direct feedback'. In the free comments, three themes emerged for superior teaching. Firstly, they demonstrated surgical expertise and up to date knowledge. Secondly, they allowed and encouraged resident participation. Thirdly, they supported a good learning

environment. While not explicitly stated, the implication was that the ratings, by the trainees, of individual surgeons, informed decisions on their promotion. This was interesting because the ratings of individual surgeons, as mediocre or superior, did not change over the five-year study period.

Ramani et al. (2003) looked at the characteristics of good teachers from a different viewpoint. They explored the barriers to delivering bedside teaching using focus groups of experienced clinical teachers, both trainers and trainees. Several themes emerged. Firstly, there was a general decline in skills at bedside teaching. Secondly, bedside teaching had an aura that only 'master clinicians' can deliver. As a result, clinicians, who did not view themselves as masters, preferred to teach in the classroom where they had more control. Thirdly, teaching was valued less than clinical or research activities, which led to a general erosion of the teaching ethic. There was little incentive to develop excellence in bedside teaching. They also suggested some areas needed addressing such as an emphasis on bedside teaching skills, setting the learning environment, and improving the value of teaching.

These papers on postgraduate views of good teaching relate to the same areas of activity as undergraduates namely; facilitator, role model and information provider (Harden and Crosby, 2000). Within the facilitator role, the postgraduates valued the one-to-one interactions within the workplace, particularly the surgical trainees. It was important for them to be valued as clinicians and to receive direct feedback on their clinical work. Thus, the more these young doctors became involved in direct clinical care of patients, the more they valued the direct interaction with excellent clinicians. This is in line with the progress from newcomer to old-timer (Lave and Wenger, 1991) as described for legitimate peripheral participation (section 2.2.2.3). It also illustrates that the educational requirements of the doctors in training change as they progress towards fuller participation in their community of practice.

As information providers, the postgraduates placed much more importance on the clinical and practical aspects of teaching than on the classroom. However, this was countered by some teachers being more comfortable in the classroom than at the bedside (Ramani et al., 2003). A theme more prominent amongst the postgraduates was that the teaching should relate directly to patient care. This theme reflected the postgraduates' expectation that their teachers should be role models more as doctors than as teachers. There was a suggestion that the undergraduates were increasing the importance they attached to their teachers as role models as good doctors towards the end of their training. Perhaps this related to the undergraduates moving from the novice in a new community of practice, namely medicine, to an appreciation of the relevance of workplace learning as they became involved in real patient care and become legitimate participants.

The complexities surrounding the perceptions of what makes good teachers is extended further when considering self assessment by the teachers. O'Byrne (1988) described his personal experiences of being rated as a 'poor teacher' by a group of trainees when lecturing. The key issue here was that he thought he was teaching well. He had recently completed a four day training workshop and applied what he had been taught. After a degree of soul searching and discussion with his wife, an experienced qualified teacher, he identified his main problem as a lack of practical teaching experience. Just following the instructions from the course was not enough. He modified his teaching in light of the critiques from his students and his ratings dramatically improved.

Further evidence of the difficulty of self assessment in this area is described by Finucane et al. (1995). In their survey of experienced medical teachers, the majority rated their own teaching skills highly despite few having undergone recent training. In addition, while they felt that formal training could improve teaching, a third of respondents would not wish to participate.

In summary, the attributes or characteristics of a good teacher seem to depend on the learners' perceptions and their status as undergraduates or postgraduates. As circumstances change over time, different characteristics of teachers take prime position. The main roles that learners expect of their teachers fall into their functions as facilitator, role model, and information provider. However, the other roles, of resource developer, planner, and assessor are still important to underpin the structure and consistent delivery of the teaching.

2.4 Teaching doctors to teach

2.4.1 Overview

An aim of the development of TTT courses has been to improve medical teaching and, by implication, patient care. However, there have been variable approaches to the development and evaluation of the effectiveness of TTT courses. Bing-You and Tooker (1993) surveyed the prevalence of TTT courses for 428 internal medicine programmes within the USA. There was a 60% response rate from 256 programmes, which reported only 51 had any form of TTT for trainees. There was no consistency in the content (curriculum). The courses covered various topics: evaluation/feedback (86%), teacher behaviour (78%), leader skills (74%), and learning styles (59%). Only seven of the 51 TTT courses undertook any form of long term follow up of the effectiveness and this was not reported. This lack of evaluation of the TTT courses was confirmed by a further review by Steinert (2000).

An interesting aspect of TTT courses is the lack of stated objectives for many courses or the adherence to a stated curriculum. Many of the courses do not report undertaking educational needs assessments before setting up their courses. Perhaps this lack of attention to educational principles, when designing courses, may go some way to explain why courses have not had their outcomes rigorously assessed. The variety of intentions and content of the different courses have added to the difficulty of making direct comparisons of outcomes. For example,

Gray (1982) described the introduction of TTT for general practitioners (GP) within the UK. This took the form of workshops with four main functions. These were to give support to the trainers, develop their teaching techniques, set clinical standards and to help with the administration and management of trainees. This development took place against a backdrop of GPs who were novices as far as supervising trainees. This evolution of TTT has been different in hospital practice where the majority of consultants, trainers, have had some experience of trainees at least since the 1960s (Rhodes, 1981).

There have been several studies since 2000 which have tried to identify core curriculum themes for TTT. Wall and McAleer (2000) sought the views of consultants and trainees using a multimodal approach including interviews, questionnaires and analysis of then current TTT courses. They identified five main themes for inclusion in TTT courses; learning how to give constructive feedback, keeping up to date as a teacher, building a good educational climate, assessing the trainee and their learning needs. Gibson and Campbell (2000) surveyed a group of consultant teachers and refined their findings using focus groups. They recommended that the priority areas were basic teaching skills, appraisal, assessment, and how to give feedback. They felt that these could be best delivered through small one or two day courses tailored to the needs of the attendees. Busari et al. (2002) explored the views of the trainees using interviews. They felt there was a need for teaching basic teaching skills. They suggested this be delivered by a combination of literature on teaching, workshops and feedback on their teaching. McLeod et al. (2003) involved 14 non-clinician educational experts using a Delphi technique and identified four core themes. These included the principles of curriculum, how adults learn, helping adults learn and assessment.

There were areas of commonality such as basic teaching skills, feedback and assessment. However, their suggestions were broad and while they could form the basis for a 'course'

there was no guidance on the relative importance of the themes. Nor were there suggestions on the depth or specifics of what should be taught.

The main approach to improving how doctors teach has been to try to improve their knowledge and beliefs about education by designing stand alone courses. In the next section I explore some alternative approaches suggested from the literature on teacher development.

2.4.2   Models of teacher development

An underlying approach to developing these TTT courses has been the use of a linear model to improve teaching (Figure 5). The premise is that the doctors receive training in how to teach with the aim of changing their knowledge and beliefs. This change is then expected to improve their learners' outcomes and thus the teachers learn to modify the way they teach.

Figure 5 Linear teaching model
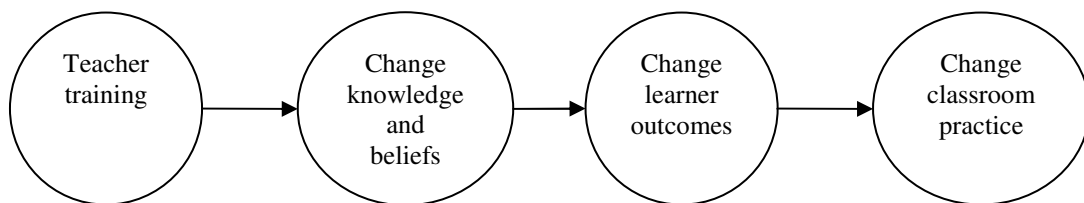
Guskey (1986) considers that staff development programmes within teaching are all about systematic attempts to bring about change. He suggest that the linear model does not work. He presents a different model of what might be effective (Figure 6). The various components of the model are essentially the same as the earlier linear model. This is based on the premise that staff development programmes will only produce changes in the teacher's beliefs and attitudes after changes in student outcomes are evident. The outcomes result from changes in the classroom practice. Practices that work then become retained and those that do not work are rejected.

Figure 6 Modified linear teaching model
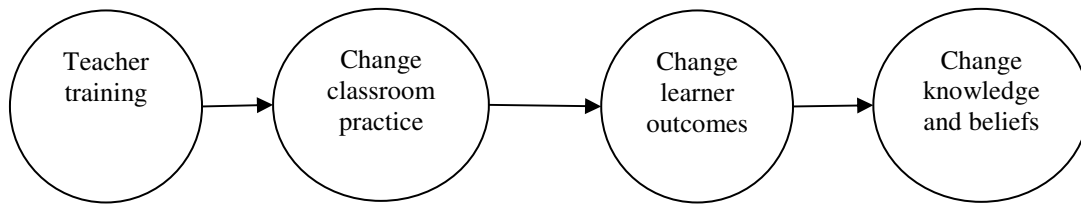
Clarke and Hollingsworth (2002, p.948) consider that these linear models have resulted in

ineffective 'deficit' training:

> *'The clear ineffectiveness of attempts to effect teacher change through professional*
> *development programmes based on the deficit-training-mastery model has provided the*
> *impetus for much research related to the process of change and professional development*
> *in recent years.'*

They feel that the way teachers learn or are taught how to improve their teaching is more

complex than can be represented in a linear model. They suggest four domains, which are

similar to the four sections of the linear model. These domains are related by enactment and

reflection. Their domains are (with Guskey's (1986) equivalent in brackets):

- External domain – external source of information or stimulus (teacher training).

- Personal domain – knowledge, beliefs and attitudes of the individual teacher
  (knowledge and beliefs).

- Practice domain – where professional experimentation takes place (classroom).

- Domain of consequence (outcome) – salient outcomes of the change (learner
  outcomes).

They use the word enaction to describe when a new idea or belief is put into action. They go

on to consider how this model can be developed to stimulate changes, and to foster these into

growth networks. The meaning of networks is concerned with how the individual puts the

sequences of growth together. This is brought together in Figure 7 which, as can be seen, is more complex than the linear models.

Figure 7 Interconnected model of professional growth

External
domain

Personal
domain

Practice
domain

Outcome
domain

Enactment

Reflection
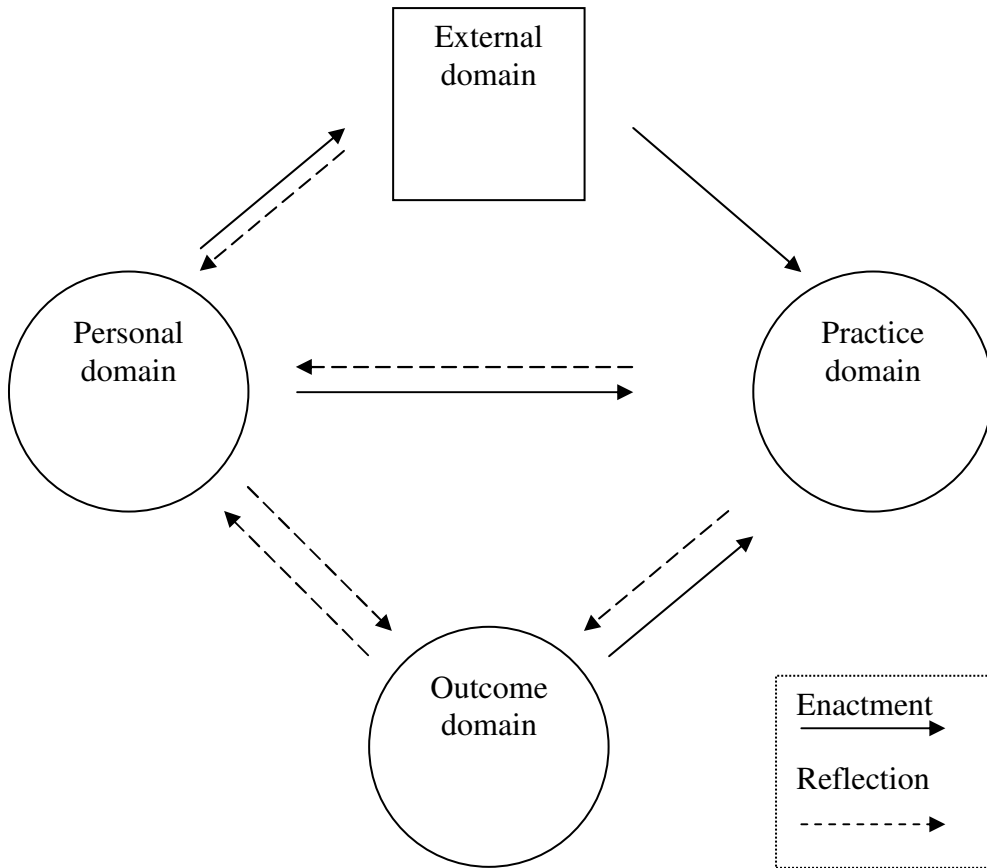
This complexity can be understood by giving an illustration. This example starts in the external domain with an educational intervention e.g. the teacher's attendance at a course which emphasises the positive impact of one-to-one feedback. As a consequence the teacher changes their teaching practice e.g. how they give feedback. This has an effect on outcomes e.g. their learner's results improve, which the teacher recognises as an improvement. This alters aspects of their personal domain, such as their beliefs e.g. the impact of one-to-one feedback. This change is then accepted by the teacher and then feeds back to their practice domain and the cycle continues. This is further complicated because personal beliefs and attitudes will affect which changes are seen as 'improvements'.

A further approach is given by Shulman and Shulman (2004) and shown in Figure 8.They describe a theoretical model for how teachers develop. While there is no empirical evidence, it does relate to a larger project they were involved in 'Fostering a Community of Learners' in the USA. They emphasise the importance of the teacher being ready to learn from their teaching experiences:

> *'An accomplished teacher is a member of a professional community who is ready, willing and able to teach and to learn from his or her teaching experiences.' (Shulman and Shulman, 2004, p.256)*

Figure 8 Model of teacher development (Shulman and Shulman, 2004)
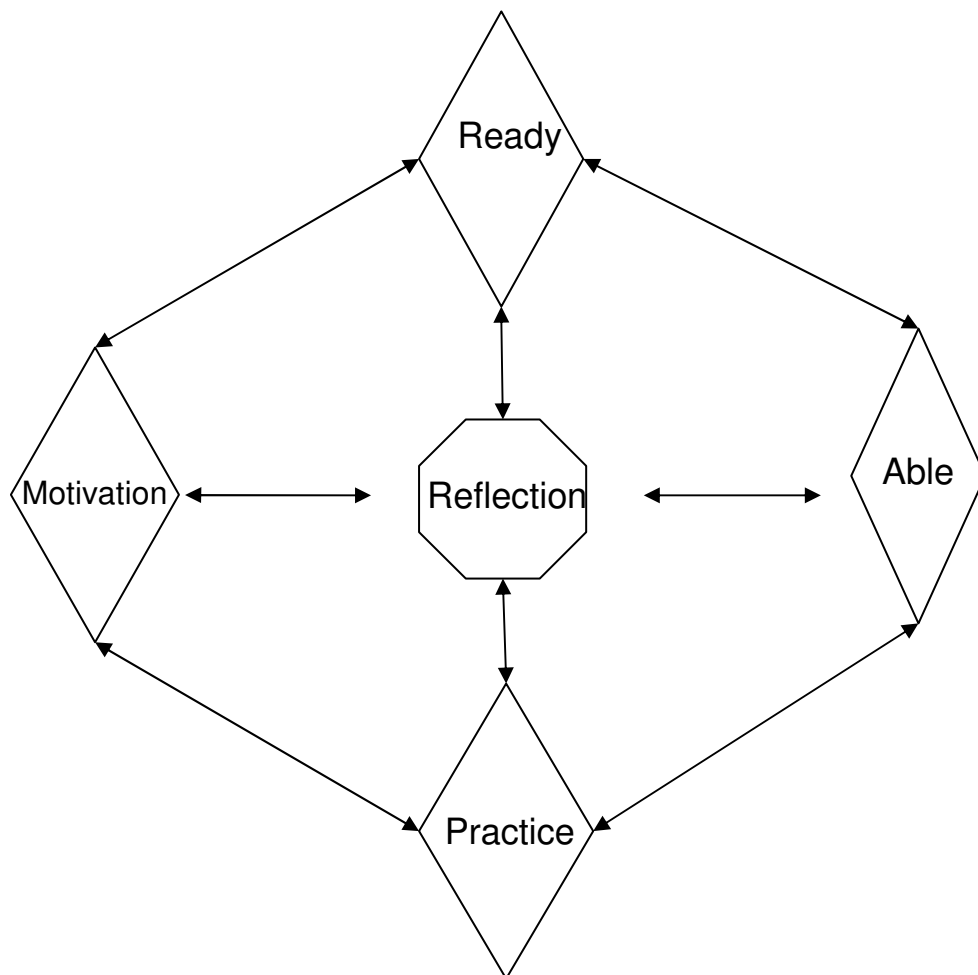
This model accepts that teachers, who need to improve, are already teaching as is the case with doctors. Shulman and Shulman (2004) acknowledge the importance of the teacher recognising the need to change and being motivated to make changes. The early TTT courses

tended to be attended by motivated and interested individuals and they would likely have met these criteria. However, as teaching became a requirement for all doctors, more attention needed to be given to consideration of preparing and encouraging doctors to improve their teaching.

Before exploring the effectiveness of the TTT courses that have already been developed, the next section considers the challenges of deciding what constitutes evidence of effectiveness of educational interventions.

2.5 What constitutes evidence?

As we saw in the introduction, SCOPME (1992) has acted as a catalyst to the development of courses aimed at improving doctors as teachers within the UK. SCOPME also emphasised the importance of evaluating the effectiveness of the courses. These evaluations need to provide evidence of the effectiveness of the courses. This evidence should be robust and of sufficient quality to convince the medical profession and other stakeholders, such as the patients, the politicians and the employers. However, there are challenges to being clear about what constitutes evidence. Belfield et al. (2001, p.164) reviewed 305 abstracts looking at the levels of evidence for the effectiveness of various educational interventions. One of their main conclusions was: *'…there is considerable ambiguity over what constitutes an effectiveness measure'*. Gough (2007, p.214) also acknowledged the challenge and importance of being clear about what constitutes evidence. He considered it in the context of enabling constructive debates on the judgements made using evidence:

> *'Being specific about what we know and how we know it requires us to become clearer about the nature of the evaluative judgements we are making about the questions that we are asking, the evidence we select, and the manner in which we appraise and use it.'* *(Gough, 2007, p.214)*

In order to explore what might constitute convincing evidence, this section starts by looking at how doctors view and use evidence in their medical practice. The principles of evidence based medicine are considered together with how evidence based education and best evidence medical education have evolved. The measures used to grade the quality of evidence, as it applies to TTT courses described in the literature, are explored.

Doctors are the main teachers of doctors. These doctors try to use the best evidence available to guide and inform their clinical practice and patient treatment. However, Petersen (1999) suggests these same doctors do not accord similar importance to using evidence when educating our future doctors. Thus, in his view, the role of the medical education leaders is:

> *'…to convince their colleagues that the evidence base is as important in educating new doctors as it is in assessing a new chemotherapy.' (Petersen, 1999, p.1223)*

If evidence is the way to encourage doctors to change their teaching practice, that evidence must be robust and understandable. Unless the evidence is convincing they will have good cause to ignore it. This is a challenge.

Doctors are required under their registration with the GMC (2006, p.3)*'…to provide effective treatments based on the best evidence available'*. Implicit in this requirement is the ability to analyse evidence critically. The Cochrane library has systematic reviews of many medical topics that are freely and easily accessible. In contrast, the evidence for medical education is difficult to find and there are few systematic reviews available. Furthermore, much of the research methodology used in education is unfamiliar to doctors. Encouraging doctors to accept the evidence from unfamiliar methodologies is an added challenge.

The next section reviews what doctors consider as evidence within their clinical practice taking a lead from Sackett (1996) using the Cochrane collaboration (Clarke and Langhorne, 2001). It traces the Best Evidence Medical Education movement from its inception (Harden et

al., 1999). These findings shape the study design, which is described in the next chapter. The importance of addressing the quality of evidence, in these terms, will facilitate scrutiny by others.

2.5.1   Evidence based medicine

'Evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research.' (Sackett et al., 1996, p.71)

These principles set the background for the establishment of evidence based medicine (EBM). A key issue within this move towards more EBM has been the systematic defining of what constitutes evidence. The medical profession has its roots within the natural sciences so scientific evidence rates highly with the pinnacle of evidence being the randomised control trial (RCT).

A major influence in promoting the use of EBM was the foundation of the Cochrane collaboration in 1993 (Cochrane Collaboration, 2005). Their main product is the Cochrane Database of Systematic Reviews published quarterly as part of The Cochrane Library. These reviews are easily accessible through the internet and enable busy clinicians to have reliable synopses of current best evidence on a variety of healthcare interventions without them having to search for the evidence themselves. Part of the attraction of using these systematic reviews and their evidence is that the methodology and criteria for grading the quality of evidence are transparent, objective and agreed.

An example of the criteria used for grading evidence is that used by the Scottish Intercollegiate Guidelines Network. Their criteria are headed by high quality meta analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias (Scottish Intercollegiate Guidelines Network, 2001).

Table 3 Cochrane classification of evidence

Levels of evidence	
1++	High quality meta analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well conducted meta analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
1 -	Meta analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
2++	High quality systematic reviews of case-control or cohort or studies High quality case-control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal
2+	Well conducted case control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal
2 -	Case control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion

In 2001 there were more than 6,000 people in more than 60 countries world wide working on these reviews (Clarke and Langhorne, 2001). However, a word of warning is necessary. An assessment of some of the Cochrane reviews from 1998 raised concerns. Fifty three published reviews were re-examined and major problems were identified in 29% (Olsen et al., 2001). The three areas of concern were that the evidence did not support the conclusions; the conduct of the review was unsatisfactory; or that there were stylistic concerns. The lessons learnt from these earlier reviews have improved the quality control. It is reassuring that it was possible to access the data and reproduce the methodology used by previous reviewers.

2.5.2   Evidence based education

In response to the success of the Cochrane collaboration, the setting up of an equivalent group for 'crime and justice', 'education' and 'social welfare' was discussed at an exploratory meeting at University College London in July 1999. The result was the establishment of the

Campbell Collaboration at a meeting at the University of Pennsylvania on February 24-25, 2000. The Campbell Collaboration website (Campbell Collaboration, 2007) sets out their aims and aspirations:

> *'The systematic reviews of research evidence prepared and maintained by contributors to the Campbell Collaboration's Review Groups will be designed to meet the needs of those with a strong interest in high quality evidence on "what works"… Campbell systematic reviews will be published electronically.'*

While this group have developed their approach to systematic reviews and the use of evidence, there have been discussions in the education literature as to some of the potential difficulties (Evans and Benefield, 2001). Davies (1999, p.114) raised an area of concern on deciding what constitutes evidence:

> *'A key issue in developing evidence-based education, and evidence based health care, is the uncertainty as to what counts as evidence.'*

Despite these reservations, there is increasing support for developing evidence based education.

2.5.3 Best evidence medical education

Around the same time as the Campbell collaboration was being established a similar approach was developed for medical education. This evolved to form Best Evidence Medical Education (BEME) and applies the same principles to medical education as EBM does to clinical practice.

> *'Best evidence medical education (BEME) is the implementation, by teachers in their practice, of methods and approaches to education based on the best evidence available.' (Harden et al., 1999, p.553)*

A public discussion of the idea to form a BEME collaboration group, similar to the Cochrane, took place at the international Association of Medical Education in Europe (AMEE) meeting in 1998. After further discussions at AMEE 1999, an inaugural meeting took place in London in December 1999. This has resulted in the BEME collaboration making recommendations on

how to search the literature, how to grade the evidence (BEME, 2007) and how to conduct systematic reviews (Haig and Dozier, 2003a; 2003b). They also act as a conduit for setting up new review groups. There is a link between the Campbell and the BEME collaboration groups to avoid duplication of efforts.

A number of challenges were faced at the outset of BEME. The evidence can be difficult to find because the education databases are not as well established as the medical databases, such as Medline. In addition, much of the material is located in specialist journals, which are not on the regular reading list of practicing clinicians. The methodologies used in education research tend to be more varied and often qualitative in design and RCTs are uncommon. The doctors are less familiar with these types of studies and may be suspicious of their worth. In addressing these challenges the evidence needs grading in a consistent, transparent, and robust manner.

It is now clear there is movement to base educational interventions in medicine on the best evidence available. However, the BEME collaboration is still in its infancy in comparison to Cochrane. The development of what constitutes evidence for effectiveness of educational interventions is ongoing and needs to be taken account of while undertaking this study. I will return to the evidence underpinning TTT development in section 2.5.9.

2.5.4   BEME first review

The challenge of grading evidence was shown in the first systematic review published under the auspices of BEME (Aspegren, 1999). The criteria used in this review were different to those later proposed by BEME. Presumably, this was because he had completed this review before the BEME recommendations were available. He used three criteria: internal validity (bias control), precision, and external validity taken from a proposal made by Sanson-Fisher et al. (1981). He graded each article from one (good) to three (poor). He then rated any article

that scored grade one in all categories as 'high quality'. An article scoring a three in any category he rated 'low quality' and the remainder as 'medium quality'. He eliminated articles of low quality from further analysis. On this basis, he selected 93 articles for review out of 180 found through the selection procedure. A single author produced this review and while the steps are clear, there was no external check on his analysis. This is at variance with the Cochrane Collaboration principles where group consensus and discussion is integral to their process. However, Aspegren's (1999) review was undertaken at the same time as the BEME 'ground rules' were under development.

2.5.5 BEME grading of evidence

The inaugural article formally launching the BEME collaboration concentrated on the challenge of grading the evidence (Harden et al., 1999). They suggested that the evidence used to guide teachers varied from unsubstantiated personal opinion to high quality peer reviewed research. Unlike the Cochrane Collaboration there was no agreed schema for grading the quality of evidence available within education. This made it difficult to compare and judge the worth of different studies. The authors suggested a scheme (Table 4) of grading evidence, which is similar to one used within EBM (Scottish Intercollegiate Guidelines Network, 2001).

Table 4 Initial BEME grading of evidence

Grade of evidence	Evidence based on…
0	None
1	Professional judgement
2	Educational principles
3	Experience
4	Consensus views built on experience
5	Studies in a comparable but not identical area
6	Well-designed non-experimental studies
7	Well-designed quasi-experimental studies
8	Well-designed controlled studies

However, when they tried to apply this scheme they found it difficult. They felt part of the problem was using a unidimensional approach to a multidimensional problem. They proposed a multidimensional scale using the acronym QUESTS which is spread across six dimensions (Table 5). Each dimension has its continuum from low to high.

Table 5 QUESTS dimensions for evaluating evidence in educational practice (Harden et al., 1999, p.555)

Quality	How good is the evidence?
Utility	To what extent can the method be transferred and adopted without modification?
Extent	What is the extent of the evidence?
Strength	How strong is the evidence?
Target	What is the target? What is being measured? How valid is the evidence?
Setting	How close does the context or setting approximate? How relevant is the evidence? *[are the findings transferable from the study location and context into world of the reader]*

The Quality dimension looks at the type of study. It includes the interplay between the method used, its suitability, reliability and the circumstance in which it is used. For example, a well conducted and carefully documented case study can be 'better' than a poorly conducted randomised controlled trial. The Utility dimension looks at transferability from the original description into a new situation. For example, the introduction of problem based learning curriculum without having trained supervisors. The Extent dimension looks at whether the evidence comes from a single source. For example, data from a single small institution is likely to be less robust than data from several larger institutions. The Strength dimension relates mainly to comparative studies when statistics are used. The Setting dimension takes account of the context where the study took place. As teaching and learning take place in a variety of different locations and environments this dimension takes account of the transferability of findings from one arena to another. For example, could the success of an e-

learning package for first year medical students be applied to the continuing professional development of experienced physicians? Are resuscitation skills, learnt in the clinical skills laboratory directly transferable into workplace?

The Target dimension aims to assess the relevance of the evidence when applied in the specific world of individual teachers. Harden et al. (1999, p.559) suggest this is the most important of the dimensions because it is *'…the quality of the benefit that matters.'* While the other dimensions are important, if the research does not address valid outcomes for teachers in the real world, then it is irrelevant. They suggest the target dimension can be graded by the application of the hierarchy described by Kirkpatrick (1967). This hierarchy has been refined and modified by them and subsequent BEME publications (Issenberg et al., 2005; Steinert et al., 2006; BEME, 2007). However, these refinements have changed the meanings and interpretation of some of the levels and may lead to confusion. The importance of these modifications is that they demonstrate an awareness of the emerging difficulties and tensions of being clear about what constitutes evidence. The next section will explore the various modifications that have evolved, starting with the original.

2.5.6   Kirkpatrick hierarchy

Kirkpatrick (1967, p.88) realised the importance of evaluating the effectiveness of training programmes within industry. He saw the purpose of evaluation was *'…to determine the effectiveness of a training programme.'* However, he went on to emphasise that this definition was meaningless until one states: *'In terms of what?'* He suggested effectiveness could be evaluated using the four steps of reaction, learning, behaviour, and results (Table 6).

Table 6 Evaluation steps (Kirkpatrick, 1967)

Step 1	Reaction	How well did the conferees like the programme?
Step 2	Learning	What principles, facts, and techniques were learned?
Step 3	Behaviour	What changes in job behaviour resulted from the programme?
Step 4	Results	What were the tangible results of the programme in terms of reduced cost, improved quality, improved quantity, etc?

Evaluation of reaction was concerned with the participants' views of the event or course. This gave a measure of their 'happiness index'. The assumption was that happy participants were more likely to learn than unhappy ones. The next step was to get some measure of what the learners understood or learnt. One approach could be to use before and after measurements, preferably set against specific objectives. The third step was to measure how the learner's on-the-job behaviour changed at work. This was much more challenging than steps 1 and 2. The fourth step was concerned with measuring tangible results. In industry, these might include aspects such as increased production, reduced cost, or decreased accidents.

Belfield at al. (2001) modified Kirkpatrick's stages to include a fifth lower level, that of participation (number and type of participants) As the first stage in any learning has to be an engagement with the learner, I have included this participation level in my analysis of the literature on TTT evaluations.

Before exploring the BEME modifications of Kirkpatrick I review some of the TTT literature as an illustration of how the hierarchy can be applied in practice using the modification suggested by Belfield et al. (2001). In addition it has helped to develop a structured approach to evaluating a widely variable and disparate set of papers.

2.5.7   Kirkpatrick applied to TTT literature

The first steps of participation, reaction, learning and behaviour, can be applied to the evaluation of medical TTT courses with little modification. The results step is rather more

complicated. It depends on how one defines tangible results. I suggest that the ultimate purpose of medical education is to educate doctors to become and remain competent to deliver care to patients. Therefore, in the current context the result requires a demonstrable link between TTT and an impact on patient care. An alternative and more narrow interpretation of a result could be to demonstrate an improvement in the way doctors teach other doctors. If we return to Kirkpatrick, he was evaluating results within industry and clearly expected tangible results for the employer. This is one of the challenges associated with evaluating medical education. In order to accommodate these views of results I propose that there should be an acknowledgement that providing better 'doctors as teachers' might be linked to patient care.

In order to place Kirkpatrick in the context of medical education and TTT courses, I illustrate each of the levels of evaluation with a selection of papers. While the schema suggested by Kirkpatrick is simple and thus attractive, determining the level of each study is less straightforward. The reason for this lies in the descriptors for each level not being explicit. For example, is it enough for the participants to say that they have learnt? Can we accept that participants have changed their behaviour if there is no independent confirmation? As in many schema that appear simple, the devil is in the detail when one actually tries to apply it.

The following section will help to build a picture of the extent of the literature available with respect to TTT. The papers have been selected to illustrate the variety and breath of information available and are not exhaustive. In addition it addresses some of the challenges posed when comparing and contrasting studies that use different methodologies, methods and approaches to analysis.

Participation

The literature has many papers which describe how various authors and institutions have set up courses for TTT. Morrison and Hafler (2000) described personal views and a historical basis to the evolution of TTT courses. Wipf et al. (1995) described a six hour TTT classroom course for residents in the USA. Hatem (2003) described the setting up of a teaching course. While it is implicit that they had participants on their courses, they concentrated on describing what they had set up rather than participation rates. The inclusion of numbers attending could form the first step in assessing the impact. The reports which included numbers also included information which placed them at a higher Kirkpatrick level and are include later.

Reaction

As an example of reaction, Rayner et al. (1997) described a classroom course of how they delivered teaching skills training in one UK hospital with 56 participants over 12 weeks, some of whom only attended one session. This study thus reached the level of participation because it recorded the numbers attending. Nineteen participants returned an anonymous self administered questionnaire and 13 (68%) found the course relevant to their teaching activities and felt their knowledge about teaching had improved to the level of 'very much' or 'quite a lot'. The authors felt the course evaluated well despite the low response rate of 34%. The description of this TTT exceeded the participation level. However, the amount of detail included in the paper makes it difficult to assess whether their participants had reached the level of learning.

Morrison et al. (2003) described a 60 hour voluntary elective in teaching for medical students. In the end of course evaluation 49 out of 50 students reported that they found this teaching course valuable. The students felt they were more motivated to improve their teaching after attending the course.

Learning

Skeff et al. (1999) used retrospective pre- and post-intervention ratings to assess the impact of teaching workshops for 282 attendees. The workshops were highly rated and the participants felt their future teaching would improve. The participants' self ratings showed a statistically significant ($p<0.001$) increase in their knowledge of the principles of teaching and their teaching ability. However, there was no follow up after the workshops to assess if the 'learning' became a change in teaching behaviour.

The TTT courses considered under reaction and learning were evaluated by participants using self assessments of their learning in the form of their contentment with the course at the time or soon after. While the participants may intend to change what they do, without a follow up there is no evidence. There was no external evaluation to confirm the participants' self assessment. This raises the difficult question as to whether unsubstantiated self reporting of improved teaching can be considered to exceed the level of learning to reach that of behaviour change. This illustrates the challenge of trying to fit diverse studies into a 'simple' scoring system of value.

Behaviour

I have chosen to accept that participants who *reported* a change in their approach to teaching after the event *have* changed their behaviour. However, a change in behaviour does not necessarily equate with an improvement.

Whitehouse (1997) described a six day classroom based TTT course for 24 consultants. The impact of this course was measured using two self assessed questionnaires. The first was administered at the end of the course to give an overview of the relevance and usefulness of the content, which meets the level of reaction. The second questionnaire was also self administered 10 months later with a response rate of 21 (88%). They reported that the

participants were using some of the principles introduced during the course. There was no measurement of impact on their learners.

Marks (1999) used qualitative interviews to evaluate a TTT course, conducted for six hours per week over eight months. Twenty four of the 34 participants were interviewed. The participants felt that they had learnt to plan educational activities. All but one of the participants reported they had successfully applied the educational principles learnt on the course in their teaching activities. Furthermore, 24 felt that the course had a positive impact on their careers. However, there was insufficient detail given in this short paper to explain how the author had arrived at this conclusion, other than a comment:

> *'Most commonly, the participants perceived that the course had introduced or confirmed medical education as a field of academic pursuit.'(Marks, 1999, p.72)*

Gelula and Yudkowsky (2003) described a series of three interactive teaching workshops for 36 participants. They assessed the participant satisfaction with questionnaires administered immediately after each workshop. The participants rated the workshops as highly relevant and felt that they learnt a lot. In addition nine participants, who had attended two sessions, were contacted by telephone four months later. They all reported they were using teaching strategies they had learnt on the course and were able to describe concrete examples of their use.

Dennick (2003) explored the retention of teaching skills of 94 participants who had attended a TTT from a single UK centre. The responses from the 72, who returned a self evaluation questionnaire, suggested that they improved their teaching and maintained these changes. However, there was no external confirmation of the participants' change in teaching skills or attitudes.

Yolsal et al. (2003) described the impact of a TTT course in Turkey for a group of 85 senior clinicians. Their participants were satisfied with the course and at six months 73% felt that they had managed to implement some of the course material in their teaching. However, the authors did acknowledge that these views were only those of the teachers. Godfrey et al. (2004) compared self assessed changes in teaching practice for consultants who attended a TTT course with controls who had not. They reported that the participants improved their teaching ability for 16 out of 18 skills in comparison to the controls. While this is a self assessed change, the participants reported a change in their practice.

These studies showed that the 'teacher learners' demonstrated that they know how to teach 'better'. However, they do not provide evidence that this learning has transferred into improvement performance with real learners, other than by self reporting.

Results – improved teachers

Bing-You (1990), in a single institution, studied the effects of a TTT course on 26 internal medicine trainees by observing videotapes of their teaching. He showed an improvement in their skills in delivery, feedback, and use of audio-visual materials. However, there was a decline in organisational skills and no change in listening skills, interpersonal skills or fostering rapport, knowledge or overall teaching quality.

Nathan and Smith (1992) described the effects of a one-day workshop on the teaching for 12 family practice faculty members. The medical students rated their teachers skills before, immediately after and several months after the workshop. There were significant improvements in lecturing ($p<.0.05$) immediately afterwards, but no further changes at the longer term follow. Interestingly the students felt the fulfilment of their educational needs overall declined ($p<0.05$).

Bing-You et al. (1997) explored the effect of written feedback on the quality of teaching delivered by trainees to medical students. They randomised 30 trainees to either receive feedback or act as controls. Over the ensuring year there was significant improvement in the 'experimental' group's rating of teaching by their medical students. They used a validated tool to assess the quality of teaching, the Clinical Teaching Assessment Form (CTAF) developed by Irby and Rakestraw (1978; 1981). The CTAF scored the quality of teaching against nine criteria: organisation/clarity, group instructional skill, enthusiasm/stimulation, knowledge, clinical supervision, clinical competence, modelling professional characteristics, accessibility, and overall teaching effectiveness. They rated each item against a six point Likert scale. There was statistically significant improvement in two of the characteristics: the teacher establishing rapport ($p<0.01$), and providing direction and feedback ($p<0.05$). There was no change in the other characteristics. The ratings remained stable for the control group.

Wipf et al. (1999) studied the effectiveness of a six hour compulsory TTT course for all their senior trainees who were responsible for teaching junior trainees and medical students. This was a large study of 446 trainees, with 3,964 evaluations, conducted over six years. They compared the teaching quality during the three years prior to the course introduction with the following three years. The learners used the CTAF to score the quality of the teaching. There was a consistent and steady increase in the quality of the teaching year on year above the baseline ($p<0.001$), following the introduction of their TTT courses.

Brown and Wall (2003) reported the value of a TTT programme for psychiatrists by relating the courses to the improvement of overall evaluations of the training programme by the trainees.

Morrison et al. (2003) used Objective Structured Teaching Episodes to objectively measure improvement in teaching with trained (13) versus untrained trainees as teachers (10). The

trainees were randomly assigned to be 'trained' or not. The trained teachers showed a statistically significant (P<0.005) improvement in their teaching scores whereas the untrained teachers showed no change. Twenty one of the 23 participants were followed up one year later using semi-structured interviews (Morrison et al., 2005). Those who had attended a course continued to use their 'new' teaching skills in their day to day practice. Three themes emerged: enthusiasm for teaching, learner centeredness and self-knowledge about teaching. The trained teachers also expressed greater enthusiasm and understanding of these three themes than those who had not attended.

These studies showed that TTT can translate into improved teaching in the clinical setting. The study by Bing-You et al. (1997) is particularly interesting because it showed an improved teacher performance without the need to provide classroom teaching. Their key intervention was to use individual feedback.

Results – improved patient care

In this area I was unable to locate studies which directly related TTT to patient improvement. This difficulty, with demonstrating that an educational intervention has impacted on patient care, has been described elsewhere (Jordan, 2000). While it is tempting to ignore the difficulty with finding or reporting these links, I believe we must continue to look for them. If we cannot demonstrate direct links between educational interventions and patient care then we must acknowledge this deficiency.

Although I could find no studies that reached the highest level of impact, an article by Mourad and Redelmeier (2006) raises some interesting questions. In this retrospective study they looked for but did not find a relationship between patient outcomes and the quality of the teachers.

'There is no large correlation between teaching effectiveness scores and short-term patient outcomes, suggesting that doctor teaching capabilities, as perceived by house staff, does not generally impact clinical care.' (Mourad and Redelmeier, 2006, p.637)

Forty of 57 clinical teachers, who were invited, agreed to participate. They had all attended a TTT course and had their teaching evaluated by their trainees between four and 40 times. They measured the quality of teaching using a 'teaching effectiveness score' (TES). The TES had 15 items which were rated on a five point scale and these were summed and rescaled to give a single number between 0 and 10. The teachers were separated into two groups of 20 and classified as low or high rated teachers. The low-rated had a mean score of 8.73 and the high-rated a mean score of 9.52. Although the groups were statistically different, they were separated by the median and thus there was no overlap, the actual difference in scores was small. Was this difference sufficient to be significant? There was insufficient published information to confirm or deny this query. They looked at patient outcomes by reviewing the medical records of 4,377 consecutive patients admitted under the participating teachers. The patients were stratified according to their diagnosis. There was no statistically significant correlation for mortality, hospital length of stay or readmission rates in the following year.

This study can be looked at in a number of ways. One would be to claim that the quality of teaching is unrelated to patient care. An alternative, not suggested by the authors, might be that quality teaching is not detrimental to patient care. However, there are many confounding factors in this study. Firstly, the group of 17 doctors (30%), who did not take part, is large enough to affect the findings if they had been included. There is no further information on this group. Secondly, the separation into two equal groups, which both have high mean scores, was arbitrary. A more robust separation would be to define good and poor teaching according to actual scores. However, as the lowest score was 7.33, out of a maximum of 10, I wonder if

any of their teachers were poor? Thirdly, the TES depends only on the trainees and does not take account of the opinions of peers or patients.

This study is a good illustration of the challenges facing educational researchers when trying to explore the interrelationship between teaching and patient outcomes. While they may have 'failed' to demonstrate a positive effect of teaching, these researchers have raised further questions.

Part of the challenge of demonstrating the effectiveness of educational interventions is being clear about what constitutes evidence. This is important when designing and assessing the impact of new educational interventions. I address this challenging issue further in the next section.

2.5.8 Kirkpatrick modification (Issenberg et al., 2005)

Issenberg et al. (2005) in their BEME review, on simulation, graded the quality of their evidence according to: design, implementation, analysis and strength of the findings. Prior to grading, they used screening criteria for the initial 670 peer reviewed journal articles or other documents (doctoral theses or academic papers for meetings). The articles had to be comparative or involve simulation as an educational tool. They eliminated review articles, in favour of empirical studies, and articles where simulators were used only for assessment. This reduced the number of articles to 109. The quality of each paper was graded independently by two reviewers, from one (strongly disagree) to five (strongly agree). The inter-rater reliability was high with more than 35% reaching perfect matching. The 109 articles included in their final analysis had 'strength of findings' scores ranging from 2.9 to 3.5.

When it came to classifying the level of evidence, they used a further modification of Kirkpatrick's levels (Table 7).

Table 7 Kirkpatrick levels and BEME (Issenberg et al., 2005)

	BEME	Kirkpatrick
Level 1	Participation in educational experiences.	
Level 2a	Change of attitudes.	? Reaction
Level 2b	Change of knowledge and/or skills.	Learning
Level 3	Behavioural change.	Behaviour
Level 4a	Change in professional practice.	
Level 4b	Benefits to patients.	Results

While they maintained four levels, as suggested by Kirkpatrick, they have reorganised and relabelled them. They have included Belfield et al's. (2001) suggestion of participation. They have added a 2a level, which they have labelled 'change of attitudes'. However, they do not explain the reason for this change. As it is placed between participation and learning (change of knowledge/skills) it may to be equivalent to Kirkpatrick's reaction. Alternatively and more likely, it may be that they have broken down the learning level into knowledge, skills and attitudes. They have also added a level (4a) to the results by including a change in professional practice. Again they do not give an explanation and it is not clear how this is different to a change in behaviour. Their highest level (4b) requires evidence of patient benefit as a result of the educational intervention.

This variation in the use of terminology and a lack of precision in what constitutes each level highlights some of the problems associated with determining the quality of evidence. What started out as an apparently simple approach becomes difficult to apply in reality. However, this systematic review looked more like a Cochrane review in its format. The research question was clear and the methods used to find the evidence were stated in a format that can be reproduced. The reviewers were trained with clear statements of how the evidence would

be graded. As a result, they were able to make clear statements of what was effective and areas for future research.

This adherence to transparency is also evident in the more recent reviews (Dornan et al., 2006; Steinert et al., 2006). As the review groups gain experience and expertise, the reviews are becoming more standardised. I explore the TTT or faculty development review in detail in the next section.

2.5.9   Kirkpatrick modification (Steinert et al., 2006)

Steinert et al. (2006) undertook a systematic review of TTT for BEME. As part of this review they have offered a further modification of Kirkpatrick's framework (1967) (Table 8). As this is at variance with the BEME review published by Issenberg et al. (2005), only one year earlier, I revisit Kirkpatrick. They have also have maintained four levels. However, they have 'reverted' to Kirkpatrick's original terminology of reaction, learning, behaviour, and results. One key difference here it that they have set their endpoint, results, at improving undergraduate or postgraduate learning rather than an improvement in patient care. They also divided learning and results into subsections as shown in Table 8.

Table 8 BEME levels

Level 1	Reaction	Participants views on the learning experience, its organisation, presentation, content, teaching methods and quality of instruction
Level 2A	Learning – change in attitudes	Changes in attitudes or perceptions among participant groups towards teaching and learning
Level 2B	Learning – modification of knowledge or skills	For knowledge, this relates to the acquisition of concepts, procedures and principles: for skills this relates to the acquisition of thinking/problem-solving, psychomotor and social skills
Level 3	Behaviour – change in behaviours	Documents the transfer of learning to the workplace or the willingness of learners to apply new knowledge and skills
Level 4A	Results – change in the system/organisational practice	Refers to the wider changes the organisation, attributable to the educational programme,
Level 4B	Results – change among the participants' students, residents or colleagues	Refers to improvement in the student or resident learning/performance as a direct result of the educational intervention

Before considering their report, it is important to review their inclusion and exclusion criteria. Their research question was:

> *'What are the effects of faculty development interventions in the knowledge, attitudes and skills of teachers in medical education, and on the institutions in which they work?'* (Steinert et al., 2006, p.449)

They included only developments related to improve teaching. Their inclusion of effect on institutions probably explains their development of level 4A. They excluded studies related to teaching specific content and studies that considered development of trainees as teachers. This diverges from my approach because it excludes doctors still in training. My area of exploration specifically relates to doctors still in training. This difference explains why many of the papers I use are not included in this review.

They found 2,907 abstracts of which 53 meet their criteria for inclusion. Only 10 reached the level of 'results' with only three in 4B, which relates to demonstrable changes in quality of teaching (Skeff et al., 1986; Marvel, 1991; Nathan and Smith, 1992). The seven papers

showing changes, in 4A, related to changes in the organisational structure of teaching. None of these papers demonstrated any impact on patient care.

Furthermore they included one study that had only been reported at a conference (Sachdeva and Kelliher, 1994). They rated this as a study that reached the '4B' level. This was a report that I was unable to obtain. Neither could I find evidence that the authors had published this in the peer reviewed literature. Another paper (Rayner et al., 1997), that they scored as having reached '4A', was interesting because when I reviewed this paper (section 2.5.7) I felt it only reached the level of reaction. Their only empirical data related to measuring the participants' satisfaction at the time of the course. They did report that they had held four further lunchtime meetings and set up a committee to link with the network of doctors teaching undergraduates. However, their was no further evidence of the effectiveness or impact of these changes. The use of such low levels of evidence serve to confirm the difficulty finding data to demonstrate the effectiveness of faculty development.

As has been discussed there have been many papers published on TTT courses and interventions. However, few of these papers show a direct link to improving the changes in the educational organisation of teaching or improving the teaching of the learners. They also report a variety of teaching methods and a lack of consistency of course contents.

2.5.10 Summary

In an attempt to improve 'doctors as teachers', TTT courses have been developed. When considering the function of doctors as teachers it is important to take into account the varying roles that they undertake. It is important to consider the characteristics of poor and excellent teaching. The courses can then target appropriate areas to improve teaching. The learners value good facilitators, role models, and information providers. The undergraduates tend to value their trainer's role as a teacher more highly than as a clinician. The postgraduates tend

to value the trainer's role as a clinician more highly than as a teacher. The postgraduates look for a facilitator, an information provider, and a clinician, who will guide them in learning how to treat patients.

The impact of TTT courses has been widely reported in the literature. There are many papers documenting the value of participating from the perspective of the attendees. In the main, these courses get favourable responses. There is some evidence that the courses can lead to improvements in the organisation of teaching and what the learners learn. It is noteworthy that these studies did not engage or address what it is that makes a 'good' teacher. Furthermore, there is, as yet, no evidence directly linking TTT courses to improved patient care.

As can be seen from the discussion, developing education programmes to improve doctor teachers is not easy. Clearly, a lot of effort has been expended on developing all sorts of short TTT courses in different countries. One starting point is the educational cycle with its four phases of; needs assessment, selection of teaching methods, delivery, and assessment of outcome. It would appear from the literature prior to 1990 that many of the courses have been developed by starting with teaching methods set firmly in the classroom. It was not until the 1990s that descriptions of curricula and assessment of outcomes start to emerge.

 Even into the 2000s, journals are still publishing descriptive papers of short courses. This is disappointing because some 'educationalists' are still designing and delivering TTT courses without critical consideration of the desired outcome. It is also interesting that while most of the courses are delivered within the classroom, the evidence suggests that the postgraduate trainees value clinical teaching above that delivered in the classroom.

The next section moves from delivering teaching within the classroom to consideration of integration into the context in which our trainees are learning.

2.6 Workplace context

The aim of medical education is to prepare doctors to give good care to their patients. They give this care within the real world of the clinic, at the bedside in hospital, in treatment areas such as the OR, or diagnostic centres. While some may not deal with 'living' patients (pathologists), they all need to perform within their working environment. The use of classrooms and simulations can prepare them to work in the clinical setting. As we saw above the principle of an apprenticeship model is to start within the workplace and then extend to the theory. However, because of the complexity and risks to patients, medical training starts with the theory and then moves it into the workplace, the clinical setting. How can we effectively make this transition?

At some stage medical students move into the real world of clinical medicine. They have to bridge the gap between the classroom and the clinical setting. If they are to benefit from their clinical exposure, their teachers or facilitators must be competent to guide them. In a similar way, the teachers have to bridge the gap between learning to teach in the classroom and teaching in the clinical setting. This section approaches the difficulty of these transitions by considering a theoretical framework or model within the context in medical education.

2.6.1   Koens et al.s' model

Koens et al. (2005) developed a model for considering the role of context within medical education. They suggest that there are three dimensions to context: physical, semantic and commitment. Each of these dimensions spans a continuum from very reduced to enriched contexts (Table 9). I will explain this model by first providing illustrations for learning medicine. Then I develop this by drawing on examples about developing as a doctor teacher.

Table 9 Dimensions of context (Koens et al., 2005)

	Reduced context	→→→→→→	**Enhanced context**
Physical dimension	Learning in the library	Learning in a skills laboratory	Learning in the OR
Semantic/cognitive dimension	Learning facts unrelated to clinical practice	Reading and understanding a basic science text	Constructing a physiological explanation of a clinical case
Commitment dimension	Listening to medical news on the radio	Reading a text to report to peers	Learning with responsibility for patient care

The physical dimension relates to the physical surroundings of the learner. For example, reading about the anatomy of the knee joint, alone in the library, will be at the reduced end. In contrast, learning within the OR as a surgeon operates on a knee, when the learner can see the anatomy, will be at the enhanced end. The semantic or cognitive dimension relates to the connection between the learner's knowledge and the learning task. For example, a simple task of learning facts, such as three causes of a low blood pressure, will be at the reduced end. In contrast, constructing a physiological explanation of why a real patient, in hospital, has a low blood pressure will be at the enhanced end. The commitment dimension relates those aspects of learning that determine the learner's motivation. For example, listening to medical news on the radio, such as the problems of miscarriages, will be at the reduced end. In contrast, the experience of the learner, who has to deal directly with a couple struggling with multiple miscarriages, will provide a commitment to learn at the enhanced end.

This model also relates to doctors learning to be teachers. In the physical dimension, reading in the library about how to teach in the clinical arena, will be at the reduced end. In contrast, a skilled teacher showing and guiding the learner to teach effectively at the bedside will have an enhanced context. In the cognitive dimension, the learner who learns a list of the key points

about how adults learn would be at the reduced end. In contrast, the context is enhanced for the learner who delivers bedside teaching for a group of medical students based on the principles of adult education. Within the commitment dimension, reading about the importance of assessing trainees may have reduced contextual importance. However, when the learner has to assess others, whose careers may depend on their decisions, it is at the enhanced end.

In addition to these dimensions, I believe that there is something special about how the teaching affects the care of the patient. This relates to the potential danger posed to the patients when trainees are learning or being taught on real patients in the clinical setting. The lowest risk is at the level of an elective attendance at a clinic appointment or GP surgery. I say this because this is a situation that can be controlled by the teacher. The teacher can be present or absent. The trainee can take their time and the teacher has the opportunity to check what has happened and if necessary make adjustments. This is true for both the patient's medical care and the learning of the trainee. The time available is determined by the teacher rather than by the urgency of the delivery of patient care.

At the bedside, in hospital, for elective or non-urgent cases, the same criteria apply. The teacher can devise teaching ward rounds. Here the teacher can pre-select and gain consent of the patients for teaching. However if a patient requires urgent or emergency treatment then there may not be time for the teacher to pre-select patients, which may remove the safety net of the actions of the trainee being correctable. The risk to the patient becomes more acute once the learners start to perform procedures on the patients. In this instance, the procedure may be relatively safe, for example taking blood. On the other hand, it might be potentially life threatening, for the patient, for example administering a general anaesthetic.

I suggest this model would benefit from an expansion of the physical dimension to include the location of the teaching. The enhanced end of each dimension could include a gradation into where the teaching interaction takes place such as; classroom, clinic, bedside or OR. Much of the literature, as reviewed above, has related TTT to classroom teaching. This can translate into circumstances where there is a degree of teacher control over the physical environment and the sequence of events. Perhaps this lack of control, by the teacher, explains the reluctance for some doctors to relinquish the safety of the classroom to teach at the bedside (Ramani et al., 2003).

In addition, I suggest there should be a fourth dimension to take account of the urgency of the patient's care in the form of diagnosis or treatment. At the reduced context, there would be no urgency, as in the elective attendance at an outpatient clinic. In contrast, an example of the enhanced context would be the management of a patient with an acute and life threatening haemorrhage. I would suggest that learning and teaching in the workplace has to include this element of urgency or time.

The inclusion of the context of the workplace and patient safety require that the quality of the teaching be of a high standard. Otherwise, patients are at risk. One approach might be to consider 'teaching in the workplace' as a series of competencies in a similar manner to the competencies associated with giving an anaesthetic. I address this concept in the next section.

2.6.2 Workplace teaching as a competency

Miller (1990, p.s63) described a four stage pyramidal model for assessing: *'…the professional services delivered by a successful physician (doctor).'* These four stages are *knows about, knows how, shows how* and *does*. Teaching is one of the professional services that doctors need to deliver competently. What are the implications of viewing teaching in the workplace in the same light as a practical skill? Before explore teaching as a competency, I consider how

clinical teachers guide trainees to gain medical competencies when measured against Miller's pyramid.

Knows about   At this level, the clinical teacher guides their learner through being in the OR so that they get an overview and *knows about* the environment. This can vary from a learner's first experience in the OR such as a nurse or a medical student observing anaesthesia or surgery. On the other hand, an experienced anaesthetist may be seeing a new specialty such as cardiac anaesthesia or obstetric anaesthesia for the first time. This experience may be so different to their previous experiences that they are effectively newcomers. In this circumstance, the clinical teacher takes responsibility for ensuring the learner is safe, that they cause no harm to the patient and that they abide by local protocols, such as not breaking sterile practice.

Knows how   The learner has completed the *knows about* stage and is now ready to gain a deeper understanding. At this level, the learner should be able to describe or explain the event or procedure. As part of this stage there will be some explanation from the teacher to the learner of what is going on. This sets the scene for the learner becoming competent and contributing to patient care. The learner is still only observing. For example, when considering central line insertion, a medical student would get to observe, and receive an explanation of the procedure and reasons behind its use. This paves the way for the next stage.

Shows how   This is the stage when the learner starts to do things to or with the patient. This might be simple such as holding an airway or inserting a peripheral venous cannula. They would already have observed and explained the procedure. At this level, the teacher supervises the learner's actions and corrects or intervenes as necessary. The learner might have practiced the procedure in a simulated environment such as the clinical skills laboratory.

Does   When they reach this level, the learner actually does what they have learnt and practices the skills until they are ready to move to the level of independent performance. At this stage the clinical teacher begins to stand back as the learner's competence and confidence grow.

I would argue that throughout a teaching session in the OR the learner is likely to be learning at more than one level. For example, a medical student might be practicing intravenous cannulation, learning to manage an airway, while visiting a new OR and seeing gynaecological surgery for the first time. As discussed above under experiential learning, a task of the teacher is to guide the learner to identify which of their many experiences are currently in focus.

Can OR teaching be a competency? How does teaching as a competency match to Miller's hierarchy?

If we consider the development of doctors as teachers, it can be argued that as doctors, they are already expert learners and are well aware of what teaching, as a practical skill, looks like. Furthermore, they have experienced a lot of teaching and will already teach. Thus, they also *know how*. One purpose of TTT courses may be to reinforce these two levels of learning the practical skills of teaching. At a higher level some of the courses give the opportunity to teach within the safety of the classroom, *shows how*. The area that is not so well covered and much more challenging is how to move from *shows how* to *does*. The implication in the word does is that this is for real and is about actual performance.

How do we manage the transition from *shows how* in the classroom setting to *does* within the clinical workplace? This is particularly important when dealing with patients in the clinical setting because their life may be at stake. At the simple end with a clinic consultation, a wrong diagnosis might be made. At the more acute end, a mistake by an anaesthetist might

kill or permanently maim a patient in less than three minutes. If this happens while a trainee is learning, it will clearly be the responsibility of the supervisor and this will affect their own medical career.

If we are to equip our trainers of the future with the skills to manage the learning of doctors for the future then we need to address this transition from classroom to workplace. The theory can be learnt and the learners' understanding can be assessed in the classroom. The psychomotor skills can be learnt in clinical skills laboratories and simulators. In some simulators, it is now possible to conduct full anaesthetics on manikins. However, at some stage the learners have to make the transition to anaesthetise a real patient for a real operation. While there have been descriptions of how to manage this is in the literature there is little empirical evidence for the recommendations other than they have stood the test of time. Even less well researched is how we teach these doctors to teach within this environment. As was discussed earlier many of the doctor teachers are still trainees. Then they take on the responsibilities for the learners and the patients while others learn.

2.7 Linking the literature review to the thesis and research questions

Doctors learn to be doctors in the context of the workplace. A key feature to learning clinical medicine is that patients are involved. Furthermore, patient care takes place at the same time that doctors are learning and teaching. Taking responsibility for teaching in this context is challenging. There is extensive literature about developing teachers in the classroom or for clinical areas, which they can control. However, when it comes to teaching in the more acute areas, such as anaesthesia in the OR, there is little empirical data. Traditionally the acute areas of medicine use a form of apprenticeship to develop the necessary expertise. The introduction of shortened and time limited training makes it more difficult for trainees to stay in 'an

apprenticeship' until they are deemed competent. The teachers in the clinical areas need to become more expert in maximising the trainee experiences during their limited exposure. The expectation, from the patients and the public, is that doctors will remain highly competent.

The literature review has identified questions about how doctors learn, teach, and learn to teach. This study concentrates on looking at the world of the anaesthetist in the OR from the perspective of anaesthetists in training. There are two strands to the investigation. The first explores the current state of affairs with respect to the processes relating to teaching and learning in the OR. The second uses the data collected from the exploration to identify ways in which teaching in the OR might be improved. These aims are summarised as two questions.

- How do anaesthetic trainees teach and learn to teach within the operating room?

- How can anaesthetists improve their teaching in the operating room?

3 RESEARCH METHODOLOGY

3.1 Methodology

This section opens with the research questions. It goes on to explain my theoretical framework for understanding the nature of knowledge and evidence. My understanding and approach has been influenced by completing a postgraduate certificate course in educational research. I position this against my clinical research background in the scientific paradigm. In this section, I explore how the interpretative paradigm appears to present an appropriate beginning for my study. I consider the importance of placing educational interventions within the context in which they will be used. I conclude by reviewing a framework described for investigating complex medical interventions and refine this framework to be applicable to this study.

- How do anaesthetic trainees teach and learn to teach within the operating room?

- How can anaesthetists improve their teaching in the operating room?

The research questions have developed, in part, as my understanding of ontology and epistemology has increased. The research questions and methodological approach have evolved hand-in-hand with the one influencing the other.

3.1.1 Ontological and epistemological standpoints

I start with a consideration of the positioning of the positivist scientific views and my roots within it. At the start of my journey to explore teaching in the OR, I had firm views about what constituted high quality research. I believed that the pinnacle of excellence in research was the RCT. The implication for the current study is that this belief is shared by many of the medical profession. In order for this study to be taken seriously by my peers in the medical profession I will have to persuade them to consider that there are other legitimate forms of

research. The next sections explore some of the difficulties of using the scientific paradigm and some attractions of adopting the interpretative paradigm for a mainly 'scientific' audience of doctors.

3.1.1.1 Scientific approach

Inherent within the scientific approach are a number of assumptions (Cohen et al., 2000). Firstly, determinism - events have causes. The scientific approach believes these links can be found and understood. Secondly, empiricism - knowledge originates in experience and is verifiable by observation. This requires the proposition of theories or hypotheses, which can be tested within a research setting. Thirdly, parsimony – when phenomena are explained it should be in the simplest way possible. Fourthly, generality - findings from a sample of observations can be generalised to the world at large. Underlying these assumptions is the ontological premise that reality is objective in nature. This reality does not depend on the individual knower because objects have an independent existence.

My primary training and work is within the culture of medicine so I was naturally drawn to start my thinking within the scientific paradigm. Postgraduate medical practice places emphasis on the principle that the treatment of patients is guided by knowledge gained from scientific research. In this context, the underlying assumption is one of realism. The philosophical basis for scientific enquiry assumes that the world exists independently of the individual. Scientific research is concerned with investigating this world to gain knowledge about it and so discover its universal laws. This approach develops a theory and then attempts to validate it using experimental or quasi-experimental methodology. This ethos of scientific research, systematic enquiry and its integration into clinical practice is fundamental in the training of all medical doctors. This ethos is reinforced during training because all trainees must demonstrate experience and some expertise in conducting audit and scientific research.

Within the context of my research, focusing on the production of a large RCT showing the effectiveness of a TTT course would provide persuasive evidence for a medical scientific audience. However, is this possible? Is it an appropriate framework in which to develop an understanding of how doctors learn to teach, particularly within the OR?

In the scientific paradigm, a central assumption is that there is just one reality and all that is needed is to identify the truth. Providing there were clear and measurable objectives for a TTT course it could be hypothesised that the participants would be taught how to do X. The success of the course could then be measured in terms of the numbers of participants that achieved the objectives at the end of the course. A medical example of this might be measuring the success rate of teaching medical students how to perform a venepuncture. This could be extended by conducting an RCT comparing different teaching methods to show which was the most successful.

However, the aims and objectives suggested for the TTT initiatives tend to be more general and complex. For example, one of the important skills identified for trainers to learn was to be able to give effective feedback (Wall and McAleer, 2000). Within this arena it would be difficult to establish objective outcome measures, without which it is not possible to determine the success or otherwise of an educational intervention, within the scientific paradigm. This illustrates some of the difficulties in investigating complex interventions.

This research, with its focus on _how_ doctors learn to teach _within the OR_ is highly complex. There are no easily identifiable measurable outcomes. The difficulty of researching complex medical interventions within the scientific paradigm is well recognised (Campbell et al., 2000).

3.1.1.2 Interpretative approach

The interpretative approach to the nature of social science is rather different from the more (assumed) objective scientific approach. The ontological premise underlying the interpretative approach is that reality is dependent on the individual knower and thus there will be a number of different perceptions of reality. In this situation knowledge becomes subjective and has to be related to the person and the circumstances in which it is experienced. It means that researchers are necessarily involved with the subjects so that they can view and understand the world from the perspective of the people being investigated. This is very different to the scientific approach where the researcher is looking for a single reality. Within the RCT of clinical research, conducted within medicine, the researcher or research team are remote from the patient. The selection criteria for inclusion in the study and the information to be collected are pre-determined to avoid subjective bias.

The interpretative model focuses on understanding the subjective world of individuals' experience and how they interpret the world around them. Thus, different methodologies and standards for investigating the subjective world of social science are needed. As was discussed above a key feature of the RCT is to start with a theory or hypothesis and then conduct the research against the null hypothesis principle. Interpretative research tackles the process very differently. The principle is to collect the data and, during the process of analysis, theories, that attempt to explain what is happening, will emerge. This is the so-called 'grounded research' because the theories are grounded in the available data (Strauss and Corbin, 1990).

The interpretative approach to educational research has a number of particular features (Cohen et al., 2000). People interact with the world of reality in which they live and can influence what takes place. This is in contrast to the normative model, which considers people

as passive and responsive to an external world of reality in which they are merely passengers. Furthermore, the context in which people interact and undertake social episodes is of major importance. The way people react in one context, say at work, may be different to the way they react to a similar situation in the home. The interpretative model accepts that there may be more than one reality. These multifaceted issues of context and multiple realities make it difficult, if not impossible, to reduce the complexity of the world to simple single interpretation.

The acceptance that there may be more than one reality provides different challenges to researching educational effectiveness. Any research and its recommendations have to take account of these uncertainties. The educational community has been struggling with the concept of how educational research should guide the day-to-day practice of teachers. Hargreaves (1997) put forward the view that educational research should have relevance for practical teaching rather than being research for the sake of research. He made a comparison with EBM through the idea that both teaching and medicine are professions with similarities. Both professions make decisions, which involve complex judgements in order to improve health or learning. Medical research provides scientific evidence of which treatments are effective. This knowledge and evidence is then used in conjunction with experience to underpin the decisions made by the doctors managing their patients. However, Hargreaves (1997) suggests that the teaching profession does not have the same depth and wealth of research underpinning their decision making. He advocated improving the evidence but acknowledged it is not easy.

Davies (1999) supports the principles that education research should increase the evidence available and adopt its use in its decision making. He also makes the case that the research has to be integrated into individual learning and teaching. However, others ask for caution.

Edwards (2000) warns that education needs a broad based approach to research. There needs to be a balance between 'basic' research and practical research. Furthermore, this balance should be maintained whether or not it fits with the aims and objectives of political 'masters'. Pirrie (2001) also advises caution about rushing to embrace evidence based practice. She warns against the use of educational research to produce evidence only to construct toolkits for teachers leading to the dominance of what is easy to measure.

The differences between EBM and evidence based education are also recognised within the medical education literature. Greenhalgh et al. (2003) identified four differences. Firstly, many of the questions related to clinical medical practice fell into a simple taxonomy. The questions asked tended to be about prevalence of a disease, its prognosis or its treatment. While those for education tended to have a more complex taxonomy. The questions asked might be about the effectiveness of a single educational intervention, such as attending a continuing professional development course to improve patient care. Secondly, the questions related to medical treatment were mainly quantitative while those in education were mainly qualitative. Thirdly, the online educational literature was more difficult to find and navigate than the medical literature. Fourthly, when striking a balancing between research evidence and practical wisdom, education leant towards practical wisdom and medicine leant towards research evidence.

The GMC requires medical professionals to: '…*make the care of your patient your first concern...*' (General Medical Council, 2006, p.2). This use of the word patient, in the singular, emphasises the nature of medical practice being concerned with patients as individuals. In some respects while medicine as a whole leans towards research evidence, the individual doctor may lean more towards practical wisdom when interacting with an individual patient.

One of the intentions for the TTT initiatives, suggested by SCOPME (1994a, p.3), is to ensure that learner-centred education is at the heart of the changes:

> *'The environment SCOPME wishes to see created is one in which learners play a leading role in their own education and where learning opportunities provided meet previously identified, individual needs.'*

This accords with applying the general principles of adult education (Brookfield, 1986; Knowles, 1990). An implication of this intention to place the learner at the centre of the process is that it should be individualised or have the potential to be individualised by the learner. If we are going to enable individualised learning for the trainees, when they are learning medicine, then it seems a logical step to apply the same principles to teaching the teachers.

A further complexity is that the trainees also live and function within the context of social practice. Dreier (1999) considers that as part of an individual's development one must take into account that they are participants within social practice, which the doctors learning to teach undoubtedly are. He argues there are four reasons why this is an important concept. Firstly, human activity is only meaningful because it is involved in common social practices. If researchers are to understand what is going on, within the interpretative model, then it is fundamental to study how the individuals take part in social practices. Secondly, each individual's participation is based within *local* contexts of social practice. Thirdly, participation is only *partial*, meaning that individuals take part in many different social contexts but only partly in each one. For example, the way in which individuals participate in the different social contexts of work and home will vary. Furthermore, they participate in many contexts within the work environment at different levels. Fourthly, individuals act within the limits of a particular social context but at the same time may be extending those limits.

3.1.1.3 Summary

This exploration of the two paradigms, scientific and interpretative suggests that to provide high quality evidence of how anaesthetic trainees teach and learn to teach in the OR will be challenging. Approaching it within the scientific paradigm of a single cause and effect, by measuring the achievement of specific objectives will not enable an in depth exploration of the experience of individual trainees. In the real world of multiple realities, understanding the process and application of learning in context are also important. Clarke and Hollingsworth (2002), from outside of the world of medicine, emphasised the importance of understanding this when developing a model to improve teachers.

> *'If we are to facilitate the professional development of teachers, we must understand the process by which teachers grow professionally and the conditions that support and promote that growth.' (Clarke and Hollingsworth, 2002, p.947)*

As there is little evidence in the literature concerning how anaesthetic trainees learn to teach in the OR, this study started by looking for a methodology which would help develop an understanding of their teaching. This understanding can then be used to identify potential areas where interventions might be made to enhance their learning.

In order to achieve this a research framework and design needed to be developed. As identified earlier, the interaction between teaching and patient outcome is complex. The challenge of investigating the management of complex clinical conditions has been recognised and a theoretical framework suggested (Campbell et al., 2000). I explore this in more detail because I argue it can act as a link between the worlds of the scientific and interpretative paradigms.

3.1.1.4 Campbell's framework

Campbell et al. (2000) have described a framework to evaluate complex interventions within the world of medicine (Figure 9).

Figure 9 Sequential phases of developing randomized controlled trials of complex interventions (Campbell et al., 2000)
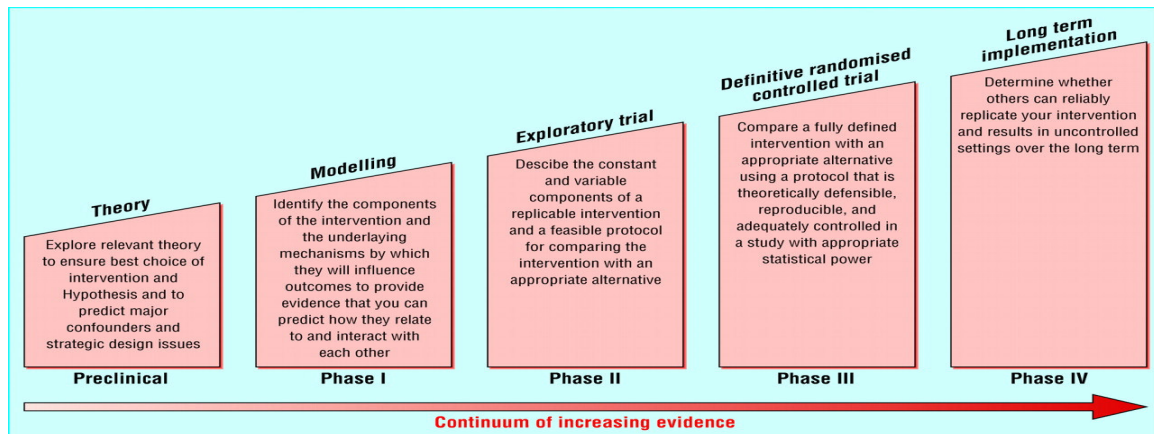
They suggest that medical researchers might use this framework to design RCTs for complex interventions. Their approach is firmly located within the positivist scientific tradition. Although I have already suggested the positivist paradigm seems inappropriate for my research questions, their arguments about research design for investigating complex interventions are worth exploring. I review their framework and consider which aspects are relevant to investigating the complexities of teaching doctors how to teach.

Campbell et al. (2000) operate within the scientific paradigm where the aim is to demonstrate whether an intervention does or does not work. They consider the RCT is the gold standard method and their framework clearly has this goal in mind. They cite, as a hypothetical example, the complexity of designing a trial to demonstrate the effectiveness of managing patients with strokes within a specialist stroke unit. Such a trial would have to consider the expertise of various health professionals as well as investigations, drugs, treatment guidelines, and arrangements for discharge and follow up. The active components of the stroke unit may be difficult to specify, making it hard to replicate the intervention. The challenges contained within demonstrating the effect of a single part of an intervention within a complex environment are well summed up by Campbell et al. (2000, p. 695) :

'There are specific difficulties in defining, documenting, and reproducing complex interventions that are subject to more variation than a drug'.

In the instance of the hypothetical stroke unit there are many inter-related aspects to the patient care and it is difficult, if not impossible, to formulate a hypothesis for testing. With RCTs, it is essential for each group to receive identical care, except for the intervention, and then through statistical analysis reveal the effect of the intervention. Campbell et al. (2000) suggest that problems arise because researchers fail to define fully and develop the intervention. They propose a five-phased approach to investigate complex interventions, which is both sequential and iterative.

Preclinical – Theory   A central purpose of the initial phase is to identify evidence on effective interventions to inform the choice of interventions and hypothesises. A literature review, in its broadest sense, is a key activity of this phase for any research investigation.

Phase 1 – Modelling   This phase is concerned with trying to understand the components of the intervention and how they relate to each other. They recommend that this phase is best investigated by using methods taken from qualitative methodology. They specifically identify the value of using case studies within this phase. Furthermore, they recognise that the qualitative methods may be able to give ideas for how the interventions work and identify barriers to successful implementation. It is important to note that in this phase they are using modelling to define and focus on the intervention that they will investigate.

Phase 2 - Exploratory trial   This is where the ontological and epistemological standpoint of the scientific paradigm becomes acknowledged because there is an underlying assumption that there is a correct answer. They suggest that the data gathered during phase 1 is now used to inform both the optimum intervention and the study design. This confirms that their model is set firmly within the scientific paradigm because of the belief that there is a best way of

doing things and the researchers' ontological premise is that reality is objective in nature. It is encapsulated in their suggestion that the exploratory trial should '*…be randomised to allow assessment of the size of effect' (Campbell et al., 2000, p.697).*

Phase 3 - Definitive RCT The scientific paradigm continues as they recommend that the design needs to address the same issues as RCTs.

Phase 4 - Long term implementation This part of the process is a continuation within the scientific paradigm where those using the interventions, identified to be effective, have the opportunity to confirm or refute the findings of the original investigators. This is the phase during which peer review of the evidence and a wider assessment of the reliability and validity of the findings can be made.

This framework offers a rational, sequential and linear approach to investigating complex interventions with the underlying premise that a RCT can be designed to answer complex research questions.

How appropriate is this framework to my study? To refresh, my research questions are:

- How do anaesthetic trainees teach and learn to teach within the operating room?
- How can anaesthetists improve their teaching in the operating room?

These apparently simple research questions contain many potential variations and possibilities. The OR is a complex environment. It is designed to treat patients. It is not designed for teaching or learning. The learners are qualified professionals who are learning a 'non-medical' skill (teaching) that is a secondary reason for being in the OR. The learners may also be acting as teachers. Also the teachers are teaching different learners different things at different levels. In view of these complexities, it seems likely the anaesthetic trainees will learn to teach in more than one way.

One approach to this study would be to replicate the linear framework in line with Campbell et al. (2000). The theory phase would be similar. It would consist of a review of the information and literature available. The modelling phase would require some preliminary investigations to understand the issues involved in how trainees are learning and learning to teach. Campbell et al. (2000) suggest a qualitative methodology may be the most appropriate for this phase. The data collection can be extended into the exploratory trial phase again using qualitative methods. The intention of the exploratory phase is to develop an intervention which can be investigated. This is where a divergence occurs because their purpose is to design an RCT for the next phase. However, there are similarities because the information collected in both cases influences the focus of the research questions.

A further divergence is that in the interpretative paradigm, peer review forms part of and is integral to the development of the question, the design and influences the modelling. In the Campbell framework peer review follows the presentation of the findings rather than contributing to it. The main divergence is the acceptance of the RCT as the gold standard. The next section describes how my framework evolved within the interpretative paradigm.

3.2 Research framework

My initial ideas led to a review of the information available, which influenced the formulation of the preliminary research questions. These aided the design for data collection and analysis. However, at all stages of the process, the information review, research questions and the data collection and analysis were subject to peer review from my educational supervisors, a critical friend and submitted as part of the assignments for a PGCert. Thus, even during the preliminary stages there was external peer review. This approach is shown as four interrelated circles in the form of a Venn diagram in Figure 10. The overlapping area in the middle of the

circles is where the model for possible interventions to modify or improve teaching in the OR emerges.

Figure 10 Two dimensional research framework

IR

PR   DCA

RQ

IR – information review
DCA – data collection and analysis
RQ – research question
PR – peer review

Model of possible interventions
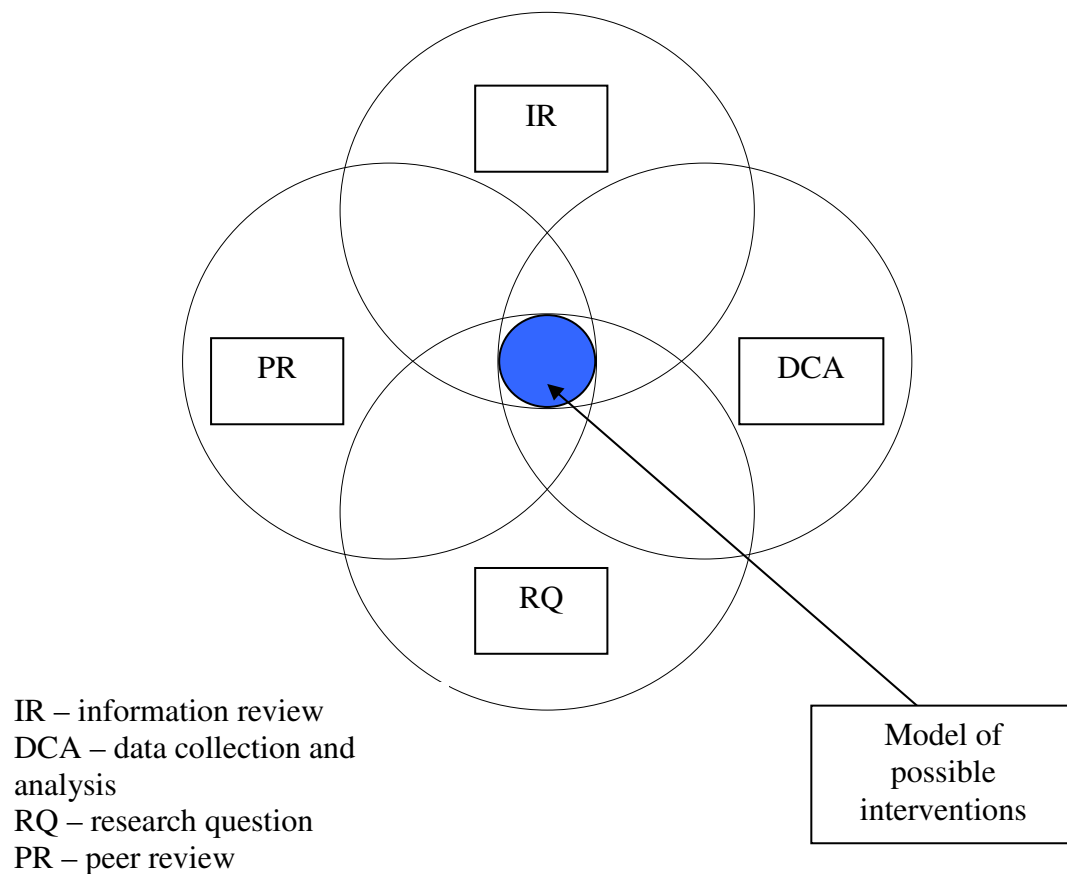
However, the situation is more complex than this simple 2-D arrangement. I will illustrate by tracking the sequence of events that unfolded for my study in more detail. It started with the collection of some initial information from the literature and some preliminary research questions were formulated. These were discussed with peers whose ideas suggested changes to the research questions and lead to a wider review of the literature. However, this return to the literature was undertaken at a higher level than before because it took account of the

knowledge gained on the first review. The research questions were revisited in the light of the expanded literature review and subjected again to peer review. As the data collection and analysis began then the process became more complicated as the information was fed back into the literature review, research questions and peer review. It could no longer be considered as a flat or linear process although progression was being made.

This flat 2-D framework can be transformed into 3-D by projecting each of the 4 aspects on the base upwards in the form of a pyramid (Figure 11). The top of the pyramid is where the model for possible interventions emerges from the centre.

Figure 11 Three dimensional research framework

Model of possible
interventions

IR – information review
DCA – data collection and
analysis
RQ – research question
PR – peer review

IR

PR   DCA

RQ
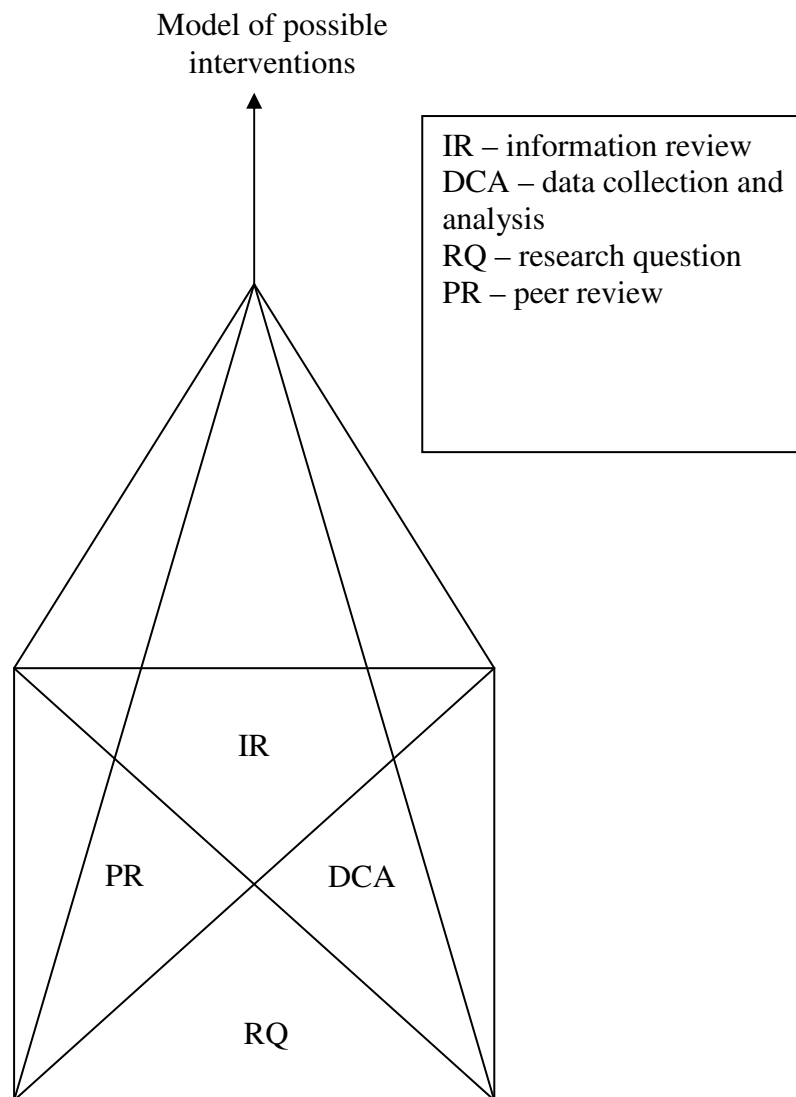
However, once again the analogy is more complex than building a pyramid because this

implies that there will be a single answer. Perhaps it is more like climbing a mountain range.

While it is possible to scale a peak of the mountain range and thus reach the top, there always

seems to be a higher or different peak that cannot be seen until reaching the top of the current

one (Figure 12).

Figure 12 Mountain range
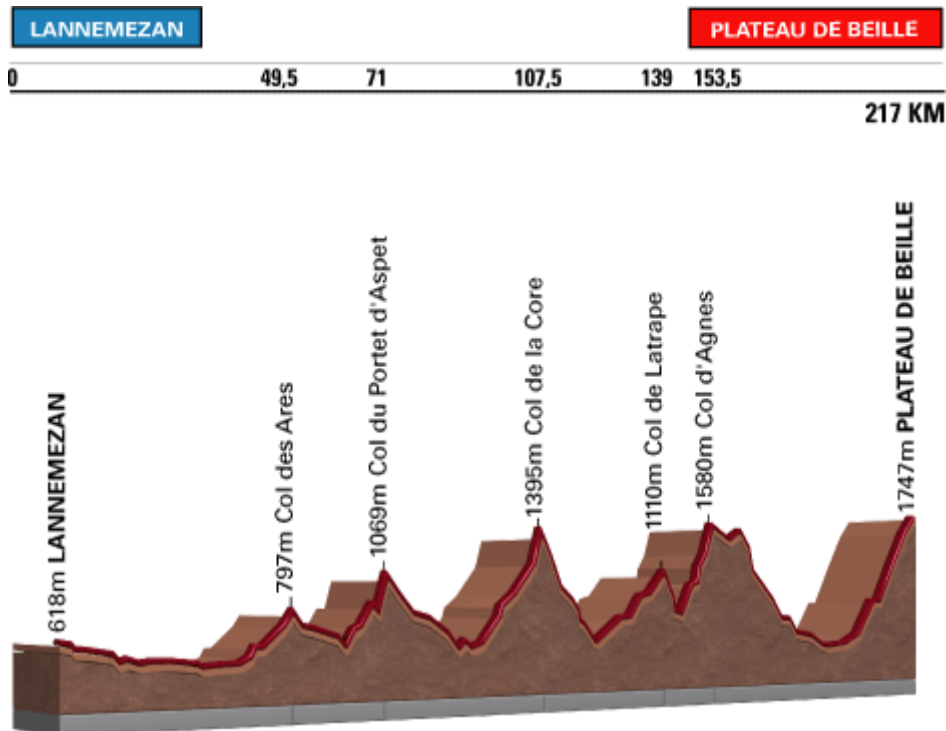
Furthermore the mountain peaks can be thought of as having many different levels and taking a wrong turn may require returning to a previous level in order to take an alternate path to the top. However, the knowledge gained from going the wrong way feeds back into the choice of the next direction. A different analogy of the same situation is that it takes the form of 3–D snakes and ladders. As one moves forward into the unknown there is always the opportunity of a ladder going up or a snake going down. One is never quite sure where the snakes or ladders are leading or in which direction.

In respect of my study, the initial review of information included a historical perspective on why and how TTT courses for doctors evolved and evidence of their effectiveness. This was combined with literature from education outside the world of medicine. This set the scene for identifying areas which were ripe for further investigation. The initial research questions were formulated and modified after discussion with my supervisors and a critical friend.

As there was little published information the next step was to undertake some preliminary data collection. This took the form of a mapping or scoping exercise to investigate in some detail specific aspects of the research area. This was achieved by undertaking interviews with a small number of anaesthetic trainees. This extra information helped identify a number of possible avenues for more detailed investigation. It also acted as an iterative process by suggesting different areas of the literature which should be considered. The next step was to refine the questions, revisit the information, and after peer review again review the research questions.

As a result of these iterative stages a second data collection phase was designed. This second phase needed to be flexible and reflexive so that the data collected would capture the explorative nature of the research questions. This would allow the data gathered to be used as a guide to areas that merited more in-depth investigation.

In addition as the data were collected and analysed, it was shared with a wider audience. This took the form of presentations, posters and workshops at local, national and international meetings. The evidence was scrutinised by peers, as the study evolved, and this contributed towards the reliability and validity of the findings.

In the longer term the effectiveness of the research will depend on how others utilise both the data and the ideas within their own realities. It is unlikely that others will directly repeat this original work, as might happen within the scientific paradigm. The context is likely to change or be different; the actors will be different and with this the complexities will have changed. Using the mountain range analogy, this research can be considered to be an early phase in the development of maps and documenting routes through the mountains.

3.3 Research design

Having established a research framework (Figure 11) for investigating how anaesthetic

trainees learn to teach, the next design task was to set out the research steps. While various

authors have different classifications for research design they also have areas of commonality

(Robson, 1993; Edwards and Talbot, 1999; Cohen et al., 2000; Bryman, 2001). The areas of

commonality include experimental, survey, case study and comparative or ethnographic

research. As the intention here is to ask mainly 'how' questions the case study design offers

an appropriate plan.

3.3.1   Case study

Yin (2003) suggests that the case study is the preferred strategy when asking 'how and why'

questions, when there is little control over events, and when one is looking at contemporary

phenomenon in a real-life context. All these criteria are in operation in my study. The

principal reason for adopting this approach is that my research emphasis is on understanding

the subjective world of the trainees' teaching experience and how they interpret the world

around them. There is no expectation of a single reality or truth. Thus, the study draws on the

experiences from research designs within the interpretative paradigm. This case study

approach enables detailed and rich data to be gathered from a defined group of trainees (Keen

and Packwood, 1995; Bassey, 1999; Scott and Usher, 1999; Gillham, 2000a).

As we have already seen there is a lack of empirical evidence available as to how anaesthetic

trainees learn to teach. Greaves et al. (2003, p.XII) summarised this lack of evidence in the

introduction to their book aimed directly at guiding anaesthetists how to teach:

> *'There is no textbook available that can lead and inform the established trainer or trainee on practical and educational aspects of learning the practice of anaesthesia.'*

This confirmed that this area of research has little background data available and therefore the design has evolved along with the study. It was clear from the outset that the direction would be determined by the data collected and its analysis. This expectation of a voyage of discovery, within the interpretative paradigm, suggested the overarching design would encompass case studies drawing on action research methodology. This resulted in the use of mixed methods.

3.3.2 Action Research

One of the challenges of this study was that much of it was exploratory and that the findings were used to guide and develop the direction of the study. An action research design is appropriate for this more fluid approach. Action research is simple in its conception and is concerned with exploring and changing aspects of the real world through the process of the research. There are many definitions to be found but the one I find encapsulates this study most closely is by Kemmis and McTaggart (1988, p.5):

> *'Action research is a form of collective self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understandings of these practices and the situations in which these practices are carried out.'*

It brings out the importance of aspects of reflection and participation which lead to changes in the participant's own world. In the context of this study, I formed a group of trainees to explore how they taught and learnt to teach within the OR, the social situation. Part of this exploration required them to reflect on their own teaching experiences in order to identify areas of their practice they might consider improving.

In action research the participants, or research subjects, are actively involved in the research process. The methods used tend to be qualitative and deal more often with language than numbers. Reflection, particularly critical reflection on the process and outcomes, is integral to

the cyclical nature of action research. Action research starts with a question or query and this is used to generate a plan of action to explore and address the question. This plan is acted upon and the action observed and reflected upon. The findings of this cycle then influence the next cycle which in turn begins with a further plan (Figure 13).

Figure 13 Action research cycle
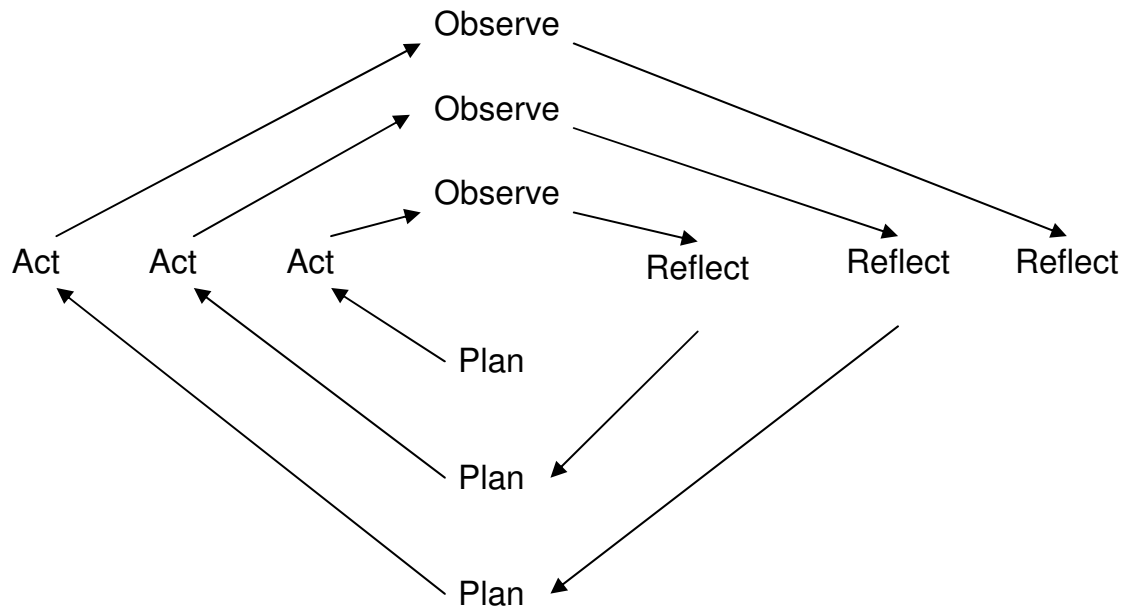
This cycle of plan, act, observe and reflect continues until the participants have satisfactorily addressed their concerns. At the start imprecise questions can be expected to yield imprecise answers. However, these imprecise answers can help to refine the questions and identify the most appropriate method to use for investigation. Each cycle acts as a step in the direction of clearer action and research. McNiff (2002) suggests a common starting point for action research is the desire to improve one's work. The aspect of action research that separates it from informal reflection on one's day to day work is the rigour with which the data are collected and analysed.

The origin of the concept of action research is attributed to Lewin (1946; 1947). He was exploring ways to produce social change through a cycle of collecting and analysing data, and using this information to effect change.

> *'Rational social management, therefore, proceeds in a spiral of steps each of which is composed of a circle of planning, action, and fact finding about the result of the action.'* (Lewin, 1946, p.38)

This approach has features in common with change management. Indeed some (Lilford et al., 2003) argue action research and change management can be considered as one and the same. However, managers may not need 'summative' data to convince themselves that change is effective and thus will not require the same rigour as action research.

Action research has similarities to other types of research. It leads to knowledge, provides evidence to support this knowledge, makes explicit the process of enquiry through which knowledge emerges and links new knowledge with existing knowledge. However, it does have differences. It requires action as an integral part of the research process itself and is focused by the researcher's professional values. It is necessarily insider research, in the sense of practitioners researching their own professional actions.

In the context of this study I use the principles of action research to give a framework. The study started with an imprecise question about anaesthetic trainees involvement in teaching. The plan, to interview a small group as a case study, was the action and this was reflected on. This evolved into the plan to explore and identify areas in anaesthetic trainees teaching practice for possible change. This was observed and things continued to evolve.

There were four phases to the data collection design. Firstly, a scoping exercise used interviews with a purposive sample of senior anaesthetic trainees. Secondly, action learning groups were used for an in-depth exploration of the experiences of anaesthetic trainees in the OR, with regard to teaching and learning. Thirdly, action learning groups were used to

explore the experiences of surgical trainees in the OR, with regard to teaching and learning.

Fourthly, a questionnaire was used to explore the generalisability of the findings from phases

one, two, and three.

3.3.3   Overview of phases

Table 10 sets out the main phases of the research process together with a timeline. It traces

how the research questions evolved as the project progressed and summaries the research

methods for each phase, the data collected and how the findings from one stage influenced the

next.

Table 10 Overview of research process

PHASE	Research questions	Methods related to RQ	Data analysis & purpose	Findings
Preliminary Oct 2001	Investigate the effectiveness of short TTT courses for doctors.	Literature search using Medline and hand searches.	Review of literature available and quality of empirical data.	Minimal evidence of effectiveness of TTT pre 2000, some pre 2002. Little on workplace teaching.
Phase 1 Scoping May-August 2002	Do senior anaesthetic trainees teach? How have they learnt to teach? How do formal TTT courses fit with their training?	Interviews with trainees until saturation. Selected for convenience and pragmatism.	Recorded, transcribed – checked by participants for accuracy. Themes extracted. Transcripts read by supervisor and critical friend and themes agreed.	Identified classroom (formal) and workplace (informal). Little TTT which did not match workplace teaching.
Phase 2 Anaesthetic ALG April 2003 – March 2004	How do anaesthetic trainees teach and learn to teach within the operating room?	Diary keeping by trainees, group discussion of teaching both received and delivered.	Recorded, transcribed – returned to participants to check accuracy. Initial themes extracted by author and agreed with one participant.	Themes related to teaching delivered and received.
	How can anaesthetists improve their teaching in the operating room?	Group discussions identified areas for change which were revisited	Areas for change negotiated with participants.	Areas for change, and evidence of what worked.
Phase 3 ENT ALG June-August 2004	Can ALG be applied outside anaesthesia, and can the themes move across for other groups in the OR.	Diary keeping and group discussion of teaching delivered and received.	Themes compared to anaesthetists.	Partial generalisability from anaesthetic ALG themes.
Phase 4 Survey Feb 2006	Are the findings more widely applicable in anaesthesia and ENT?	Questionnaire – self administered.	Descriptive and comparative statistics	Areas of commonality which are more widely generalisable.

My initial exploration started with inquisitiveness around the value and relevance of the TTT courses being offered in 2001. I had a particular interest because of my involvement in the design and delivery of a number of local and national courses. So my first attempt at a research proposal for the PhD included a rather broad research question.

> *To investigate the effectiveness of short courses for Medical Doctors in teaching; referred to as 'Training the Trainers' or 'Teaching the Teachers' (TTT).*

As I explored the options for investigating this proposal through completing a postgraduate certificate in educational research, it became apparent that this initial question was too broad. Through the taught sessions and assignments, I came to realise that I needed to focus on a specific aspect. As I work mainly within the clinical realm of anaesthesia, I concentrated on this arena. Thus the question became: *'How might the teaching of anaesthetists be improved?'* This limited the project to a single specialty but still encompassed teaching from a broad perspective. This enabled a more focussed exploration of the literature which revealed little empirical data surrounding the roles and responsibilities of anaesthetists involved in teaching. Furthermore, as a member of the small group designing TTT courses for the Royal College of Anaesthetists in 2001, it was apparent that there was little empirical evidence to guide us, particularly with reference to teaching in the OR. There was a disjunction between teaching anaesthetists how to teach in the classroom while much of their practical teaching would take place in the different context of the OR. This posed a puzzle and influenced me in deciding to start with a scoping exercise to explore the extent of anaesthetists' involvement in teaching and what training they had received to undertake teaching. This lack of empirical data around anaesthetic teaching suggested a further question which needed to be addressed before proceeding: *'What is the extent of the involvement of anaesthetists in teaching and what training have they received?'*

While the description given here might give the impression of a linear research process, this is not so. The research questions evolved as the project progressed with one phase informing the next. The data analysis was also not linear in that I kept moving backwards and forwards between the data from different phases. An example of this relates to the challenges associated with the patient as a major source of stress on teaching in the OR. While the impact of the patient was mentioned in the interviews, it was not until the anaesthetic group discussions that this emerged as a major issue. Then, when I returned to the interviewee transcripts the issue was clearly present but not investigated or probed in depth in the interviews.

Phase 1, using exploratory interviews, suggested that most of the anaesthetic trainees' teaching took place within the workplace in an informal manner when patients were receiving treatment. These interviewees had received little or no guidance on how to teach in these circumstances. In addition, what they had received in the classroom did not seem relevant to OR. However, these accounts were retrospective and while they could give specific examples these were not exhaustive.

Phase 2 grew out of the results of the interview findings as the exploration became focused towards specific issues surrounding teaching in the workplace and concentrated mainly on the OR. The primary intention was to capture contemporaneous episodes of teaching. This was approached by asking a small number of senior anaesthetic trainees to keep diaries of their experiences of teaching and of being taught in the OR. To gain a wider perspective and more in-depth exploration of these episodes, the trainees shared their teaching experiences with other trainees in the form of an action learning group facilitated by myself. The principle underlying action learning groups is the provision of a structure to help an individual reflect on specific real experiences, use discussion to identify ways to improve and then encourage

implementation. This is covered in detail in section 3.4.2 (action learning group). It was left to the trainees to decide what they considered teaching to be, a deliberate decision so as to avoid imposing my view upon the group.

In addition to exploring anaesthetic teaching episodes, it was anticipated that the very act of asking the trainees to document their teaching episodes might change how they thought about the activity. Furthermore, their discussions and reflections might be another source of change in how they taught in the future. In order to explore these possibilities, the study was designed to capture these changes. Areas for change were identified by the trainees who also suggested specific approaches for individuals in the group to try. These attempts were recorded and discussed at subsequent meetings of the group.

The results from phase 2 suggested that teaching in the OR was challenging, particularly in relation to maintaining patient safety, and that the trainees felt unprepared for this teaching role. The approach of using an action learning group to gather data and effect change in the participants' teaching was effective but this was a small purposively selected sample and I had concerns whether the findings might be more generally applicable.

Phase 3 explored generalisability using a group of ENT surgical trainees. I selected this group because both trainees and trainers were easily accessed and agreeable to participating. This phase used the same methods as phase 2 but over a shorter and predetermined time span. The findings were variable when compared with the anaesthetic group. The similarities were that patients came first in terms of priority and that teaching in the OR was challenging. However, the action learning group approach did not identify areas for change or effect change to the same extent as with the anaesthetists. The main reason for this was that the ENT meetings were limited to 35 minutes to fit into their regular teaching sessions and there was insufficient time to identify and agree specific areas for change.

Phase 4 explored the generalisability of the findings within a wider audience. This was approached by designing a self administered questionnaire and given to two groups of anaesthetic and ENT trainees. The results of the survey confirmed that some of the findings from the earlier phases were more generally applicable. These included that the OR was a good place to learn but that it was challenging and patient safety was a key issue.

Phase 1 - Scoping exercise

The most straightforward way to find out what the trainees thought about teaching and learning was to ask them. Therefore, semi-structured interviews were used. A detailed explanation of the approach to data analysis and interpretation are covered in section 3.4.1. In brief, a series of anaesthetic trainees from a single organisation were interviewed and the data analysed using principles of grounded theory to identify common themes (Strauss and Corbin, 1990; Coffey and Atkinson, 1996). The interviews continued until saturation of new themes which were then used to refine the next phase of the investigation.

Phase 2 - Exploration of anaesthetic teaching and learning in the OR

This second phase explored how individual anaesthetic trainees teach and learn to teach within the OR. The data were collected within the confines of a case study drawing on the principles of action research, using a small group of anaesthetic trainees. The principal approach was to form an action learning group.

The trainees collected, prospectively, experiences of teaching and learning, while going about their usual duties. They recorded their experiences in the form of a reflective diary. These diaries and the entries remained the property of the participant. The diaries were not shared or viewed within the group except through edited abstracts. They met as a group on five occasions to share and discuss their experiences. In addition, they formulated suggestions and

plans for ways to improve their teaching in the OR. The effects of these proposed changes in teaching formed part of the discussions at subsequent meetings.

Phase 3 - Exploration of surgical teaching and learning in the OR

The third phase took the suggestions for the use of action learning from phase 2 and applied them to a group of ear, nose and throat (ENT) surgical trainees. The intention here was twofold. Firstly, to investigate whether the themes developed from the anaesthetic trainees were applicable outside anaesthesia and, secondly, to see if action learning would work for a different group of trainee doctors. The approach was the same as for the anaesthetic trainees, a group of ENT trainees met on three occasions using reflective diaries and group discussions.

Phase 4 – Wider generalisability of findings

The data and themes generated by the first three phases all relate to small groups. This posed the question as to the generalisability of these findings to a wider audience and this was explored by designing a brief questionnaire to survey the views of a larger sample of anaesthetic and ENT trainees.

3.4 Methods

3.4.1   Phase 1 - Scoping exercise

The participants

The participants were volunteers from a pool of 28 anaesthetic trainees working at a university hospital. I approached trainees whom I knew well and had expressed some interest in education; all had either completed or were about to start a voluntary educational module that I supervise. I explained verbally the purpose of the study, that participation was voluntary and any information gained would be confidential. I reassured them that any data presented or published would not identify individuals or individual institutions. They clearly could not be

anonymous to me but would be to wider audiences. All agreed to have the interviews taped and transcribed. At the initial approach I also gave them a list of possible questions I was intending to use (Appendix 3). This gave them the opportunity to consider and reflect on the subject matter and gave them the opportunity to withdraw.

These trainees had completed at least two years at registrar level and had passed their final anaesthetic examinations. The reason for selecting post examination trainees was that up until this point their future career depended on their passing the examination. Failure meant they could not progress into their third registrar year and consequently could not complete their training. Therefore, their energies would be concentrated on the examination rather than participating with research. While they came from one institution they rotated on a yearly basis to other hospitals over their five year training programme.

In total I interviewed four anaesthetic trainees. This number was determined by the extent to which new themes emerged with each interview. I stopped when saturation was reached. This small number has limitations which might cause bias. In addition, as the trainees were from one institution they might not reflect the views of trainees elsewhere, although all had worked in several other institutions. As it turned out there were two male and two female trainees with a mix of ethnic backgrounds and all had completed at least five years within the UK training scheme for anaesthesia.

This sampling strategy had both advantages and disadvantages. On the positive side, I was already part of the culture. I understood the context within which the anaesthetic registrars worked, their language and how they needed to function. Furthermore, I had easy access to them. On the negative side, this meant that I started the process with preconceptions and biases. It was possible that as the trainees' senior in hierarchical terms, they may have felt obliged to participate and the information they shared may have depended on what they

thought I wanted to hear. They might also have felt that what they said might be used in a different forum to influence their careers. Clearly this needed to be handled with great care because it has implications for reliability and validity (Rubin and Rubin, 1995; Arksey and Knight, 1999).

Questions

The questions were a combination of open and directed questions. While the nature of the enquiry was to gain insight and understanding it was also to gain information on a specific topic. As research interviewing was a new venture for me, I listed more questions than I thought I might need as I was concerned about running out of questions. In practice this was unnecessary because all interviewees spoke freely and only required some gentle probes. The topic areas for questions came initially from the research question. These included:

1. Do they teach and if so what? (This was expanded by asking for real examples of their teaching.)
2. How have they learnt to teach?
3. How do formal courses for TTT fit in with their training?

The questions were refined by reflecting on my experience of anaesthetic trainees' involvement in teaching, by discussion with a critical friend with a particular interest in medical education and my study supervisors. The wording of the questions actually used was much more general than those listed (Appendix 3). For example my opening question was:

> *'What I'm interested in today is looking at how we learn to teach in medicine. I wondered if you did any sort of teaching at the moment.'*

Location

The interviews took place within the hospital. I avoided the use of my office in order to maintain a degree of neutrality and to limit any potential advantage I might be perceived to

have as the interviewer. However this caused other difficulties. On one occasion it became necessary to move during the interview because a room that is normally unused suddenly became a thoroughfare, despite being a dead end. On another occasion it became necessary to shut the windows because of noise from ambulance sirens around the hospital site, but this made the room hot and uncomfortable.

Recording and Transcription

The literature gives a number of warnings when recording interview data (Oppenheim, 1992; Britten, 1995; Rubin and Rubin, 1995; Gillham, 2000b). In short, what can go wrong will go wrong. I had a number of specific difficulties despite careful preparation. On the first interview the microphone sensitivity was set for 'meeting'. However, the sensitivity was so high that there was considerable noise in the background. This meant that transcription took longer than expected (4 hours for a 30 minute interview) due to having to repeatedly replay parts of the interview and listen through the background noise. The potential risk of this poor recording was the loss of relevant content material.

The biggest technical problem was when a brand new tape snapped on the first attempt to listen to the recording. It took over an hour of disassembling an unused tape before working out how to repair the broken one. In the end there was no loss of interview material but it did reinforce the dependence on and the vagaries of any form of technical equipment. My contemporaneous notes would have salvaged some of the themes but would have missed detailed quotes. As I had checked the tape soon after the interview I could have expanded my notes from memory.

Process of Analysis

I elected to undertake the transcription myself which gave me an opportunity to immerse myself in the data. The transcriptions did not include pauses, hesitations, or reference to body

language or the 'feel' of the interview. These decisions already limited the 'view' of the interview as an event (Arksey and Knight, 1999). This meant the process was not neutral or value free. I transcribed each interview before undertaking the next. The transcriptions of the interviews were given to the interviewees so that they could check them for accuracy and withdraw aspects if they wished. They did not make or request any changes. My initial impressions were that after four interviews there was a saturation of the emerging themes and there was little to be gained by further interviews

I approached the data analysis from three directions. My first approach was to consider the data while trying to minimise my preconceptions. Initially I read the four interviews to get an overall view of the substantive statements and some of the main themes which were emerging. I then re-read the interviews coding each of the ideas and assigned these ideas into broader themes. Finally, I identified other themes which seemed important but were not already covered. My second approach was to consider the semi-structured questions used for the interview because by their nature they might provide some core themes. My third approach to the analysis was to search the transcripts electronically utilising text searches. A text word search of 'teach' revealed a count of 229 occurrences and of 'learn' a count of 56. Inspection of both of these searches showed that the majority of occurrences had already been coded by one of the previously identified themes.

My ideas and themes were presented to and discussed individually with my two supervisors and critical friend together with the full transcripts. The ideas and themes were also discussed in a group consisting of my supervisors, critical friend and myself. After modification and revisiting the transcripts, the broad themes were agreed as a fair interpretation and summation of the interviews.

From a technical point of view I utilised the computer software QRS NVIVO to highlight the identified themes and as the main record keeping tool (Appendix 4). I used this as an alternative to the more traditional approach which uses highlighter pens, paper and scissors. The computer programme did not undertake the analysis, select the ideas or develop the themes. The advantage of using this computer software was that it was easy to add, subtract and modify themes. It kept an electronic record that could be adjusted, changed, and printed. Furthermore it acted as a record of how the process developed by saving different versions of the analysis on a time basis.

If the project had consisted of only the four interviews, then learning to use the computer software would not have been an effective use of time. The process would have been quicker using pens and paper. However, when combined with the action learning group transcripts it enabled easy access between the transcripts of the various phases of the project. The power of this electronic access to the ideas and themes facilitated movement between different transcripts. It also enabled assimilation and display of ideas and themes from different phases into single documents. In contrast, a paper approach would have been more time consuming. It is worth emphasising that NVIVO was used as a record of the processes not as an analysis tool.

Reliability

The concept of ensuring reliability from a series of interviews is complex. The word reliability is, within the positivist paradigm, concerned with the repeatability of the results found in a study. If the study is repeated by other researchers under the same stated conditions then, if the study is reliable, they will find the same results. This works in the experimental research designs where experiments are looking for a single 'true' answer. However, within the interpretative paradigm things are different. In this paradigm there is no expectation of a

single reality. There is the underlying acceptance that there may be multiple realities or 'truths'. In my study it was anticipated that each trainee would have different views. However, within these differences there would also be commonalities. The interviews continued until there was saturation of the common themes identified. Repeatability between different subjects at different times was not expected or indeed looked for and thus external reliability was difficult to achieve.

It is also possible to look for internal reliability. This could be achieved by re-asking similar questions on one or more occasions throughout the interview. Alternatively the individual could be interviewed again on another occasion.

Equivalent words to reliability, in the interpretative paradigm, include dependability and authenticity (Bryman, 2001). Does the data collected convey a measure of trustworthiness? This is a particular problem when there is a large amount of data which then requires interpretation by the researcher and the original data are not presented. It is found when analysing in-depth interviews. There are no concrete facts, as in scientific experiments, which can be published to allow reanalysis by others. One suggestion (Bryman, 2001) is to encourage others to 'audit' the researchers' original data so that they can follow the researchers' train of thought. Authenticity can be achieved by checking that the findings reflect the views of the subjects. While this is not always possible, in this study the participants received a transcript of their interview for verification.

Validity

The validity issue is equally complex within the interpretative paradigm. Internal validity requires that the research is carried out according to good practice and is submitted for peer review so that the wider research community can confirm or query the findings. The validity of the questions was addressed in this study by reflecting on my experience of anaesthetic

trainees' involvement in teaching, by discussion with a critical friend and my supervisors. External validity is related to applicability within in a wider context. This is of concern when small studies have generated the data which have been used for the analysis and interpretation. An area of particular importance is for the researcher to declare how they collected the data, analysed it and state their position within the context in which these took place.

The problems of reliability and validity that this study has struggled with are as follows. The study gathered qualitative data which was subjective and impressionistic. The theories of how doctors learn grew out of the data rather than being pre-determined. In-depth interviews by their very nature are difficult to replicate. Different individuals are likely to have different views, which may be different on different occasions. Replication is also dependent on the researcher because different interviewers will follow different paths in semi-structured interviews. However, the key to demonstrating reliability and validity can be summarised as making the whole process as transparent as possible. Future researchers can, at the very least, follow in the same direction if not the same footsteps.

Conclusions

This scoping exercise can be located within the framework described in the methodology section 3.2. Evidence within the literature, on how anaesthetists learn to teach was minimal, and this was confirmed by peer review on two separate occasions. The questions asked in the interviews were selected after reviewing information on research interviewing and discussion with supervisors and a critical friend. The emerging themes were developed from the data and confirmed as fitting in with the experiences of others.

3.4.2   Phase 2 - Anaesthetic action learning group

This phase followed the scoping interviews with the four anaesthetic trainees where four themes emerged: they were all involved in teaching, teaching was mainly within the workplace, teaching was mainly opportunistic, and they had received no 'training' in workplace teaching.

This phase of the study had two main sections. The first section was to build a picture of how the anaesthetic trainees learn and teach within the OR. While the interviews had given some indication, these were memories and covered issues in general. In order to explore what happens in the OR, more detailed and in depth illustrations were needed. These descriptions needed to encompass the breadth of teaching to include episodes that demonstrated good practice and those that were less successful. The second section used the analysis of how the trainees taught and learnt, in the OR, to identify areas where they might change their practice. In addition there was an opportunity for the trainees to put these changes into practice.

I considered a number of options to capture examples of teaching and learning in the OR. Observation of the trainees teaching was considered, particularly as this approach was used successfully by Lyon and Brew (2003) when they looked at medical student teaching in the OR. This was rejected for several reasons. The observer would need to be supernumerary, as all the members of the OR team are actively engaged in patient care. This would involve complex ethical issues involving consent from the patient, all members of the OR team and the learner. Furthermore the cost of employing such an observer would be prohibitive as there were no monies for this study. The use of videos and recording was also considered but this also involved ethical and consent issues. I took the approach of asking anaesthetic trainees to document their teaching and learning experiences. This was achieved by asking them to keep diaries of their experiences. This was different to the interview approach because they would

be identifying the teaching in real time and be able to document it soon afterwards. Thus the teaching episodes would be contemporaneous.

This approach produced problems of its own. The act of identifying and writing about their teaching had the potential to change what they were doing because they would be viewing their teaching from a different perspective. I decided to utilise this problem by including the trainees in identifying changes they might want to try in their practice. I approached this by setting up an action learning group (ALG) with a small number of experienced anaesthetic trainees. This enabled the trainees to discuss their experiences with peers and identify common areas of excellence or concern. This then fed into identifying changes that each of them might make as individuals to their teaching. In addition the group offered suggestions and support for other members of the group. This meant that the ALG acted as an educational intervention.

This was an innovative approach to gathering data, identifying areas for change, and providing an educational intervention for anaesthetic trainees. The direction the study would take was uncertain as was the expectation of success. In order to track the progress and the reasons for the direction the study took I kept a diary, including reflections on the process which formed part of the data collection.

In summary this phase took the form of a case study using an action learning group of anaesthetic trainees, drawing on the principles of action research. The overall structure is summarised in Figure 1. I identified and approached suitable participants and invited them to an introductory meeting. The participants then documented teaching and learning episodes in their diaries for discussion at four subsequent meetings. I explore the methods used in more detail in the following sections.

Figure 14 Summary of the design for Phase 2

```
                    ┌──────────────┐
                    │ Participant  │
                    │  selection   │
                    └──────┬───────┘
                           │
                           ▼
                    ┌──────────────┐
                    │ Preliminary  │
                    │   meeting    │
                    └──────┬───────┘
                           │
                           ▼
                    ┌──────────────┐
              ┌────▶│ Diary entries│◀────┐
              │     └──────┬───────┘     │
              │            │             │
              │            ▼             │
┌──────────────┐    ┌──────────────┐     │
│  Recording   │◀───│Action Learning│────┘
│Transcription │    │Group meetings │
└──────┬───────┘    │    1 - 4      │
       │            └──────┬───────┘
       ▼                   │
┌──────────────┐           ▼
│   Analysis   │    ┌──────────────┐
└──────────────┘    │  Disbanding  │
                    └──────────────┘
```
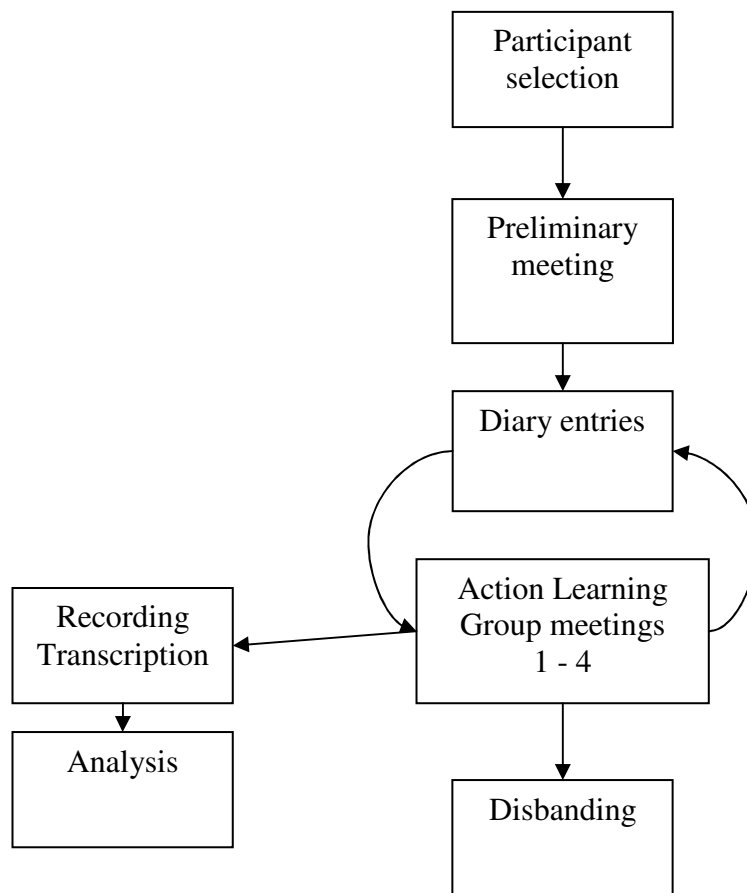
Action Learning Group

Central to this phase of the study was the establishment of the ALG. Action learning is:

> '…*a continuous process of learning and reflection, supported by colleagues, with an intention of getting things done.*' *(McGill and Beaty, 1995, p.21)*

This definition has several terms that relate directly to my study. There is an intention to

improve the trainees' teaching in the OR, there will be the support of colleagues in the form

of a group, and there will be reflection on their teaching. The purpose of an ALG is to help the

individual reflect and to suggest ways of moving forward. It was hoped that meeting in a

group would facilitate this, as we often do not find the time for reflection in everyday life.

However, it is still the individual who changes as a result of this group process. The

individual has the opportunity to speak and think aloud. It is not so much that the group

members select a solution to a problem as they help the individual to find the solutions for themselves. It is about real issues and resolving real problems. However, the individual has to want to develop and learn.

Novel or painful experiences encourage or even demand reflection. However there are all those other mundane experiences which never quite demand reflection. Action learning is one approach to encouraging reflection on the less dramatic but still important experiences of life. The process is cyclical in that it starts with experiences, which may be novel or problematic. These experiences are shared and discussed by the group members to understand the issues and formulate plans for the individual to try. The individual implements the plan and then brings the 'results' back for further discussion.

This integration of experience, reflection and action include aspects of Kolb's (Kolb et al., 1971) experiential learning and Schon's (Schon, 1983) reflection as discussed in the literature review. Indeed tracing back these three themes shows they converge at the seminal work of Kurt Lewin (1946). At the time Lewin was looking for ways to improve race relations in the USA. He brought together a group composed of individuals who worked together, despite widely different beliefs, because they were ready and willing to face difficulties realistically, fact find and work together to overcome them. Lewin (1947, p.12) describes the relationship between fact finding, action and how its investigation may influence change:

> *'Individual perception or 'fact-finding' – for instance, an act of accounting – is linked with individual action in such a way that the content of the perception or fact-finding depends upon the way in which the situation is changed by action. The fact-finding in turn influences or steers action.'*

The ALG consisted of a small number of anaesthetic trainees and me, to lead the group, from a single university hospital.

Participants

The sample was selected from the anaesthetic trainees attached to a university hospital between February and August 2003. They needed to have completed at least two years as an anaesthetic trainee and have passed their final anaesthetic examinations. In addition those trainees who were within six months of completing their training were also excluded because their energies were concentrated on acquiring a consultant post and this research study would not be completed in time. This left a total of seven potential individuals.

I approached all of the individuals personally face to face. I explained the purpose of the study and that it was to form part of my thesis into investigating how anaesthetists learn to teach. I emphasised that it was voluntary and that they could withdraw at any stage without reason. Furthermore all data would be treated confidentially and when presented or published it would be aggregated so that individuals or individual institutions cannot be identified. There would be no references to individual patients or members of staff.

Five of the seven potential individuals were keen to participate. The two who did not volunteer to participate had not worked at the hospital before, did not know me and seemed wary of the study. Out of the five who volunteered, two had already completed an educational module with me and one of these was already part way through a Postgraduate Certificate in Medical Education. Two had previously approached me about how they might improve teaching, one of whom was about to start a Postgraduate Certificate in Medical Education. The gender mix of the group was three female and two males.

Diary keeping

Reflective diaries or journals have been suggested as an effective tool to undertake a systematic look at one's own practice (Holly, 1989). Diary writing is a powerful way for teachers to explore their practice through the discipline of documenting their action. The act

of writing helps to construct and reconstruct their experiences so that reflection can take place. Diaries for reflection have much in common with research diaries which can be used as companions to the research process (Altrichter et al., 1993; McNiff, 2002). These diaries often contain notes of observations made and ideas for new research questions. They can act as a record of the researcher's development and as a historical document.

Edwards and Talbot (1999) view diaries as a conversation with oneself. They suggest the entries might include an indication of what one intended to do on the day or during the session (in detail) and why. This is extended by recording one's perceptions of what happened and reflecting on the targets set or the questions explored. Moon (1999a; 1999b; 2004) has undertaken an extensive review of the literature on various uses of diaries, journals and logbooks. She considers they have a use in reflection while at the same time appreciating that not everyone finds them easy to use.

The use of reflective writing in logbooks now forms part of the UK postgraduate medical training scheme (Foundation Programme Committee, 2005, p.30). The use here is related mainly to the effects on the patient and the trainee:

> *'Describe interesting, difficult or uncomfortable experiences. Try to record both positive and negative elements.*
>
> *1. What made the experience memorable?*
>
> *2. How did it affect you?*
>
> *3. How did it affect the patient?*
>
> *4. How did it affect the team?*
>
> *5. What did you learn from the experience and what (if anything) would you do differently next time?'*

Preliminary meeting

This took place on April 16th 2003 with four participants and myself. The fifth was unable to attend because of work pressures within the department. I met later with her individually. However she failed to make any of the meetings or contribute any diary entries due to other work pressures.

The meeting started with a detailed explanation of the study. I gave an introduction to the principles of the research methodology and explained how it can be made reliable and valid. I gave a verbal introduction on how to keep a reflective diary. In order to be able to illustrate this I had kept a reflective diary of my OR teaching for the previous four weeks. This was supplemented with a comprehensive handout including a brief literature review of keeping reflective diaries and action research (Appendix 5 and 6) and some background reading on situated learning.

The suggested guidance for the diary entries included:

- Recording the date and location.

- Recalling events as written recollections as soon as possible.

- Trying to include descriptions, your responses and how you felt.

- Recording questions that arise to be tested in practice or against current understanding.

- Recording implications for future actions, future practice and intentions.

- Leaving a blank space for later reflections which may be revisited to back up continuous themes evident elsewhere in the diary.

I also gave a ring bound notebook to each of them to start their reflective diaries.

ALG meeting one

This took place as scheduled on 4th June 2003 with the same four participants as for the preliminary meeting. The meeting lasted for about 90 minutes and was recorded. At the end of the meeting we agreed a number of areas that we might concentrate on changing within our teaching in the OR. A further meeting was scheduled for the 6th September.

ALG meeting two

This took place as scheduled on 6th September 2003 with the same four participants as the meeting one. This meeting only lasted for 20 minutes because they had little opportunity to teach in the OR. This was mainly due to the pressure on the service over the summer holidays. The meeting was recorded and transcribed. We revisited the main areas for concentrating on changing with our teaching and then rescheduled to meet on 17th October 2003.

ALG meeting three

This took place as scheduled on 17th October 2003 with three participants. One of the male members had forgotten. This meeting lasted for about 90 minutes and was again recorded. The group agreed to meet again during the spring of 2004 to review their progress. I sent transcripts of the meetings to the participants and invited them to check and return comments and observations.

ALG meeting four

This took place in March 2004 with the same three participants present at the meeting three. The format was similar except there was no expectation of further diary keeping other than as a personal choice. The meeting was recorded and transcribed. The last section of the meeting focused, by design, on series of targeted aspects which included:

- Have you kept up your diaries?

- Has it changed your job satisfaction?

- Have you talked about 'learning' to each other individually or as a group, either formally or informally?

- Have you spread your learning or experiences any further?

- Would you be prepared to facilitate your own group?

Process of Analysis

I transcribed the recordings of the group meetings and gave copies to the participants so that they could check them for accuracy and withdraw aspects if they wished. They did not make or request any changes. As in the analysis of the interviews, I utilised NVIVO as my record keeping tool for the ideas and themes and used a similar approach to analysing the data as with the interviews. The data were analysed from two perspectives relating to the two questions addressed in this phase of the study. The first considered the teaching delivered and experienced by the participants as an extension of the data collected in the interviews. The second explored the areas participants identified for possible changes in their teaching, and their success or otherwise in achieving these changes. Throughout this analysis there was frequent movement between the transcripts of the four interviews and the four anaesthetic group meetings.

The ideas, themes and transcripts were shared and discussed with my two supervisors and critical friend. In addition, one of the participants reviewed the initial ideas and themes with a detailed reading of the full transcripts. This was undertaken after the final group meeting in March 2004. As part of their involvement in this analysis, the participant looked particularly at the changes effected through the process and was first author for a poster presentation at AMEE 2005.

3.4.3   Phase 3 - ENT action learning group

This phase considered whether the ALG approach was generalisable to trainees from a different speciality. Specific aims were to evaluate the practicality of using the learning group to improve teaching in the workplace, to help improve their workplace teaching and to evaluate the ALG as a process to develop individual and group reflection.

I choose ENT surgical trainees for several reasons. This is a defined specialty which has a good track record for education. There was a large department within the hospital which is the hub of the training scheme within the region and has at least 15 trainees attached at any one time. Thus they were easily accessible in a single location.

The practicalities of getting more than five trainees in the same room at the same time meant that the sessions had to be conducted as part of their weekly teaching programme. This provided two challenges. Their time was limited to 45 minutes and there was no guarantee that the same trainees could attend all the sessions due to service commitments. In addition these challenges would shed light on the challenges of using ALGs to a wider audience within time constraints. The overall process used was similar to that used for the anaesthetic group. There were three meetings.

The preliminary meeting introduced the ENT trainees and their consultant supervisor to the background of the study and asked for their agreement to utilise their teaching sessions in this way. I explained the concepts of workplace teaching, action learning and the practicalities of using reflective diaries to capture, prospectively, real teaching and learning episodes. This was supplemented with a handout and personal notebooks for use as reflective diary entries (Appendix 7).

At the second meeting, four weeks later, they were invited to contribute their teaching experiences since the first meeting. The discussions were recorded and transcribed. At the end

of this session I highlighted some suggestions that emerged from the discussions they might wish to try in their teaching approaches. The third meeting, a further four weeks later, took a similar format with an emphasis on the changes they had made and their effects.

Process of Analysis

I transcribed the recordings of the group meetings and gave copies to the participants so that they could check them for accuracy and withdraw aspects if they wished. They did not make or request any changes. As in the analysis of the interviews I utilised NVIVO as my record keeping tool for the ideas and themes.

The approach to the analysis was similar to the previous phases. I concentrated on exploring how the ENT trainees' experiences of OR teaching matched those of the anaesthetists. In addition, the issues relating to the conduct of the ALG were explored within the limits of the time available. As before, the ideas, themes and transcripts were shared with my supervisors and critical friend to ensure they were a fair reflection of the data.

3.4.4   Phase 4 - Questionnaire survey

A questionnaire survey was undertaken to identify whether the themes that emerged from the previous phases were applicable to a wider audience. A questionnaire was designed to be self administered to two groups of trainees in anaesthesia and ENT surgery. The questions were developed from the themes that emerged from the first three phases. The questionnaire was divided into two sections (Appendix 8). The first consisted of questions related to the demography of the trainees, who they taught and what training to teach they had experienced. The second consisted of a series of Likert questions to explore their feelings about teaching in the OR. These questions covered areas related to the environment in which they taught, how they had learnt to teach and the stresses and challenges associated with OR teaching.

The questions were reviewed for clarity by my supervisors, a critical friend and two anaesthetic trainees, neither of whom would be members of the groups surveyed. The Likert questions were placed in a random order.

The questionnaires were given by hand to the respondents and collected soon after their completion. The anaesthetic trainees were attendees at a TTT course run at the Royal College of Anaesthetists. This gave a spread of respondents from different areas of the UK. The ENT trainees were attendees at a regional training day for ENT surgeons.

Process of Analysis

The analysis of the survey results was undertaken using SPSS 14.0 and gave a mix of descriptive and comparative statistics which are addressed in section 4.5.

3.4.5   Ethical issues

In this section I set out the approach to research ethics I adopted in this study. This study was conducted with participants who work within a hospital setting and although patients were not involved, I sought advice on research ethics approval requirements with the chair of the hospital local ethics committee in 2002. I also sought advice on the ethics relating to this project within the ethics advisory group of the West Midlands Deanery. On both occasions the views were that the study did not need to be submitted for ethical approval. The principal reasons for this were that no patients were involved in the study and the interviews and questionnaire were evaluations of current practice and participation in the group work was entirely voluntary.

Research ethics approval has attracted controversy and recommendations have changed since designing and starting data collection for this study. One issue concerns the lack of clarity around the definition of what constitutes research, how it is distinct from evaluation and

clinical audit, in the context of requirements for ethical approval. Any study intended to be published might be considered research and thus required ethical approval (Bedward et al., 2005). However, more recently, the National Patient Safety Agency (2007) refined its definition of research and now excludes clinical audit, case studies and service evaluation. These do not require ethics approval.

Since this is an educational study rather than a medical study, I adopted the 1992 British Educational Research Association guidelines, which were updated in 2004 (BERA, 2004). These guidelines explore five aspects relating to how research should be conducted: the person, knowledge, democratic values, the quality of educational research and academic freedom. The guidelines suggest researchers should undertake their research with consideration of the responsibility for the participants, the sponsors of the research and the community of educational researchers. As is explained below, these aspects have been taken into account.

The participants were all volunteers and there was no coercion or detriment to anyone who did not participate. I have considered the potential issues surrounding my position as the participants 'senior' in section 3.4.1. The interviewees were approached individually and the purpose and process explained at least two weeks prior to the interview. The group participants had detailed verbal and written explanations of the process and purpose several weeks before the ALGs took place. The participants were all qualified doctors in clinical practice and thus able to give their own consent. There were no incentives offered to participate and they were free to withdraw at any time without explanation. Indeed, one individual, who had agreed to participate in the anaesthetic ALG, did not attend any meetings of the group and another choose not to attend all the meetings. I did not contact either of these individuals to seek any explanation. In addition the participants received copies of the

transcripts which they were encouraged to amend if they were concerned about the content. The respondents to the questionnaire were anonymous and participation was voluntary.

The data collected from the interviews and ALGs were anonymised. When data are presented names and personal details have been removed. The data has been stored within the West Midlands Deanery which is registered under the Data Protection Act (1998). The only sponsorship involved in this study was a contribution to my university fees by the West Midlands Deanery.

Throughout the study I have been aware of my responsibility to protect the integrity and reputation of educational research. I have approached this by ensuring I had the appropriate skills and help to design the study so that data were collected and analysed in a transparent and honest manner. I am unaware of deliberate distortion of the findings or misconduct in conducting this study.

4 FINDINGS

4.1 Scoping exercise

This part of the study explored how anaesthetic trainees understood their teaching role. Three areas were probed using open questions and asking for specific examples of teaching, with prompts as necessary (Appendix 3).

- Do they teach; if so, what and to whom?
- How have they learnt to teach?
- How do formal TTT courses fit in with their training?

I interviewed four anaesthetic trainees for about 30 minutes each. The interviews were recorded and transcribed giving a total of 12,500 words.

4.1.1 Theme development

I coded the ideas and grouped them into five themes: teaching involvement, patient safety, nature of the learners, instruction in teaching, and nature of teaching. Although I started with three open questions the ideas were developed from the data rather than trying to fit the data into predetermined categories. Each of the five themes is reported in turn.

4.1.1.1 Teaching involvement

All four interviewees were involved in teaching and had been throughout their postgraduate training years. They described a variety of teaching activities. These ranged from answering simple questions from individual medical students or nurses, in a clinical setting, through to delivering formal lectures at national meetings.

These interviewees described most of their teaching as taking place informally within the workplace, namely the OR or the ICU. This is in line with the structure of training programmes for anaesthesia where the trainees spend most of their working days in either an

OR or an ICU. This informal workplace teaching was also often unplanned, in both subject matter and who the learner was. The nature of this unplanned informality surrounded much of their teaching and was illustrated by their responses to the opening interview question 'What sort of teaching do you do?'

> *Int 1: I do teaching informally of medical students, junior registrars and SHOs [senior house officers]..*

> *Int 2: It's usually unplanned. If someone's with you, either they ask a specific question, or I want to discuss a topic.*

> *Int 3: Well I do informal teaching in theatres [ORs], in both elective and emergency cases. In teaching registrars how to do cases perhaps they have not done before.*

They also undertook more formal teaching roles, in a classroom setting. These included formal lectures, presentations, and facilitating tutorials.

> *Int 3: Asked to do formal teaching either by presenting at a meeting or educating people about a subject perhaps they don't know about. I've done teaching sessions at *** hospital... I did a teaching programme for the ICU s on a Wednesday morning.*

This conceptual separation between formal and informal teaching is consistent with the views in the SCOPME report on postgraduate teaching in hospitals (SCOPME, 1994b, p.1). In this report they defined formal teaching as: '...*educational activities which have a primary educational purpose, are discreet, occur at a set time and location, and have a predetermined content and process.*' The informal teaching consisted of everything else. They did acknowledge that: '...*much, if not most, postgraduate teaching takes place informally and opportunistically in the clinical context at the workplace.*'

These interviews acted as an opportunity for the trainees to reflect on their roles as teachers. After my initial approach and explanation of the study they had to decide whether to participate. This would have required them to think and reflect about 'teaching' and their teaching role before the interviews took place. As a consequence of participating in these

interviews they began to recognise that many of their activities, concerned with facilitating others' learning, were actually 'teaching'.

> *Int 3: I think that it happens more in practical terms, the number of times you're trying to teach somebody… It happens all the time, education comes into part of your everyday anaesthetic life.*

Furthermore this suggested they seemed to view helping others to learn, when in the workplace, as an integral part of their daily work. Perhaps the interviews gave them an opportunity to reflect on their actions and modified what they recognised as 'teaching'.

4.1.1.2 Patient safety

One aspect of teaching that was mentioned by all the interviewees, when they were teaching in the OR or the ICU, was the presence of the patient. This theme emerged from the use of open rather than targeted and closed questions. While it was not explored in detail this theme became more prominent as the study evolved. When their comments were considered in detail it was clear that there were many issues and tensions relating to their concerns for the safety of the patient.

> *Int 2: I also have to decide about the state of the patient. If the patient is too critically ill …we should be sure to minimise potential complications….I will probably not allow the SHO to do the epidural on that occasion.*
>
> *Int 1: … without compromising on patient safety…*
>
> *Int 3: She'd been supervised once but she wasn't really capable of putting it in herself.*
>
> *Int 4: If it's to the patient's benefit for someone more experienced to do this [the procedure] then it's a missed opportunity. So there needs to be a balance.*

These comments bring out a number of issues related to patients being integral to a teaching episode in the workplace. There was a tension related to the interviewee having to decide if a teaching episode could take place safely. Their first consideration was the condition of the patient. Was there a risk to a patient's safety if they were used as 'learning material'? While the use of any patient as 'learning material' is potentially hazardous it seemed to be a

particular issue for these interviewees. One interviewee was clear that there were occasions when the patient was too sick to allow a novice to learn or practice a procedure, such as an epidural.

The next consideration was making an assessment of the learner's ability and expertise. This informed the interviewee's judgment as to whether this learner should 'learn' using this patient. The majority of these decisions were straightforward, providing the teacher had all the relevant information available on which to base the decision. However, there were occasions when the decision was unclear and this had caused tension for the interviewee. The final consideration was that the teacher had a responsibility to the learner. Each time they decided not to involve the learner in 'practice', a learning opportunity was lost.

The presence of a patient placed additional responsibilities on the teacher when compared to the classroom, where the primary 'consumers' were the learners. These conflicting tensions required the teacher to reach a balanced view between the care of the patient and the needs of the learner.

> *Int 3: I taught one of the ICU SHOs last week. …she wasn't really capable of putting it [a central venous line] in herself... asking her questions as she was doing it and guiding if she was going wrong.*

The outcome of this assessment of this learner's capabilities was that the interviewee could only allow them to participate in a small part of the procedure.

4.1.1.3 Nature of learners

The interviewees identified they were all involved in teaching a number of different groups of healthcare workers. The learners were varied and included most healthcare workers with whom the trainees come into professional contact. They included nurses, medical students, ODAs , more junior trainees both in anaesthesia and other specialties, peers and consultants.

They taught in various places which included the classroom or lecture format, the ward, the OR and the ICU.

The learners in the classroom were usually other doctors, mainly anaesthetists. For example, departmental meetings included other trainees, who might be more or less experienced than the interviewee, and consultants. This wide range of learners in a single audience was challenging because of the diverse experience, knowledge and motivation of the audience.

> *Int 2: In the departmental meeting, most of the people know something about it, we don't need to go to the absolute basics. I also try to adjust my talk to make it interesting.*

This contrasted with their teaching of more homogeneous groups such as other anaesthetic trainees in the classroom. This varied from a series of introductory tutorials, for those new to the ICU, to individual lectures for senior trainees on how to prepare for and pass their anaesthetic exams. In the latter case the interviewee, who had recently passed the same exam, knew what the learners need to achieve. Furthermore these learners were highly motivated as their future career depended on examination success.

> *Int 1: I gave an afternoon lecture to the trainees who were sitting their final exams, on regional anaesthesia. I tried to prepare them for the exam, because their main aim was to pass the exam.*

However, these interviewees did most of their teaching in their clinical workplaces. Their teaching encounters were with diverse groups of learners. For example, medical students were allocated to a specific operating list for the anaesthetist to teach them specified practical skills such as venous cannulation and airway skills.

> *Int 1: Medical students or ODAs, I teach usually very basic anaesthetic skills; including airway maintenance and intravenous access.*

Then there were other types of learners, who were not allocated specifically to the anaesthetist, with whom they interacted because the learner was curious and asked questions.

Int 4: …non medical staff. Nursing, ODAs and ODA students and again that is very informal. It's more of a sort of question and answer session or simple practical procedures like laryngeal mask insertions. The thing is in the job of an anaesthetist you quite often do informal teaching with junior doctors all the time, and medical students even just in passing.

They were required to supervise more junior anaesthetic trainees as part of their service and training commitments. There was an expectation here that this supervision would include teaching. This illustrates how the term supervision has 'teaching' embedded within it but may not necessarily be recognised as such.

Int 1: ..teach informally whenever I supervise a junior anaesthetist in the emergency situations.

Int 3: Well, I do informal teaching in theatres [ORs], in both elective and emergency cases. In teaching registrars how to do cases, perhaps they have not done before.

The interviewees came into contact with a variety of learners, who had diverse expectations and motivations. In addition a large proportion of their workplace teaching was unplanned and opportunistic depending on the clinical situation and the type of learner.

4.1.1.4 Instruction in teaching

Two interviewees had received some instruction in teaching and two had received none. One interviewee had attended a two day formal TTT course. This was a generic course set in the context of a classroom. The emphasis of the course was on understanding the theory as it related to teaching within the classroom, mainly in the form of lectures and small group facilitation. There was no practical teaching involved and little guidance on teaching in the workplace. The impact of this theory based approach was reflected in this interviewee's concept of successful teaching.

Int 4: Successful teaching is the ability to impart the theory behind the procedure and the ability to demonstrate it.

One interviewee had spent one day a week for three months on a bespoke educational module which I supervised. This was related to an aspect of education of the interviewee's choosing, was self-directed and encompassed both theory and practice.

The other two interviewees had received no instruction in how to teach. They had taught themselves how to teach based on their experiences as learners. They described this as mainly observation and imitation of how they had been taught by others, using trial and error.

> *Int 1: I have tried to copy the teaching methods of the teachers I approved of most. You know when I was a junior SHO that was how they taught me. That's what I copy and the way I benefited most.*

> *Int 1: ...all I know about how to teach is how I have seen it done and how I have found it effective for myself.*

This theme from the interviews showed that there were deficiencies and variations in how these anaesthetic trainees had learnt to teach. The formal teaching course concentrated mainly on the theoretical and classroom aspects. This confirmed the findings suggested in the literature review chapter where teaching developments have concentrated on the more formal aspects of teaching in the classroom.

These interviewees' main involvement in teaching was in the workplace. They had received no instruction in how to teach in the clinical arena. Their experiences of learning to teach in the OR was ad hoc. They had to use trial and error drawing on their experiences as expert learners.

All four interviewees felt that anaesthetists should have instruction in how to teach before being appointed as consultants. Indeed one even felt it was so important that assessment of teaching skills could be included as part of the anaesthetic exams.

> *Int 1: One argument could be to teach it for the exam, so one can assess whether people know how to teach during the final exam.*

These interviews have revealed some gaps in how our anaesthetic trainees are learning to teach particularly in the workplace. While some had received theoretical instruction in teaching methodology none had had supervised teaching practice in the workplace. This gap and how it might be addressed has formed the basis of the next phase of this study.

4.1.1.5 Nature of teaching

The interviewees described a wide variety teaching activities. These included explaining theory, introducing new material, teaching practical skills, and acting as role models. In order to make sense of this diversity I have mapped the descriptions of their experiences onto the three domains of learning: cognitive, psychomotor and affective as described by Bloom et al. (1956).

They all described an involvement in teaching and explaining things to others. Throughout these descriptions they used the words theoretical and basic facts. These examples of experiences map directly onto the cognitive domain. Furthermore they crosslink to the teacher's roles as information provider both in the classroom and workplace, as discussed in the literature review chapter, section 2.3.2 (Harden and Crosby, 2000).

> *Int 1: I'd go through all the theoretical aspects of airway management.*
>
> *I was giving them the theoretical knowledge in a sort of way of discussing things.*
>
> *I give them the basic facts of knowledge they need to know.*

They also described examples of teaching psychomotor skills and the practical aspects of giving anaesthetics. All this teaching took place within the OR or ICU and involved real patients. At the simplest level this consisted of teaching individual practical skills to non anaesthetists, such as medical students, nurses and ODAs.

> *Int 1: I teach very basic anaesthetic skills; including airway maintenance and intravenous access.*

Int 4: … simple practical procedures like laryngeal mask insertions.

I use the term 'simplest' because being an expert at airway management is a fundamental skill of anaesthetic trainees. Thus they were able to recognise and rescue the situation if the learner made a mistake. Some of these learners, usually medical students, were specifically attached to the anaesthetist to learn these skills as part of their training. They also taught more complex skills to anaesthetic trainees, which were nevertheless discrete skills.

Int 3: Or sometimes you can teach them practical procedures that they've not done before… how to put in an epidural… or arterial lines and central lines.

At this higher level the interviewees were teaching and supervising the skill acquisition by less experienced anaesthetists. In this situation, while they were more experienced than the learner, they might not be skilled enough to rescue a mistake by the learner. These psychomotor skills map across on to the learning facilitator role, as they are taking place within the workplace in real time.

One interviewee described how she deliberately set out to address the learners' attitudes towards their patients.

Int 1: I teach …attitudes towards patients.

While another acted as a role model for a learner when he took them to assess patients pre-operatively. Throughout the descriptions there was a suggestion that the interviewees acted as role models and influenced, all be it in an indirect manner, the learner's experience particularly in the clinical environment.

Int 2: …it will also entail the other practical aspects like explaining to the patient beforehand. Then I will take the SHO along with me and talk to the patient. Explain to the patient the procedure so the SHO knows what I am talking about and of course ask the SHO at the end whether he wants add anything.

These interviewees described a wide variety of teaching activities within the classroom and the workplace. The relationship between the type of teaching and where it took place is now explored in more detail.

4.1.2   Teaching and location

One aspect of the type of teaching explored was the relationship between the location, type of teaching and the domains of learning (Bloom et al., 1956). This relationship is shown in Table 11. When they described their experiences of formal teaching it was exclusively associated with the theoretical domain. Whereas they described aspects of all three domains in the informal workplace setting. They separated formal classroom teaching from the informal workplace learning.

Table 11 Relationship between location/setting and learning domain

	Informal	Formal
Theory	4/4	4/4
Psychomotor	4/4	0
Attitudinal	2/4	0

One of the interviewees identified that the TTT courses did not fully address their needs for their informal teaching in the workplace.

> Int 1: There are a number of features of teaching within the workplace setting that are not addressed by the current TTT initiatives. Workplace teaching and learning is often opportunistic because it depends on the real life situations which are unpredictable. It is often initiated by a learner's question and these are often unpredictable.

Perhaps this is because the TTT usually take place within the classroom setting and the curricula for these courses focus on pre-planned teaching with set aims, objectives and outcomes. This suggests there is a gap between where anaesthetists are taught to teach and where they do most of their teaching in reality.

The teacher, in the clinical workplace, has to make use of the facilities available, rather than being able to pre-order audio-visual aids or pre-prepare handouts for example. The teaching is situated within the real world and the job in hand, caring for the patient, has to take precedence over teaching.

> *Int 1: I interfere as soon as I recognise they are not able to do it. And without compromising on the patient safety and that is when I interfere.*

The skills needed to provide successful teaching in the workplace may be different to those required in the relatively structured and controlled environment of the classroom. The end result of training is to deliver independent medical practitioners. Thus any model of the learning and teaching needs to take account of how the delivery of service takes place. At the same time, the intention is to enable the learner to be transformed from a novice to an expert, who is able to undertake independent practice. Furthermore, the teachers, who are still learning their anaesthetic skills, take responsibility for teaching and training the next cohort, whilst they are still learning.

The newcomers to anaesthesia within our hospital start their first morning by being attached to an experienced anaesthetic consultant within the OR. They do not start in the classroom. There has been little published research on how anaesthetic trainees learn within the OR environment and none on how they learn to teach within the OR.

Before setting out the conclusions and the direction for the next phase of the study I look at whether these findings and interpretations can be more widely generalisable.

4.1.3   Generalisability and triangulation (peer review)

One of the challenges when interviewing small numbers of purposively selected individuals is whether their views and the interpretations are more widely applicable. In order to investigate this issue the findings have been presented in several fora for discussion and critical review.

The initial review was by my two supervisors and critical friend. These took the form of open verbal discussions and written comments on early transcripts. The findings were also discussed informally with other anaesthetic colleagues.

The results have been presented in two international arenas. The first was as part of a workshop I facilitated at the international meeting of the Society of Education in Anaesthesia held in Montreal in June 2003. The workshop consisted of a mix of anaesthetists from Canada, North America and Britain. The general consensus was that anaesthetists learnt their trade and skills within the clinical arena of the OR and ICU. There was also agreement that the faculty development of senior staff within the anaesthetic departments concentrated on improving their classroom or formal teaching skills. No one was aware of empirical data on or anyone developing programmes directly targeted at improving teaching skills within the informal workplace.

The second was as a short presentation at AMEE in Berne in September 2003 (Appendix 9). The presentation in Berne was to a diverse audience, encompassing different nationalities, specialties and some external to medicine. Again there was general agreement that the majority of learning how to be an anaesthetist takes place within the workplace. Several of the audience commented on their disappointment on the demise of the apprenticeship model in favour of structured classroom teaching. There was also agreement on the lack of empirical data of how anaesthetists learn to teach within the OR.

These views taken as a whole suggest that the views expressed by the interviewees are more widely held. The concepts and themes emerging from the data seemed to be in accord with the views of other clinical teachers.

4.1.4   Conclusions

This scoping exercise can be located within the framework described in the methodology. A review of the available evidence within the literature on how anaesthetists learn to teach was minimal and this has been confirmed by peer review on two separate occasions. The questions asked in the interviews were selected after reviewing information on research interviewing and discussion with supervisors and a critical friend. The emerging themes have been developed from the data and confirmed as fitting with the experiences of others.

The themes that emerged from the scoping case study have indicated a number of different areas that might be suitable for a more detailed exploration. While it would be valuable and exciting to look at learning and teaching within the whole world of anaesthesia this is not practical within the constraints of a PhD thesis. One of the key features in this area of their practice is that 'teaching' in the OR was not regarded in the same way as teaching within the classroom. This fits with the general move away from apprenticeship type training into the more structured form that takes place within the formal setting of a classroom (SCOPME, 1992).

This separation of informal and formal teaching can also be seen in the new quality assurance approach of postgraduate teaching set up by PMETB, the statutory body overseeing postgraduate medical training. They conduct surveys of trainees and visit training hospitals on a five yearly cycle. In their national survey conducted in 2006 they asked specific questions about the number of hours spent in formal education:

> ' *How many hours of relevant, timetabled, organised educational meetings or other events of educational value do you take part in on average each week?' (PMETB, 2007b)*

The questions asked about workplace learning relate more to provision of supervision in the clinical environment. When PMETB conduct formal visits they interview supervisors and

trainees using structured questions. There is more emphasis on asking about the formal than the informal teaching as shown by a sample of their questions (Appendix 10).

> *'How much protected teaching time do you have during the week and what form does it take?*
>
> *Do you have access to courses on generic professional skills?*
>
> *Have you had any problems attending formal "classroom" sessions?*
>
> *Is there a regional training programme?*
>
> *What other forms of teaching take place and how effective are they?'*

The data from the present study suggests there is a gap between where anaesthetists are taught to teach and where they teach in reality. This scoping exercise served to shape my research questions so that I chose to look in further detail at how anaesthetic trainees teach and learn to teach within the OR.

4.2 Anaesthetic action learning group

The findings from the anaesthetic action learning group (A-ALG) are considered in four sections. In the first section I explore and discuss the findings from the first of the four meetings. The ideas and challenges, that emerged from the discussions, are taken in conjunction with those from the interviews and developed. I consider these ideas in the context of how the participants reflected on their teaching by using diaries, discussions and guided questioning.

The second section explores how the group developed their teaching as a result of reflecting on their practice. The second and third meetings are analysed as one session. In summary, the main change to their practice was to assess each learner's needs in order to set the level for their workplace teaching. This simple step enabled the participants to improve their teaching. When they demonstrated the use of this step it acted as a role model for their learners,

particularly for those learners who were 'late' or appeared part way through an operating session. An underlying message of the role modelling was that the patient comes first.

The third section looks at the effects of the group process on the participants some six months later. This meeting gave valuable insight into how they developed their teaching further. In summary, there was good evidence that the lessons they had learnt from the earlier meetings, that they found had been effective, had now become part of their tacit understanding. Furthermore, two of the group related their developments as integrated with formal educational qualifications they undertook. They found the two different approaches complemented each other. However there was a reluctance for the participants to set up their own learning groups for their colleagues in the near future. Several reasons underpinned their reluctant but the two most prominent included a lack of seniority or gravitas and a lack of experience. Despite these shortcomings, they found the experience of participating in the ALG, the principles of reflection and the use of diaries valuable.

The final section reviews the main points and puts them in the context of generalising the findings to other groups and forums. It also sets the scene for further explorations in the form of learning groups for surgical trainees.

4.2.1   A-ALG meeting one

In this section I look at the data generated by the first A-ALG. There were two questions asked in this study – what approaches do anaesthetic trainees use for teaching and how might we address improving their teaching when we take into account these approaches. I use the term participants to refer to the group members in order to make it easier to separate them from other learners, teachers and learner teachers.

The participants for the first A-ALG meeting consisted of myself, as facilitator and participant, and four anaesthetic trainees attached to a university hospital between February and October 2003. I identified descriptions of 22 specific teaching or learning episodes discussed during the first ALG meeting.

4.2.1.1 Analysis

I approached the analysis using similar principles to those used for the interviews. Their experiences in this first meeting were mainly descriptive as were the shared diary extracts. The later meetings provided shorter descriptions with more evidence of reflection on their actions and how they had used their reflections to modify their practice.

The analysis was informed by the five themes that emerged from the four interviews undertaken during the scoping exercise: teaching involvement, nature of the learners, the nature of the teaching, patient safety, and instruction in teaching. Two of these clearly emerged in the A-ALG meetings, namely teaching involvement and the nature of the learners. Patient safety, as a theme, is explored as one of the stresses or challenges posed by teaching in the OR along with unexpected and/or unknown learners.

While there was no discussion around how they had learnt to teach, or what instruction they had received in how to teach, I have included this as a background in the description of the participants. Like the interview group they had received little help in how to teach in the OR. A theme that emerged from analysis of the discussions were the particular stresses and challenges associated with teaching in the OR. These stresses were multiple but revolved around the underlying principle that patient safety was paramount.

4.2.1.2 Teaching involvement

The five themes are considered in turn starting with teaching involvement. The four participants explained that much of their workplace teaching focused on practical skills usually related to intravenous access and management of the airway. Anaesthetists are expert in these skills, even at the level of senior trainees, and because of this expertise they are commonly used to impart these skills to others. This type of teaching is related to Harden and Crosby's (2000) 'clinical or practical teacher' role in the clinical context.

The participants also described how they imparted factual information. This was either in the form of question and answer sessions in response to questions from inquisitive learners or in the form of mini-tutorials within the OR. These tutorials usually related to aspects of the patient under their care and were delivered while surgery and anaesthesia were ongoing. This type of teaching is related to Harden and Crosby's (2000) 'information provider' in the clinical context.

The third area was less well defined and related to looking after the welfare of the learners entrusted to them. It included introducing newcomers to the OR and ensuring they coped with the unique environment. This could be any healthcare worker or trainee anaesthetist who was new to the OR and anaesthesia. For those who were more used to the OR, they acted as guides through the vagaries of the duties of anaesthetists that were perhaps more tacit than laid out in any of the curricula. This third area was complex and encompassed aspects of role modelling both as an anaesthetist and a clinical teacher. This type of teaching can be related to several of Harden and Crosby's roles (2000) namely learning facilitator, mentor, on-the-job role model, and clinical teacher.

When considered from the perspective of determining educational objectives for the learners, these three areas were similar to those described by the interviewees in the scoping exercise.

They were involved in teaching across the three domains, cognitive, psychomotor and affective (Bloom et al., 1956).

4.2.1.3 Nature of the learners

In terms of the second theme that emerged from the interviews, the nature of the learners, these participants also encountered a variety of learners within the OR setting. These included nurses, midwives, medical students, visiting anaesthetists as observers, novice trainee anaesthetists, experienced trainee anaesthetists and consultant anaesthetists. In order to make sense of their interactions these learners can be separated into two broad categories.

The first category includes those who are engaged on a career in anaesthesia. It includes both trainee and consultant anaesthetists. I suggest that these individuals are part of an anaesthetic community of practice (A-COP), as described in section 2.2.2.3. The novice anaesthetists equate to Lave and Wenger's (1991) new-comers, the consultants to the old-timers and the experienced trainees are part way to becoming old-timers. They are all members and legitimate participants of an A-COP.

The second category includes those learners who touched the edge of anaesthetic practice. These learners have no intention or expectation of joining the A-COP. By this I mean that these learners are not present in the OR primarily to learn about anaesthesia. On many occasions the interaction is unplanned or opportunistic. For example a nurse seeking information or understanding in an area that the participant was an expert.

> P4: I asked a Philippine nurse to do a group and save. She didn't have a clue what a group and save was because she only works in cardiac and they always send off a cross match. So I had to go back and explain what the differences were.

These learners were not directly involved in anaesthetic practice. So what is the obligation of the participants to be responsible for their learning? Do the participants treat or approach the two categories of learners differently?

When they described their interactions with anaesthetists they seemed to be more holistic than when they were describing teaching skills or knowledge to others. This was illustrated by the descriptions of their approach to teaching intubation to a novice anaesthetist in comparison to that of a medical student.

Novice anaesthetist:

P3: I said to them,' I wasn't expecting you to be here, what do you want to learn?' He said, 'I'd actually quite like to do the intubation but I've just been told by the consultant I can go home.' It was about 4 o'clock on a Friday bank holiday weekend. So that was fine, because once we had established that then we thought, 'right, for an extra five minutes we can get something useful out of it.' But anything more than that and neither of us was really going to want to be there.

Medical student:

P1: A medical student said, 'is it alright if I spend the morning with you?' I said, 'that's fine, what do you want, what have you got to do for your module?' They bring out this work book. I said, 'is there anything you want to do?' She goes, 'I want to intubate today.' I said, 'OK, have you done venflons yet?' She said, 'oh no, I want to intubate today.' I found that really hard. When I was a medical student I would never have told a registrar I want to intubate.

Both these learners seem to ask for the same thing, to learn to intubate. However, the reaction by the two participants was different. On neither occasion had the participant met the learner before and superficially they were both asking the same thing but the intentions were different. The medical student needed to complete her workbook in order to pass her anaesthetic module. The novice anaesthetist, however, was keen to improve their anaesthetic competence as part of integrating into the A-COP. He was certainly motivated as he was prepared to stay late on a bank holiday Friday afternoon. The response from the participants, as teachers, differed. In the case of the novice they agreed to the request to do the intubation. In the case of the medical student, the participant refused.

P1: I said, 'I'm very sorry but you won't be doing any intubations today as we need to start off with the basics of airway management.'

This seemed to be due in part to their irritation with the medical student. In addition further questioning of the medical student, by the participant, had revealed they had not yet mastered the basics of airway management.

4.2.1.4 Nature of the teaching

Moving on to the third theme, the nature of the teaching, from the interviews it was difficult to identify a consistent approach that was being used by all the participants. To make sense of this I considered how they approached the management of learners throughout an operating session, how they imparted knowledge in the form of mini-tutorials or answering questions, how they taught specific practical skills, and how they behaved with and to their learners.

This first description related to an interaction with a novice anaesthesia who the participant had not met before. After introductions and an explanation of the patients on the list he sent the novice to see the patients on the ward, unsupervised. The participant's description of his day with the novice went as such:

> *P2: And then it was pretty much a hotchpotch really. There was no structure as to the teaching format. What I did was just allow her to chip in as the case went along, with any thing she had queries about.*

He spent the day supervising several practical procedures, spent some time talking about specifics related to the cases and general discussions. Despite his enthusiasm and all his efforts the participant was disappointed with the outcome.

> *P2: I felt it was a good opportunity to teach. I tried going back to real basics and how I felt when I first started i.e. questions I would have asked. I was disappointed she didn't ask any questions at the end. I wasn't particularly sure if she was shy, timid or both, or didn't particularly like me.*

Interestingly this was the first description that was volunteered in the first A-ALG meeting. There was clearly an intention and a will to teach this novice. However the reflections by the end of the day illustrate a degree of frustration with patients not seen, no questions asked and

an acknowledgment of lack of any structure. This feeling was echoed by the other

participants:

> *P4: I had a similar problem really of how to pitch it. And how to give him an overview of what anaesthetics were, in the space of an afternoon.*

This approach to teaching could be termed 'experiential' in that the learner is getting

experiences in the real world. However, the lack of structure and guidance, by the participant,

on the relative importance of their experiences meant that they may not have learnt the 'right'

things or maximised the workplace learning opportunity. This approach has been termed an

'apprenticeship' model but as I highlighted in the literature review chapter, while it is a

characteristic of medical training that a lot of the time is spent working with patients and other

healthcare professionals, it is also how these experiences are managed that is important.

At the other end of the spectrum was a description of a nurse observing cardiac surgery. The

participant acted as her guide explaining the whole procedure, both anaesthesia and surgery,

and answering questions and queries. This related to the participant imparting their knowledge

to the learner with the opportunity for the learner to ask questions for clarification. The value

to the learner of this experience is set mainly by themselves.

> *P2: I actually enjoyed the experience of answering her questions or showing her some practical skills or whatever she wanted to do. Rather than being under stress and surgeons getting stroppy because you're wasting time. Or what they perceive to be wasting time. I think a lot of people don't have time for teaching.*

There was something here about having the time and not being under pressure to complete the

work such as get the list moving or get through the patients. There were also clear

expectations, albeit not explicit, of the roles of the teacher and learner and what the learner

expected to learn. This was different to an extension of the previous example where the

participant stated:

P2: I found it difficult to gauge what or where to pitch it really to be honest….I was trying, just trying to go on personal experience, at three weeks what did I know? So I am not sure what she really knew or had seen before.

This difficulty with determining the level of the learner was a recurrent theme throughout the meeting. The participants found it difficult to know what to teach and what level was appropriate for their learners.

P2: So I am not sure what she really knew or had seen before. That's why I thought that the practical skills would be OK, I mean you can't pitch that too high or low really.

The discussions that ranged around this theme resulted in the realisation that it is important to undertake a needs assessment for each learner. This became one of the key issues that they went on to address and think about 'changing' for their teaching and was discussed in subsequent meetings.

P2: I'm still not sure how we pitch what level to teach at when people turn up. Presumably we'll just get them talking and try and work out whereabouts they are.

The comment about 'get them talking' suggests that perhaps they did have some structure when they were teaching theory or facts in the OR. It was not until there was a discussion around this point that they came to identify this as structure. While there was no formal structure, this question and answer interaction between the participant and the learner meant they would need to have been 'introduced'. Through the questions and answers, the participant could gauge the learner's level, a needs assessment, and pitch the discussion appropriately.

P3: The way I try and get round it is to get them to start asking questions. Because you can get some idea from their question, if they understand the basics. When I start off asking questions, I think, ' ah right so they don't even know that, I have got to really centre down on it.'

P4: I've written, 'my appreciation of the nurse's level of knowledge was incorrect. I had to keep getting her to explain back to me what she knew'.

When it came to teaching practical skills, mainly intravenous cannulation and airway management, the usual approach was to give the learner an opportunity to try an easy part of the skill. Then the participant was able to make real time assessments of the learner's ability and decide how far the learner could go.

> *P4: When I do practical things in the anaesthetic room I try to do one little thing, just make it into little parts. …. he just put his hands on the face mask and held the jaw on one. On the next one, he had one hand on the bag, and squeezed the bag a couple of times. Then as we built it up he went from not doing anything to by the end of the session he managed the face mask, valve adjustment and turning on the volatile agent. By the end of the day, he was inserting a laryngeal mask and assessing its patency. But it was six or seven cases, all short, just little tiny things rather than trying to get them to hold a mask on and squeeze the bag. I don't know what anybody else has found by breaking it into tiny little things that are very easy to remember and then build it up.*

This approach to practical skills teaching is at odds with the principles being taught at TTT courses based in the classroom or clinical skills laboratories. A particular example of this is the method used for teaching on advanced life support courses for the Resuscitation Council (Mackway-Jones and Walker, 1998, p.24). They recommend a four stage approach to teaching practical skills. These stages consist of: the instructor demonstrates the skill, the instructor demonstrates the skill and provides a commentary, the learner provides the commentary and the instructor demonstrates the skill , the learner demonstrates the skill and provides the commentary.

The other participants gave similar unstructured descriptions of how they taught practical skills in the OR. Perhaps their lack of a structured approach to teaching skills goes some way to explain how stressful they found the process.

On the other hand one participant gave a description of how an experienced (old-timer) consultant, with a reputation as an excellent teacher, managed the participant's learning. The participant joined the consultant, who they had not worked with before, part way through a complex and stressful operation.

P2: I walked in and everything was going belly up. He'd got this 18 year old for a pelvic clearance or something and I looked at the monitor and the systolic was 55 [this is a very low and life threatening blood pressure]. He was a perfect gentleman, he introduced himself and everything. I thought, 'he's alright.' And I just basically mucked in.

On this occasion the consultant was working in a familiar environment and with a team he worked with regularly. Although it appeared to be stressful to the participant, this experienced consultant was almost certainly still in his comfort zone. Interestingly the participant was prepared to and also felt valued by 'mucking in' to help look after the patient.

P2: I was thinking, 'if this was me and a junior had just turned up I'd be like a headless chicken. I've got to take care of him, got to try and sort out the patient.' Whereas he managed to integrate it so well.

P1: He's more experienced isn't he? He was in control.

The other members of the A-ALG were impressed by this account and were able to relate this to their experiences of working with highly regarded consultants. There was something here about the ability to be 'ice cool' in difficult circumstances. This description is worth exploring in more depth.

There were several steps that the consultant took. Firstly, he introduced himself to the learner and made an assessment of their level of competence. This was despite having never met the trainee or worked with them. However, these steps did not become clear until I probed the participant in detail about the event and encouraged them to reflect on the episode.

MC: Did Dr xxx know who you were?

P2: He said, 'oh I've seen your name about.'

MC: So he actually had no idea what your abilities were at all.

P2: No, he in fact said, 'what stage are you at?'

This approach was then reinforced by the consultant's actions by allowing the participant to become involved, and as the case progressed, to add suggestions to the patient's management. The key features from this encounter were to treat the learner as important and it was possible

to determine the learner's level of competence quickly and simply. From this, the level of involvement in the care of the patient can be determined.

4.2.1.5 Patient safety

The fourth theme reminds us that throughout all the teaching in the OR a patient is involved. As we saw from the scoping interviews, there was a realisation that patient safety was a key concern of the teacher. However, this also produced a tension as the learners have to be given the opportunity, at some stage, to gain experience working on the patients. Integral to this was the type of teaching they undertook. There was a distinction drawn between 'tutorial' type teaching and having the learners undertake practical procedures.

> *P1: It kind of makes me jittery. I feel that my anaesthetics are less in control when I've got a novice SHO doing them with me. Like if I let them do things in the anaesthetic room. Whereas I'd quite happily sit and talk to them all day in theatre[OR] about knowledge things.*

When the learners were undertaking practical procedures this produced more stress in the participants for two main reasons. Firstly, there was the frustration of standing and watching a novice struggling. Secondly, they found it difficult to decide what amount of 'incompetence' was acceptable and then when to intervene and take over.

> *P3: His technique wasn't brilliant but he still got the tube down.... Afterwards I found it very frustrating watching someone do something I do every day, which I find difficult. I think it's difficult knowing when to jump in. One can tolerate for just so long. Obviously you get to a point when you've got to let them have enough goes but not put the patient at risk.*

At this point it is worth restating that these participants had had no help in learning how to manage these difficult situations. Despite this, it is the 'traditional' way that anaesthesia has been, and still is, taught and learnt in the UK. However the participants recognised their discomfort and the risks of teaching practical skills in the OR.

4.2.1.6 'New' stresses to teaching in the OR

Another theme, identified within the OR episodes, was that learners appeared without warning. This has already been alluded to when discussing the types of learners. When a teaching episode resulted from curiosity and questions from learners not 'allocated' to the participant this was not surprising. However, it also applied to those learners who had been allocated. The learner knew where they were supposed to be but the participant had no prior knowledge of their attendance. This sometimes resulted in the participant being taken off their guard.

A common occurrence was a learner appearing unexpectedly part way through an operating session. On the one hand this might be a nurse coming to observe the surgery.

> *P2: A nurse from the *** hospital came to observe a patient for the day. Mr X had told her to come down to theatre [OR], see the patient and follow it through.*

On the other hand it might be a novice anaesthetist who appeared during the induction of anaesthesia. The latter can be distracting for the anaesthetist because the induction of anaesthesia is one of the most critical periods and they need full concentration on the job in hand.

> *P1: And he also came in when I was inducing a patient. He caught me off guard, I was worried about this woman. I didn't like to say go in another theatre [OR]. *** [the anaesthetist's assistant] could see I was on edge.*

A further twist to not knowing when learners will appear was that the participants had often not met them before. As everyone in the OR wears similar clothing it is not obvious, without reading their name badges, who or what their role is. These participants described a degree of irritation that the learners did not always introduce themselves. This perceived lack of courtesy could then influence the teacher learner relationship in an unhelpful way.

P1: I think what aggrieved me was the way he introduced himself and the way he sort of just said, ' are you the anaesthetist?' I felt like saying to him, 'and who are you?' They could be, like, a cleaner or something.

P2: But as a one off, never having seen someone before I found it quite difficult.

P3: Did you know they were going to be there before you started?

P2: No.

The unexpected appearance of learners caused a degree of irritation or even stress to the participants. The degree of this depended on how the learner introduced themselves, the stage of the operating session and how challenging the participant was finding the particular patient for whom they were responsible. As first impressions are important it can be difficult to set up a safe learning environment if there is a misunderstanding or clash within the first few seconds on their first meeting. This theme of stress within the participant is continued in the next section.

The success of addressing the first impression was illustrated by an interaction with a novice anaesthetic trainee during their first three weeks. This trainee appeared unexpected by the participant but a few minutes before the first patient arrived. This gave the participant a little time for introductions and to undertake a needs assessment. Not only did the participant agree the learning outcomes but also set limits to the learner's participation based on patient safety.

P3: She'd done three weeks of anaesthetics, six months of accident and emergency after house jobs. She felt confident with venflons, but wanted more airway practice. So we set the aims for the list to improve practical airway skills and discuss manipulating blood pressure with different drugs. I explained that some cases were higher risk, so I couldn't allow her to do the whole induction for them.

The participants described several situations when they were working at the edge of their capabilities. These may be for several reasons; the patients on the list are challenging, the trainee may be working close to the edge of their capacity, there is pressure to get the cases through quickly, or they may be tired. Then any additional tasks or duties, such as teaching,

may result in task overload. If this happens, they may function inefficiently and may make errors of judgement. Task overload is described in the realms of scuba diving and is a well recognised cause of diving accidents and diver death (Richardson, 2004). The difference here is that it is the individual who is overloaded that is at risk rather than the third party, namely the patient.

> *P1: I think there is a lot of pressure; you know not only the internal pressure of you being nervous about the patient but the external pressure.*

> *P2: I must admit that when I'm struggling with central lines in cardiac or something; it feels to me that the consultant, who is over viewing the whole case, is a lot more chilled about it than I would be, if the roles were reversed.*

> *P4: I had an adolescent list, all 13 and 14 year olds. There had been a lot of fuss made about it. ….So all I did was to try to think, OK what can I achieve that is not going to stress me out. Because I was already stressed about all these young girls.*

> *P1: I'm not very good at 3 or 4 o'clock in the morning letting one of the ICU SHOs start putting in a haemocath [complex procedure for intravenous access], when I haven't been to bed. It's just quicker for me, sometimes, to put it in. Sometimes there is a time to teach.*

This illustrates that the participants could find the presence of learners increased their levels of stress. This stress was increased when they allowed the learners to participate in patient care.

4.2.1.7 Suggestions for change

One of the aims of the A-ALG was to identify areas of teaching practice that the participants were finding challenging. These areas have been shown above. The next challenge was to agree suggestions that they could try in their everyday practice. The intention was to develop a cycle of using the diaries to record teaching episodes prior to a further discussion meeting. At the end of the first A-ALG meeting there was a consensus that there were two main challenges. These revolved around the difficulty they were having with not knowing the level at which to pitch their teaching and the need to ensure patient safety. For the first, the suggested way forward, as agreed by the group, was to try to ensure they introduced

themselves to each learner. Then they would undertake a brief verbal needs assessment with each learner. For the second, they agreed to try two specific strategies. One was to consider having the learner observe if and when the participants were unable to give the learner their attention because their concentration was directed to patient safety. The other strategy was to consider sending learners to the library to undertake a specific learning task and then have them return to discuss their findings.

4.2.1.8 Summary of first A-ALG meeting

The anaesthetic teacher has a primary responsibility to perform a job of work, namely giving anaesthetics and patient care exceeds everything else. The teacher will be there working irrespective of whether a learner is present. The teacher is fixed while the learner is optional and it made no difference to whether there was a learner allocated to that list as it would still carry on. This was different to prearranged classroom teaching. A lecturer would not give a lecture to an empty lecture theatre.

In the OR the learner increased the work load of the participants and was sometimes viewed as an irritation or a nuisance. As the OR was designed primarily to treat patients, rather than for teaching or learning, it was sometimes a frightening and alien environment to the learner. Teaching in the OR took second place to patient care and was often unplanned and opportunistic.

4.2.2   A-ALG meetings two and three

The second meeting was brief because the participants, all of whom were present, had few teaching episodes to discuss. The underlying reason for this was the time period spanned a peak holiday period, both for the participants and the anaesthetic department. Thus the findings from the second and third meetings are looked at together.

The third meeting took place six weeks after the previous meeting and four months after the initial meeting where the suggested changes in practice were agreed. On this occasion one of the participants (P2) did not attend, although he had expressed his intention to come. As an aside, this was the individual who did not undertake any further courses in education, such as a certificate, following the action learning meetings, and neither did he attend the follow up meeting six months later.

I consider the data from these meeting from two viewpoints. Firstly, I look for evidence that the participants implemented or tried to implement the changes agreed at the first meeting. Secondly, I explore the introduction of different types of learners.

There were two main areas for potential change identified from the first meeting, pitching the teaching at the right level for the learner and empowering the learner to observe or go to the library. In addressing the first of these there were three potential steps identified, introductions, needs assessment and setting the level of learning. As I illustrate below the participants gave descriptions of directly addressing the latter two aspects. While there were no direct descriptions of how they introduced themselves to the learners, their needs assessments took place early in the contact with the learner. As a one-to-one needs assessment requires the teacher and learner to talk to each other it is reasonable to assume that introductions did take place.

4.2.2.1 Changes

The first example concerned the participant who described how they looked after and guided a Polish medical student while he observed open heart surgery. It was clear from the description that the participant had gained valuable information from this student as to the level of their experience. I suggest this would have been unlikely without introductions and an interactive dialogue:

P1: I had a third year medical student from Poland, who was on a one month attachment to experience what medicine was like in the UK. He was attached to the cardio-thoracic unit and OR for the month. He spent a whole day with me doing an open heart case.

The depth and timing of the needs assessment of this medical student was not clear until I

probed the participant, during the meeting, to reflect on their actions.

MC: Did you go through what he had done before you started?

P1: Yes, I asked him. He had been on the cardiac ICU for a few weeks so he knew about arterial and central lines. But he had not been around when any had been put in. It was his first time in a cardiac theatre [OR], but he had been in other theatres [OR]. So I went through everything that was very basic. He spoke very good English so there wasn't any problem with the language.

This detailed verbal needs assessment enabled the participant to target their teaching

appropriately. This student was there to observe the cardiac surgery aspect of the patient's

care and did not expect to take an active part in the anaesthesia. However, the participant took

the opportunity to explain what he was doing and how this contributed to the patient's care.

Despite this clarity of realising and addressing the needs of the learner, the participant was

disappointed when the student's attention shifted to observing the surgery rather than being

interested in the anaesthetic aspects. This was further evidence of the participants having

different perspectives on their responsibilities for itinerant learners, who come from outside

the A-COP.

P1: I was a bit peeved when he completely ignored me after we had got the patient on the table. But I thought, ' if I was a medical student and had never seen the heart, I would have probably have just switched off and watched the surgery.'

As part of probing the participant's reflections on this episode I enquired if they had changed

their approach and if so had the teaching become easier or more difficult as a consequence.

P1: I probably thought a bit more about breaking it down. [Which helped with] Pitching it at his level.

I think it was harder because I'm not used to doing it really, really basic. We never get medical students in cardiac theatre [OR]. Every time I was explaining something I would

say, 'just say if you don't understand or if it is too basic'. I think a lot of the time pitching it at the right level is one of the hardest things. I think it just comes with experience.

It was interesting that the participant had found difficulty with pitching their teaching to the low level required by the student. They suggested this was because they were unused to having this level of learner with them during open heart surgery. This illustration demonstrated this participant was able to pitch their teaching at an appropriate level for this student because they had taken the step of ascertaining the student's needs and level of experience. The participant's teaching role was mainly to introduce the learner to the cardiac surgery OR, this was therefore at the level of Miller's *knows about* (section 2.6.2). In this example the student undertook an observer's role for part of the time, so it served to illustrate the importance and value of allowing learners to watch as a teaching tool. The success was confirmed by the participant's report of the student thanking him and saying he had been very helpful: *'He thanked me at the end and said that I had been very helpful'.*

This was contrasted by a description of how an experienced anaesthetic trainee was managed, when they experienced obstetric anaesthesia for the first time. Here the participant spent some time getting to know the trainee and introducing them into the new environment. In this instance the participant had already worked with the learner in the past and had some first hand experience of their capabilities with anaesthesia and associated techniques in general.

> *P3: I had an SHO who was attached to the obstetric unit, who had not done any obstetric anaesthesia before. He was an experienced SHO, who needed to get some obstetric experience.*
>
> *MC: So how did you know he had not done any obstetrics before?*
>
> *P3: Thankfully I actual knew him, because I had worked with him as an SHO when he first started. When he arrived [on the obstetric unit] I knew which training scheme he was on. I said, 'you've not done any obstetrics before' and he said, ' yes'. So we had to work out how we were going to learn, we did sit down before hand. I showed him where to get changed and whilst we were doing that went through what he wanted to do. The first bit he wanted to get were the nuts and bolts of how it all works. He had not seen a caesarean section since he was medical student.*

This illustrated how a well conducted introduction can merge into the needs assessment. Determining the learner's previous experiences and current learning needs do not necessarily require a formalised process. This initial interaction set the scene for further interactions between them including guiding him through his first anaesthetic for a caesarean section. As part of the explanation and discussion within the group the participant noted, on probing, that he was trying to make his teaching more relevant to the individual learner.

> *P3: So when he had been completely settled in we went through elective sections. He had done plenty of spinals before so I scrubbed up with him. So, if he was unhappy anywhere throughout [I could assist]. I was trying my best not to get into a monologue. I was trying desperately to make it directly relevant to what was happening at the time.*
>
> *MC: So is that a new thing for you, trying to make it directly relevant?*
>
> *P3: I think it's something that I was made aware of when I was having to write things down about what I taught, afterwards. …. Probably having a familiar face when you start helps too. He specifically told me he was quite glad when he saw someone he knew.*

This illustration addressed several of the changes suggested. The participant made a particular effort at the initial meeting, which included re-introductions, as they had already worked together in different circumstances, and an outlining of the key learning requirements. These included an induction into the obstetric suite, this would come into the area of *knows about* and would be mainly transfer of information. When this had been completed they were able to move onto *knows how* and *shows*, as the learner participates in the care of a patient undergoing a caesarean section. Indeed he even enabled the trainee to administer and conduct a spinal anaesthesia for a caesarean section on their first day, with very close supervision.

The quality of the needs assessment also proved important. In this next example the participant knew the learner as they had already worked together and undertook a brief assessment of their previous experience with the complex skill of inserting a central venous line. However, the procedure did not progress according to expectations and took rather longer than expected.

P1: We had a central line to insert. She had done three previous central lines and she had been supervised each time; two internal jugulars and one subclavian. I said, 'do you want do this one then? Do you want me to sit or are you happy to do it on your own because you have done three now supervised or do you still want me to be at the end of the bed?' She said, 'could you still be at the end of the bed.'

I didn't discuss the procedure with her because she had done three before. I said, ' just get on with it and I'll stand at the end of the bed.' It was very early on when I realised that she hadn't taken very much in when she had done the three previous ones. It took her a long time to hit the vessel. She was doing it at the wrong angle and so I tried to guide her and once she did get the blood vessel. I could tell that she was looking and thinking 'what do I do next?' She had lost her train of thought so I talked her through it, 'next you're going to get your dilator and dilate up'. She got it in. It just made me realise that when people say, 'I've done a few,' as she had done three I was quite happy to sit away from her. But I am glad that I didn't in the end.

But the other problem was that it was a very busy Sunday and I was bleeped probably six times while she was doing it, from the neurosurgical ICU asking me when I was coming. I got quite snappy with her at the end because I thought, 'if I had done it myself I'd have done it in five minutes and could have got on with all my other jobs.' I think sometimes, 'when is it appropriate to teach people? Is being on call an appropriate time?' But then if you don't do it then you don't know when they are going to get that experience. So I think, 'you've just got to.'

The participant assessed the learner's needs and level of competence. However, this initial assessment was not sufficiently detailed and led to a misjudgement of the novice's real level of expertise. This contributed to a prolonged procedure. When this was combined with the other duties of the participant it resulted in the participant's level of stress rising which resulted in them getting irritated with the learner. There were continual phone calls from elsewhere which increased the participant's stress levels which suggested an element of task overload. However, despite all these stresses and challenges they persevered and the learner succeeded in safely placing the line. The learner was a novice member of the A-COP and perhaps, while it was not stated, this contributed to the participant's tolerance of the learner. I suspect that the same degree of tolerance would not have been extended to a trainee who was not within the A-COP.

When it came to teaching practical skills there was evidence that the application of some of the principles discussed, such as the needs assessment, was beginning to reap benefits. In the exchange below it wasn't until the participant was encouraged to reflect on their practice in the group setting that they realised that their approach to teaching practical skills had changed. In particular, here this meant giving the learner a say in what they learnt. As part of this process the participant had to talk to the learner and engage in identifying the needs of the learner.

P3: It has not been any different in terms of what we have been teaching and what we have discussed. Last time we discussed intubation and venflons. I have been doing it very much the same way as I did it before.

MC: You haven't done anything different then?

P3: I have put the ball a bit more in their court as to what they want to learn because I realised that sometimes they were losing interest anyway and I thought I would give them the option about what they wanted to learn.

MC: Is that any easier for you then? Just putting that little extra bit in?

P3: Yes, it doesn't take much longer and then I know better what they want.

The success of spending time, identifying the learners' needs and their level, was also illustrated in the classroom setting. In this exchange the participant reported an improvement in conducting a tutorial.

P2: I think I have been better at trying to gauge the pitch than I was before. I have just made it a lot more open. An open format so that if we are talking about oxygen or blood gases or whatever then I just let them start talking and try and judge it from there. I have a handout that covers most of that stuff anyway. And usually the handout is pretty much irrelevant to what I am telling them at time. I find we go off and talk about something that is not on the handout. But is just an abridged summary of it.

Yes, in terms of being as rigid as I was before with what I talk about, it has been a lot more open. Which is a good thing.

MC: So is that because you are getting more confident with it or ..?

P2: A little bit but it's also because of what we have discussed and also because I think it helps to make it a bit more interactive so that rather than one sitting there just looking at

blank faces for an hour. It gives you a bit more confidence when you get a bit more feedback as well. So yes I think it is a combination of the two really.

This example illustrated the participant's ability to transfer their learning from one arena to another. This is a potentially encouraging and unexpected aspect of the ALG. As I suggested in the literature review chapter one of my concerns about the TTT courses in the classroom was the value of the lessons and whether they could be transferred to the workplace of the OR. This suggests that there was some transfer of skills, which the A-ALG participants found effective, from the workplace to the classroom.

The second main change was active consideration of using the options 'observe' and 'go to library'. We have already seen one illustration of the use of observation as teaching with the Polish medical student. A further illustration was explicit when the participant had to stop a mini-tutorial in the OR when a patient's oxygen level suddenly fell.

P4: Then the patient suddenly desaturated, with no warning.

P1: But what did you do with him [the medical student], when things started to go wrong?

P4: I just said, ' we are going to have to stop a minute, because the patient has got to come first'. I sorted out the problem and then I went over desaturation; what the causes are, what we do about it, why I turned up the flow rates, and why I had gone onto 100% oxygen to buy time.

The participant then went onto use this acute change in patient status as a teaching point for the medical student. There were several important points concerned with this teaching episode. The patient came first, which acted as a role model as a clinician. The medical student was still involved as they were invited, indirectly, to observe how the participant managed hypoxia, which is a condition the learner will experience when they qualify. The observation was then followed up with a detailed debrief of the management both practically and its theoretical underpinning.

On another occasion the participant sent their learners for coffee to think about what else they wanted to learn. One learner was happy and didn't want anything further. The second unleashed a series of domestic and family problems which then caused further stress.

> *P4: I've done stuff with them and then when you're both exhausted I've sent them off for a cup of tea. There are two I've said, ' go off for 15 minutes and come back with something you want to discuss'. One came back and didn't have anything he wanted to discuss, so that was fine.*
>
> *The other chap, this was a difficult one. Again he was a fourth year medical student and had done ICU for four weeks. He came in and I said, 'you've done four weeks now, you've had your lectures, is there anything you want to revise or do you want something new?' Obviously you want to get your book signed. He said, 'I've missed most of the lectures, I've not been around because of family problems.' My heart sank because I thought, 'how much sympathy or empathy do I have with him having a family problem with him now being returned back and having to learn what he has missed from this module?'*

On the one hand this illustrated the effectiveness of giving both the learner and teacher a break. It enabled the learner to reflect and consider what else they needed to learn. In the first case the learner decided for themselves there was nothing further they wished to be taught, which made life easier for the participant. The second produced a situation the participant did not expect, for which they were unprepared and caused concern. This learner had issues and problems which were outside the remit of an anaesthetic trainee who had not met the medical student before and was unlikely to again. It was, however, interesting in that it demonstrated the power of one-to-one teaching in the OR in identifying the learner's needs, even in a relatively short period of time. It also demonstrated the need for an infrastructure to support our anaesthetic trainees when they are required to teach others who come from outside the A-COP.

In the next section I explore the nature of the learners with whom the participants came into contact. This builds on the variety of COPs with which the participants interacted. The participants seemed to feel that they had different responsibilities toward teaching learners

who were outside their A-COP. While they were pleased to be involved in their education,

they seemed to view this type of teaching in a different light.

4.2.2.2 Learners (further types)

A new type of learner that the participants encountered was the uninterested learner. This was

a medical student who was present only because they had to be. All the medical students have

to get their logbook book signed. If they do not then they fail the module and this will prevent

them qualifying as a doctor. The imposition of these learners, who are outside the A-COP,

added more stress onto the participants who were are trying to teach as well as care for the

patient.

> *P4: He walked in and he very much said, 'I want to get my book signed but I don't know anything because I've not been here because of family problems.' I felt he had set the agenda, that he was going to get his practical skills but please don't ask me any questions because I know nothing.*

This description of the uninterested learner with external problems generated a lot of

discussion. While the others empathised with the situation none of them had experienced

anything quite so profound. At this point in the discussion I explained the possible routes for

referral of such individuals both at the medical student level and the postgraduate level.

Perhaps this is one of the down sides or challenges of trying to get to know and understand

the individuals one is responsible for teaching. This is about setting boundaries for learners

and teachers. If we are expecting these doctors in training to be responsible for teaching

others outside the A-COP then we should have some mechanisms in place for advice and help

if difficulties arise. This was a new theme that emerged in this part of the study.

> *P4: I just felt I hadn't come across that situation before because you either know people because they are SHOs you have worked with before or registrars when you feel have got a responsibility. A few people say, 'I'm not having a good day.' You say, 'oh what's the matter?' You have a bit more of a social chat but there is big difference between being a third year registrar and fourth year medical student. I didn't feel that that it was a social interaction or even a professional one as to another colleague.*

Another description of a very challenging medical student encapsulates many of the challenges of teaching unknown entities within the complex world of the OR while still trying to care for the patient. Despite managing well, with a frightened medical student who turned up late and unexpectedly, when they had identified the learner's level and lack of understanding it proved difficult to plan a way forward. It finally fell apart when the patient's oxygen levels dropped necessitating the participant's full attention. After this the teaching never got going again.

> *P4: I had a fourth year medical student who was on his first week in anaesthetics and he was really anxious. He didn't want to touch anything and just stood in the corner quivering.*

This learner had arrived in the OR as part of his anaesthetic attachment in a confused and frightened state. It is thus hardly surprising that it proved challenging, during a single teaching episode, to deal with these difficult issues so he could learn effectively. However, throughout the process the participant does describe good role modelling. They tried to welcome the learner and tried to ascertain their learning requirements. The learner was not shouted at or humiliated and they were welcomed despite a poor start.

> *MC: How did you deal with it?*

> *P4: I tried to think, 'does he know where he's suppose to be or when he's suppose to be there.' So I gave him the benefit of the doubt. I also thought he's a fourth year, perhaps he's never been in theatre [OR] before. So I tried to think how I was. I remember it was awful. You can go places and nobody speaks to you. Nobody shows you where to get changed. So I tried to remember from my own experience, how really awful it was.*

Perhaps there were some valuable lessons for the learner but that is speculation. There was admiration and support from one of the other participants for the way P4 had handled this challenging learner.

> *P3: You are obviously much more patient than I am. No I think I would probably have been the same. I hope I would have done it similarly.*

A variation on the type of learner, the ODA, emerged during the second and third meetings. ODAs are professionals in their own right and undertake a variety of roles in the OR. One of their duties is assisting with the anaesthesia when they are partly responsible to the anaesthetist. A good ODA is invaluable, as they anticipate the anaesthetist's requirements for drugs and equipment. On other occasions they will undertake procedures and duties that might not be directly their responsibility. For example, many are proficient in airway management and gaining intravenous access. In some instances they are trained in adult life support and are full members of the hospital cardiac arrest team.

The ODAs are full members of a COP within the OR room, some as old-timers. However, they are not full members of the A-COP in the same way as anaesthetic trainees and consultants are. This is because they cannot reach the level of an independent anaesthetic practitioner. In a similar manner the anaesthetists have membership of the OR COP, but are unlikely to be full members to the same extent as the ODAs. The complexity of this interaction was illustrated by the participant when describing how they interacted and taught a student ODA.

> *P3: I taught a student ODA, again completely unprompted. Just because she started asking me questions about what I was doing, what drugs I was using and why. It turned into a mini tutorial. I didn't feel it was me teaching, more me answering questions if you know what I mean. She was leading the discussion so I just let it flow. When she had had enough she stopped asking questions and made life a lot easier for me.*
>
> *P1: In what way did you feel it made it easier for you?*
>
> *P3: I didn't feel it was my responsibility to be teaching her, it was that she was coming up to me to ask.*

This participant commented on how they didn't feel responsible for this student ODA's learning. The issue of responsibility is complex. On the one hand, any increase on the workload of the anaesthetist has the potential to increase the risk to the patient and should be avoided. On the other hand, improving the understanding and skills of ODAs might be

expected to improve the quality of care given to other patients. Despite this lack of formal responsibility, there were several instances of the participants taking the time and effort to teach ODAs practical procedures such as intravenous and arterial access.

> *P1: Then he [an ODA] had also done quite a lot of cannulas. To work in this hospital he has to be supervised again and get some forms filled in. So he asked me if I'd go through that with him.*

On this occasion the ODA was already experienced at intravenous cannulation but needed to be supervised, observed and assessed as competent. The participant was able to complete this. In addition she embarked on teaching the same ODA how to insert an arterial line. This is a more complex and difficult skill usually confined to medical practitioners. This did, however, raise the issues of how to manage a learner who failed to achieve success with a practical skill.

> *P1: He said he was getting anxious because he could tell that he was hurting the patient even though he was using local anaesthetic. He said that he was upset that he hadn't got it in. I said, 'well it is really difficult and even more difficult when the patient is awake because you don't want to hurt them.' I said, 'it just takes practice, you've just got to keep trying.' I asked him if he understood the theory of it and he said he understood about the needle and the cannula. That once you hit it you had to advance it a bit more. He just couldn't understand why he couldn't hit it because the pulse was really bounding. I said, 'it just takes time and some times you feel the pulse in one place because it transmits to other areas.' But subsequently I have worked with him and I've seen him put one in.*

The intravenous access was straightforward as the ODA had become proficient elsewhere and needed to update their practice and get themselves signed off as proficient. The arterial access proved more challenging. While the ODA had seen many arterial lines inserted it was not a procedure they had previously attempted. The participant explained the background theory and talked the ODA through how to insert the cannula. However, the ODA failed to hit the artery on two attempts and as the patient was awake and distressed the participant took over. The participant then had to deal with the ODA's failure to succeed with the practical

procedure and the patient's distress both of which add to the challenges and stress of OR teaching.

4.2.2.3 Practical skills - particular challenges

The challenge of dealing with failures in practical procedures was discussed more widely by the participants in the A-ALG meeting. They described how awful they felt when they had failed practical procedures as learners. This sense of failure may be made worse if the teacher then takes over and completes the task with apparent ease.

> *P4: Soul destroying but so many times you get frustrated and you get disappointed that you can't get an arterial line in or central line. And somebody else comes along and does it. But I think it will get you down and further down. You've got to pull yourself back up and think, 'well I can do arterial lines I just couldn't do it on this patient.'*

A failed practical procedure produced problems for the learner, the teacher and the patient. The discussion re-emphasised that the patient's welfare came first. However, the impact on the confidence of the learner can be huge.

> *P4: I find I have a terrible lose of confidence if I find I can't do something.*

There was a good description of how to teach a practical skill in the classroom setting using the four stage technique. This participant was aware of the process and could carry it out in a controlled situation, where there was plenty of equipment, time and motivated students. In this instance there was no clinical stress, no patient safety issue, the learner's level was pre-determined and the fact that they were on a 'paid' course, directly related to their clinical practice suggested that the learners were motivated.

> *P1: We did it in how you teach skills. Showing them what to do without any talking and then doing with talking through and then getting them to talk us through it. Then them actually doing it. It is quite a good morning and we had lots of equipment and everything was prepared. There were the right number of students in each group and the amount of time we had. The students filled in the evaluation forms and they seemed to enjoy it.*

This description emphasised several features of successful teaching. These included having a structure, having sufficient equipment and instructors and having enough time. The challenge of teaching under time constraints was acknowledged. This generated discussion between the group members as reaching a balance of teaching and getting the job done caused stress to all of them.

> *P4: I think we sometimes fall into the trap of not teaching people. Particularly in theatre [OR] if it is a busy list. I won't let them do the cannula, I won't let them put the tube down because it is all wasting time. But in fact if it was you doing it on your own and were struggling they [the surgical team] would have had to wait wouldn't they?*

The time of the day also came into this discussion with the challenge of teaching in the middle of the night and whether this appropriate. This was not resolved but is an issue that is an added challenge to teaching in the workplace. However, this does reinforce the idea that there does have to be a definite decision as to whether undertaking teaching is warranted.

On the positive side there were several suggestions for overcoming some of these stresses. The first, which the participants identified, was to spend more time on a detailed assessment of the learner's level of competence. While this might appear to take longer at the start, the time could be made up because the procedure became streamlined. As one of the time wasting parts of the procedure was a lack of familiarity of the equipment two suggestions were offered. One was to let the trainee open and get familiar with the equipment before approaching the patient. This does have the difficulty of expense with some types of equipment. Another was to scrub up and stand with the trainee while they undertake the procedure to enable more hands on guidance.

> *P4: The thing I've done before is to put on a pair of gloves. So you are as ready to do it as they are. So gown and gloves or whatever and I've said before, 'I'll act as your assistant.' So I set the trolley up and flush everything through, as if you are doing it to help them. And then it means when they are struggling with the angle or whatever you can say this is how I do it. And either put your hands on theirs, which is what has been done by somebody to me for fibre-optic intubation. Actually physically move your hand into the*

right position. Because I'm sure there must be some sort of memory thing with positioning your hands. If somebody physically puts them in the right place. So I've done that before. Actually physically held their hands to say this is how I do it.

The teacher is then in a position to help with the equipment while the learner can concentrate more on the procedure. It also makes it easier for the participant to take over for some parts of the procedure. Further suggestions included the use of a handout or a video so the learner can see and perhaps rehearse the procedure away from the patient. While this is not always possible, as a lot of OR teaching is opportunistic, the wider availability of inter- and intra-net access may make other modes more available.

4.2.2.4 Reflection

Throughout this description there is evidence of the participants engaging in reflection as the process evolved. In addition the discipline of writing about their teaching, soon after it happened, and then discussing it in a group enabled them to develop their reflective skills. The effectiveness of this reflection is evident in the way it helped them understand the importance of identifying the learner's needs, getting the right level of teaching and developing a 'safe' environment for the learning to take place. There was evidence to suggest that the act of asking the participants to keep diaries encouraged them to think about their teaching.

> *MC: Do you think keeping the diary has changed what you do?*
>
> *P3: Yes definitely. It's made me think about it.*
>
> *MC: In what way?*
>
> *P4: It's made me think about it. Every time I've got a teaching opportunity I think, 'oh this is going to go in the diary… better do to the best of my ability rather than just doing it quickly, because I'm in a hurry.'*

This agrees with the findings from the scoping interviews where asking the interviewees to think about their teaching encouraged or even enforced reflection on their practice.

4.2.2.5 ALG process

The process of utilising an action learning approach has identified some of the issues related to anaesthetic trainees teaching in the OR. This group, like those from the interviews, had received little help or assistance in teaching within the OR. Both groups interacted with a variety of learners who depended on their teaching. These varied from nurses and medical students, whom they might only teach once, to trainee anaesthetists and ODAs, whom they worked with more closely.

Despite this variety of learners, there were common themes that emerged. The learners were often unexpected by the participants and so teaching was unplanned and mainly opportunistic. The participants found it difficult to know at what level to pitch their teaching. The participants identified a valuable action would be to ask the learner, at the beginning of a session, about their needs. The second and third meetings reported that this approach was successful and improved the participants' satisfaction and confidence with OR teaching. An unexpected effect of carrying out a needs assessment was that the participants applied the same approach effectively in classroom teaching. This suggested that learning from ALGs might have more widespread influence than might be anticipated.

The participants also made use of empowering learners to watch and observe proceedings as part of learning. This seemed to free them from a burden of having to teach all through the day in the OR and during times of stress, such as a patient with a falling oxygen level.

Throughout all their participation they showed active engagement with the process of 'enforced' or encouraged reflection. Although, even towards the end of the process they sometimes needed probing questions to help them realise how they had changed and moved forward. In some respects the process of deliberate reflection had become incorporated into their tacit knowing.

All three felt they had learnt something out of the experience of participating in the A-ALG.

The key issues they identified were learning to use different teaching methods, spending time

gauging the level of their learners, that they were not alone in their difficulties, and that

reflection on their teaching had helped them to recognise areas where they are teaching well.

This is illustrated by the discussion towards the end of the third meeting.

P3: It showed I am very different but very similar to my colleagues. The frustrations of teaching, the difficulties, hearing other people's stories. Thinking, 'Oh yeah, I had one like that. It's not just me.' I think we had one where we had both taught the same person and I thought I had problems and we both had the same problems. That it is not just, that I'm a dreadful teacher or I'm a really boring person or that they hate me. It's because this person is a shy person and they're not … That's the way they react to teaching.

P1: Different teaching methods, different styles and different ways of handling situations…

Sort of gauging more what they have done in the past…

It's sort of when you're writing it down in your diary as well, you kind of, as you're writing things down I've thought 'Ooh I never mentioned that, I wonder why not'. So as you're writing it down you are recalling what you did, you realise you've missed bits out or you could have done things differently, while you're writing it down. And then that is further development.

P4: Yes, because I think if you don't write it down you forget as well and you don't realise there are bits that you have missed out or you think 'Oh that was quite good I did that. So I think it is important, writing things down. And discussing it as well… Reflecting on what you have written as well….

I've realised that the things that I enjoy teaching, I feel I teach better than the things that I don't enjoy, I think that's because of my lack of knowledge or lack of education myself. So what I've tried to do now is to prepare topics so that when people come I have a bank of topics. Little things like drugs or neuromuscular junction or the airway or whatever. So I have a list of things that I feel comfortable with so I am never left to feel that I don't know what to talk about. So there is always something, so that's made me realise that I think preparation is vital.

I think that, as P1 says, going over your diary and having to write it down [is important]. It's very easy at the end [of a session] to have a heartsink and think, 'oh that was dreadful.' But when you look through and you write it down, you realise that someone did do two venflons, they did hand ventilate the patients, and they did put a guedel airway in. You think, 'I did teach them something.' So even if it hasn't gone very well you feel you have passed on something.

At the end of this meeting there was agreement that we would meet again in six months to revisit how their teaching had developed. This forms the next section and in it I will concentrate on how they have put into practice some of the changes described.

4.2.3　A-ALG fourth meeting

This meeting had the same three participants and myself, as at meeting three. In addition to discussing how they had developed their teaching, I also had some specific questions to address during the meeting. Some of these I asked directly if they had not come up spontaneously during the discussion. The first part of this section continues from the previous meeting by considering the impact of assessing the learners' needs.

One of the clearest descriptions of a change in practice that became established was how one participant had changed their practice when teaching central line insertion. The description of events was succinct. The participant gave evidence of the thought and reflection they had used to modify their approach to teaching a complex skill. They had dealt with an opportunistic situation with a real patient in the workplace setting.

> *P1: This cardio-thoracic SHO asked me if he could do the central line. He had done a couple before. We went through the technique theoretically and did the landmarks. I think the mistake I made last time was I hadn't done that bit.*
>
> *MC: Did that help do you think?*
>
> *P1: Yes. The bits he wasn't sure about he could ask me then instead. The patient was awake so I didn't want her getting nervous as I explained what I was doing next. I explained to the lady that he had done some before but he wanted to do a few more. Did she mind? She was happy with that.*
>
> *So we set up the trolley together. As he started the technique he told me what he was doing at each step. He identified the vessel easily. Then he had problems. He got the guide wire in and then had problems when he got to dilating the vessel. Basically he hadn't made a big enough cut in the skin. So in the end I had to gown up and help him with the dilation. Then I let him carry on. I think it is very difficult knowing when to intervene. But he had had a few pushes and the guide wire was going to get kinked in a minute. But he was happy for me to help him and I gave him positive feedback and praise. He did do very well.*

This participant described problems when she taught central line insertion during meeting three. There has been marked change in her approach. She spent time determining the learner's experience and expertise in detail. She also encouraged the learner to ask questions during this discussion, which had helped to establish a rapport between them. This was supplemented during the procedure by having the learner explain what he was doing as he proceeded. This then allowed her to assist when he had a problem with one part of the technique, the dilatation. The dilatation is a step that many trainees find difficult, when they learn central cannulation, because the pressure that needs to be exerted seems excessive until one gets used to it. After this she allowed him to complete the procedure rather than taking over completely.

This teaching approach was successful on several counts. The learner succeeded. The participant had sufficient confidence to teach the learner on an awake patient. This can be more difficult than with an anaesthetised patient because any discussion or explanation can be heard by the patient, who may then become distressed. An awake patient may be more stressful because the teacher has to obtain the patient's consent and maintain their co-operation throughout the procedure. The participant's description gave the impression that she maintained control of the situation and was able to offer help when appropriate.

This description has more in common with the four stage technique described earlier for practical skills training (Mackway-Jones and Walker, 1998); the instructor demonstrates the skill, the instructor demonstrates the skill and provides a commentary, the learner provides the commentary and the instructor demonstrates the skill, the learner demonstrates the skill and provides the commentary. The participant ascertained the learner knew what the procedure looked like because their explanation was satisfactory. This enabled the participant to conclude that the learner had already completed the earlier stages, although she did have to

intervene at one point. There was a clear description of the learner providing a commentary as they undertook the procedure.

When asked directly this participant was able to reflect on the development of her teaching over the period of the A-ALG.

> *P1: I think as an individual I've learnt quite a lot. I approach teaching differently now. I think and prepare it more. Like lectures and things. Even on the spot things like doing a line. It's more organised and logical in my mind, what I'm going to do. And how to approach it.*

Over time she explained that her diary entries had become briefer. For example her diary entry for the central insertion consisted of, '*taught cardiac SHO and was having problems dilating'*. In part this was perhaps because some situations were repeats and the participants did not feel the need to record the detail in the diary.

The detailed descriptions of teaching episodes, and their reflections, seemed to have most value when they encountered a new situation. The discussion on the value of using diary entries was expanded further by the other participants. They agreed on the value of the formal reflection when they were set a new challenge. However, once they had encountered a difficulty and worked out a course of action there seemed to be little necessity to record everything in detail.

> *P3: I think it would be useful [recording in a diary] if you had, for example, started doing a new block [anaesthetic attachment].*

Despite their recognition of the value of recording their teaching episodes and reflections they found it difficult to maintain their diary entries. Indeed the same participant, P3, commented after one of their teaching sessions, '*I didn't keep my diary*.' Only one participant, P1, had continued with wide usage of their diary. She had been able to give clear descriptions of her teaching and her development. In contrast P4 realised that the lack of recording of teaching did make it difficult to recall and discuss specific episodes.

P4: But I think now I've got about 20 things in my head where I have taught people but I've got nothing documented anywhere to say that that's what I'd done. So [P1] has got a much clearer idea of what she thought at the time because she has written it down. I think from a personal perspective it probably is more sensible to keep it.

The value of keeping a diary of events, even brief notes, was recognised by all the participants. However, this still did not make it easy to keep a diary. This challenge, to maintain a reflective diary or journal, is in accordance with descriptions elsewhere in the literature (Moon, 1999a; 1999b; Pedro, 2005; Rees et al., 2005).

The practice of assessing the learner's starting level was illustrated on other occasions. All three participants gave examples of assessing the learner levels before starting teaching both in the OR and in the classroom. While the previous discussions had mainly revolved around the challenges of OR teaching they demonstrated some transfer of new teaching approaches to the classroom setting. One illustration came from the clinical skills laboratory where the participant was teaching intravenous cannulation to radiographers.

P1: When I teach the practical skill I demonstrate what I am going to do and then I demonstrate it again and explain what I'm doing and get the students to tell me what to do and then repeat it. Then I let them do it. The students get a handout with their talk and everything. They fill in evaluations and the organisers said then it has always been positive. The organisers keep asking me to come back so I must be doing something right.

A second example referred to a teaching session when the participant had been scheduled to teach a group of anaesthetic trainees in the classroom. He had been informed that this group of learners were preparing to take their primary examination for the Royal College of Anaesthetists. His informal needs assessment identified this information was incorrect and he was able to adjust his session accordingly.

P3: I chatted to them over coffee before hand. They had anything from six weeks to six months experience and none of them were taking their exam. So the thing I have learnt is to make sure you make your own assessment of what they know before you start.

This participant reflected that good preparation had improved their confidence particularly when it was related to identifying the appropriate level for the learners.

P4: I think part of the confidence comes with knowing that you're well prepared and that you have prepared it the right way. You can prepare a talk but to prepare it in the right way you have to think about using the whole group. You've thought about the subject matter, the level you're going to pitch it at. There is a confidence that comes from knowing that you are probably doing the right thing.

The effect of this increased confidence of the participants in their teaching ability also extended to the area of empowering their learners to set the agenda. On occasions this encompassed the learner taking responsibility for the patient's anaesthetic management, while the participant acted as a resource and backup.

P4: A couple of people have said we would rather do the clinical case today and we'll talk about whatever comes up. Someone said, 'I have something else to do. Can I have half an hour to do some writing?' So I said, ' yes, just go.' I think it is a false economy to keep them there when they want to be somewhere else, trying to teach them something they already know better than I do, possibly. He went away for half an hour and came back and was really keen. We had a nice steady sort of case together. But I don't know if that is the right thing to do or not.

MC: Would you have done that before?

P4: No. I would have struggled on, murdering myself quietly in the corner, thinking 'oh I've got to teach him something'.

Perhaps a significant change these participants achieved during this process was to increase their confidence in their abilities as teachers. I suggest that a key feature underpinning this increased confidence was taking account of the learner's needs. The assessment of the learner's needs played a role in the participants being able to deliver relevant experiences. Furthermore their increased confidence allowed them to 'release' the learners to leave the workplace to undertake independent study, while still under the 'control' of the teacher. This increased confidence also released them from feeling they had to 'teach' their learners all the time they were with them.

MC: Has it changed your job satisfaction?

P4: I think I'm less concerned about teaching people than I was. Part of that is realising that your colleagues have the same worries and concerns as you do. They struggle with the same parts that I do. It has changed because I can pitch it more easily and I feel that I

have a wider breath of knowledge to be able to pass on information. Even if then they teach me something in return I feel like I come away from a teaching experience on a daily working life, happier than I did before. Whether that's because I am more relaxed I don't know.

This comment illustrated that being more relaxed about teaching in the workplace improved their job satisfaction. I suggest that this has some relationship to a decrease in the participants' stress levels when they are responsible for both patients and learners. Their reflections on the wider aspects of workplace teaching has enabled them to incorporate the learners more effectively.

> *P3: I think I'm relaxed because I know that it is not just me that finds it difficult now. So I had a nightmare case and the ODA quietly suggested to the student, before I'd even sat down to write the chart, that they might get a bit more attention next door. Because the case was going badly. I wasn't bothered by that. I thought, ' well if he had hung around for another 10 minutes, I'd have sorted myself out.'*

In addition to being more relaxed about their teaching they have also gained confidence to put the learner to one side while the patient comes first. The realisation that this was acceptable, to others, and that they were not alone in their concerns removed some of the stresses described in earlier sessions.

The extent of their progression as teachers did not really become obvious until this last session when we explored this issue specifically.

> *MC: So what do you think has pushed you along changing your direction?*

> *P1: I think doing the certificate and also us meeting and discussing what each of us does. Because in past meetings we've had teaching experiences and we have all approached things in a different way or given each other suggestions. I do this sometimes or would it have been better if you'd done that. For example, the central line I had problems with teaching the time before. I hadn't gone through. I'd assumed, as [P4] said with hers, you sometimes assume too much.*

This observation illustrated the complexity of the effect of a single educational intervention. In the current study the intervention was the ALG. But as this participant noted her progress was interlinked to the certificate course in postgraduate medical education she was also

undertaking and also just growing in experience. The aspect of the ALG she picked up on was the opportunity to discuss her teaching and to get suggestions for different ways to approach a problem. They had successfully transferred their own learning from one arena to another. This suggests that this group were able to bridge the gap between classroom techniques and the real world of the workplace and vice versa, and that the ALG had some part to play.

The value accorded to the meetings as part of their progress was confirmed on direct questioning in regard to their teaching expertise.

> MC: So what has happened over the last year to change that?
>
> P1: Probably the fact that we have had meetings and talked about teaching and education. The other courses have been helpful.
>
> MC: It's not just that you're a year older?
>
> P1: No I don't think so.

As part of the discussion in this last meeting I explored their roles in promoting teaching outside of the group. They had not met as a group outside of the arranged meetings. However, there were general enquiries between them as to how they were progressing with their educational certificate courses.

> MC: I was wondering if you had swapped or shared ideas.
>
> P1: Yes.
>
> P3: Asking about how the education stuff has been getting on.
>
> P1: I was asking [P4] about the *** course a couple of weeks ago and what did she have left to do. So not really the way we teach but how we are all doing different educational bits.
>
> MC: So there is a sort of swapping of educational speak.
>
> P4: Yes.
>
> MC: Do you find that has changed now that you have other people to talk to about it?

P4: I think it is very reassuring that there are people around that you could ask if you did have problem. Very rarely do you have a network of colleagues that you feel you could go to ask them for advice or how would you tackle this. Whereas we are all in the same boat.

P1: If someone is struggling with an assignment, I would look in my modules from *** and see if the area was covered there. One of my friends is doing the *** course and I gave her some information from my *** modules. She had a look at some of that and that helped her with one of her modules.

This exchange of ideas suggested that their shared experiences of working in the group enabled them to offer support outside the meetings. While I did not explore this in detail in this study it seems that this networking has the potential to act as the start of a COP related to teaching in the OR. This would make an interesting area for further exploration in the future but is outside the remit of the present study.

One way in which the approach of using the ALG to develop trainees' teaching skills might be for these participants to set up their own groups. When I explored this possibility none of the three anaesthetic participants were prepared to lead or facilitate groups for other trainees, at that time. This section explores these issues and considers how their views impact on the possibility of cascading the use of ALGs for teaching teachers in medical education.

4.2.3.1 Group facilitation

Their first reaction to being asked if they would facilitate their own groups was to identify they did not have time.

P1: I haven't got time.

P4: Time is a major issue.

This is understandable because this particular group of trainees were now at the stage of identifying suitable consultant posts and going through the process of getting appointed. At the time of the fourth meeting (2004), consultant interview panels did not tend to view excellence in teaching as a major consideration for appointment. Interestingly enough, one of

the three, who had helped in some of the analysis and been a co-author on one of the presentations, used his teaching certificate and teaching expertise as his major interest. He was appointed with dedicated teaching sessions, which at the time was unusual.

Even when time was removed from the discussion around leading ALGs there were three other issues that seemed to be acting as barriers to them setting up their own groups. The first was the how to set up and maintain an ALG while still being a trainee. Their enthusiasm for the principle was tempered by the practicalities of rotations and having another meeting to attend.

> P3: I think choosing people will be difficult because trainees move around frequently. When you get on a block, you are less likely to jump at the chance of having an extra meeting to go to.

This addressed several difficulties that I found with setting up the group. The frequent rotation between hospitals (usually every nine months) means it takes time for the consultants to get to know the trainees. As has been seen from the data presented from the ALG it took time to build a safe environment even when the involved parties started to know and trust each other. In the real world of training rotations the opportunity to get to know the trainee is limited. This difficulty is compounded because setting up an ALG would compete with other meetings both educational and non educational that already exist.

They came with one suggestion to overcome the challenges of rotations, which involved setting up groups across hospitals. However, this brought into play some further problems.

> P4: I think you could do it. It would be easy enough to do providing you had people that were motivated, which is always the initial thing. Also it's like where do you do it? Have we got any facilities that people can use? And the question of study leave, as always, is a difficult one because people want to use their study leave for what they want to go to. How would you facilitate it so that they wouldn't have to lose a day of their own study leave that they want to use for something else?

There was also a suggestion that this sort of education might only be effective with volunteers and interested trainees but not if it were enforced. Certainly this group of trainees were clear that it could only work with volunteers. They also felt that a key element to the present group working was because they were volunteers and this is confirmed by the fact that only three 'completed' all the meetings. A further suggestion for selection across hospitals was to set up an email network to identify if there were enough interested trainees to make a viable group.

The second main issue related to the challenge of facilitating a group once it was arranged. When directly asked if they would be prepared to facilitate ALGs their feelings are well summarised by the following quote.

>   *P4: I'd be terrified to facilitate a group.*

There seemed to be a number of complex issues underlying this fear of facilitating groups, many of which resonated with my own fears recorded in my reflective diaries. At a simple level there is something about having confidence in one's own competence and ability as a teacher. This experience was something new for all of us and the trainees were finding it sufficiently challenging to find something to talk about at the meetings.

>   *P3: I think I probably want to be a bit more experienced as a teacher before I was in a group discussing teaching. At the moment I have been finding it difficult enough to have something to talk about.*

They also identified that the facilitator needed both credibility and some sort of authority. There was the practical difficulty of trying to facilitate groups without having a permanent job i.e. having achieved the status of consultant. There was the more complex issue of having the basic competencies required for teaching and to some extent the documentation to validate it. They were also quite clear that these groups might be difficult, if not impossible for a non-anaesthetist to run. Thus there was an issue about the competence of the individual as both a clinical anaesthetist and a teacher.

They did make a number of suggestions as to how they might be helped to become facilitators in the future. These included perhaps attending a short introductory course to facilitating these groups but they were not prepared to embark on this until they were established as consultants. They also felt that some sort of framework would be necessary for how to proceed.

> *P4: A framework from which to follow. It is very difficult because we have all got used to talking now and telling each other our experiences but I would imagine at the start watching us all, we were all quite awkward probably initially. I don't know if that is true or not but I certainly felt awkward reading the stuff from my diary thinking, ' Oh my *** they are all going to laugh or think that I've done it a stupid way.' I'd hate to be the person who was in charge of leading a group when nobody says anything.*

In summary the fourth meeting confirmed that the A-ALG had affected changes on the participants, including myself. However, the process had not given them the confidence or expertise to facilitate their own groups. Their general feelings were that this sort of educational intervention was not suitable for all trainees and should not be enforced. However, they had clearly benefited from the experience and were in principle willing to participate in the future but not until they were established as consultants and also as teachers.

4.2.4   Review of A-ALG process

This process has been successful at a number of levels. It has clarified some of the findings from the scoping interviews, introduced new ideas and demonstrated that active reflection within a group can produce improvements in teaching in the OR.

This group of anaesthetic trainees taught a variety of healthcare professionals, mainly within the OR. The learners can broadly be divided into three. The first were those who aspired to be full members of the A-COP, such as other anaesthetic trainees. The second were those who did not aspire to join the A-COP and interacted for only a brief period with the participants,

such as medical students. The third were those who worked closely with the participants, were full members of an OR COP, but were only partial members of the A-COP.

These anaesthetic trainees deliberately taught knowledge and skills and acted as role models both as clinicians and teachers. While they found teaching in the OR challenging and stressful, it could be rewarding and enjoyable. The particular aspect of OR teaching that made it stressful was the presence of a patient. The stress was highest when the participants were responsible for the learner who was using the patient as 'learning material'.

Each participant used their diary to record specific teaching episodes, which were then discussed in the learning group. Through the meetings we identified two areas which the participants found challenging and they wanted to change. The first was pitching the teaching at an appropriate level for each learner. This challenge was compounded when the learner was unexpected and previously unknown to the participant. They improved this aspect of their practice by ensuring they introduced themselves to the learner at the beginning and undertook a needs analysis for each learner. These two actions usually took place informally and at the same time. The second change was to relieve the participant from 'actively teaching' continuously. This was achieved by empowering the learner to observe, if and when the participant was unable to give the learner their attention because their concentration was directed to patient safety. Alternatively the learner gave the participant a break by going to undertake a specific learning task elsewhere and then returning to discuss their findings.

The implementation of these changes led the participants to report that their teaching improved. They found that as the process evolved they became more confident that their teaching was effective. By the end of the fourth A-ALG meeting, nearly one year after the first, they felt more relaxed with their teaching both in the OR and in the classroom setting.

These changes were catalysed by the use of the A-ALG which had less than four hours direct contact time with the facilitator. However, the time spent by each of the participants was considerably more because they had to identify and record teaching episodes and implement changes in their practice. In addition there was the work involved with myself as the facilitator to organise and facilitate the group. But can this success be replicated in other circumstances?

The participants were senior anaesthetic trainees from a single organisation and were all volunteers. The eligibility criteria identified seven suitable individuals of whom five initially agreed to participate. One failed to attend any meetings, another attended two meetings and three attended all four. Thus a weakness of the study was that the findings were based on less than half of the invited trainees. The participants who completed the process had indicated an interest in education before the study started. In addition, the three who attended all the meetings went onto complete Postgraduate Certificates in Medical Education.

The generalisability of this process, using diaries, ALG discussions and reflection, is investigated further in the next section by applying the principles to a group of ENT surgeons.

4.3 ENT action learning group

This learning group, of ENT surgeons, built on the experiences of the A-ALG. The main purpose of this part of the study was to look at the applicability of an ALG approach to ENT surgeons teaching within the OR from three perspectives. The first was to evaluate the practicality of using ALG as an educational initiative. The second was to evaluate the effectiveness of the ALG to improve their OR teaching. The third was to explore the effect of the ALG to develop them as reflective learners, both as individuals and as a group.

The ENT action learning group (ENT-ALG) met on three occasions over an eight week period. These meetings formed part of their regular and protected teaching, which took place every Wednesday at 8:15 am for a maximum of 45 minutes. At the first meeting the purpose of the study was explained to the group and the ENT consultant in charge of training. I supplemented this with a handout and a notebook for each to act as their diaries (Appendix 7). I facilitated, recorded and transcribed the second and third meetings, when we discussed their teaching experiences. The first meeting was attended by six trainees. The second meeting was attended by eleven trainees of whom only nine contributed to the discussions. These nine consisted of six senior trainees (specialist registrars) and three junior trainees (senior house officers). The two non-contributors were visitors. The third meeting was attended by nine trainees of whom the seven contributors were senior trainees, all these attended both meetings. The two non-contributors were junior trainees.

Transcription of the meetings came to 8,100 words. Only two of the trainees kept any form of written 'reflective diary'. The first had only made one brief entry. The second had kept more detailed written reflections which were shared verbally within the group. There were eight specific teaching episodes described from the period of the study. By this I mean that they described and discussed these episodes as having taken place during the study period. These consisted of 3,500 words. More than half the time of both meetings was taken up with general discussions about teaching and learning.

There were several structural differences between the ENT and A-ALG. The ENT group met during their normal teaching sessions and thus they did not increase their workload. Their contribution to the process was voluntary as they did not have to attend and could withdraw at any time. I only knew three of the participants slightly, as I had little contact with the ENT trainees in my normal working. I was outside of their COP when I joined their Wednesday

morning teaching session. This caused difficulty with the transcription as it was not possible to be certain which trainee was speaking when. However, it ensured confidentiality about identifying who was who. The possible impact of these differences are discussed later in relationship to the comparison with the anaesthetic group.

I have analysed both discussion meetings together. This was because of the brevity of the first meeting, 32 minutes, and because we did not agree suggestions for changes to their teaching approaches. I did attempt to summarise the discussion but by this stage several of the participants had already left.

4.3.1   Teaching involvement

The focus of the discussions was directed to their experience of teaching in the OR. The majority of episodes were described as taking place within the OR and these related to teaching or learning how to perform specific operations. There was one episode described of teaching in an outpatient clinic and one on a ward round.

They were involved in teaching across the spectrum of knowledge, skills and attitudes. The main thrust of the discussions related to teaching and learning the practical skills of surgery. As the discussions revolved around the OR, when knowledge was taught it related to the surgery that they were teaching or learning. This was usually related to the anatomy of the procedure.

> *R1: We drew the anatomy on the board. We went though it and the surgical steps one by one.*

4.3.2   Nature of the learners

These ENT trainees only described teaching episodes involving other ENT trainees. Their teaching and learning took place within an ENT-COP. By this I mean that they were either full members of the community, namely the consultants, or they were part of a training

scheme to become ENT surgeons. This was quite different to the descriptions from the anaesthetists who taught many others from outside of their A-COP.

Another notable difference from the anaesthetists was that the ENT trainees only ever supervised others that they knew and trusted. Unlike the anaesthetists they did not describe teaching either knowledge or practical skills to nurses, ODAs or medical students. They did however, still act as role models but more in the guise of surgeons rather than as teachers. Any teaching outside of their specialty was related to the explanation of knowledge and facts.

4.3.3   Nature of the teaching

A pattern emerged from the descriptions of their teaching practical skills. Their approach to teaching operative skills showed a structure resembling the four stage approach to teaching practical skills (Mackway-Jones and Walker, 1998). The first stage, observation of the operation, was usually assumed rather than being described. The teacher knew the trainee, their level of experience and expected exposure to common operations, from the trainee's position in the training hierarchy. In other circumstances this assumption was made because the teacher and learner had worked together before and also knew informally each other's experience. The second stage, the teacher talking through the steps of the operation while operating, was illustrated as part of one trainee's description.

> *R1: I got [R2] to scrub with me and put on a pair of headlights, so that we could both see what was happening. I did the operation whilst I showed him the steps. Then I had him to do another one in which he did specific steps. And then the third one was when he did most of the operation.*

The third stage, when the learner described the procedure, was reported by several of the trainees. They felt this was an important part of the process to ensure the learner was clear about the steps of the operation. This varied from an informal discussion, to setting out

exactly who would do what. Sometimes this assessment of the learner's understanding
included a detailed review of the relevant anatomy.

> *R1: You get them to, not sketch it, at least be able to convey to you exactly how they go about performing the procedure, before you let them put knife to mucosa.*

Interestingly one of the other participants was the learner in this teaching episode and he also
found it valuable.

> *R2: But what I think was most helpful was actually discussing before we started what we were going to do. Before we went on and did it. Because I know when I have learnt other operations before, when you are watching, however closely you watch, you never really appreciate what they are doing until you are doing the same thing yourself. Then, I have got lost before on other things but when I was learning with [R1], because we had run through things before hand, it seemed more simple.*

This approach of rehearsing the stages of an operation was a feature of the surgical teaching
described by these trainees. The learners found it useful and appreciated its importance.

> *R4: One of the keys to learning is going through things before you do it. And that is what I have always found. If someone takes the time to run through with you what they want you to do, and how they expect you to do something, rather than doing it on the spot as you are doing it. It does make a lot of difference.*

These descriptions of the four stages were applied to learners learning new operations. But
what of the more experienced trainee who had not worked with their teacher before? The
approaches varied from assuming the learner was already competent to the teacher watching
the learner operate.

> *R8: Some trainers will say to a senior trainee, 'this is a myringoplasty' [common ear operation], even if they haven't worked with you before, 'you do this one'. They expect you to go off and do it. Others will say, regardless of how senior you are, 'let's watch you do this.' They will watch you do it. So some expect a level of performance and others will always start off from basics and determine exactly where you are, before they give you any, or have any confidence in you.*

The participants appreciated the importance of understanding the level and previous
experience of the learner so that they could take this into account while trying to structure the
teaching. This was highlighted by one participant whose omission of this step could have

meant their learner missed out on performing part of an operation. This omission was

managed by the consultant supervising both the learner and the teacher.

> *R3: I had an opportunity to teach a colleague. He had newly joined in the last couple of weeks. The consultant asked me to take him through a myringoplasty. So I jumped at the opportunity and tried to show off whatever I could do. I think, once we started scrubbing and draping the patient, I suddenly realised that I should have asked him how many myringoplasties he had done…So I should have asked him whether he had done a myringoplasty or if he had taken a graft. So at least part of the operation he could do it. I didn't ask that question but the consultant asked him had he taken any grafts before. So from then onwards he took the graft.*

A further area of teaching involvement that was different from the anaesthetic group, was the

importance placed, by these trainees, on their role models. The role modelling was one of two

types. The first was as a surgeon, working within the OR and behaving appropriately with the

other members of the team. The second was as a teacher, within the OR. This was illustrated

by examples of the variation in their consultant teachers. One of the senior trainees was very

clear about what he considered his ideal role model, as he described one consultant.

> *R8: He asks you in very un-insulting terms what you have done, your experiences. And he is neither patronising nor condescending, he just gauges, in a very subtle manner, what you have done. Then he watches you do a little bit of something and he can tell what you have done before.*

This contrasted with their descriptions of other teachers who behaved differently. Here the

trainees reported that they found it difficult to learn the necessary practical skills.

> *R8: You get some consultants who can't watch their trainees do sensitive stuff. They just say, 'I'll be in the coffee room, call me if you need me.' They just cannot stand there and watch. Then you get others who can't let go. They say, 'you do that' and then five seconds later their hands are in there. Then they say, ' you do it now,' and then their hands are in again and they can't let go. Then other guys who are on your back all the time.*

> *R7: There has to be a happy medium between them, where it would be the sort of ideal way to teach. Because it is not comfortable, all the time, having your trainer in the coffee room while you're doing something that you are not 100% happy with.*

This illustration seemed to suggest there was a fine balance between teachers who interfered

too much and those who did not directly participate in the operation. This one-to-one

interaction between the teacher and the learner was a key part the success of learning in the OR.

> *R8: Some people have the right teaching technique but have the wrong temperament. When they want to tell you something they tell you in a way that is not conducive to further good performance. Whether that is by being snappy and jumpy or using humiliation as a method of teaching. Or where it is by being sarcastic or bombastic.*

These references to humiliating, sarcastic and bombastic behaviour, from these teachers, have resonance with the discussion in the literature review (section 2.3.3.1) to the prevalence of such behaviour in surgical training. The power of role modelling, or in this case the effects of negative role modelling, was illustrated by an interesting observation from one of the participants who had attended a TTT course. He felt the course teachers demonstrated little understanding of teaching in his world.

> *R8: I went on a teaching the consultant trainers course which lasted for three days which I thought was frankly useless. They didn't spend anytime finding out what exactly led to each of the students being there. They went against all their rules. They obviously knew the right thing to do when it came to running a teaching programme. They simply hadn't implemented their own rules. They made no effort to find out what kind of teaching we did, what kind of teachers we were, or the degree of experience we had.*

In this instance the professional facilitators of the workshop gave guidance on the importance of using the principles of adult learning. However, they seemed to have failed to follow their own advice when running the workshop as they had not addressed the needs of their own learners. As a consequence of this experience the trainee seemed to have doubts about the relevance of this classroom experience to his teaching in the OR.

4.3.3.1 Stresses and challenges for ENT surgeons

The ENT trainees had a different emphasis on the things that induced stress in comparison to the anaesthetic group. There were no instances or examples of them having to teach unexpected or unknown learners. However, it was interesting what happened when one of them was asked to take another trainee through a procedure at short notice, this extends from

any earlier illustration: '*…suddenly I realised that I should have asked him how many myringoplasties he had done.*' He did not consider the level of his learner until part way through. This was reminiscent of the anaesthetists when they did not know the level of their learner because they had only just met them. In this illustration it emerged that the learner was new to the department.

Their stresses related to supervising or teaching other trainees that they knew and to some extent trusted. The challenge was to balance the needs of the learner against preventing damage to an individual patient.

> *R1: But that is what I said about generic skills last time. I felt that [R2] had the generic skills to do the operation but didn't know exactly the stepwise procession through the procedure. In terms of his physical performance he performed it very well.*
>
> *MC: So you were comfortable watching him?*
>
> *R1: I was comfortable watching him yes. I felt that all times he didn't go any further than I would have liked him to go.*
>
> *R6: Were you watching him or assisting him?*
>
> *R1: Assisting.*
>
> *R3: And watching him.*
>
> *R1: Yes and watching him.*
>
> *R2: As with [R3] I felt comfortable that I wasn't about to do anything horrendously dangerous. I did feel that he could see exactly what was going on. And would stop me if I was doing something really stupid. He was also comfortable standing off and letting me go as far as I could.*

This exchange of views, about a specific teaching episode, brought out two important issues surrounding teaching surgery in this group. Firstly the issue of trust between the teacher and the learner. It was emphasised in this exchange that this trust worked in both directions. Secondly the issue of how the teacher could maintain patient safety while the learner was learning. Throughout the discussion and descriptions of teaching operative skills the issue of

trusting the learner before allowing them to operate came through clearly. This was evident

even when the teacher knew the learner.

> *R9: There is always an issue of trust with learning what grade you are. So with someone new they may not be happy with you to do as much, as if you are someone they have been with a long time. During the time you generate trust, to do it on your own.*

This requirement of interaction and trust before allowing the learner to operate was different

to the anaesthetic group. It seemed to stem from the idea that the teacher may not be able to

retrieve errors made by the learner. This was not so much that the patient would die, as in

anaesthetic errors, but the patient might be permanently damaged.

> *R9: Well if you have never had a trainee before you don't know whether they are completely ham-fisted and you can't just let them dive in and do a procedure where you could make mistakes with consequences, bad things could happen.*

> *R7: I think people are more concerned in ENT about whether you can do things or the trust issue because a lot of operations are single operator procedures. So it isn't as if someone can assist you and stop and be there when you make the mistake they could be stood behind you and can't see.*

This element of trust was not concerned just with whether the learner was competent to

undertake the procedure. It also related to the learner being able to recognise and admit to

their teacher when they might be out of their depth. This degree of trust going in both

directions was at the centre of the relationship between the learner and the teacher. This

relationship, on a one-to-one basis, required time and the two individuals working together for

it to become established. This was unlikely to occur between two strangers who had only just

met.

> *R8: Part of the trust process is that you know the guy and you trust them to tell you if they are out of their depth.*

The importance of being competent as a surgeon before supervising others came out from one

of the senior trainees, who would soon be a consultant. He was concerned about how he

would manage his trainees as learners when he has appointed to a consultant post.

R8: In the first couple of years I shall allow my trainee to do absolutely nothing. Because in this day and age in the surgical specialties you do not get as much experience as you would in earlier years. So if I had a trainee at all, I would like to have very junior trainees so that I could let them do very basic stuff. I would like to do anything that is intermediate to advanced myself for the first couple of years.

His suggested approach was to limit his trainee from doing any operation that was potentially dangerous until he had more personal operative experience. This highlighted the challenge of teaching potentially risky procedures in the OR. This emphasised the importance of the teacher being competent and confident in performing the procedures they teach.

In the one example of teaching on a ward round, the importance placed on trust took a lower priority. In this environment it was possible to retrieve the situation in the case of errors. This was illustrated when one of them summarised the difference to teaching operating skills.

R8: There is huge difference between medical and surgical teaching procedures. Surgical teaching of procedures is a completely different area.

A second aspect from this illustration was enabling the trainee to 'practise' on a ward round, supervised. This gives further support to the unique nature of supervising a learner undertaking operative surgery as contrasted to outpatients or ward based work.

R7: This lady came in with a huge thyroid and stridor. I think she was given some steroids. I was just explaining, she didn't know what would happen in the future. I said, 'we are going to do a scan and go into a fine needle [biopsy]. And then I suspect you will need your thyroid out.' At which point she burst into tears. I thought, 'oh what have I said?' Which I think is still true but then the registrar came back and kind of pacified her. She was someone who had had a huge thyroid for years and years and some affection for it I think. She wanted to keep it, goodness knows for what reason.

This suggests that there is a wide variation in the confidence of the trainees in their workplace teaching skills.

Another theme that emerged as an important stress in teaching in the OR was the question of time spent teaching. There were a number of descriptions about the pressure exerted by other theatre staff when a junior trainee was allowed to perform an operation.

R2: It is a constant thing for any surgical trainee is theatre staff getting shirty about pressure of the time. So in some ways we are all used to living with it and I try not to get irritated by it. In some ways it is getting used to operating under pressure.

The main issue was that the staff expected a new learner to take longer to complete the operation than the more experienced surgeon. At this point it is worth digressing to explain how operating sessions are organised in most UK hospitals. The majority of the theatre staff, except the surgeons and anaesthetists, are employed for a session. They get paid irrespective of how many cases they get through or how hard they work. In addition if a case runs over time, then there is rarely anyone else to take over their duties so they finish late. It is unusual for the staff to get extra pay for these overruns and taking time back in lieu is usually taken at someone else's convenience. So they have little incentive to encourage learning in others particularly if they might finish late.

One of the suggestions for getting around the issue of time for inexperienced trainees was to limit what the learner contributed to the operation. For example, when inserting grommets, perhaps the most difficult aspect is to set up the microscope to see to be able to operate. This participant described setting up the microscope so that the learner could do the operation rather than using valuable time getting the microscope set up. The use of the microscope then becomes a 'practical skill' in its own right and can be learnt on a different occasion.

R7: When I was an SHO, I was taught how to do grommets. Grommets are a very fiddly operation. You may spend your time to set up the microscope and then be told, 'sorry no time.' So when my time came to teach others to do grommets, I set everything up and let them insert the grommets, so that they feel they have done something.

In these illustrations, they described ways the staff pressurised the more senior and experienced surgeon to undertake the operation.

R2: We did have a sub-mandibular gland, which was my first time really taking a large tumour largely unassisted. And very early on I had a comment from a member of the nursing staff who suggested that we were going very slowly. It was a small list so we didn't really have a time pressure on our times. We fought off the ones who commented.

R4: It can put pressure on you, particularly when you are teaching, because we had the comment at the end which was, 'an hour for a septoplasty.' I said, 'yes but we are teaching here and it was a difficult one.' So I had to take over. Sometimes that is the opportunity gone.

They also described their tactics for dealing with the pressure and comments. These varied

from ignoring them to pointing out that they were all working in a teaching hospital. On the

other hand the trainees were also well aware that the staff did have different priorities to the

them.

R1: I think it is understandable because their priorities are different. Their priorities are to have the list finished on time and our priority is either to teach or to learn.

R5: It depends on the time when the teaching is done. If it is at the end the list which is tending to run over then they have a genuine reason to get upset. And they tend to pass more comments. If you have a comfortable list and you do it at a reasonable pace with a reasonable amount of time left for the rest of the list and take responsibility for the rest of the list to finish roughly on time, then there isn't cause to comment. If you have control over the whole situation then they know that you are going to deliver the goods within time.

There were reports of one consultant deliberately setting up teaching lists with less cases than

normal.

R1: I have come across where it has happened [cases pre-selected for teaching]. Mr X once booked two stapedectomies on a list. He said to me he is booking those two for me. And indeed I got to do large parts of them.

R6: Yes. Mr X does that when you start with him he says, 'what cases do you want to do?' And he tries to book things that you want to do.

This approach to pre-selecting the cases for teaching required organisation. It is worth noting

here that the operating sessions are booked several weeks in advance. This idea of

predetermining the OR session, with balancing the cases and the learner, is different to most

of the anaesthetic experiences where the learning was opportunistic.

4.3.3.2 Development of reflection

Only two of the trainees reported making any diary entries and that was only for the first

discussion meeting. The first of these, a senior trainee, had only made short notes and did not

give any concrete examples. The second, a newly appointed registrar had written rather more

and shared some interesting experiences of his developing practice.

> *R1: I have written one liners like, 'altered practice and seems more effective.' I haven't filled up more than 4 or 5 lines really.*

The remainder of the participants remained silent when I enquired if they had written any

comments. This lack of writing was confirmed by one participant who reflected during the

session.

> *R3: I haven't written it down. I have just thought of reflecting on one particular occasion.*

This lack of writing down their learning or teaching experiences was rather disappointing. In

the anaesthetic group all four of the participants made some diary entries. It was this

recording of specific events that was a key feature of the anaesthetic group making progress

because they could relate to specific teaching episodes. Then when the group discussions took

place 'anecdotes' became real events. This enabled them to learn from the experience.

Despite the lack of written reflection there were several instances of the ENT trainees

thinking differently about their approach to teaching because of the up coming group meeting.

On some occasions they reported this consideration resulted in a modification to their

approach.

> *R1: But this time it was kind of trying to formalise it more. I was conscious of this thing coming up [discussion meeting]. I have thought of how we do it and marginally altered to get [R2] to scrub with me.*

> *R5: The usual way I approach this is I try and say, 'what do you know about the subject?' And usually the response, 'is very little or nothing.' And then I go to the board and write down the structure that I think they need to know for their level. But I tried on this occasion to ask her how she would approach the problem clinically.*

4.3.3.3 Suggested changes

As I have explained at the start of this section the first discussion meeting did not produce any

suggestions from the participants for action. This was due to the meeting breaking up after 32

minutes because the participants started leaving. This was because their normal teaching session time was over and they were expected elsewhere. In an attempt to move the process forward I gave a brief summary and requested they consider aspects of assessing the individuals learning level, the value of pre-planning and considering the safety of the environment.

However there was some evidence of progression between the second and third meetings.

> *R2: It wasn't long after the last session we had with you so we very much had that on our minds, I think. So what [R3] did was to ask me to draw on the board the anatomy of the nose and septum and ask what I was going to do. This was a very effective way of pointing out what I didn't really know.*

4.3.4   Summary

This ENT-ALG functioned differently to the anaesthetic group and had different effects. There are a number of possible reasons for this. The group was already formed and I was not part of their community. The contact time for the two discussion meetings was less than 35 minutes on both occasions. The group was larger and the membership was slightly different on each occasion.

I feel there are a number of reasons for this although I can only speculate as to the main causes. The structure of the ALG was superficially the same for groups, namely preliminary meeting, diary entries, group discussion and reflection, plan and implement changes, further diary entries and then further group discussion. While both groups were volunteers the anaesthetic group went out of their way to participate whereas the ENT group process took place in their normal teaching time. The time span of the groups was different the anaesthetic one spanned 12 months whereas the ENT was only eight weeks. The groups interacted differently perhaps because the ENT trainees already functioned as a group and I as the facilitator was outside of their COP. I did not establish the same degree of rapport or trust

with the ENT trainees. Whereas for the anaesthetic group I was an integral member of this group as the group did not exist outside of the ALG.

The more specific contrasts were the low number of teaching or learning episodes reported. The episodes that were described related mainly to teaching others how to operate. Not all those present participated and those that did tended to be the more senior trainees This contrasted with the anaesthetists all of whom were at an equivalent level. In the ENT group they varied from SHOs all the way up to those who were ready to become consultants.

Despite these shortcomings there was still evidence that the process of setting up an ALG encouraged the trainees to reflect on their teaching in a group setting. It could encourage changes in their approach to workplace teaching. There was some evidence that the process induced change in their practice by talking about their teaching practice at a discussion meeting with their peers.

One final aspect of running this group was the participants requested me to run a half-day teaching session, related mainly to running small groups. I duly completed this for them some six months later as part of their regional teaching day.

The ENT trainees were different to the anaesthetic trainees. They were already part of their own COP within the ENT department, which at most had 15 trainees and 12 consultants. Furthermore they spent most of their working day in one area of the hospital and met weekly for their local teaching. In contrast the anaesthetic trainees were part of a large department, about 60 trainees and 70 consultants spread across three sites geographically separate. They did not meet regularly for teaching. Furthermore while they knew each other they had not necessarily worked together in the OR. This difference in the membership of COPs may go some way to explaining why the learning group approach was less successful with the ENT

surgeons. Perhaps they needed this approach less as they already had a more established and structured approach to teaching in the OR.

4.4 Personal Reflections

4.4.1   Teaching diaries pre- A-ALG

This section reviews my reflections on my own teaching in the OR, which I undertook before setting up the A-ALG. In order to decide whether diaries would be a useful source of data I embarked on extending my research diary to include teaching experiences within the OR. I made seven diary entries prior to our preliminary anaesthetic group meeting in April 2003. I made a further six entries before the first A-ALG meeting. While I shared the fact that I had kept a diary, I did not share the entries with them because I did not want to bias their recordings. However, I did share the structure that I had found workable (Figure 15).

Figure 15 Format for teaching reflections

Date:

Location:

Recall events as written recollections as soon as possible. Try to include descriptions and your responses and how you felt.

Record questions raised to be tested in practice or against current understanding

Record implications for next actions for future practice and intentions

Leave a blank space for later reflections which may back up continuous themes evident elsewhere in the diary

I was involved in a variety of different teaching episodes for a variety of learners in the OR. The learners included nurses, ODAs, medical students, and anaesthetic trainees varying in ability from those in their first week to those who had nearly completed their training. The

episodes included teaching theory, practical skills and acting as a role model. One of my early

reflections, written just before the first anaesthetic group meeting, illustrated that once one

investigates something in the real world then things start to change as a result.

> *I think I am changing my approach to OR teaching because I am paying more attention to the learner. (Nov02)*

It is worth emphasising here that I undertook the diary exercise to facilitate the process for the

participants not in the expectation that my own teaching style or expertise might change.

The theoretical topics discussed and explained on a one-to-one basis related to the patients

under my care so that the learner could understand and participate, as appropriate, in the

patient care while learning. This is illustrated on one occasion when I varied the amount of

anaesthetic vapour and we observed the effects on the patient and related this to the

pharmacological theory.

> *We experimented with effects on the eyes/pupils with the different levels of isoflurane [anaesthetic vapour]. Also demonstrated the effect on respiration with increasing doses. Tried to relate this to the principles of solubility – blood/gas/lipid. (May03)*

There were many examples of mini tutorials lasting for only a few minutes. The topics all

related to aspects of an individual patient's care. The triggers for mini tutorials varied from

learner questions to unexpected critical incidents involving the patient that the learner did not

understand.

When possible the practical skills teaching consisted of demonstration, explanation, and

allowing novices to practice under direct supervision. These skills varied from intravenous

cannulation to managing a complete anaesthetic or operating list. In the case of more senior

trainees I sometimes observed, from a distance, them taking charge of the anaesthetic.

On reviewing my diary entries three years after they were written, it seems that my approach

was to set the scene for the session by agreeing with the learner what we were going to do,

attempt to deliver our agreement and then have a debriefing at the end of the session. However, this approach was not evident at the time, it is only with hindsight and the experience of participating in the ALGs that this pattern has emerged. An interesting aspect to adopting this approach was that some of my learners had not considered what it was they might want to learn before the operating list. I noted in one of my entries: *'No clear aims from the trainee (May 03).'* When we discussed the options for his learning for the session he initially requested to be 'taught' about renal physiology. As this topic was unrelated to the patients on the list, we looked for topics more related to the current patients' care. In the end we settled for the management of aspiration of stomach contents because this related to the choice of airway management for a patient later on the list.

As my diary entries progressed I made an interesting entry after two sessions giving 'easy' anaesthesia for simple surgery, with experienced trainees. Both of these trainees could have managed the patients without direct supervision and indeed probably would have undertaken the list on their own if I was absent.

> *My teaching in the OR is becoming more disorganised. Is this because my anaesthetic and surgery have no special aspects? It seems easier to have structure when the trainee is new to the area. It is different if they can already conduct the anaesthetic on their own. (May 03)*

This observation was made despite both sessions having been successful in terms of patient care. On neither occasion had there been any particular learning in terms of theory or practical skills. However, on both occasions I did deliberately demonstrate the importance of professional behaviour but did not make this explicit to the trainees.

4.4.2   Reflections on the ALG process

An early challenge was to approach and ask potential participants if they might participate and I wrote at the time (April 03):

I had a number of difficulties which made me wonder about whether starting this project was at all sensible. I found it quite difficult to approach the registrars. I was worried on several counts. Would they think me weird for undertaking an educational PhD and using a research methodology that is so far removed from research within the anaesthetic literature? Would they feel obliged or even coerced into contributing? How would I deal with rejection?

As this diary extract shows I was very apprehensive mainly on a personal level about as to how it might change the trainees' perceptions of me. On further reflection this illustrated a key difference between the positivist paradigm and the interpretative paradigm. In the positivist paradigm the researcher is outside the project looking to test a hypothesis. While in the interpretive paradigm the researcher may be integral to and part of the project.

Another interpretation of the challenge I felt around approaching others might be related to my assimilator learning style (section 2.2.3.2). The assimilator prefers to reflect and think about, rather than actively get involved in trying things out. This might also relate to my feeling that it was important to have a structure or model to explain to the potential group participants. My apprehensions are further illustrated by my writing immediately after my first meeting with the potential ENT group.

As always I was very apprehensive and didn't sleep well. I get the feeling – not justified- that this may be viewed as educational psycho-babble. I got an interested and attentive hearing. They were bemused by a handout without a power-point presentation. (June 04)

One of the most difficult areas in the whole process has been trying to set up the meetings of the group. The difficulty arose because as this was a research study I had to fit everything around their service and personal commitments. One problem was getting them released from their clinical duties. At first sight arranging for four or five trainees to be released from a pool of about 60, for an hour and a half, seemed easy. The difficulty related to their working patterns, service commitment and other training requirements. This was different to the current approach to running the current TTT course for the anaesthetic trainees when they attend for a single day. The challenge here was to arrange the follow up meetings. This has

probably been one of the most challenging parts of the process, getting everyone in the same place at the same time.

There are thus real world challenges surrounding the management of introducing ALG as a way of improving OR teaching. I wonder if this sort of teaching was formalised, as part of the educational agreement with the Trust, whether these can be circumvented. Certainly the contact time within the classroom was short. Educationally, most of the positive aspects met the principles of adult learning – active, reflective, feedback, relevant and useable (Knowles et al., 2005).

4.5 Phase 4 – Questionnaire survey

The intention of this part of the study was to investigate the wider applicability of the findings from the interviews and the ALGs. The earlier data collections were made from small groups which were purposively sampled and the contributors were volunteers. A questionnaire was designed to be given to two groups of doctors. The first was a group of anaesthetists attending a national TTT course run over two days at the Royal College of Anaesthetists. The second was a group of ENT trainees attending their monthly regional teaching, for ENT surgery.

The questions for the questionnaire were derived from several sources. They were mainly informed by the findings of the data already collected. Further ideas were taken from the GMC document on the responsibilities of doctors for teaching (General Medical Council, 1999), Harden and Crosby's (2000) work on the attributes of teachers and suggestions from a critical friend and my supervisors.

Contained within the questionnaire (Appendix 8) was background demographic information including: gender, when and where they qualified (this information is in the public domain on

the GMC website), what instruction they had received on how to teach and who they were responsible for teaching within the OR.

The main part of the questionnaire consisted of a series of statements to which respondents were asked to indicate their level of agreement. Statements were scored using a six point Likert scale to 'force' the participants to make a choice between agreement or disagreement (1 = strongly disagree to 6 = strongly agree). The set included a mix of positive and negative statements. The questions addressed four main areas of aspects of teaching within the OR. These were: the educational environment of the OR, the teacher's perceptions of teaching in the OR, the challenges presented by teaching in the OR and the place of teacher training (Table 12).

Table 12 Categories of questions

Category	Statements
Educational environment	The OR is a good place to learn
	Real teaching takes place in the 'classroom'
Views on the teacher role	Teaching in the OR is rewarding for me
	Teaching in the OR is enjoyable for me
	I look forward to trainees being with me in the OR
	Teaching in the OR is just part of the life of an Anaesthetist\ENT surgeon
Challenges and stresses	Teaching in the OR is challenging for me Teaching in the OR is more challenging than lecturing Teaching in the OR is a distraction for me
	It is difficult to maintain continuity of teaching for learners I rarely see the same learner repeatedly in the OR I see the same learners regularly to teach them in the OR
	Patient safety limits teaching in the OR
Training (of teachers)	I learnt to teach in the OR by observation
	All Anaesthetists\ENT surgeons involved in training should be trained in one-to-one room education
	My OR teaching would improve if I could discuss it with others

The analysis was undertaken using descriptive and comparative statistical tests in SPSS 14.0. The approach to analysis of Likert scale data can be controversial (Jamieson, 2004) particularly in regard to the use of parametric statistics. I have been cautious in my approach and used non-parametric tests for comparative data. Arguments for this decision include my concern that the interval between scores is not necessarily the same. For example is the interval between 1 and 2 same as that between 4 and 5? Furthermore, with a small sample (16 and 20) a normal distribution was neither expected nor present. However, I have used mean values to give an indication of the positioning of the values between groups and between questions in a format that is common.

4.5.1 Results

4.5.1.1 Demography

There was 100% response rate from both the anaesthetic trainees (16/16) attending a national TTT course and from the ENT trainees (20/20) attending a regional surgical course. It is worth noting that there were also 17 consultants and associate specialists present on the anaesthetic course. These have been excluded from the results presented here as this study is concerned with doctors in training.

The background data on the two groups of trainees is shown in Table 13. Both groups had more males than females but the split was similar. The anaesthetic group was slightly more senior and had more exposure to being taught how to teach although this did not reach statistical significance. The ENT group had more UK graduates than the anaesthetic group which was statistically significant.

Table 13 Background data for anaesthetic and ENT trainees – count (percentages)

		Both	Anaes n(%)	ENT n(%)	fisher's exact test
Gender	Male	31	13(81)	18 (90)	ns
	Female	5	3(19)	2(10)	
Grade	Year 1	2	0(0)	2(10)	ns
	Year 2	10	2(12)	8(40)	
	Year 3	8	4(25)	4(20)	
	Year 4	10	6(38)	4(20)	
	Year 5	6	4(25)	2(10)	
Qualification	UK	22	7(44)	15(83)	<.05
	Overseas	12	9(56)	3(17)	
Formal TTT	Yes	14	9(56)	5(25)	ns
	No	22	7(44)	15(75)	
Formal 1-1	Yes	1	1(6)	0(0)	ns
	No	35	15(94)	20(100)	
Informal 1-1	Yes	10	5(36)	5(25)	ns
	No	24	9(64)	15(75)	
Totals		36	16	20	

The variety of health care workers the trainees taught within the OR varied (Table 14). There was no difference between the teaching of qualified doctors, medical students and nurses. This finding is interesting because the trainees in the ENT learning group only described teaching qualified doctors. The ENT trainees had little or no input into teaching ODAs or paramedics. This was expected as the ODAs work mainly with anaesthetists and the paramedics come to the OR primarily to learn airway management under the responsibility of anaesthesia.

Table 14 Variety of healthcare workers taught by anaesthetic and ENT trainees

		Both	Anaes n(%)	ENT n(%)	Chi-squared
Doctors in training	Yes	33	15(94)	18(90)	ns
	No	3	1(6)	2(10)	
Medical students	Yes	32	16(100)	16(80)	ns
	No	4	-	4(20)	
Nurses	Yes	28	13(81)	15(75)	ns
	No	8	3(19)	5(25)	
ODAs	Yes	19	15(94)	4(20)	<.0001
	No	17	1(6)	16(80)	
Paramedics	Yes	15	14(87)	1(5)	<.0001
	No	21	2(13)	19(95)	

4.5.1.2 Likert statements

The data are reported in two parts. The first part looks at the data in relation to specialty. The

second part considers other segregations. The statements are arranged into four tables (Table

15, Table 16, Table 17 and Table 18) to correspond with the categories identified in the

questionnaire design section (Table 12). The tables report mean values, standard deviations

and the Mann-Whitney test as the comparative statistic. A full table of all the responses,

including individual counts for each statement, is shown in Appendix 11. The results are

shown in descending order of agreement and it is important to note that for negatively worded

statements the results are effectively reversed. A further aspect to note is the wide spread of

responses across the statements (minimum to maximum). Only one statement did not straddle

the divide from agree to disagree (Likert scores 3-4) '*Real teaching takes place in the*

classroom' with a range from 1-3. All the other responses had ranges of at least 4 .

Table 15 Perceptions of educational environment - mean (SD)

	Both	Anaes	ENT	Mann-Whitney
The OR is a good place to learn	5.4(.64)	5.5(.72)	5.3(.72)	ns
Real teaching takes place in the 'classroom'	1.8 (.74)	1.9(.94)	1.7(.80)	ns

The two groups view the OR, the workplace, as a good place to learn, giving high mean

scores. This is confirmed by their disagreement with the statement that '*Real teaching takes*

place within the classroom'. Both groups value the importance of learning and being taught

their crafts within the environment in which they practice.

Table 16 Views of the teacher role – mean (SD)

	Both	**Anaes**	**ENT**	**Mann-Whitney**
Teaching in the OR is rewarding for me	5.1(.80)	5.2(.69)	5.1(.91)	ns
Teaching in the OR is just part of the life of an Anaesthetist\ENT surgeon	5.0(.89)	5.1(.92)	4.9(.91)	ns
Teaching in the OR is enjoyable for me	4.8(.71)	4.8(.78)	4.8(.79)	ns
I look forward to trainees being with me in the OR	4.5(1)	4.7(1)	4.1(.91)	ns

The response to the statements about the teacher role indicate that both groups viewed OR

teaching as rewarding and as part of their normal day to day activities with high mean scores

given across the four statements. The mean values were well above the mid point of

agreement (3.5). However, there were several respondents that disagreed with the statements

and gave a degree of individual variation. Overall it was encouraging to find that they viewed

teaching in the OR to be rewarding and enjoyable. While the respondents looked forward to

having trainees with them, this study did not ask why. It could be that they liked them there to

teach, which is laudable. However, it could be that the trainer used the opportunity to do

something else while the learner worked. Deeper exploration of this is an area for further

research.

Table 17 Training (of teachers) – mean (SD)

	Both	Anaes	ENT	Mann-Whitney
All Anaesthetists\ENT surgeons involved in training should be trained in one-to-one OR education	4.83(1)	5.23(.96)	4.75(1.1)	ns
I learnt to teach in the OR by observation	4.61(.96)	4.35(1.3)	4.65(.99)	ns
My OR teaching would improve if I could discuss it with others	4.17(1)	4.47(.94)	3.85(1.1)	<.05

Both groups reported they had learnt their OR teaching skills by observation. This was consistent with data in Table 13 where only one respondent had received formal one-to-one training in how to teach in the workplace. Both groups felt they should be trained to teach on a one-to-one basis. However, the anaesthetic group was significantly more receptive to the idea of using discussion as a way of improving their workplace teaching. This could be a feature of a difference in the specialties or their experience of TTT. The anaesthetic group had the higher preponderance of attendance at TTT although it did not reach statistical significance. However, all the anaesthetic group were sampled at a voluntary TTT course.

From their responses to the statements, both groups reported challenges and stresses to teaching within the OR (Table 18).

Table 18 Challenges and stresses to OR teaching – mean (SD)

	Both	Anaes	ENT	Mann-Whitney
It is difficult to maintain continuity of teaching for learners	4.5(1.3)	4.3(1.3)	4.4(1.5)	ns
I rarely see the same learner repeatedly in the OR	4.0(1.5)	4.1(1.3)	3.8(1.7)	ns
I see the same learners regularly to teach them in the OR	2.7(1.4)	2.7(1.2)	2.9(1.5)	ns
Teaching in the OR is challenging for me	3.9(1.1)	4.1(1.3)	3.4(.99)	ns
Teaching in the OR is more challenging than lecturing	3.7(1.3)	3.8(1.4)	3.5(1.3)	ns
Patient safety limits teaching in the OR	3.0(1.9)	4.0(1.4)	2.7(1.3)	<.01
Teaching in the OR is a distraction for me	2.6(1.9)	2.7(1.2)	2.6(1.2)	ns

This was related to the difficulty of providing continuity of teaching which was confirmed by the statements related to the regularly of contact with the same trainee. This was surprising as the reports from the ENT-ALG suggested that they did have continuity when teaching their learners. Perhaps this relates to the wider group of learners that this larger sample of ENT trainees teach. This problem of continuity endorses some of the difficulties identified in the literature with changing work patterns for trainees (Underwood and McIndoe, 2005). The decreasing hours and shortening of training have made it difficult for teachers to get to know individual trainees.

The opinions related to patient safety and teaching being a distraction varied between individuals. When considering *'Patient safety limits teaching in the OR'* the ENT respondents varied from strongly disagree to agree. Whereas the anaesthetic respondents varied from disagree to strongly agree. This difference was significant (p<0.01) suggesting that the anaesthetic respondents were more concerned about patient safety than the ENT respondents.

Perhaps this difference relates to the previous findings that the ENT-ALG tended to teach operative skills to members of their own COP, whereas the anaesthetic group had more unexpected learners from a wider population.

In this second part I consider the Likert statement responses, when the data are grouped other than by specialty. When the results are combined and analysed by attendance at formal TTT, differences are revealed. A statistical difference is shown in the responses to *'Teaching in the OR is more challenging than lecturing'* ($p < 0.05$), which gave mean scores of 4.4 for the TTT attendees and 3.2 for non attendees. This suggests that those who had completed a course were more confident in the classroom setting than the OR. It maybe attendance at TTT has improved their confidence in classroom teaching.

The second statistical difference is shown in the responses to the statement '*Patient safety limits teaching in the OR'* ($p < 0.05$), which had mean scores of 4.0 for attendees and 2.8 for non attendees. Perhaps this difference resulted from the attendees being more aware of the difficulties related to OR teaching as a result of better understanding of the implications of teaching. It could also be the interplay between the specialty variable. There were no differences in the Likert statement responses for gender, or the medical school of qualification.

4.5.1.3 Questionnaire reliability

In order to use statistics to group responses together, it is necessary to check the reliability of the questionnaire. This was undertaken using Cronbach's alpha when a score >0.7 is generally considered as an indication of reliability (Field, 2005). This statistical test estimates the likelihood of a respondent getting the same score if they completed the questionnaire on two different occasions. The score for the one negatively phrased question was reversed (Q 15 *Real teaching takes place in the 'classroom'*). When all 16 questions were included the score

was 0.597, which suggests a low reliability of the questionnaire. As part of the calculation of Cronbach's alpha, SPSS also lists the scores if each question (item) is removed. The alpha score increased to 0.79 if the two questions 8 (*Teaching in the OR is a distraction for me*) and 21 (*I see the same learners regularly to teach them in the OR*) were removed . In the analysis that follows, statements 8 and 21 have been removed.

4.5.1.4 Factor analysis

While the categories of the likert statements (Table 12) were generated using personal interpretation there are also mathematical approaches to identifying factors, such as principal component factor analysis. However, factor analysis needs to be used with caution in small samples. Its use here can be criticised because one recommendation is to have at least 10 participants per variable (Field, 2005, p.640), on this occasion it is 36 : 16 a ratio of nearer 2:1. An alternative way to check the sampling adequacy of small samples is to use the Kaiser-Meyer-Olkin Measure. This test gives an indication when factor analysis is likely to be inappropriate. Values between 0.5 and 0.7 are mediocre with values between 0.7 and 0.8 are good. The current questionnaire had a value of 0.63 which indicated the overall sample size was adequate when all the results were pooled. I used factor analysis was to test out my grouping of the statements (with the exclusions of questions 8 and 21 as suggested by the Cronbach's alpha scoring).

Principal component factor analysis identified five factors accounting for 70% of the variability (using varimax rotation, substitution of missing values with means, and displaying only variable loadings >0.5), which are shown in Table 19.

Table 19 Comparisons of questionnaire factors with author's categories

Factor	Questions	Loadings for each variable	Author's categories
1	Real teaching takes place in the 'classroom'	-.844	Educational environment
	I learnt to teach in the OR by observation	.736	Teacher
	Teaching in the OR is enjoyable for me	.720	Teacher
2	Teaching in the OR is just part of the life of an anaesthetist	.835	Teacher
	Teaching in the OR is rewarding for me	.683	Teacher
	The OR is a good place to learn	.548	Educational environment
3	I rarely see the same learner repeatedly in the OR	.771	Challenges and stresses
	My OR teaching would improve if I could discuss it with others	.694	Training
	All anaesthetists involved in training should be trained in one-to-one OR education	.537	Training
4	Teaching in the OR is more challenging than lecturing	.830	Challenges and stresses
	Teaching in the OR is challenging for me	.730	Challenges and stresses
5	Patient safety limits teaching in the OR	.777	Challenges and stresses
	It is difficult to maintain continuity of teaching for learners	.762	Challenges and stresses

Table 19 only has 13 of the statements because question 20 (*I look forward to trainees being with me in the OR)* was excluded due to a low loading which made little contribution to any of the five factors. Close inspection of Table 19 shows that factors 1 and 2 contain all the teacher and environment statements. The training issues are in factor 3 and most of the challenges are in factors 4 and 5. Thus the combination of the factors and my own categories suggests there maybe three themes: the interaction of the environment and the teacher, the training issues (of teachers) and the challenges and stresses of OR teaching.

This small scale survey has helped clarify and confirm some of the findings from the interviews and ALGs. It confirmed that OR teaching was indeed thought to be challenging. However, despite the challenges, the overwhelming majority felt that the OR was a good place to learn. There were varying views between individuals as to how much they 'enjoy' teaching and how this balances with the challenges that teaching in the OR presents. There was support for being taught how to manage one-to-one teaching. In addition the opportunity to talk about OR teaching as a 'training' tool was considered valuable by 11/16 anaesthetic and 12/20 ENT trainees. This corroborates the experiences described by both the anaesthetic and ENT ALGs.

While it may not be possible to remove the challenges or change the environment, there is an opportunity to improve the way our OR teachers of the future learn to teach. There was some evidence that those who had attended a TTT were more confident teaching in the classroom and had different insights into the difficulties of OR teaching. There was support for setting up discussion or action learning groups by 23/36 of these trainees.

5 DISCUSSION

This discussion is set out in six sections. The first summarises the findings relating to the exploration of the how trainees teach and learn to teach in the OR, and their perception of the meaning of teaching and suggests a framework placing the patient at the centre. The second summarises the findings of the experience of using ALGs and explores how this approach may contribute to improving OR teaching. The third considers the quality of the evidence provided and how this relates to other approaches to teacher improvement initiatives. The fourth considers the weaknesses of the study. The fifth makes some concluding observations. The sixth explores my personal development through this study.

5.1 Teaching and learning to teach in the OR

This section brings together the data concerning how the trainees teach and learn to teach in the OR. The scoping exercise identified that anaesthetic trainees were involved in teaching and the majority of this teaching took place informally in the OR. The participants' perception of what constitutes teaching is explored in the next section. Their learners were varied, including medical students, nurses, and other anaesthetic trainees. They imparted knowledge either as mini-tutorials or question and answer sessions mainly on a one-to-one basis. They also guided their learners in performing practical skills, on real patients, which varied in complexity from intravenous cannulation to the management of a whole anaesthetic. In addition they acted as role models for their learners both as teachers and clinicians. These various roles are all included within the twelve roles of the medical teacher (Harden and Crosby, 2000).

The presence of a patient, as an integral part of their OR teaching, placed different responsibilities on them as teachers when compared to the classroom, where the primary 'consumers' were the learners. This produced a tension between caring for the patient and the

learner, which challenged and stressed these trainees. Despite this, only one of the interviewees had received any formal tuition in teaching, which was conducted in a classroom. These interviewees had learnt to teach in the OR by observation and imitation of peers, and implementation by trial and error. This finding is similar to the assumptions made by SCOPME (1992) and suggests that the introduction of TTT courses has had little impact on these trainees.

The A-ALG discussions confirmed the findings of the scoping exercise. These discussions, which were more focused and in-depth, emphasised the concerns these trainees had for the patient's safety, while they were also responsible for a learner. Many of the trainees' learners were unexpected and unknown when they arrived in the OR for teaching. Their learners could be considered in three groups according to their positioning in relation to the anaesthetic community of practice (A-COP). The complexities as to what constitutes a COP are addressed in section 2.2.2.3 (Wenger, 1998b; Dornan et al., 2007) and, in this interpretation, I have taken account of how fully individuals can participate in a COP (Goodwin et al., 2005). The first were anaesthetic trainees who were part of the A-COP as they were training to be anaesthetists. The second were the ODAs who were partly of the A-COP but would never become full members. The third were those learners who were outside the A-COP, who were just passing through.

The approach of these trainees to teaching appeared to be haphazard with little externally discernable structure or consistency. Two of the four participants completed an educational module with me and one of these was already part way through a Postgraduate Certificate in Medical Education. There did not appear to be any difference between the descriptions of those who had or had not completed an educational module as to their approach to OR teaching.

Analysis and discussion around their teaching episodes suggested a number of areas where they were uncomfortable. Their main area of discomfort was that they were unsure what their learners needed to learn or at what level to pitch their teaching. Consequently they sometimes guessed what to teach. They found the presence of the learners could increase their stress levels, particularly when they themselves were reaching the limit of their clinical capabilities.

The ENT-ALG concentrated on their teaching activities in the OR with the objective of looking at the acceptability and applicability of the ALG process in a different specialty. The majority of their teaching episodes related to teaching operative surgery in the OR. However, they knew their learners, who were ENT trainees themselves and thus all members of the ENT-COP. Like the anaesthetic trainees they placed the safety of the patient foremost. They also found it challenging to get the balance between the need of the learner to gain operative experience and expertise, and the patient's safety. One difference was that the ENT trainees expressed an explicit need to trust their learner before allowing them to operate. This trust seemed to be particularly important when the learner was performing an operation which the teacher was unable to see what they were doing.

5.1.1 Teaching in the OR

In the literature review chapter (section 2.3.1) I considered the challenges associated with the terminology surrounding TTT. One of the terms addressed was that of teacher. I choose to use the term in a broad sense to encompass those doctors who helped or facilitated others to learn. During the data collection phases the terms teacher and teaching were used but not defined. This meant that the participants applied their own interpretation as to what constituted teaching and the role of a teacher in the clinical workplace.

The participants described a variety of different activities under the term teaching. At one end of the spectrum there were descriptions of classroom based teaching such as intravenous

cannulation on manikins and tutorials (sections 4.2.3 and 4.2.2.3). The teaching during these

activities matched some traditional views of the role of a teacher, which is well encapsulated

in a quote from Knowles et al. (2005, p.251).

> *'I was brought up to think of a teacher as one who is responsible for what students should learn, how, when and if they have learned. Teachers are supposed to transmit prescribed content, control the way students receive and use it, and then test if they have received it.'*

The feature that stands out from this view, for the present discussion, is the control the teacher

has over what and how students learn. It is clear in these interactions who is the teacher, who

is the learner and the purpose of the teaching episode.

At the other end of the spectrum, they gave descriptions of teaching when short interactions

resulted from questions from other members of the healthcare team. For example, the short

opportunistic exchange (section 4.2.1.3) between one of the participants and a nurse who did

not understand what was meant by the term 'group and save'. This nurse was not a learner in

the same way as in the classroom in that there was no 'prescribed content' and the participant

was not responsible for the nurse's learning. If the limited view of teaching suggested above

were adopted then it could be suggested there was no teaching. However, the nurse had a gap

in her knowledge and understanding which directly related to patient care. This gap in the

nurse's knowledge was identified and addressed. The participant explained what a group and

save was and why it was being used in the context of this patient. When we consider this

interchange from the perspective of the nurse, I suggest she had learnt. So in this instance I

suggest that learning had taken place because the participant had facilitated learning and so

acted as a teacher.

There were also examples of teaching that fell between these two extremes. All the episodes

described as teaching had some commonalities. There was always a direct one to one

interaction between a clinician and a learner and these took place within the context of the

clinical environment where an individual patient was undergoing treatment in an OR, an ICU or a ward. While the teaching episode may have been unplanned and opportunistic, it was a direct one-to-one interaction which was deliberate on the part of the clinician. Its content or purpose was related to the care of a specific patient. In addition, the clinician, as teacher, had the opportunity to assess whether the learner had gained and understood from the interaction. This was illustrated with a different exchange (section 4.2.1.4) when a participant described how they had a nurse explain back their understanding of an explanation.

In the teaching episodes described, the participant maintained a degree of control over the teaching. This was illustrated on those occasions when the clinicians sent potential learners away because they were preoccupied with a patient's care and when they had learners observe while they dealt with clinical problems, such as an acute fall in oxygen levels (sections 4.2.3 and 4.2.2.1).

Another group of teaching episodes were described when learners were scheduled to be allocated to a clinician for 'teaching'. These interchanges resembled traditional teaching with predetermined roles of teacher and learner. Likewise for these allocated sessions there was usually a purpose in the learner being present and related in some form to a curriculum, although the teacher was not always clear about the purpose. This was particularly so when learners appeared unexpectedly. These sessions had the potential to follow similar approaches to teaching as those in the classroom. The teaching steps might include a needs assessment, setting of learning objectives, delivery and assessment of learning.

A challenge posed in the OR was that the course of events was unpredictable because of the presence of a patient undergoing surgery. In these circumstances the experiences available to the learners were not predictable. In addition, there were potentially so many experiences available that the learner could become overwhelmed. Perhaps the key purpose of the teacher

in these circumstances is to facilitate the learner to select relevant experiences and then make sense of them. However, as discussed in the literature review (Kolb, 1984), learners tend to have preferences as to whether they make best use of concrete or abstract experiences. While learners do not usually inform the teacher of what type of experiences they prefer, an awareness that learners vary might encourage the teacher to take this into account. The teacher can then guide a learner who does not seem to realise the importance of a particular experience or event. This sensitivity can also be usefully applied in relation to the way the learners synthesise an experience with different emphases on reflection and action. Those learners who prefer to reflect before moving forward might appear 'slow' or reticent particularly to a teacher who is more active. An awareness of these differences between the learning styles of teacher and learner might help to explain and overcome those occasions when the interactions are poor.

An alternative approach is to consider what goes on in the OR in the light of the 'social theory of learning' as proposed by Wenger (Wenger, 1998b), considering that part of learning is about the integration of the learner into a COP. In these circumstances, the clinician can act as a guide to what is an acceptable way to behave in the OR which, in this case, I consider is a COP. For the novice new to the OR it can be an intimidating environment. While showing a newcomer to an OR, where to get changed and what they can or cannot touch might not at first sight be viewed as teaching I suggest that it is if a broad interpretation of teaching is adopted. Indeed, this moves into the realms of role modelling with the impressions formed by a novice from the behaviour of members of the OR COP and their actions and interactions being a powerful teaching tool. This was exemplified with the experienced trainee who arrived part way through a case where the patient was at severe risk of acutely dying. The consultant behaved in a calm and welcoming manner. This behaviour gave the trainee a role

model which had a positive impact on the trainee about how to behave. Perhaps this example will have a lasting effect on the way the trainee behaves in the future. In this instance, the experience may change their behaviour: they have learnt, as a direct consequence of the consultant's example, and I suggest that this is teaching.

When it came to being taught effectively there were also commonalities. As learners, they wanted and valued being directly involved with a patient's care even if it was as an extra pair of hands. The impact of the clinician as a teacher in these circumstances was that they valued the presence and input from the learner, even when the learner was less experienced than the teacher. Here, the clinicians acted as role models both as clinicians and teachers. It is perhaps the importance of this role modelling in the clinical environment that identifies excellence, which was discussed and highlighted when considering the attributes of excellent clinical teachers (Irby and Rakestraw, 1981; Matthews, 2000; Elnicki et al., 2003; Schwind et al., 2004). Certainly within the roles assigned by Harden and Crosby (2000) role modelling is viewed as important. The impact of poor role models was described by an ENT trainee who attended a classroom based TTT. On this occasion the teachers did not role model what they were teaching because they failed to address the issues that participants felt were important.

The challenge of explaining what it is that makes a good clinical teacher has been addressed by Sutkin et al. (2008, p.458) who undertook a review of the literature from 1909 to 2006. Out of the 4,914 titles, only 68 met their criteria for analysis and they noted that: *'We found more opinions than empirical data about good teaching.'* Through their analysis they concluded that clinical teaching was something different from 'ordinary' teaching.

> *'Excellent clinical teaching, although multifactorial, transcends ordinary teaching and is characterised by inspiring, supporting, actively involving and communicating with students.' (Sutkin et al., 2008. p.452)*

This report highlighted the importance of developing the noncognitive attributes in addition to knowledge and skills. While they did not address clinical teaching in the OR specifically, their suggestions surrounding this extra dimension of teaching accords with the findings for the current study.

In summary, I suggest that being a teacher in the OR is a complex undertaking that requires a different understanding to a 'traditional' view of a teacher. It includes one- to-one interaction between a clinician and a learner and is related to the care of an individual patient. Because of the one-to-one nature of the interaction there is immediate feedback between clinician and learner. The interactions require a deliberate act on behalf of the clinician to allocate time to the learner, even though the clinician might not label this act as teaching. While role modelling is an important aspect of teaching in the OR, it is not clear how the 'modelling' was deliberate on the part of the clinician.

5.1.2   Proposed model of OR teaching

This section brings together, in a single model, four main themes evident in the findings related to teaching in the OR. This model emerged from the data. Firstly, in the OR a single patient is the centre of attention, not the learner. Secondly, the workplace location is a complex place in which to learn or teach. Thirdly, for the learner each learning episode is a one-to-one experience. Fourthly, the doctor has a dual role as she/he is responsible for both the patient and the learner.

In the OR, a single patient is the centre of attention for the whole OR team. Without the patient there is no reason for the OR to exist; the OR team is present to care for this patient. We do not anaesthetise or operate on patients unless it is part of their clinical care. When a patient forms part of teaching then there is a potential for them to come to harm as a result of the teaching. This scenario is different to lectures, tutorials, and clinical skills laboratories

where the centre of attention is the learner. Even in the clinic or on the ward it is possible to have learners practice on or with patients without causing harm. This makes the OR setting different because the teacher cannot use a learner centred approach in the same way as in the classroom or tutorial. While it is possible to take the needs of the learner into account, the needs of the patient take priority.

The location of the OR as a learning environment is complex. It has been designed to deliver patient care in a safe and effective manner. In contrast, the classroom is an environment designed for learning and teaching. The OR is designed with patient care in mind and with little consideration of the learner.

For the learner most learning episodes in the OR are one-to-one experiences. By this I mean that, for the anaesthetists and surgeons, there is usually one teacher and one learner. This makes each learning episode a personal experience for both parties. Unless the learner only observes there will be direct interactions between them. These interactions will be both verbal and non-verbal and each will assess and make judgments of the other. If the two parties already know and have worked together, this relationship will start from a different point than if they have never met before.

The teacher, in the OR setting, is present to give care to the individual patient as a doctor. Their teaching role is secondary to their clinical role. This split in their responsibilities can lead to difficulties. If the doctor puts all their energy into patient care then the learner is sidelined. If the doctor puts all their energy into the learner then the patient becomes merely a teaching aid, rather in the form of a manikin used in the clinical skills laboratories. It is how well doctors balance their responsibilities as clinician-teacher that determines the overall outcome for patient and learner.

These four themes, the patient, the location, the learner and the clinician-teacher have complex interrelationships as shown below in Figure 16.

Figure 16 Interrelationships of teaching in the OR
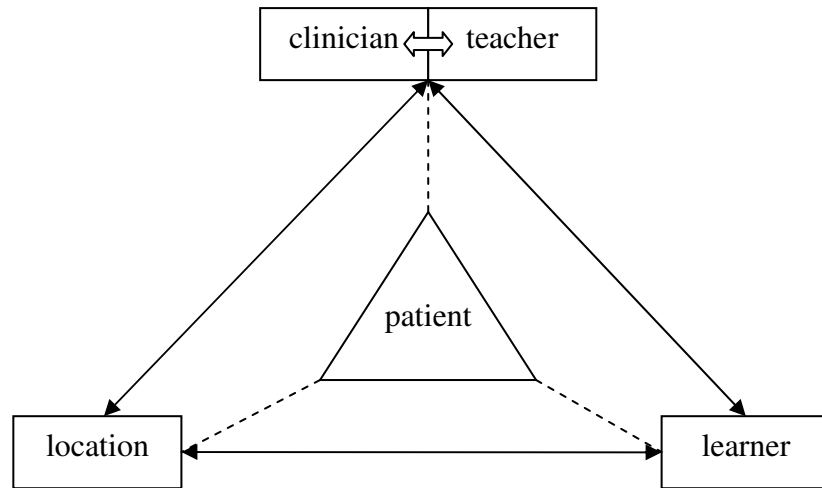
I explore these interrelations by starting with the patient who is central to the model. I continue with a discussion of the challenges posed by the location and the individual learner. I finish with the clinician-teacher whose management of the patient, location and learner influences the outcome of the interactions.

5.1.2.1 Patient

The one theme that runs through all the findings is that the safety of the patient comes before everything else. While this may seem obvious, the importance of the patient, in the teaching process in the OR, is not always evident. For example, Greaves et al. (2003) in their book on teaching in the OR for anaesthetists first mention patient safety in the middle of their 275 page book: '*The welfare of the patient must always take precedence over teaching and learning (p.126).*' Lyon and Brew (2003, p.55), when exploring medical students' learning in the OR, acknowledge the importance of the patient.

> *'Strategies to improve teaching and learning in theatres need to take account of the messy and unpredictable reality of the operating theatre as a workplace where patients' needs and not the needs of medical students are the focus of attention.'*

However, when they explore possibilities to improve their medical students OR teaching the patient is not central in their suggestions.

Patients have operations for a specific reason and it is important to get their care right the first time. This is different to the work in a clinic or a scheduled ward round when there are many opportunities to revisit, review and perhaps practice without harming the patient. Unless the patient is critically ill, then there is usually an opportunity for a second chance, for both the patient and the learner.

A further aspect of the patient in the OR is that they often have a general anaesthetic which means they have given away their autonomy and any chance to influence their clinical care. They need to have complete trust in the anaesthetist, surgeon and the OR team to look after them. If the anaesthetist or surgeon is also teaching, does the patient get their full attention? The data from the ALGs suggest that the participants, both anaesthetic and surgical, realised this tension and made the necessary adjustments between clinician and teacher. On occasions they were prepared to ignore or even send the learners away so they could concentrate on the patient.

However, the responses given in the survey were less clear. Two questions enquired directly about patient safety, *'Patient safety limits teaching in the OR,'* and, *'Teaching in the OR is a distraction for me.'* There was a full range of opinions expressed on both questions by both anaesthetists and surgeons, from strongly agreeing to strongly disagreeing. Perhaps it is surprising that some individuals did not perceive that teaching in the OR affected patient safety or might be a distraction. While there is insufficient detail or depth to the data to enable interpretation of these variations, it is interesting to speculate. One possibility could be that

the respondents only taught if patient safety was not affected and only taught if it was not a distraction. Another is that the respondents did not teach in the OR. At the other end of the spectrum is the possibility that the respondents did teach but did not realise patient safety could be an issue. The final possibility is that the questions were unclear and open to misinterpretation.

The issue of patient safety, while teaching and learning in the OR, is of interest to us all as prospective patients. This study has highlighted the importance of patient safety. At the same time it has raised more questions and is an area where more investigation could be focused in the future. How do we balance the needs of an individual patient against the needs of society to train new doctors? What preparation should take place before a trainee is allowed to learn on a patient in the OR?

5.1.2.2 Location

As has been described in the findings section, the participants teach in a variety of locations which include the classroom, the clinical skills laboratory, the ICU and the OR. Both anaesthetic and ENT groups described teaching and learning mainly in the OR.

The physical structure of ORs is variable. These variations include overall floor space, the location of doors and positioning of equipment. For example, the anaesthetic machine may be to the left or right of the anaesthetist and at the foot or the head of the patient. These variations can cause challenges to both teacher and learner. When the teacher is not familiar with the layout of the OR then they will have to spend time orientating themselves. This challenge is encapsulated by an entry I made in my diary in March 2003:

> *I recently ended up doing an ENT list….in an OR I never worked in before. I felt very uncomfortable …. I didn't know the ODA, I didn't know the OR.*

The learners will also need orientation. Those learners unfamiliar with the OR will need guidance about behaviour and etiquette, such as where they can stand and what they can touch. The importance of this orientation as part of teaching for medical students new to the OR was highlighted by Lyon and Brewer (2003) and Fernando et al. (2007). When they visit the OR for the first time then this guidance will be the 'teaching' required for the learner. For those who have learnt OR etiquette they may still need further orientation when they visit a different OR.

It is interesting here to reflect on some of my own experiences as a medical student. Even during our first year we were allowed and encouraged to watch surgical operations from viewing galleries. These galleries were specifically designed for the surgeons to be able to demonstrate and explain the surgery to students and other visitors. The big advantage was that the viewers did not enter the OR and therefore posed no risk of infection or obstruction. It gave us an overview and an understanding of what going to the OR might be like. It is perhaps unfortunate that viewing galleries are no longer built or used.

The surgeons also described most of their teaching taking place in the OR. Aspects of the physical structure they alluded to were that they sketched the anatomy of the operation before starting. My experience of this is they 'borrow' part of a board used to keep track of the needles and swabs used during the operation. While the OR is not designed for teaching there are some audio-visual aids available. These include video cameras attached to various scopes and microscopes so that all the staff can view what the surgeon is doing. These allow others to see and mentally rehearse an operation before undertaking it themselves. In addition, it allows the teachers to view their learner's progress from a distance and keep some control over their actions. The recordings can be used later as the basis for review and feedback between the learner and the teacher.

Whatever visual aids are used, the teacher will need to take account of where the teaching is to take place. They need to be familiar with the layout of the location and what facilities are available. This accords with the principles of teaching practical skills in a classroom or clinical skills laboratory where it is the teacher's responsibility to ensure everything is ready before the learners arrive (Mackway-Jones and Walker, 1998; Peyton, 1998).

The survey suggested that both anaesthetic and ENT trainees considered the OR to be a good place to learn. The majority found the experience rewarding, enjoyable and an expected part of the day to day life of anaesthetists and surgeons. This was confirmed by their disagreement with the statement that, 'R*eal teaching takes place within the classroom.'* This suggests both groups valued the importance of learning and being taught their crafts within the environment in which they practice. The value these groups placed on learning in the OR accords with the model of Koens et al. (2005) which emphasises the importance of providing enriched contexts for learning. These findings suggest that despite the shortcomings, the OR is an appropriate and worthwhile place to learn to become anaesthetists and surgeons.

5.1.2.3 Learner

As I have already highlighted, most of the teaching in the OR is on a one-to-one basis. It becomes a personal matter between the two individuals, the teacher and the learner. In order for this relationship to work there has to be some degree of respect and understanding of each other's roles and responsibilities. As we have seen, the anaesthetists interact with a wide variety of learners from within and without their COP. In addition, they often meet the learner for the first time in the complexity of the OR. This meeting may cause stress if the anaesthetist is not expecting a learner to appear. This was sometimes compounded by the learner appearing after the operating session had started, which often caused the clinician-teacher some irritation. An interesting aspect of the ALG discussion was that each of the

participants thought that the 'late' learner was only a problem for them. I will return to these issues when I addressed the changes the A-ALG made in their teaching practice.

This interaction with the learner also needs to take account of the opportunistic nature of learning experiences in the OR. While opportunistic learning is unpredictable this does not necessarily mean it is unstructured. At one level the learner and teacher can agree broad objectives for an operating session based on the scheduled patients and the operations. At another level the unpredictability of what will happen with each patient makes it difficult to plan exactly what learning opportunities will arise. In order to 'plan' to make the most of the variable experiences there needs to be a degree of flexibility from both learner and clinician-teacher. It is how the teacher helps the learner identify and utilise these variable experiences that transforms random events into 'experiential learning' as suggested by Kolb (1984). This is different to a classroom session where the main source of variability is usually the learner. In the OR the patient, the location and everyone else involved become variables which are uncontrollable. This element of structure, opportunism, uncontrollability and broad objective setting is perhaps what makes teaching in the OR exciting, exasperating and challenging.

5.1.2.4 Clinician-teacher

The clinician-teacher has to take into account the needs of the patient, the learner, the location and relate this to the context of the real situation. Then they have to decide on their ability to manage both the patient and the learner. Section 4.2.1.6, in the A-ALG, gave illustrations of the stress the trainees may experience when they are managing the anaesthesia for patients which challenge them clinically. For example, one anaesthetic trainee sent a learner away because they needed all their concentration for their patient and thus they were acting wholly in their clinician role. On the other hand, an experienced anaesthetic teacher had sufficient capacity to manage both a difficult patient and an unknown senior trainee (section 4.2.1.4).

The clinician looking after the patient is responsible primarily for the patient's safety. As the clinician is a single individual there is only so much that they can cope with at any one time. As suggested earlier, if they become task overloaded, just as with scuba diving, ability to function deteriorates. This deterioration can result in patient harm and even death. The clinician-teacher has to decide where on the continuum between clinician and teacher they will function.

I suggest it is making these complex decisions, for which there is probably no right answer that forms a difficult part of clinical teaching and supervision. Many of these decisions are probably made without the clinician-teacher being consciously aware of them. This tacit decision making and an ability to modify their actions in 'real time' are key features of professionals as suggested by Schon (1983). I further suggest that gaining an understanding of these complex interrelationships will enable us to improve clinical teaching in the OR. It is the way all these different features are brought together that determine the quality of the learning. Put another way, teaching in the OR can be thought of as how the clinician-teacher manages to balance these features. Therefore the clinician-teacher has to balance where they concentrate their energies. The line separating or joining the clinician-teacher is movable. However, the area or size of the box is fixed: if they allocate more of their energies towards the learner then their vigilance of the patient will be decreased.

Another facet to the function or duties of the clinician-teacher is that of supervision of trainees. The meaning of the term was considered in the literature review section 2.3.1 (PMETB, 2007a; Royal College of Anaesthetists, 2007a). As can be seen from these descriptions, the area between teacher and supervisor is less clear than that between clinician and teacher. Whenever a doctor is supervising a trainee, at whatever level, they still have responsibility as a clinician to the individual patient. While there are suggestions in my data

that this is an issue, it was not identified as a specific one. This is a further area in the complexity of educating our doctors of the future in the OR and is worthy of further investigation but is out with the scope of this study. It would be interesting to explore how trainees and trainers viewed their teaching and supervisory roles. Do they lie on a continuum or are they separate entities? What attributes are required for teaching and supervision?

In order to make sense of this clinician-teacher role for an individual teaching episode I suggest posing a series of questions that might help. These relate to how prepared and willing the clinician is to act as a teacher in a specific clinical situation. When all these questions can be answered 'yes' then teaching and learning is likely to be safe and successful:

> Do I feel like teaching today?
> Do I have time?
> Is it a safe environment to teach now?
> Am I working well within my clinical competence level?
> Am I properly 'trained' or fit for this teaching role?
> Am I able to cope with the extra responsibility of teaching?
> Am I prepared to be responsible for this learner's safety *and* learning?

This model illustrates the complexity of teaching effectively within the OR while maintaining patient safety. The next section looks in more detail at how the clinician-teacher might develop their teaching competence.

5.1.3   Developing teaching competence

In the findings section I considered what is taught along the lines of knowledge, skills and attitudes. However, as we have seen, OR teaching and learning is also about learning in the context of a COP. In order to take account of the contextual aspects I am going to revisit my

suggestion that teaching might be considered as a competency, which was explored in section 2.6.2 of the literature review chapter.

The study participants were functioning as both clinician and teacher. In their teacher role they were functioning independently at Miller's (1990) *does* level. However, this does not necessarily mean they were effective as teachers. The A-ALG participants described that they had learnt to teach in the OR mainly by observation, imitation, trial and error. None of them described their teaching skills being formally assessed. The survey also showed that observation played a major role in how the respondents developed their OR teaching skills. While not asked directly, it seems unlikely that their teaching competence had been assessed. This is an area that I could have explored in more detail through the survey with extra questions.

Their role as a teacher in the OR seems to be an accepted part of being an anaesthetist or surgeon, both for trainees and trainers. This was borne out by the findings of the survey. However, there is little formal acknowledgement or training offered to ensure competence for this role. It is almost as if there is an assumption a competent doctor will also be a competent teacher (O'Byrne, 1988). This lack of preparation is not confined to anaesthesia:

> *'Resident physicians spend numerous hours every week teaching medical students and fellow residents, and only rarely are they taught how to teach.' (Morrison and Hafler, 2000, p.238)*

As I explored in the literature review one of the challenges in this area is the lack of agreement as to what is acceptable teaching. The main roles that learners expect of their clinical teachers fall into categories of the facilitator, role model and information provider (section 2.3.2) (Harden and Crosby, 2000). The literature suggests that learners have varying ideas as to the relative importance of these features depending on their status as medical students or postgraduate trainees (section 2.3.3.2). If a learner's view of what constitutes good

teaching is misplaced then their *knows about* will also be confused. In this case the learner is likely to replicate this misconception in their teaching style. In this instance the learner will need to unlearn the *knows how*.

In addition there was little recognition that teaching in the OR might require special skills and competencies. In order to shed some light on this complex issue I look at OR teaching as if there are four discrete types of teaching that take place. These mirror Miller's four levels of *knows about, knows how, shows how* and *does*.

The explanation that follows is potentially confusing because there are two learners. The first is the learner being taught anaesthesia or surgery (I will call this person the learner). The second is the learner who is learning to teach (I will call this person the teacher-learner). The teacher-learner is also a teacher of the first learner. So we have the learner being taught anaesthesia or surgery by the teacher–learner.

I suggest there are different competencies required to teach at each of the four levels. For example, there is, arguably, a marked difference between teaching a novice medical student during their first visit to an OR, and supervising an experienced anaesthetic trainee managing an anaesthetic for a complex trauma patient. To illustrate this I am going to explore the teaching competencies required to take a novice medical student, who is on their anaesthesia module, through their first visit to an OR.

The student's first requirement is to learn what is involved in giving anaesthesia within the OR in a broad sense, to reach Miller's level of *knows about*. Let us suppose they are allocated to an operating list that is being anaesthetised by an anaesthetic trainee who is competent as an anaesthetist and is working alone. If this anaesthetist has no expertise in teaching medical students in the OR then they are a novice teacher-learner. If we consider teaching in the OR as

a competency, the anaesthetist needs to go through the four phases of *knows about, knows how, shows how* and *does,* but in relation to teaching.

The data presented in the findings showed no evidence of the participants progressing through the four phases for teaching. The teacher-learners seemed to start at the level of *does*, in respect of teaching learners who were new to the OR. In this case the teacher-learner just got on with it. In relation to surgical training this would be equivalent to expecting a learner to perform an appendectomy without knowing what an appendix was. However, our novice teacher-learner does not start as a blank canvas. They have seen and been exposed to teaching in the OR as part of their training. They know what teaching in the OR looks like. There was an implicit assumption that they knew what *good* teaching looked like. Providing the teacher-learner has had good role models for teaching, then they will have reached the level of *knows about.* If they chose a poor teacher as a role model then successful imitation will perpetuate poor teaching. The risk of imitating poor role models is illustrated in the surgical world where bullying is viewed by some as an effective strategy for teaching in the OR (Musselman et al., 2005).

Once our teacher-learner has identified what good teaching looks like, *knows about*, the next phase is *knows how*. This phase is concerned with the teacher-learner understanding and being able to explain good teaching. At first sight this seems such an easy step that it might be omitted. But a failure to appreciate the important aspects of what makes up good teaching can lead to difficulties later. For example, one of the A-ALG participants had reported some of their teaching had not changed over the course of the life of the ALG. However, when I probed and encouraged them to reflect on their teaching, they recognised that they had involved their learners in setting the learning objectives. It was not until the participant

recognised and understood they had now incorporated this step into their teaching that they appreciated its importance.

A teacher-learner has reached the *knows how* to teach stage when they understand and can explain what teaching in the OR encompasses. However, the teacher-learner may not have included or considered how they will care for the patient and the learner at the same time, particularly if the 'learning' has been classroom based. The next two stages involve the teacher-learner having to manage both a patient and a learner. The presence of the *shows how* phase would allow the teacher-learner to develop their teaching skills before they taught independently. In neither ALG was there evidence that any of them had been guided through this phase.

The findings from the A-ALG group suggested that the participants did struggle when they undertook looking after learners new to the OR. They were not sure what was expected, nor how to manage the learner and the patient at the same time. Their unease was illustrated with the difficulties they encountered with their first meeting with the learner particularly if they were unexpected or appeared part way through a case. Perhaps these challenges would have been addressed if they had been through all four of Miller's phases.

The folly of moving from *knows about* to *does* without the intervening steps is illustrated by the 'Generation Game' shown on television in the 70's, 80's and 90's. The idea here was for an expert to give a quick demonstration of a complex skill, such as icing a cake. The participants then had to emulate the expert without explanation or help. The consequence of this was that the participants' attempts to copy, what they had seen briefly, provided entertaining television as they invariably made a mess. This was because they had moved from *knows about* to *does* without any intervening explanation, opportunity to ask questions or chance of supervised practice.

Many of the TTT courses set in the classrooms introduce the principles of adult learning and help learners to apply these principles to their teaching (Brookfield, 1986; Knowles et al., 2005). The principles of planning, getting to know the learner and targeting the teaching to the learner's needs are present in the findings of this study. It is how the trainees, as teachers, apply this in their OR teaching that is missing. This is what the A-ALG process tried to address by encouraging the participants to reflect on their experiences.

One challenge was that these participants were already teaching in the OR. In order for them to improve or advance their current practice they needed to recognise a need for change. As we have seen from Slotnick's (1999) work, doctors learn when they have identified something as a problem. Until they reach this realisation they may not appreciate their unconscious incompetence (Peyton, 1998). One approach to looking at this complex issue of competency is to consider the use of a Johari window to look at the relationship between competence and consciousness.

Unconscious incompetence	Conscious incompetence
Unconscious competence	Conscious competence

The window that we are aiming for is the 'conscious competence'. When our learner or teacher is in this state then they are able to think about and reflect on their competence. In the Miller hierarchy, this is at the *does* level. This is not a static state because without ongoing reflection the competence may decline into unconscious competence or even incompetence.

Unconscious incompetence is self- explanatory and it is here that the use of TTT courses may be able to help the clinician-teacher teacher realise they may be 'incompetent'. This idea is supported from the findings of the survey where those trainees who had attended a TTT course rated their views of OR teaching differently. Those who had completed a course were more confident in the classroom setting. They also responded differently ($p<0.05$) to the item, *'Patient safety limits teaching in the OR.'* The attendees rated this statement more highly, mean score 4.0, than the non attendees, mean score 2.8, suggesting that the attendees were more aware of the difficulties related to OR teaching. Perhaps this difference was as a result of understanding the implications of teaching in the OR setting. These findings could be interpreted as those attending a TTT course also have gained or heightened their awareness for teaching in the OR

Unconscious competence may also be cause for concern because in this window the clinician-teacher may no longer think about their teaching. They may continue teaching in the same format for many years even if the needs of the learners have changed. Teachers who are aware of their incompetence or competence are in a state of readiness to develop their teaching. The TTT courses, conducted in the classroom, tend to address topics related to giving lectures, tutorials and running small groups. The transition of these teaching skills into the real world of the OR is less well covered. I suggest that the use of the ALG process described in the findings section is one way to approach this in a practical and realistic manner.

5.2 Effect of ALG as an educational initiative

The second research question 'How can anaesthetic teaching and learning be improved within the OR environment?' explores the effectiveness of the ALG as an educational initiative. The principles underlying the ALG approach can be equated to the four learning modes that make up the experiential learning model (Figure 1 Kolb's learning modesFigure 1) suggested by

Kolb (1984) and gave the participants the opportunity to experience all four types of learning style. The descriptions of teaching and learning were concrete experiences for the participants who were present. The act of recording the episode in their diary and verbalising the experience enforced reflection and participants functioned in divergent style of learning. At the same time, the episode became an abstract experience when described to other members of the group and the discussion gave them opportunities to reflect on this abstract experience, which equates with the assimilating style. When these concrete and abstract experiences were used by participants to change their practice by active experimentation it gave them the opportunity to experience converging and accommodating styles.

Through participation in the A-ALG, we identified two main areas in which individual participants would to try to improve teaching. These revolved around the difficulty they were having not knowing the level at which to pitch their teaching and the need to ensure patient safety.

For the first difficulty, the suggested way forward, as agreed by the group, was to try to ensure they introduced themselves to each learner and undertook a brief verbal needs assessment. This suggestion for change emerged from the irritations the participants sometimes felt with unexpected and 'late' learners. This reflection and realisation that it was a problem for others was a first step to their discussing how this problem could be managed. Indeed discussions revealed that the appearance of the learner after the operating session started did not necessarily mean the learner was actually late. This insight led the group members to ask 'late' learners why they were not there earlier. A simple misunderstanding can disrupt the personal one-to-one teaching before it has even begun. If the learner happened to appear at a critical moment of the anaesthetic or surgery, with the anaesthetist's attention otherwise engaged, then the learner may be ignored or even sent away. Some of these

potentials for misunderstandings are unavoidable. While it may be convenient to blame someone else, the clinician-teacher has to manage the situation. As first impressions can make or break relationships, one of the features of the changes instituted by the ALG members was managing the initial introductions. This realisation of the importance of the first contact enabled the participants to incorporate it as part of their teaching strategy.

A further challenge identified by the participants was that of pitching their teaching at the right level. There were several descriptions of them 'guessing' or trying to remember what it was like when they were in a similar situation to the learner. They then adjusted their teaching to this level but this was not always successful. The way forward suggested by the group was to make a deliberate attempt to assess the level of their learners. This again met with success and they reported that by the final meeting they had used strategies to get the pitch right.

However, undertaking this needs assessment and setting appropriate learning objectives can be complex because the priority is to respond to the patient's needs. There has to be a balance between what is available, the learner's current level, the learner's curricular needs, and the ability and willingness of the teacher to meet these needs. One way that clinician-teachers might ensure they address the learner's needs is by posing a series of simple questions about each learner:

Who is the learner?	Medical student, nurse, anaesthetic trainee, name
Are they expected?	
Do I know the learner?	Have I met them before, do I know their level of competence
What does the learner already know?	
What is to be taught/learnt?	

For the second difficulty, ensuring patient safety, they agreed to try two specific strategies. One was to consider having the learner observe, particularly if they as a teacher were unable to give the learner their attention because their concentration was directed to patient safety. The other strategy was to consider sending learners to the library to undertake a specific learning task and then have them return to discuss their findings.

There is evidence, discussed in the findings chapter, which suggests they did improve their OR teaching by incorporating these changes. The participants reported that, at the end of the process, one year later, they felt more relaxed and confident with their OR teaching. The role that participation in the A-ALG had on their improvement cannot be quantified. The three participants who completed the study had also embarked on formal certificate courses in education and they had another year's experience. However, they did feel that the A-ALG had integrated with their formal courses to help improve their OR teaching.

The ALG process with the ENT trainees did not demonstrate the same degree of change or improvement in their teaching. As I discussed in the findings chapter there were a number of reasons related mainly relating to the difference in conduct of the process, which might account for this. In the A-ALG all the members of the group actively participated in the groups and engaged in each of the four learning styles (Kolb, 1984). In the ENT-ALG only, some of the group participated and these did not demonstrate that they engaged sufficiently in the process to experience all four learning styles.

Despite these differences there were some commonalities between the two groups. The act of discussing teaching encouraged them to reflect on their teaching and in some respects enforced reflection. The principle of the ALG was to ask the participants to identify what teaching and learning they experience during their day-to-day work. Most of the study has been directed specifically to the OR. These experiences have been collected prospectively. By

this I mean that they were asked to look out for real experiences in their everyday work and to make contemporaneous notes about them. These experiences were then shared in the group so that they could tell their stories. At the same time others were able to call on their own experiences to see if they had similar or different experiences. This produced a dialogue about specific issues. The groups then discussed ways of improving or incorporating good ideas into their own practice.

This approach to learning has also been suggested by Bleakley and Bligh (2007) in respect of teaching medical students. In this commentary paper they ask where the patient comes in the discussions of learner or teacher centred learning. They suggest it is a challenge for medical educators to put the patient at the centre of the process of medical education:

> *'This will demand greater resourcefulness in setting up structured work-based learning and assessment, where science is learned on the job and made sense of retrospectively in small group settings.'(p.80)*

I suggest that the use of the ALG might be one way to redress the balance between the learner and the teacher while keeping the patient at the centre. The anaesthetic learning group was successfully able to achieve changes.

There is also the issue of the importance of the recording of contemporaneous events rather than relying on memories or generalisations. Many of the descriptions were generalisations and were attributable memories rather than prospective diary entries, particularly with the ENT group. This made it difficult to identify the real current issues. However, despite this there was some evidence that by running the group and having them think and discuss teaching in the OR reflection was engendered in some of the participants. Perhaps the participation of the ENT trainees moved some of them from a state of unconscious incompetence to conscious incompetence. For the A-ALG there is evidence they may have progressed towards conscious competence at least for some aspects of their OR teaching.

In summary the ALG approach was partially successful. It was effective as a data gathering process within this study, particularly for the anaesthetic trainees. It seems to have been effective in encouraging the trainees from both groups to reflect on their experiences of OR teaching. The extent of reflection and identification of areas to change their teaching was more evident in the anaesthetic trainees. I suggest part of the reason for this might be the engagement of the anaesthetists with recording specific teaching episodes for group reflection. It helped them to explore their interactions with learners in the OR. It acted as an educational initiative to enhance their teaching and to develop ground rules for good educational practice in the workplace. Perhaps it also encouraged and enhanced their ability to reflect on their day to day practice as doctors.

5.3 Quality of evidence - generalisability

I explore the quality of the evidence provided in this study from three perspectives. Firstly by considering how this study matches the measures suggested by QUESTS approach, as explained in section 2.5.5. Secondly by considering how the evidence integrates with the views of others about how to improve teaching in experienced teachers. Thirdly by considering the responses when the findings were presented to wider academic audiences.

5.3.1   Measure of quality

Using the QUESTS approach (Harden et al., 1999), I provide an overview and consider the Kirkpatrick stages specifically under the target aspect of QUESTS. In terms of Quality of the study, I suggest this is a carefully conducted and documented study of how clinician-teachers learn to teach. The Utility aspect was explored by trialling the ALG method with two groups, anaesthetic and ENT trainees. The effectiveness of this as an educational intervention was greater with the anaesthetists and explanations for this have been explored. The Extent of the

evidence is small as it comes from a single institution with purposive sampling and has been facilitated by an enthusiast. However, there was some supporting evidence from the survey of a wider population that some of the underlying challenges associated with teaching in the OR were more widely applicable. The Setting aspect is applicable to learning to teach in the OR setting for anaesthetic trainees. Extension beyond this group is speculative although there was a suggestion of some effect for the ENT trainees.

The Target aspect is addressed by utilising the Kirkpatrick (1967) stages (section 2.5.6). There was active participation of all those in the anaesthetic group but not with all in the ENT. The anaesthetic trainees reported they found the ALG a useful educational initiative (reaction) and demonstrated learning around teaching in the workplace. Furthermore, they reported a change in their behaviour when teaching in the OR. A criticism here is that these were self-reported changes of behaviour. There were no measures of how their learners felt and whether these changes translated into improved teaching as assessed by some external measure. If we consider Steinert et al.'s (2006) Kirkpatrick modification then I suggest we have come close to their highest level of 4B, with an improvement in the learner's performance as a direct result of the use of reflection through the use of the ALG.

The highest stage in Kirkpatrick's hierarchy, a demonstration of a change in the quality of patient care was not measured directly. However, from the descriptions of how the anaesthetic trainees had become more relaxed and confident in their teaching, particularly with respect to having learners observe when they were struggling with the patient, it may be possible to imply better patient care. As the requirement to demonstrate value for money spent on healthcare increases then programmes aimed at improving doctors' teaching will increasingly need to demonstrate an impact on patient care.

5.3.2   Integration with other approaches to professional development

As part of looking for patterns and structures of how these trainees teach and learn to teach within the OR I have explored other models of teacher development. For example, Shulman and Shulman (2004), when they considered teacher development programmes, suggested an important aspect of improving teaching was the readiness and openness of teachers to change. I suggest that the ALG has acted as a catalyst for these trainees to reflect on their current teaching activities and help them reach a level of preparedness to change. This aspect of the ALG may also be comparable with Slotnick's (1999) first stage of how doctors develop professionally as self directed learners, who continually scan their practice looking for areas that they feel they would like to improve. Thus the ALG approach might be used as an educational initiative to help doctors, who already teach, to identify aspects of their teaching as worthy of improvement.

This approach of looking at the real experiences of the doctors fits within the umbrella of Kolb's experiential learning (1971). The ALG encouraged reflection on their real teaching experiences. For the person describing the teaching this can be considered as a reflection on a concrete experience. For the other members of the group this can be considered as reflection on an abstract experience, which enabled them to match the described experience against their own.

The second aspect of the ALG as an educational initiative is that it can also be used in parallel to identify specific areas of teaching for improvement. This may be either for the group as a whole or for an individual. In addition the group can suggest ways to enact the changes. The successive meetings gave a forum for the participants to share and further discuss the changes in their teaching.

The use of the ALG as an educational initiative does not have a linear pathway in the same way that the current TTT courses do. In the TTT there is an intervention, the course, which impacts on the participant who through a modification of their knowledge and/or beliefs implements a change in their teaching. The ALG approach does not fit this linear format and when one 'tracks' an individual learner's development it is much more complex. Clarke and Hollingsworth's (2002) model (Figure 7) can be used as a framework to unravel this complexity. Their model includes similar domains to the linear model but enables description of the various interactions, between the personal, practice and outcome domains. The interaction of reflection and action can take place in any order and as many times as required by the individual teacher.

Throughout the ALG process there was evidence of the anaesthetic participants engaging in all these domains but not in the linear fashion. In the process of the ALG the emphasis was on the learner to decide where and if they embark on changes which might be in either their practice or their beliefs. The descriptions given suggest that they tried a change and only if the change produced an improvement, or a perceived improvement, in the effectiveness of their teaching did it start to impact on their beliefs or knowledge. In this respect they were given leave to try action, in Kolb's terminology, before they signed up to belief.

5.3.3 Dissemination of ideas

The third strand that suggests the evidence of this study is trustworthy and is applicable more widely was the acceptance of the findings when presented to a wider audience. As I have explained in the methodology the findings and the emerging themes have been discussed with supervisors and a critical friend.

Some of the findings and ideas have been accepted and presented at three international meetings. I presented the scoping interview findings verbally at AMEE in 2003 (Appendix 9).

In addition these findings were discussed as part of an international workshop in Montreal 2003 composed of experienced anaesthetic trainers from Europe and North America. Both these audiences were in broad agreement with the findings. The effect of using action learning groups was presented at AMEE 2004 (Appendix 12) and formed the basis of a successful workshop for the Federation of European Paediatric Anaesthetists 2007. I presented the findings of the survey at AMEE in Genoa in 2006 (Appendix 13). On each of these occasions the findings were discussed and questions posed that then helped to move my thinking and the study forward. In addition my continuing experience and expertise has had other outlets into helping design and deliver educational methodology and methods workshops for AMEE (Appendix 14 and 15).

I suggest that these discussions, acceptance and agreement with my findings contribute to the premise that these findings and interpretations are worthy of further consideration.

5.4 Weaknesses

The first part of this study tried to gain an insight into the anaesthetic trainees involvement in teaching in the OR. Has the ALG process captured an accurate picture of their OR teaching? The descriptions given by the anaesthetic trainees were their personal recollections and views as to what happened. The method relied on the participants identifying what teaching they gave and then having them make notes which they used to describe their OR teaching in the group meetings. There was no predetermination as to what constituted teaching, which meant that the identification of teaching episodes was participant dependant. Thus it is possible that there were other types of interactions, between the participants and others, which might also be considered to be teaching. This would mean there are areas of teaching that have been unexplored. These might be important or unimportant.

This area of uncertainty could be investigated by the use of observers or video recording of trainees going about their normal duties in the OR. The challenges of using such methods were considered in the methodology section and rejected on the grounds of cost and the complexity of gaining ethical approval for an un-resourced PhD. It is an area of research that could provide a wider insight into the teaching activities in the OR. The use of observation or videos would be helpful in quantifying the number and time involved in the teaching episodes.

The ALG was more effective in modifying the OR teaching of the anaesthetic trainees than the ENT trainees. However, because there were differences in the way the two groups were managed it is difficult to identify why. The differences included the way participants were selected, the way the group meetings were arranged, the time allocated to each meeting, the number of meetings, and the time span of the trainees' participation. While the facilitator remained the same I was part of the A-COP but not of the ENT-COP. This confusion might have been avoided by limiting the changes from the first to the second group.

For future investigation I suggest there are two major directions that might be taken. The first is to explore the interactions with anaesthetic trainees while modifying the way the ALG is utilised. The second is to investigate other specialties using the described process.

From the viewpoint of the anaesthetic group only three out of the potential seven anaesthetic trainees participated fully. This begs the question as to whether the ALG process is an acceptable educational initiative and is acceptable and suitable for all trainees? It is interesting to speculate on some of the areas that will need to be addressed to demonstrate the effectiveness in a wider context. Should the participants be enthusiastic volunteers, does the facilitator need to be part of the same COP as the learners, what is the optimum size of the group, can the membership vary from meeting to meeting and what should be the prior

experience of the learners? What is the impact of the 'seniority' of the facilitator on the process and outcome of the ALG?

Currently there is an emphasis on the use of TTT courses as the mainstay of improving the way doctors teach. Perhaps the ALG approach might complement these courses by offering ongoing support to doctors as their teaching develops. If this approach is to be considered then the issues of facilitation, non-participation, and diary writing need to be refined.

This ALG process was facilitated by a single enthusiastic individual. If this approach is to be extended to others then there will be a need to offer support to other facilitators. It was interesting that the anaesthetic trainees, when asked if they would facilitate their own groups, felt they would need some form of training probably in the form of a course. They did not suggest an ALG approach. This study has concentrated on the views and experiences of those who have actively participated. An exploration and understanding of the non-participants' teaching activities and their non-participation would give a valuable insight into the place of ALG in developing clinical teachers of the future. The anaesthetic trainees managed to engage with diary keeping for the first three meetings but only one continued to make diary entries up to the final meeting. In contrast only one of the ENT trainees engaged with diary keeping to a significant extent. While there is current enthusiasm in UK training to encourage reflective writing it does not yet seem to be widely used in a constructive fashion. This again is an area where further work is needed.

This exchange of ideas suggested that their shared experiences of working in the group enabled them to offer support outside of the meetings. While I did not explore this in detail in this study it seems that this networking has the potential to act as the start of a COP related to teaching in the OR. This would make an interesting area for further exploration in the future but is outside the remit of the study.

5.5 What does the study add to knowledge?

A key suggestion from this study is to place the patient at the centre of learning in the OR (Figure 16). This translates into patient centred learning rather than learner centred learning.

My purpose in undertaking this study was to explore ways to improve the teaching by anaesthetists. As teaching is an expectation of all consultants, as soon as they are appointed, the anaesthetic trainees need to become competent teachers before the end of their training. My reason for concentrating on teaching in the workplace was because the scoping exercise suggested this was where the trainees undertake most of their teaching.

Through the use of the interviews and ALGs I have built a picture and understanding of senior trainees' current teaching activities. The picture suggests that teaching well in the workplace of the OR is challenging and stressful. The OR is a complex environment because the primary purpose is to treat and care for patients having operations. There are complex interactions taking placing between the clinician-teacher, the location, which includes other members of staff, the learner and at the centre of everything the patient. While there have been suggestions in the medical education literature to place the patient at the centre this usually refers to involving the patient in educating the learners (Bleakley and Bligh, 2007). I suggest my approach to place the patient at the centre is different. It places the patient's safety and how that is delivered at the centre. As a consequence the learner must take second place to the patient. This does not mean that the learner's needs cannot be addressed. But it does move the emphasis of the learner and teacher to consider the welfare of the patient as paramount.

I do not believe my suggestion is new or controversial. However, the pressures of training our young doctors more quickly, and under more structured training schemes, has increased the pressure on the clinical teachers to ensure that as many as possible of the learners'

experiences are turned into valuable learning. Sometimes these requirements have, perhaps, favoured the learner more than the patient. As we have seen the challenges and pressures that impact on the teachers are multiple. They varied between anaesthetic and ENT trainees and it is reasonable to speculate that the stresses felt by those in other specialties might be different. I suggest that the stresses related to teaching and supervising learners in the OR may be at the higher end of stress because it may be difficult to 'repair' mistakes. I suggest it is easier to backtrack in the clinic or on a ward round when patients are not critically ill. I feel that some of these differences are related to the time course of events.

The strategies suggested for improving their OR teaching were multimodal. These included some background theory to raise awareness, promotion of personal reflection to identify areas of disquiet and excellence, and the value of facilitated group reflection to identify common difficulties and to give ideas for a way forward. The classroom can be used to introduce educational theory and raise awareness of areas of importance to individual teachers. This might encourage the promotion of personal reflection to identify areas of disquiet and excellence. The use of facilitated group reflection as action learning might be used to identify common difficulties and to generate ideas for a way forward. Small learning groups also have the potential to generate communities of practice of clinical teachers and become foci for the members to try new approaches within a safe environment.

5.6 Personal reflections

5.6.1 Research methodology and methods

As I have illustrated in the methodology section I have moved in my thought processes to expand my horizons. In my MSc in medical education I explored the area of curriculum development from the perspective of the anaesthetic trainees. I was looking for 'correct answers'. In that study I used a nominal group technique to get a consensus of what the

trainees perceived should be in their curriculum. This was then contrasted to the views of trainers and the published curriculum. While I had some experience of the use of qualitative methods within the interpretative paradigm I had not explored the methodologies in depth. Both methods in the MSc might be located within the positivist paradigm with nominal group and questionnaires which resulted in numbers, rankings and statistics.

Perhaps my greatest learning experience has been to accept that there is no one correct answer to many of the problems encountered in the real world. I have now experienced collecting data through undertaking in-depth semi-structured interviews, facilitating focus groups as action learning groups, keeping a research and reflective diary, and survey questionnaires. This use of mixed methods has provided a varied and deep source of rich data.

As this study was exploratory it began with 'fuzzy' questions rather than a detailed hypothesis to confirm or refute. The use of the data to generate ideas was another new experience. I found this a challenging experience as I became aware that the data could be interpreted in many ways. This was apparent when discussing my interpretations with my supervisors, a critical friend and presenting the findings at meetings. Each time I explained and discussed my findings it had some influence on my thinking. It is interesting that in the final stages of the data collection with the survey I still felt more comfortable manipulating numbers rather than words.

In order to achieve these personal developments I have had to engage with different approaches to data collection and analysis. The use of interviews, recording and transcription was a new experience. The use of grounded theory as a method of analysis was new as was learning how to use the computer software NVIVO as a method for facilitating the development of themes. This had several useful and valuable attributes such as ease of retrieving marked passages, sharing output with colleagues through printing multiple copies

and an ability to track how my thinking had developed. I also learnt how to use SPSS and new approaches to analysing survey data using factor and cluster analysis.

I have gained new skills and approaches to thinking about what constitutes evidence. I feel that I can now look at the spectrum of research methodologies and methods and approach them with a more open mind.

5.6.2   Writing skills

The development of academic writing skills has been a challenging and daunting aspect of undertaking this study. My medical career within anaesthesia and critical care medicine has not required rigour in the use of written English. It is interesting to return to something I wrote in 1996 when I started on my diploma/MSc course in medical education at Cardiff. One of my personal learning objectives was to, 'improve my written English'. The literature (Rudestam and Newton, 1992; Murray, 2002) suggests that I am not alone in finding writing a challenging experience. The academic requirement to explain in detail the process of how I have arrived at a conclusion is a new rigour for me.

I have spent many years learning within the world of medicine where most of our decisions have to be yes or no. Many of these decisions have been made with little basis and sometimes they are arbitrary. As Schon identified we work in a messy world where we often cannot explain how we arrived at a specific decision. In the world of education I have revisited my approach to analysing and synthesising data. There is often no right or wrong answer or maybe no clear question. Then having to explain the process and the way I have progressed is not easy. But is it easier for others who write daily? I suspect it may be.

REFERENCES

Aldrich, R. (1999) The apprentice in history. In Ainley, P. & Rainbird, H. (Eds.) **Apprenticeship: towards a new paradigm of learning**. London: Kogan Page.

Altrichter, H., Posch, P. and Somekh, B. (1993) **Teachers investigate their work: an introduction to the methods of action research**. London: Routledge.

Anonymous (2001) Bullying in medicine. **British Medical Journal**, 323: 1314.

Arksey, H. and Knight, P. (1999) **Interviewing for social scientists: an introductory resource with examples**. London: Sage.

Armstrong, E. and Parsa-Parsi, R. (2005) How can physicians' learning styles drive educational planning? **Academic Medicine**, 80: 680-685.

Aspegren, K. (1999) BEME Guide No. 2: teaching and learning communication skills in medicine - a review with quality grading of articles. **Medical Teacher**, 21: 563-570.

Baker, J.D., Cooke, J.E., Conroy, J.M., Bromley, H.R., Hollon, M.F. and Alpert, C.C. (1988) Beyond career choice: the role of learning style analysis in residency training. **Medical Education**, 22: 527-532.

Baker, J.D. and Marks, W.E. (1981) Learning styles analysis in anesthesia education. **Anesthesiology Review**, 8: 31-33.

Baker, J.D., Reines, H.D. and Wallace, C.T. (1985) Learning style analysis in surgical training. **American Surgeon**, 51: 494-496.

Baker, J.D., Wallace, C.T. and Cooke, J.E. (1987) Learning style distribution: a consistent relationship between faculty and residents. **Anesthesiology**, 67: A564.

Baker, J.D., Wallace, C.T., Cooke, J.E., Alpert, C.C. and Ackerly, J.A. (1986) Success in residency as a function of learning style. **Anesthesiology**, 65: A472.

Bassey, M. (1999) **Case study research in educational settings**. Buckingham: Open University Press.

Bedward, J., Davison, I., Field, S. and Thomas, H. (2005) Audit, educational development and research: what counts for ethics and research governance? **Medical Teacher**, 27: 99-101.

Belfield, C., Thomas, H., Bullock, A., Eynon, R. and Wall, D. (2001) Measuring effectiveness for best evidence medical education: a discussion. **Medical Teacher**, 23: 164-170.

BEME (2007) **BEME coding sheet appendix III A** [online]. http://www.bemecollaboration.org/beme/files/starting%20reviews/Appendix%20IIIA%20BEME%20Coding%20Sheet.pdf [Accessed January 1st 2008]

Bengtsson, J. (1995) What is reflection? On reflection in the teaching profession and teacher education. **Teachers and Teaching: theory and practice**, 1: 23-32.

BERA (2004) **Revised ethical guidelines for educational research (2004)**. Notts: British Educational Research Association.

Bing-You, R.G. (1990) Differences in teaching skills and attitudes among residents after their formal instruction in teaching skills. **Academic Medicine**, 65: 483-484.

Bing-You, R.G., Greenberg, L.W., Wiederman, B.L. and Smith, C.S. (1997) A randomised multicenter trial to improve resident teaching with written feedback. **Teaching and Learning in Medicine**, 9: 10-13.

Bing-You, R.G. and Tooker, J. (1993) Teaching skills improvement programmes in US internal medicine residencies. **Medical Education**, 27: 259-265.

Bleakley, A. (2002) Pre-registration house officers and ward-based learning: a 'new apprenticeship' model. **Medical Education**, 36: 9-15.

Bleakley, A. and Bligh, J. (2007) Looking forward - looking back: aspects of the contemporary debate about teaching and learning medicine. **Medical Teacher**, 29: 79 - 82.

Bloom, B.S., Engelhart, M.D., Furst, E.J., Hill, W.H. and Krathwohl, D.R. (1956) **Taxonomy of educational objectives: the classification of educational goals. Handbook 1 Cognitive domain**. New York: David McKay Company.

Boud, D. and Middleton, D. (2003) Learning from others at work: communities of practice and informal learning. **Journal of Workplace Learning**, 15: 194-202.

Britten, N. (1995) Qualitative interviews in medical research. **British Medical Journal**, 311: 251-253.

Brookfield, S.D. (1986) **Understanding and facilitating adult learning**. Milton Keynes: Open University Press.

Brown, N. and Wall, D. (2003) Teaching the consultant teachers in psychiatry: experience in Birmingham. **Medical Teacher**, 25: 325-335.

Bryman, A. (2001) **Social research methods**. Oxford: University Press.

Busari, J., Prince, K., Scherpbier, A., van der Vleuten, C. and Essed, G. (2002) How residents perceive their teaching role in the clinical setting: a qualitative study. **Medical Teacher**, 24: 57-61.

Calman, K. (1993) **Hospital doctors: training for the future**. London: Department of Health.

Campbell Collaboration (2007) **The Campbell Collaboration** [online]. http://www.campbellcollaboration.org/ [Accessed January 18th 2008]

Campbell, M., Fitzpatrick, R., Haines, A., Kinmonth, A., Sandercock, P., Spiegelhalter, D. and Tyrer, P. (2000) Framework for design and evaluation of complex interventions to improve health. **British Medical Journal**, 321: 694-696.

Chastonay, P., Brenner, E., Peel, S. and Guilbert, J.J. (1996) The need for more efficacy and relevance in medical education. **Medical Education**, 30: 235-238.

Clarke, D. and Hollingsworth, H. (2002) Elaborating a model of teacher professional growth. **Teaching and Teacher Education**, 18: 947-967.

Clarke, M. and Langhorne, P. (2001) Revisiting the Cochrane collaboration. **British Medical Journal**, 323: 821.

Cochrane Collaboration (2005) **Cochrane Collaboration** [online]. http://www.cochrane.org/ [Accessed October 2nd 2007]

Coffey, A. and Atkinson, P. (1996) **Making sense of qualitative data: complementary research strategies**. Thousand Oaks: Sage.

Cohen, L., Manion, L. and Morrison, K. (2000) **Research methods in education**. 5th London: Routledge Falmer.

Coles, C. (1993) Developing medical education. **Medical Education**, 69: 57-63.

Contessa, J., Ciardiello, K. and Perlman, S. (2005) Surgery resident learning styles and academic achievement. **Current Surgery**, 62: 344-347.

Cox, S.S. and Swanson, M.S. (2002) Identification of teaching excellence in operating room and clinic settings. **American Journal of Surgery**, 183: 251-255.

Davies, P. (1999) What is evidence-based education? **British Journal of Educational Studies**, 47: 108-121.

Dennick, R. (2003) Long-term retention of teaching skills after attending the teaching improvement project: a longitudinal, self-evaluation study. **Medical Teacher**, 25: 314-318.

Department of Health (2003) **Modernising Medical Careers: the response of four UK Health Ministers to the consultation on** *Unfinished Business: proposals for reform of the Senior House Officer Grade*. London: Department of Health.

Donaldson, I. (2002) **Unfinished business: proposals for reform of the Senior House Office Grade**. London: Department of Health.

Donaldson, I. (2006) **Good doctors, safer patients**. London: HMSO.

Dornan, T., Boshuizen, H., King, N. and Scherpbier, A.J. (2007) Experience-based learning: a model linking the processes and outcomes of medical students' workplace learning. **Medical Education**, 41: 84-91.

Dornan, T., Littlewood, S., Margolis, S., Scherpbier, A., Spencer, J. and Ypinazar, V. (2006) How can experience in clinical and community settings contribute to early medical education? A BEME systematic review. **Medical Teacher**, 28: 3-18.

Dreier, O. (1999) Personal trajectories of participation across contexts of social practice. **Outlines - Critical Social Studies**, 1: 5-32.

Edwards, A. and Talbot, R. (1999) **The hard-pressed researcher research handbook for the caring professions**. 2nd ed. London: Longman.

Edwards, T. (2000) 'All the evidence shows.' reasonable expectations of educational research. **Oxford Review of Education**, 26: 299-311.

Elnicki, D., Kolarik, R. and Bardella, I. (2003) Third-year medical students' perceptions of effective teaching behaviours in a multidisciplinary ambulatory clerkship. **Academic Medicine**, 78: 815-819.

Eraut, M. (1995) Schon shock: a case for reframing reflection-in-action. **Teachers and Teaching: theory and practice**, 1: 9-22.

Eraut, M. (2004) The practice of reflection. **Learning in Health and Social Care**, 3: 47-52.

Evans, J. and Benefield, P. (2001) Systematic reviews of educational research: does the medical model fit? **British Educational Research Journal**, 27: 527-541.

Fernando, N., McAdam, T., Cleland, J., Yule, S., McKenzie, H. and Youngson, G. (2007) How can we prepare medical students for theatre-based learning? **Medical Education**, 41: 968-974.

Field, A. (2005) **Discovering statistics using SPSS for Windows**. 2nd ed. London: Sage.

Finucane, P., Allery, L.A. and Hayes, T.M. (1995) Comparison of teachers at a 'traditional' and an 'innovative' medical school. **Medical Education**, 29: 104-109.

Foundation Programme Committee (2005) **Curriculum for the foundation years in postgraduate education and training**. London: HMSO.

Four UK Health Departments (2004) **Modernising Medical Careers: the next steps**. London: Department of Health.

Fuller, A., Hodkinson, H., Hodkinson, P. and Unwin, L. (2005) Learning as peripheral participation in communities of practice: a reassessment of key concepts in workplace learning. **British Educational Research Journal**, 31: 49-68.

Gelula, M. and Yudkowsky, R. (2003) Using standardised students in faculty development workshops to improve clinical teaching skills. **Medical Education**, 37: 621-629.

General Medical Council (1999) **The Doctor as teacher**. London: General Medical Council.

General Medical Council (2001) **Good Medical Practice**. London: General Medical Council.

General Medical Council (2006) **Good Medical Practice**. London: General Medical Council.

Gibson, D.R. and Campbell, R.M. (2000) Promoting effective teaching and learning: hospital consultants identify their needs. **Medical Education**, 34: 126-130.

Gillham, B. (2000a) **Case study research methods**. London: Continuum.

Gillham, B. (2000b) **The Research Interview**. London: Continuum.

Godfrey, J., Dennick, R. and Welsh, C. (2004) Training the trainers: do teaching courses develop teaching skills? **Medical Education**, 38: 844-847.

Goodwin, D., Pope, C., Mort, M. and Smith, A. (2005) Access, boundaries and their effects: legitimate participation in anaesthesia. **Sociology of Health and Illness**, 27: 855-871.

Gough, D. (2007) Weight of evidence: a framework for the appraisal of the quality and relevance of evidence. **Research Papers in Education**, 22: 213-228.

Gray, P. (1982) **Training for general practice**. London: MacDonald and Evans.

Greaves, D., Dodds, C., Kumar, C. and Mets, B. (eds.) (2003) **Clinical teaching: a guide to teaching practical anaesthesia**, Lisse: Swets & Zeitlinger.

Greenhalgh, T., Toon, P., Russell, J., Wong, G., Plumb, L. and Macfarlane, F. (2003) Transferability of principles of evidence based medicine to improve educational quality; systematic review and case study of an online course in primary health care. **British Medical Journal**, 326: 142-145.

Guskey, T.R. (1986) Staff development and the process of teacher change. **Educational Researcher**, 15: 5-12.

Guthrie, E.A., Black, D., Shaw, C.M., Hamilton, J., Creed, F.H. and Tomensen, B. (1995) Embarking on a medical career: psychological morbidity in first year medical students. **Medical Education**, 29: 337-341.

Haig, A. and Dozier, M. (2003a) BEME Guide No.3: systematic searching for evidence in medical education - Part 2: constructing searches. **Medical Teacher**, 25: 463-484.

Haig, A. and Dozier, M. (2003b) BEME Guide No 3: systematic searching for evidence in medical education - Part 1: sources of information. **Medical Teacher**, 25: 352-363.

Harden, R.M. and Crosby, J.R. (2000) AMEE guide No 20: the good teacher is more than a lecturer - the twelve roles of the teacher. **Medical Teacher**, 22: 334-347.

Harden, R.M., Grant, J., Buckley, G. and Hart, I. (1999) BEME Guide No.1: Best evidence medical education. **Medical Teacher**, 21: 553-562.

Hargreaves, D.H. (1997) In defence of research for evidence-based teaching: a rejoinder to Martyn Hammersley. **British Educational Research Journal**, 23: 405-420.

Hatem, C.J. (2003) Teaching approaches that reflect and promote professionalism. **Academic Medicine**, 78: 709-713.

Holly, M.L. (1989) Reflective writing and the spirit of inquiry. **Cambridge Journal of Education**, 19: 71-80.

Irby, D.M. (1978) Clinical teacher effectiveness in medicine. **Journal of Medical Education**, 53: 808-815.

Irby, D.M. and Rakestraw, P. (1981) Evaluating clinical teaching in medicine. **Journal of Medical Education**, 56: 181-186.

Issenberg, S.B., McGaghie, W.C., Petrusa, E.R., Gordon, D.L. and Scalese, R.J. (2005) Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. **Medical Teacher**, 27: 10-28.

Jamieson, S. (2004) Likert scales: how to (ab)use them. **Medical Education**, 38: 1217-1218.

Jordan, S. (2000) Educational input and patient outcomes: exploring the gap. **Journal of Advanced Nursing**, 31: 461-471.

Keen, J. and Packwood, T. (1995) Case study evaluation. **British Medical Journal**, 311: 444-446.

Kemmis, S. and McTaggart, R. (1988) **The action research planner**. 3rd Victoria: Deakin University.

Kirkpatrick, D.L. (1967) Evaluation of training. In Craig, R.L. & Bittel, L.R. (Eds.) **Training and development handbook**. New York: McGraw-Hill.

Knowles, M. (1990) **The adult learner: a neglected species**. 4th ed. Houston: Gulf.

Knowles, M., Holton, E. and Swanson, R. (2005) **The adult learner: the definitive classic in adult education and human resource development**. 6th ed. Burlington: Elselvier.

Koens, F., Mann, K., Custers, E. and Cate, O. (2005) Analysing the concept of context in medical education. **Medical Education**, 39: 1243-1249.

Kolb, D.A. (1984) **Experiential learning: experience as the source of learning and development**. Englewood Cliffs: Prentice-Hall.

Kolb, D.A. (2007) **Kolb Learning Style Inventory: LSI workbook version 3.1**. London: Hay Group.

Kolb, D.A., Rubin, I.M. and McIntyre, J.M. (1971) **Organizational Psychology: an experiential approach**. Englewood Cliffs: Prentice-Hall.

Krathwohl, D.R., Bloom, B.S. and Masia, B.B. (1964) **Taxonomy of educational objectives: the classification of educational goals. Handbook 2 Affective domain**. London: Longman.

Lave, J. and Wenger, E. (1991) **Situated learning: legitimate peripheral participation**. Cambridge: Cambridge University Press.

Lewin, K. (1946) Action research and minority problems. **The Journal of Social Issues**, 2: 34-46.

Lewin, K. (1947) Frontiers in group dynamics: concept, method and reality in social science; social equilibria and social change. **Human relations**, 1: 5-41.

Lilford, R., Warren, R. and Braunholtz (2003) Action research: a way of researching or a way of managing? **Journal of Health Services Research and Policy**, 8: 100-104.

Lloyd, G. and Chadwick, J. (eds.) (1978) **Hippocratic writings**, St Ives: Penguin.

Lowry, S. (1992) What's wrong with medical education in Britain? **British Medical Journal**, 305: 1277-1280.

Lowry, S. (1993) Teaching the Teachers. **British Medical Journal**, 306: 127-130.

Lyon, P. (2004) A model of teaching and learning in the operating theatre. **Medical Education**, 38: 1278-1287.

Lyon, P. and Brew, A. (2003) Reflection on learning in the operating theatre. **Reflective Practice**, 4: 53-66.

Mackway-Jones, K. and Walker, M. (1998) **The pocket guide to teaching for medical instructors**. London: BMJ books.

Marks, M.B. (1999) Exploring the outcomes of faculty development programs. **Academic Medicine**, 74: S72-74.

Marvel, M.K. (1991) Improving clinical teaching skills using the parallel process model. **Family Medicine**, 23: 279-284.

Maslow, A. (1943) A theory of Human Motivation. **Psychological Review**, 50: 370-396.

Matthews, C. (2000) Role modelling: how does it influence teaching in family medicine? **Medical Education**, 34: 443-448.

McGill, I. and Beaty, L. (1995) **Action learning: a guide for professional, management and educational development**. 2nd ed. London: Kogan Page.

McLean, M. (2001) Qualities attributed to an ideal educator by medical students: should faculty take cognizance? **Medical Teacher**, 23: 367-370.

McLeod, P.J., Steinert, Y., Meagher, T. and McLeod, A. (2003) The ABCs of pedagogy for clinical teachers. **Medical Education**, 37: 638-644.

McNiff, J. (2002) **Action research for professional development; concise advice for the new action researcher** [online]. http://jeanmcniff.com/booklet1.html [Accessed November 18th 2002]

Metcalfe, D. and Matharu, M. (1995) Students' perception of good and bad teaching: report of a critical incident study. **Medical Education**, 29: 193-197.

Miller, G.E. (1990) The assessment of clinical skills/competence/performance. **Academic Medicine**, 65: s63-67.

Moon, J. (1999a) **Learning journals: a handbook for academics, students and professional development**. London: Kogan Page Ltd.

Moon, J. (1999b) **Reflection in learning and professional development: theory and practice**. London: Routledge Falmer.

Moon, J. (2004) Using reflective learning to improve the impact of short courses and workshops. **Journal of Continuing Education in Health Professions**, 24: 4-11.

Morrison, E., Lewis, E., Gabbert, C., Boker, J., Kumar, B. and Harthill, M. (2003) Evaluating a 'service elective' in clinical teaching for medical students. **Medical Teacher**, 25: 662-663.

Morrison, E., Rucker, L., Boker, J., Hollingshead, J., Hitchcock, M., Prislin, M. and Hubbell, A. (2003) A pilot randomized, controlled trial of a longitudinal residents-as-teachers curriculum. **Academic Medicine**, 78: 722-729.

Morrison, E.H. and Hafler, J.P. (2000) Yesterday a learner, today a teacher too: residents as teachers in 2000. **Pediatrics**, 105: 238-241.

Morrison, E.H., Shapiro, J. and Harthill, M. (2005) Resident doctor's understanding of their roles as clinical teachers. **Medical Education**, 39: 137-144.

Mourad, O. and Redelmeier, D.A. (2006) Clinical teaching and clinical outcomes: teaching capability and its association with patient outcomes. **Medical Education**, 40: 637-644.

Murray, R. (2002) **How to write a thesis**. Maidenhead: Open University Press.

Musselman, L., MacRae, H., Reznick, R. and Lingard, L. (2005) 'You learn better under the gun': intimidation and harassment in surgical education. **Medical Education**, 39: 926-934.

Nathan, R. and Smith, M. (1992) Students' evaluations of faculty members' teaching before and after a teacher-training workshop. **Academic Medicine**, 67: 134-135.

National Patient Safety Agency (2007) **Defining research**. London: National Patient Safety Agency.

O'Byrne, G.A. (1988) Are doctors born teachers? **British Medical Journal**, 296: 838-839.

Olsen, O., Middleton, P., Ezzo, J., Gotzsche, P.C., Hadhazy, V., Herxheimer, A., Kleijnen, J. and McIntosh, H. (2001) Quality of Cochrane reviews: assessment of sample from 1998. **British Medical Journal**, 323: 829-832.

Oppenheim, A.N. (1992) **Questionnaire design, interviewing and attitude measurement**. 2nd ed. London: Pinter.

Parboosingh, J.T. (2002) Physician communities of practice: where learning and practice are inseparable. **The journal of Continuing Education in the Health Professions**, 22: 230-236.

Paukert, J. and Richards, B. (2000) How medical students and residents describe the roles and characteristics of their influential clinical teachers. **Academic Medicine**, 75: 843-845.

Pedro, J. (2005) Reflection in teacher education: exploring pre-service teachers' meanings of reflective practice. **Reflective Practice**, 6: 49-66.

Petersen, S. (1999) Time for evidence based medical education. **British Medical Journal**, 318: 1223-1224.

Peyton, R.J.W. (1998) **Teaching and learning in medical practice**. Rickmansworth: Manticore.

Pirrie, A. (2001) Evidence-based practice in education: the best medicine? **British Journal of Educational Studies**, 49: 124-136.

Plovnick, M. (1975) Primary care career choices and medical student learning styles. **Journal of Medical Education**, 50: 849-855.

PMETB (2007a) **Developing and maintaining an assessment system - a PMETB guide to good practice**. London: PMETB.

PMETB (2007b) **National Trainee Survey 2006 – key findings** [online]. http://www.pmetb.org.uk/uploads/media/NationalTraineeSurveySummaryReport.pdf [Accessed August 1st 2007]

Quine, L. (2002) Workplace bullying in junior doctors: questionnaire survey. **British Medical Journal**, 324: 878-879.

Ramani, S., Orlander, J.D., Strunin, L. and Barber, T. (2003) Whither bedside teaching? A focus-group study of clinical teachers. **Academic Medicine**, 78: 384-390.

Rayner, H., Morton, A., McCulloch, R., Heyes, L. and Ryan, J. (1997) Delivering training in teaching skills to hospital doctors. **Medical Teacher**, 19: 209-211.

Rees, C., Shepherd, M. and Chamberlain, S. (2005) The utility of reflective portfolios as a method of assessing first year medical students' personal and professional development. **Reflective Practice**, 6: 3-14.

Rhodes, P. (1981) Teaching and learning in the district general hospital. **Medical Education**, 15: 267-276.

Richardson, D. (2004) **Rescue diver**. 3rd ed. Sant Margarita: International PADI.

Robson, C. (1993) **Real world research: a resource for social scientists and practitioner-researchers**. Oxford: Blackwell.

Royal College of Anaesthetists (2007a) **THE CCT IN ANAESTHESIA I: General Principles: a manual for trainees and trainers** [online]. http://www.rcoa.ac.uk/docs/CCTpti.pdf [Accessed August 1st 2007]

Royal College of Anaesthetists (2007b) **THE CCT IN ANAESTHESIA III: Competency based, intermediate level (ST years 3 and 4): training and assessment: a manual for trainees and trainers** [online]. http://www.rcoa.ac.uk/docs/CCTptiii.pdf [Accessed August 1st 2007]

Royal College of Anaesthetists (2007c) **THE CCT IN ANAESTHESIA IV: Competency based higher and advanced level (ST years 5, 6 and 7): training and assessment: a manual for trainees and trainers** [online]. http://www.rcoa.ac.uk/docs/CCTptiv.pdf [Accessed August 1st 2007]

Rubin, H.J. and Rubin, I.S. (1995) **Qualitative interviewing: the art of hearing data**. Thousand Oaks: Sage.

Rudestam, K.E. and Newton, R.R. (1992) **Surviving your dissertation: a comprehensive guide to content and process**. Newbury Park: Sage.

Sachdeva, A.K. and Kelliher, G.J. (1994) Impact of a faculty development workshop on three institutions. In Rothman, A.I. & Cohen, R. (Eds.) **Proceedings of the Sixth Ottawa Conference on Medical Education**. Ontario: University of Toronto.

Sackett, D., Rosenberg, W., Gray, J., Haynes, R. and Richardson, W. (1996) Evidence based medicine: what it is and what it isn't. **British Medical Journal**, 312: 71-72.

Sanson-Fisher R, Fairbairn S and Maguire, P. (1981) Teaching skills in communication to medical students--a critical review of the methodology. **Medical Education**, 15: 33-37.

Schon, D. (1983) **The reflective practitioner: how professionals think in action**. London: Maurice Temple Smith.

Schon, D. (1987) **Educating the reflective practitioner: toward a new design for teaching and learning in the professions**. San Francisco: Jossey-Bass.

Schwind, C.J., Boehler, M.L., Rogers, D.A., Williams, R.G., Dunnington, G., Folse, R. and Markwell, S.J. (2004) Variables influencing medical student learning in the operating room. **American Journal of Surgery**, 187: 198-200.

SCOPME (1992) **Teaching hospital doctors and dentists to teach: its role in creating a better learning environment. Proposals for consultation - full report**. London: HMSO.

SCOPME (1994a) **Creating a better learning environment in hospitals 1: Teaching hospital doctors and dentists to teach**. London: HMSO.

SCOPME (1994b) **Creating a better learning environment in hospitals 2: Making the most of formal educational opportunities for doctors and dentists in training**. London: HMSO.

SCOPME (1994c) **Continuing professional development for doctors and dentists**. London: HMSO.

SCOPME (1999a) **Teacher development in hospital medicine and dentistry with recommendations for further work**. London: HMSO.

SCOPME (1999b) **A strategy for continuing education and professional development for hospital doctors and dentists**. London: HMSO.

Scott, D.A. and Usher, R. (1999) **Researching education: data, methods and theory in educational enquiry**. London: Cassell.

Scottish Intercollegiate Guidelines Network (2001) **SIGN 50: A guideline developers' handbook** [online]. http://www.show.scot.nhs.uk/guidelines/fulltext/50/section6.html 12 [Accessed December 30th 2001]

Seabrook, M.A., Woodfield, S.J., Papagrigoriadis, S., Rennie, J.A., Atherton, A. and Lawson, M. (2000) Consistency of teaching in parallel surgical firms: an audit of student experinece at one medical school. **Medical Education**, 34: 292-298.

Shulman, L. and Shulman, J. (2004) How and what teachers learn: a shifting perspective. **Journal of Curriculum Studies**, 36: 257-271.

Simpson, M.A. (1972) **Medical education: a critical approach**. London: Butterworths.

Sinclair, S. (1997) **Making doctors: an institutional apprenticeship**. Oxford: Berg.

Skeff, K.M., Stratos, G.A., Bergen, M.R., Sampson, K. and Deutsch, S.L. (1999) Regional teaching improvement programs for community-based teachers. **American Journal of Medicine**, 106: 76-80.

Skeff, K.M., Stratos, G.A., Campbell, M., Cooke, M. and Jones, H. (1986) Evaluation of the seminar method to improve clinical teaching. **Journal General Internal Medicine**, 1: 315-322.

Slotnick, H.B. (1999) How doctors learn: physician's self-directed learning episodes. **Academic Medicine**, 74: 1106-1117.

Slotnick, H.B. (2000) How doctors know when to stop learning. **Medical Teacher**, 22: 189-196.

Slotnick, H.B., Mejicano, G., Passin, S. and Bailey, A. (2002) The epidemiology of physician learning. **Medical Teacher**, 24: 304-312.

Spencer, J. and Lennard, T. (2005) Time for gun control? **Medical Education**, 39: 868-869.

Stark, P. (2003) Teaching and learning in the clinical setting: a qualitative study of the perceptions of students and teachers. **Medical Education**, 37: 975-982.

Steinert, Y. (2000) Faculty development in the new millenium: key challenges and future directions. **Medical Teacher**, 22: 44-50.

Steinert, Y. (2004) Student perceptions of effective small group teaching. **Medical Education**, 38: 286-293.

Steinert, Y., Mann, K., Centeno, A., Dolmans, D., Spencer, J., Gelula, M. and Prideaux, D. (2006) A systematic review of faculty development initiatives designed to improve teaching effectiveness in medical education: BEME Guide No. 8. **Medical Teacher**, 28: 497-526.

Stern, D.T., Williams, B.C., Gill, A., Gruppen, L.D., Woolliscroft, J.O. and Grum, C.M. (2000) Is there a relationship between attending physicians' and residents' teaching skills and students' examination scores? **Academic Medicine**, 75: 1144-1146.

Strauss, A. and Corbin, J. (1990) **Basics of qualitative research: grounded theory procedures and techniques**. Newbury Park: Sage.

Sutkin, G., Wagner, E., Harris, I. and Schiffer, R. (2008) What makes a good clinical teacher in medicine? A review of the literature. **Academic Medicine**, 83: 452-466.

The UK Foundation Programme Office (2007) **The rough guide to the foundation programme**. 2nd London: TSO.

Underwood, S.M. and McIndoe, A.K. (2005) Influence of changing work patterns on training in anaesthesia: an analysis of activity in a UK teaching hospital from 1996 to 2004. **British Journal of Anaesthesia**, 95: 616-6215.

van der Hem-Stokroos, H., Daelmans, H., van der Vleuten, C.P.M., Haarman, H. and Scherpbier, A. (2003) A qualitative study of constructive clinical learning experiences. **Medical Teacher**, 25: 120-126.

Van Mannen, M. (1995) On the epistemology of reflective practice. **Teachers and Teaching: theory and practice**, 1: 33-50.

Wall, D. and McAleer, S. (2000) Teaching the consultant teachers: identifying the core content. **Medical Education**, 34: 131-138.

Wenger, E. (1998a) **Communities of practice: learning, meaning, and identity**. Cambridge: Cambridge University Press.

Wenger, E. (1998b) **Communities of practice learning as a social system** [online]. [Accessed 2004/02/12

Wenger, E., McDermott, R. and Snyder, W. (2002) **Cultivating communities of practice**. Boston: Harvard Business School Press.

Whitehouse, A. (1997) Warwickshire consultants' 'training the trainers' course. **Postgraduate Medical Journal**, 73: 35-38.

Wipf, J.E., Orlander, J.D. and Anderson, J.J. (1999) The effect of a teaching skills course on interns' and students' evaluations of their resident-teachers. **Academic Medicine**, 74: 938-942.

Wipf, J.E., Pinsky, L.E. and Burke, W. (1995) Turning interns into senior residents: preparing residents for their teaching and leadership roles. **Academic Medicine**, 70: 591-596.

Wolf, T.M., Randall, H.M., Von Almen, K. and Tynes, L.L. (1991) Perceived mistreatment and attitude change by graduating medical students: a retrospective study. **Medical Education**, 25: 182-190.

Wunderlich, R. and Gjerde, C. (1978) Another look at learning style inventory and medical career choice. **Journal of Medical Education**, 53: 45-54.

Yin, R. (2003) **Case study research: design and methods**. 3rd ed. Thousand Oaks: Sage.

Yolsal, N., Bulut, A., Karabey, S., Ortayli, N., Bahadir, G. and Aydin, Z. (2003) Development of training of trainers programmes and evaluation of their effectiveness in Istanbul, Turkey. **Medical Teacher**, 25: 319-324.

Appendix 1 Kolb learning styles inventory version 1

(Kolb et al., 1971)

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Appendix 2 Kolb learning styles inventory version 3.1

(Kolb, 2007)

This appendix is not available in the web version of this thesis

Appendix 3 Outline of interview questions

MAIN QUESTIONS

Do you do any teaching?
Who do you teach?
What sorts of things do you teach?

PROBES

Can you give some examples of your teaching?
Give examples of teaching that went really well.
Give examples of teaching that went really badly.

How have you learnt to teach?
How do you put into practice what you learn?
What helps this?
What hinders this?

'Good teachers are born ' .. how do you feel about this?
Do you think you can be taught to teach?
Do you feel you can learn to teach well/better

How would you like to learn to teach?

Is context important?

How does it fit with other aspects of training?
Is teaching just another competency the SpRs have to acquire?

Where does TTT fit into learning?
How does a short course impact on the SpRs teaching other trainees?
How does a short course impact on the SpRs learning from trainers?
How does a short course impact on improving training?
How does a short course on assessment and appraisal impact on the RITA process?
What is the evidence that formal TTT makes a difference?

Can a 'doctor teacher' teach well if they are not clinically competent?

Who defines what or why doctors should be taught to teach?

Appendix 4 Examples of NVIVO
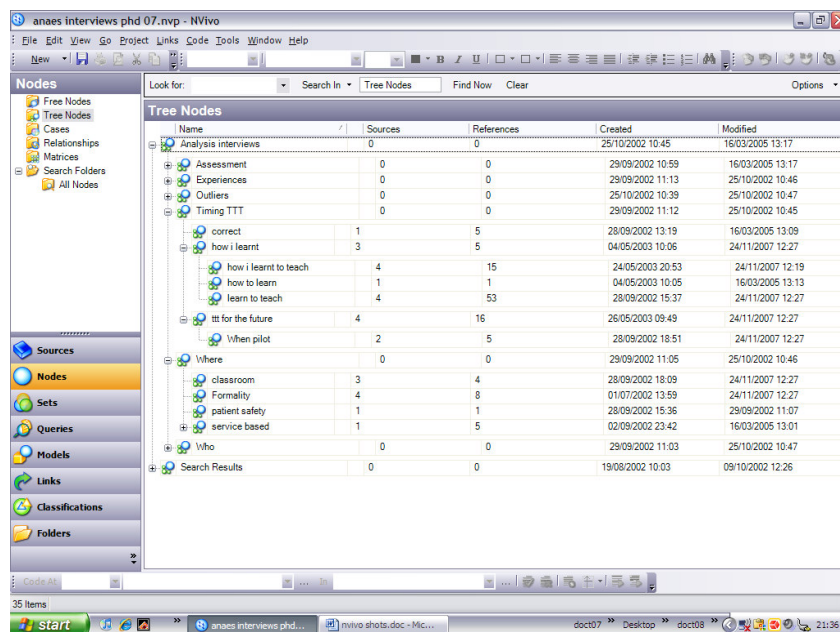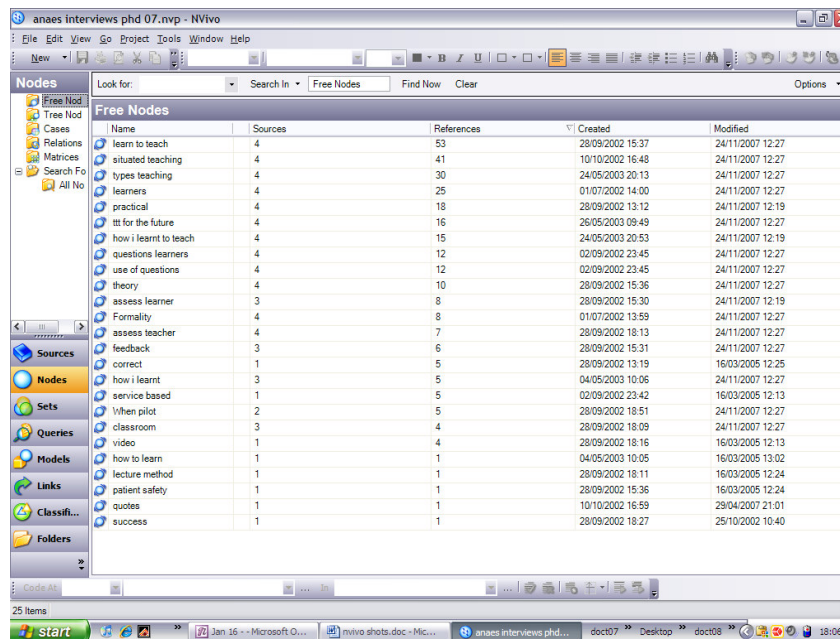
These screen shots show a listing of the ideas, called 'nodes' in NVIVO, I identified from the phase 1 scoping interviews. The top shot shows an early listing of ideas while the lower shot shows the 'nodes' can be grouped together and arranged into themes. This is shown under the theme 'where' which has a number of ideas included, classroom, formality, patient safety and of the preliminary trials of forming themes. service based. This was not a grouping that I used but is shown here as an illustration.
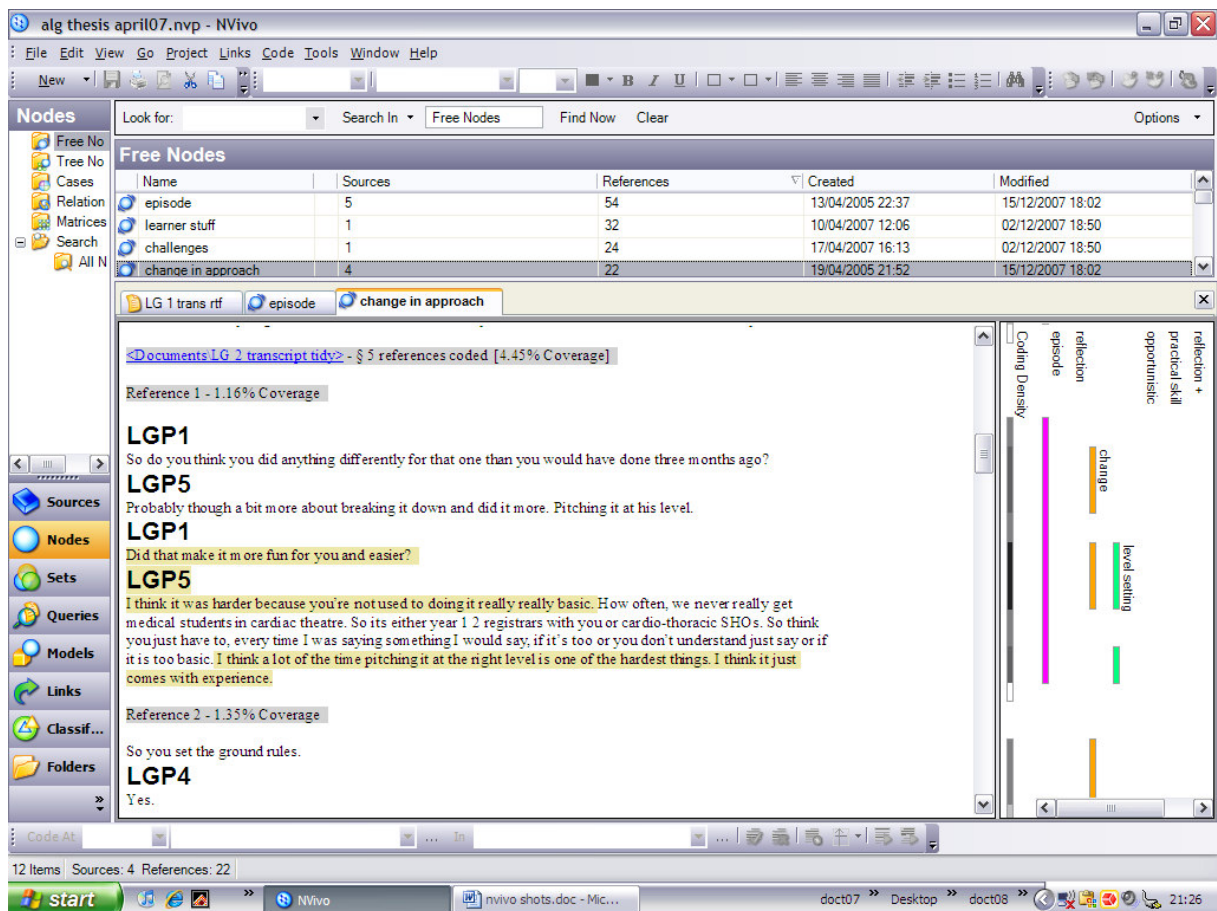
This screen shot contains several of the features of NVIVO. Firstly in the largest area is shown highlighting of various phases or ideas. This is directly equivalent to using a highlighter pen on a piece of paper. However, the power of this approach to highlighting is that one can associate the same or parts of the same phase with different ideas without the different highlighter colours becoming confused. On the right hand side the vertical coloured bars relate to different ideas or nodes.
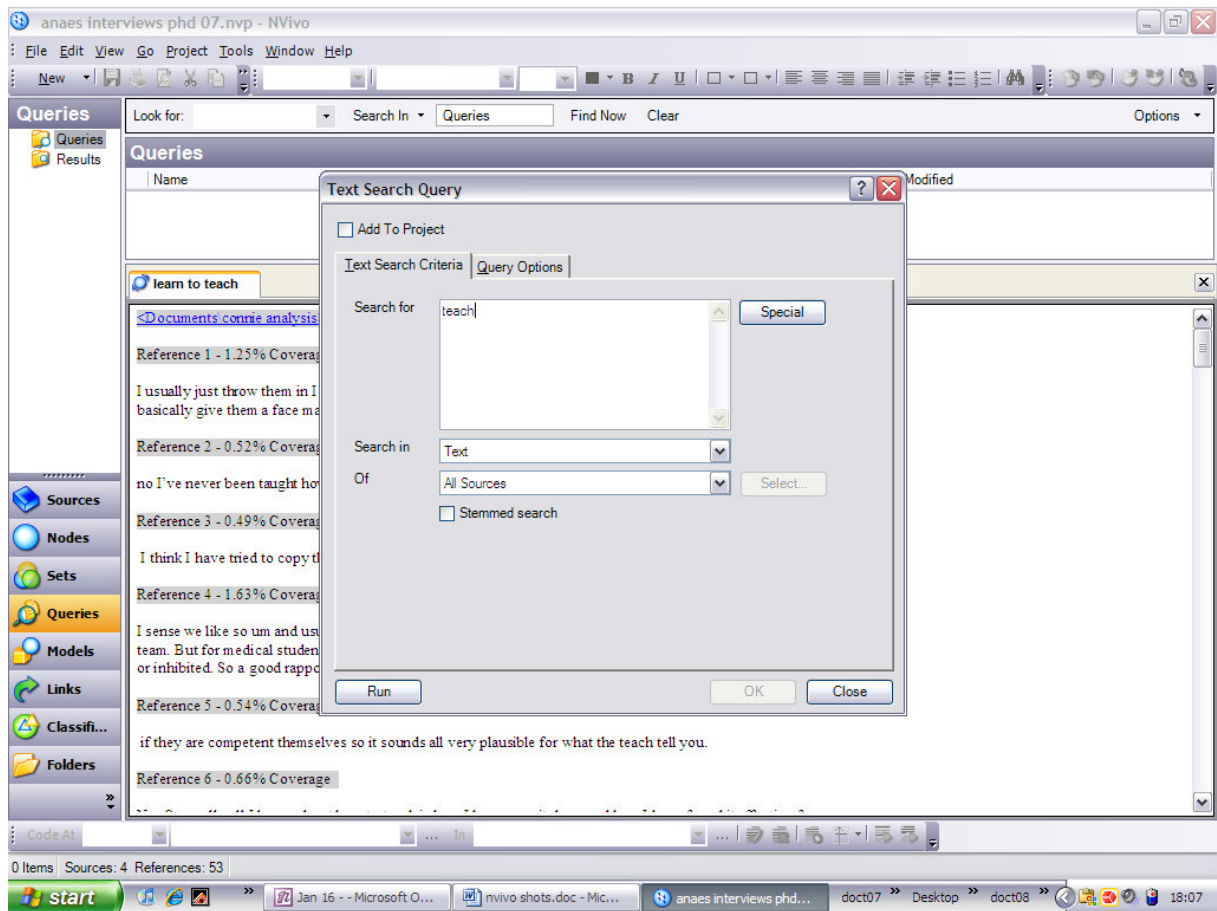
This shot illustrates the use of a query, in this case it will search all the documents attached to the project. I found it particularly useful when I wished to re-explore quotes I had already isolated because the search facility can be used with a phrase as well as a single word. In addition the structure of the program allows direct cut and pasting between NVIVO and Microsoft office applications.

Appendix 5 Information pack on diary keeping given to A-ALG

Reflective Diaries

Reflective diaries are useful for anyone who is undertaking a systematic look at their own practice. You can make a note of your observations and record the date and place it happened. You can include photographs, newspaper articles and useful addresses, thus keeping everything together as a record. However, reflective diaries go further than this as they can be used as a kind of dialogue with yourself.
The diary should be a useful working document for you. One in which you can see how what you are doing is developing you and which provides evidence you can use to identify your strengths and weaknesses.

Your diary might be:

- A self-evaluative account in which you record your personal experiences, thoughts and feelings with a view to trying to understand your own actions. This may provide indicative evidence of connections between outcomes and actions.

- A reflective account in order to examine experience with the purpose of understanding it better by writing about it.

- A record of unplanned anecdotes, informal conversations, passing observations and subjective impressions.

- A way of distancing yourself from your action in order to interrogate it.

- Brief overview of the value of reflective diaries for data collection for AR.

Moon (1999) Learning Journals

Has a nice model displayed as a complex map of reflective writing as a process, with iterative spirals. With some ideas for getting started:
- Description
    - Observation
    - Comment on personal behaviour
    - Comment on reaction or feelings
    - Comment on context
- Additional ideas
    - Further observations
    - Relevant other knowledge, experience or feelings
    - Suggestions from others
    - New information
    - Formal theory
    - Other factors i.e. ethical, moral
- Reflective thinking occurs
    - By processes of relating, experimenting, exploring, and re-interpreting.

McNiff (2002) Using a research diary

This gives some really good ideas of what a research diary is and how ot approach keeping one.
Purpose:
- ❖ To make a timeline
- ❖ To illustrate general points
- ❖ As raw data
- ❖ Chart progress

What it might be:
- ❖ Regular & systematic record
- ❖ Aide-memoir
- ❖ Detailed notes
- ❖ Record of anecdotes or informal observations or conversations
- ❖ Self-evaluative account
- ❖ Companion
- ❖ Reflective account
- ❖ Analytical tool
- ❖ Document of progress

Altricher (1993) Research Diary

A companion to the research process:
- Notes of observations - data
- Ideas for research questions
- Record of ones own development - reflection
- Historical document

This has a reasonably detailed explanation of how to go about the process with an underlining explanation of why and how it might be undertaken. Clearly from the perspective of a teacher/lecturer undertaking the process at an early stage in their development.

Holly (1989) Reflective writing

An early paper gives good background on the reasons why journal writing is a powerful way for teachers to explore their practice by documentation and in reflection. There is an added bonus of having to put into words. Writing helps to construct experience and to reconstruct it.

Edwards and Talbot (1999) Action Research Diary

View as a conversation with oneself to contain:
- o Indication of what one intended to do on the day or during the session (in detail)and why
- o Your perceptions of what happened
- o Your reflections on the targets you set or the questions explored.

Their suggested format for a reflective diary is as follows:

Date:………… Place:…………..	Questions raised by what has gone on
Direct observations and/or recalled events written as recollections as soon as possible. Recollections will include descriptions and your responses both felt and intellectual.	Implications for next action/future practice. Intentions.
	Leave blank and use the space for additional later reflections which may back up continuous themes evident elsewhere in the diary.
(p.2)	(p.3)

Your diary should be written throughout your study. Be warned leaving it until the end will not provide you with the rich reflective evidence needed to compile your reflective account.

Appendix 6 Information on Action Research

(Given to the learning group - Phase 2)

Kemmis and McTaggart (1988,p.5)

Def: ' Action research is a form of collective self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understandings of these practices and the situations in which these practices are carried out.'

Why it fits with my research: p7

'It is a way of managing complex situations critically and practically.'

Talks about having a thematic concern for the action research. This sounds a bit like an overall goal for the research. Perhaps:

- o Developing an understanding and improving or maximising the quality of the educational encounter within the operating theatre on a one to one basis of teacher and learner.
- o Or developing the quality of education received by anaesthetic trainees.

I started with a mapping or reconnaissance of the general area of education for anaesthetic trainees

Lilford et al. (2003)

This is an interesting essay arguing that AR and change management can be considered as one and the same. The argument holds providing that both approaches are rigorous and transparent. He does not dwell on this aspect. The area he does dwell on is that managers may not need 'summative' data to convince themselves that change is effective. However it is still an interesting concept to parallel the two developments. Also highlighted is the concept that context is integral to all of it.

Good quote from paper is:

'The term action research was developed by Lewin to describe the process of synthesising theory and practice through a cycle of data collection, analysis, action and evaluation.' Action research involves a cyclical process during which the intervention is evaluated while it is actually being introduced. Furthermore the evaluation may change the intervention and how it is introduced as a consequence of the evaluation.

There are five key tenets of action research:

1. flexible planning
2. an iterative cycle
3. subjective meaning
4. simultaneous improvement
5. unique context.

Appendix 7 Introduction session for ENT trainees

Aims

To evaluate the practicality of introducing a new model to improve 'On The Job' (OTJ)
teaching in clinical practice
To help you improve your OTJ teaching
To help you improve your individual and group reflective practice

Background

*An accomplished teacher is a member of a professional community who is ready, willing and
able to teach and to learn from his or her teaching experiences. (Shulman and Shulman,
2004)*

This proposal develops a new an innovative way to teach doctors how to teach within the
workplace, i.e. the operating theatre, the intensive care unit and the ward. This has evolved
out of a research study investigating how anaesthetic specialist registrars (SpRs) learn to teach
within their workplace.

The key principles include:

- Learning by doing
- Learning about the real world
- Improving in the real world
- Integrating theory and practice

Anaesthesia has traditionally been learnt in the UK in the operating theatre. The first phase of
this study suggests that the same can be achieved for learning to teach how to teach

Example

A theme identified, in the first meeting by the anaesthetic trainees, was the difficulty of
knowing what level to pitch their teaching.
This is illustrated by the comment when teaching a new anaesthetic SHO:
   'I found it really difficult to gauge what or where to pitch it to be really honest'.

This theme recurred in the second meeting (with a different member of the group), who had
been supervising an experienced SHO putting in a central line:
   *'We had a central line to insert. She had done 3 previous central lines and she had been
   supervised each time; 2 internal jugulars and 1 subclavian. I said do you want do this one
   then? Do you want me to sit or are you happy to do it on your own because you have done
   3 now supervised or do you still want me to be at the end of the bed. She said could you
   still be at the end of the bed.*

   *So I didn't discuss the procedure with her because she had done three before. I said just
   get on with it and I'll stand at the end of the bed. It was very early on I realised that she
   hadn't taken very much in when she had done the 3 previous ones. She took her a long
   time to hit the vessel. She was doing it at the wrong angle and so I tried to guide her and
   once she did get the blood vessel. I could tell that she was looking and thinking what do I*

do next. She had lost her train of thought so I talked her through it. Next you're going to get your dilator and dilate up. She got it in. It just made me realise that when people say I've done a few, as she had done 3 I was quite happy to sit away from her. But I am glad that I didn't in the end.

But the only problem was that it was very busy Sunday and I was bleeped probably 6 times while she was doing it from neuro asking me when I was coming. I got quite snappy with her at the end because I thought if I had done it myself I'd have done it in 5 minutes and could have got on with all my other jobs. I think sometimes when is it appropriate to teach people? Is being on call an appropriate time? But then if you don't do it then you don't know when they are going to get that experience. So I think you just got to.'

The final meeting shows even more progression:

'This cardio-thoracic SHO asked me if he could do the central line. He had done a couple before. We went through the technique theoretically and did the landmarks. I think the mistake I made last time was I hadn't done that bit.

Q: Did that help do you think?

Yes. The bits he wasn't sure about he could ask me then instead. The patient was awake so I didn't want her getting nervous as I explain what I was doing next. I explained to the lady that he had done some before but he wanted to do a few more. Did she mind? She was happy with that.

So we set up the trolley together. He had practice in doing that. As he started the technique he told me what he was doing at each step. He identified the vessel easily. Then he had problems. He got the guide wire in and then had problems when he got to dilating the vessel. Basically he hadn't made a big enough cut in the skin. So in the end I had to gown up and help him with the dilation. Then I let him carry on. I think it is very difficult knowing when to interrupt. But he had had a few pushes and the guide wire is going to get kinked in a minute. But he was happy for me to help him and I gave him positive feedback and praise. He did do very well'.

Why you?

ENT as a specialty is educationally well organized. There is a clear structure, robust selection and RITA assessment processes in place. At *** the training is organized and supervised by experienced consultants with high level training in education.

The main consequence of these is that there is a high quality educational environment. This is in its turn necessary before embarking on sophisticated aspects of personal development and reflective learning.

- Structure process
- Expression of interest
- Detailed explanation of the process and introduction to structured reflection
- Data collection into diaries – so of critical incidents related to teaching/learning
- Group meeting to share ideas and uncertainties – to develop areas for individual trying of new ideas
- Further data collection – targeting areas of interest

- Group meeting to share progress and develop new ideas.

Reflective practice

Forms a core part of the Appraisal: Doctors in training.
It comes under the 'Teaching and Training' section as well as others. Part of this document together with the forms is reproduced below.

The purpose of this section is to reflect on your teaching and training activities since your last appraisal and should be recorded

Form 5, the Personal Development Plan (PDP), is both helpful and important, and, in discussion with your Educational Supervisor, will identify your developmental needs and plan the training in your next post. Form 5, will be required by your next Educational Supervisor to plan the next stage of your training. This section will also include the most personal part of your portfolio, which is used to document your reflections on training and development and should contribute to the PDP.
REFLECTIVE NOTES

*This is the most **personal** section of your **portfolio**. You should take the time to make some brief notes about your progress, learning, training, assessment, appraisal, trainers etc. In fact this section can include personal views on any aspects of your learning and development.*
You may choose to keep this section separately or you may wish to share it with friends, colleagues or trainers.
Reflective Notes:
How well do you think you are doing?
What could you have done better?
What can you do better in the future?
What additional help and support do you require / from whom?

Use of diaries/journals

Reflective diaries are useful for anyone who is undertaking a systematic look at their own practice. You can make a note of your observations and record the date and place it happened. You can include photographs, newspaper articles and useful addresses, thus keeping everything together as a record. However, reflective diaries go further than this as they can be used as a kind of dialogue with yourself.
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A reflective account in order to examine experience with the purpose of understanding it better by writing about it.

A record of unplanned anecdotes, informal conversations, passing observations and subjective impressions.

A way of distancing yourself from your action in order to interrogate it.

Brief overview of the value of reflective diaries for data collection for AR.

Edwards and Talbot (1999) Action Research Diary

View as a conversation with oneself to contain:
- o Indication of what one intended to do on the day or during the session (in detail)and why
- o Your perceptions of what happened
- o Your reflections on the targets you set or the questions explored.

Their suggested format for a reflective diary is as follows:

Date:………… Place:…………..	Questions raised by what has gone on
Direct observations and/or recalled events written as recollections as soon as possible. Recollections will include descriptions and your responses both felt and intellectual.	Implications for next action/future practice. Intentions.
	Leave blank and use the space for additional later reflections which may back up continuous themes evident elsewhere in the diary.
(p.2)	(p.3)

Your diary should be written throughout your study. Be warned leaving it until the end will not provide you with the rich reflective evidence needed to compile your reflective account.

Operating ROOM education Anaesthesia\ENT

The purpose of this short questionnaire is to discover the beliefs Anaesthetists/ENT surgeons have about delivering one-to-one education in the operating theatre. The intention of this survey is to inform the development of future 'Teaching the Teacher' education aimed specifically at in-theatre teaching. In this context I am using 'learner' in the widest sense to include any healthcare worker that you teach within the theatre.

All responses are voluntary and anonymous. This questionnaire should only take you a few minutes to complete.

Part 1

1. Are you are a –

           Associate Specialist ☐

           SpR   ☐   Year 1 2 3 4 5 6 7

2. Have you attended a formal Teaching the Teachers course?   Yes ☐

                                                        No ☐

3. Have you attended a *formal* course on teaching one-to-one in theatre? Yes ☐

                                                         No ☐

4. Have you had *informal* teaching on teaching one-to-one in theatre? Yes ☐

                                                         No ☐

5. What types of learners have you taught in the operating theatres? *(please tick all that apply)*

                                   Medical students ☐

                                   Nurses   ☐

                                   ODPs   ☐

                                   Doctors in training ☐

                                   Paramedics   ☐

Part 2

Below are statements about one-to-one in-theatre education and how it relates to ENT surgery. Please circle the number which best fits with your own personal beliefs about the subject. These are all on a 1-6 scale.

1 meaning *strongly disagree*   **2** means *disagree*   **3** means *slightly disagree*
4 means *slightly agree*   **5** means *agree*   **6** means *strongly agree*

Please circle one number for each of these questions that best represents your beliefs about each of the statements below

		Disagree strongly					Agree strongly
6.	The operating theatre is a good place to learn	1	2	3	4	5	6
7.	Teaching in the operating theatre is rewarding for me	1	2	3	4	5	6
8.	Teaching in the operating theatre is a distraction for me	1	2	3	4	5	6
9.	Teaching in the operating theatre is enjoyable for me	1	2	3	4	5	6
10.	I rarely see the same learner repeatedly in the operating theatre	1	2	3	4	5	6
11.	Teaching in the operating theatre is challenging for me	1	2	3	4	5	6
12.	Teaching in the operating theatre is just part of the life of an Anaesthetist\ENT surgeon	1	2	3	4	5	6
13.	Teaching in the operating theatre is more challenging than lecturing	1	2	3	4	5	6
14.	It is difficult to maintain continuity of teaching for learners	1	2	3	4	5	6
15.	Real teaching takes place in the 'classroom'	1	2	3	4	5	6
16.	Patient safety limits teaching in the operating theatre	1	2	3	4	5	6
17.	My operating theatre teaching would improve if I could discuss it with others	1	2	3	4	5	6
18.	I learnt to teach in the operating theatre by observation	1	2	3	4	5	6
19.	All Anaesthetists\ENT surgeons involved in training should be trained in one-to-one theatre education	1	2	3	4	5	6
20.	I look forward to trainees being with me in the operating theatre	1	2	3	4	5	6
21.	I see the same learners regularly to teach them in the operating theatre	1	2	3	4	5	6

Part 3

Finally a few simple questions about yourself

22. Your gender   Male   ☐

                                     Female   ☐

23. Your year of basic qualification   …………………………………

24. Your University or Medical School   ………………………….....

25. Your qualifications

Any other comments?

**Thank you very much for completing this questionnaire.
Please return to**

Dr Michael Clapham.

[Address]

Appendix 9 Abstract AMEE 2003 Conference, Bern

Title:
Anaesthetists as teachers

Authors:
Michael Clapham, Alison Bullock.

Aim
Part of postgraduate medical training (UK) requires trainees to teach other trainees. This presentation reports the role of anaesthetic trainees in teaching and how they learn to teach.

Summary of work
Data were gathered from semi-structured interviews with senior anaesthetic trainees from a University Teaching Hospital. Interviews were recorded, transcribed and analysed using grounded theory approach. Saturation point was reached after four interviews (2.5 hours; 12,500 words transcribed).

Results
All trainees taught medical students, anaesthetic assistants and/or other anaesthetists within their everyday work. Most teaching was informal, opportunistic and undertaken in the workplace. It included theory and practical skills, usually related to the clinical situation. However the trainees did not see this as teaching. They viewed teaching as formal, pre-planned and structured and this was reflected in the 'teaching the teachers' courses they had undertaken. None had received any education in teaching within the workplace. How they had learnt about teaching, in these situations, had been through observation and modelling senior colleagues whom they viewed as good teachers and by trial and error.

Conclusions
Trainee anaesthetists teach extensively and informally within the workplace. Many do not perceive this as teaching and current training focuses only on formal teaching.

Anaesthetists as teachers

Michael Clapham
Alison Bullock

Centre Research Medical Dental Education
Birmingham

Aim

To explore
the extent of teaching
within the professional role
of anaesthetic trainees

Background

- UK trainees teach other trainees
- UK trainees take responsibility for trainees

Background

- General Medical Council now requires Doctors to teach

- Teaching The Teachers courses now widely available
  - Classroom based
  - Pre-planned

Design

- Scoping exercise as no data available
- Looking from the trainees' perspective

Methods

- Semi-structured interviews
- Recorded and transcribed
- Analysed using NVIVO
- Grounded theory approach
- Continued until saturation

Participants

- Anaesthetic trainees
- Completed professional exams
- Will become consultants within 2 years

Opening comments

- *'Well I do informal teaching in theatres, in both elective and emergency cases. Teaching registrars how to do cases perhaps they have not done before.'*

- *'I do teaching informally of medical students, junior registrars and SHOs.'*

- *'Its usually unplanned. If someone's with me either they ask a specific question, or I want to discuss a topic.'*

Do they teach?

- Yes

Themes - 15

- patient safety
- setting for teaching
- who were the learners
- teaching practical skills
- teaching theory
- assessment of learners
- assessment of teaching
- feedback
- video
- classroom teaching
- service based teaching
- lecture method
- learning to teach
- correct way of teaching
- timing of TTT

Categories – from 15 themes

1. Learners
2. Context
3. Type of teaching
4. Role of assessment
5. How trainees learn teach

Learners

- Wide variety
  - Anaesthetic trainees
  - Trainees other specialties
  - Anaesthetic assistants
  - Nurses
  - Medical students

Context and type of teaching

	Informal	Formal
Theory	4/4	4/4
Practical skills	4/4	0
Attitudes	2/4	0

---

o *I will take the SHO along with me when I talk to the patient. I explain to the patient the procedure, so the SHO knows what I am talking about and ask the SHO at the end whether he wants add anything.*

Anaesthetic teaching

o Not considered teaching
o Informal
o Opportunistic
o In the workplace

How they have learnt

o Observation 4/4
o Trial & error 4/4

o Formal 2/4 last 12 months

Assessment - concerns

o Learner's knowledge
o Learner's skills
o Feedback to learners
o Of them as teachers

Conclusions

o All the trainees teach
o Mainly in the workplace

o Patient safety – paramount

o Opportunistic
o Very different environment to the classroom

Take home message

○ On the job teaching is an integral part of anaesthetic trainees working lives

Appendix 10 PMETB questionnaire for hospital quality assurance visits

Would you recommend the post you currently hold as offering good clinical experience and good educational experience?

1. Patient Safety

Do you know who to ask for clinical advice, in the daytime and in the middle of the night?

Have you felt adequately supervised and supported according to your level of experience?

Do you have access to up to date clinical guidelines which you can refer to?

Describe the duty rota? Does it allow time to handover patients at the start and end of shifts?

Is the rota EWTD compliant? If not, why not?

How do you hand over the care of patients to your peers?

Do you operate without direct cover on your speciality or elective cases?

2. Quality assurance, review and evaluation

Do you have the opportunity to feed back on your post to your consultants/other people (e.g. clinical tutor, regional adviser) in the hospital?

Do you have the opportunity to feedback on your post to the Deanery and Training Director/regional adviser/STC Chair?

Are you or any of your peer group involved at deanery level in monitoring training quality and provision?

Are you aware of the process at Deanery level for collecting and acting on feedback from trainees?

Are you aware of any action taken as a result of feedback from trainees following the RITA process?

3. Equality, diversity and opportunity

Are you aware of any difficulties with you or your colleagues in this regard? Do you believe that training opportunities are equally available to all?

Did you feel that the process of selecting you to this post was fair and open?

4. Recruitment, selection and appointment

How were you appointed? Did you think the appointment process was satisfactory?

5. Delivery of curriculum including assessment

Do you have a copy of the curriculum for your speciality?

Are you able to work systematically through the curriculum during your training?

Are you exposed to a broad case mix and given the opportunity to take responsibility for cases under the supervision of your trainer?

Is your RITA process satisfactory? Is your review valuable to you, does it inform you?

Do you have a satisfactory dialogue with the review team?

6. Support and development of trainees, trainers and local faculty

Did you have induction to the trust/hospital?

Did you have an induction to your specialty?

Do you have agreed written educational objectives for this post,

Do you know who your educational supervisor is?

Do you meet with your educational supervisor regularly?

How much protected teaching time do you have during the week and what form does it take?

What other forms of teaching take place and how effective are they?

Is there a regional training programme?

Have you had any problems attending formal "classroom" sessions "

Do you have a learning portfolio / log book / appraisal documentation? Has anyone looked at it?

What would happen if you were not performing well?

Are you involved in audit?

Do you have access to courses on generic professional skills?

Do you get appropriate study leave? Is it allocated fairly?

Are you trained to teach and do you get the opportunity to teach?

7. Management of education and training

What sort of pastoral support are you given by the deanery/your educational supervisor/others?

8. Educational resources and capacity

Do you know how you would feed back confidentially to the department about concerns regarding your training or perhaps the behaviour of colleagues that caused you difficulties?

Is the balance between service and training acceptable in this post?

Do there seem to be the right number of doctors at your grade to manage the workload but also to give you enough experience and training?

Do you have convenient access to a computer with internet links & a library?

Is there resuscitation / clinical skills training room where you can access training?

Do you know who your programme director is?

9. Outcomes

Do you know how well this training post/programme performs against other similar ones – for example with regard to exams passed, courses completed and subsequent career progression?

Would you recommend this training programme to a junior colleague?

Would you recommend the post you currently hold as offering good clinical experience and good educational experience?

Is there anything about your training programme which we have not covered that you would like to tell us about?

Appendix 11 Results of questionnaire survey – number (%)

		Strongly disagree 1	Disagree 2	Mildly disagree 3	Mildly agree 4	Agree 5	Strongly agree 6
The operating room is a good place to learn	ENT			1(5)		12(60)	7(35)
	Anaes					8(50)	8(50)
Teaching in the operating theatre is rewarding for me	ENT			1(5)	4(20)	7(35)	8(40)
	Anaes				2(13)	9(56)	5(31)
Teaching in the operating theatre is a distraction for me	ENT	4(20)	7(35)	3(15)	5(25)	1(5)	
	Anaes	3(19)	5(31)	5(31)	2(13)	1(6)	
Teaching in the operating theatre is enjoyable for me	ENT			1(5)	6(30)	10(50)	3(15)
	Anaes				4(25)	10(62)	2(13)
I rarely see the same learner repeatedly in the operating theatre	ENT	1(5)	6(30)	2(10)	2(10)	6(30)	3(15)
	Anaes		2(13)	2(13)	2(13)	6(40)	3(20)
Teaching in the operating theatre is challenging for me	ENT		5(25)	5(25)	8(40)	2(10)	
	Anaes			2(13)	3(20)	10(68)	
Teaching in the operating theatre is just part of the life of an anaesthetist/ENT surgeon	ENT			2(10)	3(15)	10(50)	5(25)
	Anaes			1(6)	2(13)	7(44)	6(37)
Teaching in the operating theatre is more challenging than lecturing	ENT		6(30)	6(30)	2(10)	5(25)	1(5)
	Anaes	1(6)		6(38)	2(13)	5(30)	2(13)
It is difficult to	ENT		4(20)	2(10)	2(10)	7(35)	5(25)

maintain continuity of teaching for learners							
	Anaes			3(19)	2(13)	7(43)	4(25)
Real teaching takes place in the 'classroom'	ENT	10(50)	6(30)	4(20)			
	Anaes	3(19)	10(62)	3(19)			
Patient safety limits teaching in the operating theatre	ENT	3(15)	7(35)	6(30)	1(5)	3(15)	
	Anaes		4(25)	3(190	1(6)	5(31)	3(19)
My operating theatre teaching would improve if I could discuss it with others	ENT		2(10)	6(30)	6(30)	5(25)	1(5)
	Anaes			2(13)	4(25)	6(56)	1(6)
I learnt to teach in the operating theatre by observation	ENT			3(15)	5(25)	8(40)	4(20)
	Anaes		1(6)	1(6)	3(19)	10(63)	1(6)
All anaesthetists involved in training should be trained in one-to-one theatre education	ENT		1(5)	2(10)	2(10)	11(55)	4(20)
	Anaes			1(6)	4(25)	6(38)	5(31)
I look forward to trainees being with me in the operating theatre	ENT		1(5)	4(20)	7(35)	8(40)	
	Anaes			1(6)	3(19)	7(44)	5(31)
I see the same learners regularly to teach them in the operating theatre	ENT	4(21)	5(26)	3(16)	3(16)	4(21)	
	Anaes	4(25)	5(31)	4(25)	1(6)	2(13)	

Appendix 12 Abstract: AMEE 2004 Conference, Edinburgh

Title: Action Learning improves operating theatre teaching

Authors:
Michael Clapham, ACOP participant, Alison Bullock

Aim
To investigate the effect of action learning on operating theatre teaching by anaesthetic trainees.

Summary of work
An action learning set, four anaesthetic trainees and one consultant, met four times. At the first meeting the concept of action learning and reflective diaries were discussed. The second meeting provided an opportunity to reflect on teaching experiences and identify areas for modification. At meeting three the effects of agreed changes were shared. Finally, longer term effects of the action learning process were evaluated at the fourth meeting.
Data, gathered from recorded, transcribed meetings and reflective diary extracts were analysed using grounded theory approach.

Results
Four main areas for modification were identified: assessment of individual learner needs; teaching level; observation of difficult cases; end of the session learning evaluation.
All participants modified their teaching. The acts of writing and group discussion were effective in producing change. The process helped to allay feelings of isolation. Further analysis is on-going and longer term effects will be reported at the conference.

Conclusion
With a contact time of less than 3 hours, action learning achieved change in the way anaesthetic trainees taught in theatre.

Appendix 13 Abstract: AMEE 2006 Conference, Genoa

Authors: Michael Clapham, Alison Bullock

Aim:

Identification of Anaesthetist's attitudes to teaching within the Operating Room (OR).

Work

OR teaching is challenging because anaesthetists simultaneously ensure patient safety. We surveyed anaesthetists attending Royal College of Anaesthetists 'Training the Trainers' course. Participation was voluntary, anonymous and explored attitudes to OR teaching by rating statements (generated from interviews, action learning sets and the literature) using 6 point likert scales (6 = strongly agree).

Findings

Response rate 31/33 (94%). The majority were registrars (14) or consultants (10). Views reported as mean values (max 6 – min 1).

OR is a good place to learn (5.45)

OR teaching is rewarding (5.16), part an anaesthetist's of life (5.13), enjoyable (4.84) and respondents looked forward to having trainees with them (4.74)

OR teaching is challenging (4.1), more so than lecturing (3.8), and associated with patient safety (4.03) and not seeing the same trainee regularly (4.07).

While respondents had learnt to teach by observation (4.35) they felt one-to-one teaching should be taught (5.23) and would welcome opportunity to discuss teaching (4.47).

Conclusions

OR teaching is alive and well in UK anaesthesia. Anaesthetists enjoy OR teaching despite the challenges and see the benefit of learning more about one-to-one teaching .

Appendix 14 AMEE workshop 2004 - Research methods in education

Dr David Wall, Dr Alison Bullock, Dr Mike Clapham and Miss Zoë Nuttall

In line with conference protocols, the workshops starts at 09.30am and runs to 17.00pm. There is a break for coffee at 11.00am 11.30am, and again at 15.45pm to 16.15pm.

Aim of the workshop:
To introduce you to a range of research methods used in education.

Objectives:
At the end of the workshop you will have gained some knowledge and experience of:

1. A variety of educational methods including individual work, group work, keynote talks and demonstrations.
2. A variety of research designs in educational research.
3. Some ideas on questionnaire design, their effective use and analysis.
4. Action research and its potentials in educational research.
5. The analysis of data – both quantitative and qualitative data using hand analysis, SPSS and NVivo.
6. Some ideas about types of interviews and tips for better interviewing.

09.30am   Introductions and welcome   All four workshop leads
Aims and objectives of the day, including an ice-breaker
We will talk about research design with a specific focus on Action Research; and in terms of data gathering methods, focus on the two most often used – Questionnaires and Interviews. Activities and demonstrations will show approaches to the Analysis of such data.

Ice-breaker*: we will give you a questionnaire about what you want from the day – with open and closed questions we can analyse during the morning, and present the analyses to you later in the afternoon.*

09:45am   Education Research in context   Keynote talk (ADB)
An introduction to asking the right research questions, getting the right design, in choosing the right methods, and doing the right analyses.

Here we will set out the 4 common designs (quasi-experimental; surveys; case studies; action research)

10.05am   Looking at Questionnaires - the Good the Bad and the Ugly
                                                                                  Group work (ZN, DWW)
In three to four groups, candidates will be given six or more questionnaires and asked to give constructive criticism of these, and be prepared to feed these back in the next plenary.

10:30am   Plenary - some points to make about what you found
                                                                                  Feedback (DWW)

10:40am   Questionnaires - general principles of design, strengths and weaknesses
                                                                                  Keynote talk (ADB)

11:00am   Coffee break

11:30am   Questionnaires - getting the best response rate   Keynote talk (DWW)
Here we will give you some evidence based tips on how to maximise your response rates

11:45am   **Design your own questionnaire**   **Group work**

Candidates will work in three to four groups and design an evaluation of this AMEE Conference, using one sheet of A4 allowed as the size of evaluation form for this activity.

12:05am   **Plenary – Present your Questionnaires, from the groups**
                                                            Feedback

Tell us about the difficulties you had doing this task. Tell about the discussions you had

12:30   **Action Research**   **Keynote talk (MC)**

This will include explanations of action research, the use of reflective diaries, and other types of data collection involving action research work.

1.00pm   **Lunch break (one hour)**

2:00pm   **Using Action Research in your own organisation**   **Group work (MC)**

Candidates will work in three to four groups and will discuss this sort of action research projects that they could possibly do in their own educational organisations.

2:20pm   **Plenary - present your own ideas**   **Feedback (MC)**

2.30pm   **Analysing your data - Some general principles**   **Keynote talk (DW)**

This will look at various ways to analyse the both quantitative and qualitative data, and will include the use of computer packages SPSS and NVivo, and will include both cluster analysis and factor analysis.

3:00pm   **Analysing your data**   **Group work (ZN DWW)**

Candidates will work individually and will be given some text data to analyse by hand.

3:20pm   **Analysing your data - Demonstration**   **Demonstration (DWW)**

The same data will be analysed using NVivo to illustrate the computer program in use

3:45pm   **Tea break**

4:15pm   **Interviews - how to do it**   **Keynote talk (DWW)**

This will give some information about how to carry out, record and transcribe interviews, and include details about the different types of interview, interview schedules and other aspects, including ten tips for better interviewing – from the school of hard experience and mistakes we have made!

4:30pm   **Analysis of your questionnaire**   **Demonstration (DWW)**

We will use data from your results of your questionnaire filled in by you this morning to go through some of the methods of analysis we have talked about earlier in the day – using SPSS and NVivo

4.45pm   **Round up of the day and Discussion**

5:00pm   **Close of workshop**

Appendix 15 AMEE workshop 2005 - Questionnaire design and analysis

Dr David Wall, Dr Alison Bullock, Dr Mike Clapham and Miss Zoë Nuttall

Background to the topic
A workshop to give new educational researchers a start on the principles of designing and analysing simple questionnaires. This workshop will focus on the quantitative aspects of the analysis of questionnaire data, when we get onto the analyses of data.

Workshop content and structure
There will be a mixture of keynote talks, individual work, group work and demonstrations of the analyses. A workbook will be provided for each candidate.

Intended outcomes
At the end of the workshop candidates will understand the principles of designing a simple questionnaire, and relating the design to ways in which the data resulting from the questionnaire may be sensibly and easily analysed.

Intended audience
New researchers in medical and dental education, such as those about to embark on their first questionnaire based project. **This workshop is for beginners only please!**

00.00   Introductions and welcome   **All four workshop leads**
Aims and objectives of the workshop

00:10   Filling in the Amsterdam Discovery Questionnaire   Individual work

00:15   Questionnaires - general principles of design, strengths and weaknesses
                                                        Keynote talk (ADB)

00:25   Questionnaires - getting the best response rate   Keynote talk (DWW)
Here we will give you some evidence based tips on how to maximise your response rates

00.40   Looking at Questionnaires - the Good the Bad and the Ugly
                                                        Group work (ZN, DWW)
In three to four groups, candidates will be given four questionnaires and asked to give constructive criticism of these, and be prepared to feed these back in the next plenary.

00:55   Plenary - some points to make about what you found
                                                        Feedback (MC)

01:05   Analysing Questionnaires using SPSS
                                                        Demonstration (DWW)

01:20   Results of the Amsterdam Discovery Questionnaire   Keynote (DWW)

01:30   Close of workshop