

**How can reflective learning benefit medical students? A study
combining qualitative and quantitative methodologies**

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PhD thesis

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Abstract

Background

Reflective learning has been shown to bring about improvements in learning. The purpose of this study was to discover whether these improvements could be realised in undergraduate medical education.

Study design

Voluntary study with third-year medical students who kept learning journals and attended fortnightly tutorial groups. Evaluation was by semi-structured interviews, which were analysed thematically. Learning styles and examination results were compared between participants and non-participants. For comparison six interviews were carried out with third year students in Manchester where there is a problem-based curriculum. An expert workshop was held at to identify evidence-based support for reflection in learning, to discuss preliminary results and to discuss the direction of the second phase.

Results

Out of 232 students 35 signed up. Some who did not sign up said that reflective learning would not help them with current assessments.

Participants were better able to focus on what they needed to learn and less driven by exams.

We interviewed six students at Manchester (where there is a problem-based learning curriculum) who were more self-directed learners.

Phase II study

I compared (t test for independent means) reflective learning skills in Cardiff and Glasgow (PBL). Three instruments were used Self-Efficacy in Self-Directed Learning, Reflection in Learning, and Learning and Studying Questionnaire.

Glasgow students scored higher on reflection in learning, self-efficacy in self-directed learning and organisation of study.

Discussion

Reflection improves medical students' learning by changing their approach to learning and making it more integrated, but students will not engage with it if it does not relate to coursework and examinations. Students undergoing different curricula differ in reflection, self-directedness and study organisation.

Further research should identify the curricular features which promote improvements in learning seen in this study.

Introducing reflective learning into the curriculum would determine whether all students would experience the benefits seen here.

Conclusions

Reflective learning makes students more focused and more integrated in their learning. Many students will not engage in it, however, if it does not relate directly to their curriculum. Medical students at schools with different curricula show different characteristics of learning.

To Alastair

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Abbreviations

JC	John Cowan
AG	Andrew Grant
EM	Elizabeth Metcalf
JM	Jennifer Moon
HP	Hayley Prout
RP	Roisin Pill
MR ¹	Mags Rees
MR ²	Mike Robling
JS	John Sweet
FW	Fiona Wood
ALSI	Approaches to Learning and Studying Inventory
AMEE	Association for Medical Education in Europe
ANOVA	Analysis of Variance
ASME	Association for the Study of Medical Education
BPR	Best Possible Representation of Learning
CLIP	Clinical integration panel
EMQ	Extended matching questions
Full participant	Students who took part for the duration of the Reflective Learning Study
Initial participant	Students who signed up for Reflective Learning Study but who dropped out
LOT	Learning Orientation of the Teacher (model)
LSQa	Learning Styles Questionnaire (Reflective Learning Study)
LSQb	Learning and Studying Questionnaire (phase II study)
MB	Bachelor of Medicine (degree)
MCQ	Multiple choice questions
MEQ	Modified essay question
MeSH	Medical Subject Heading
MHPE	Master of Health Professions Education (Maastricht)
Non-participant	Attended introductory lecture but did not sign up
OSIE	Objective, structured integrated examination
PBL	Problem-based learning
sASI	Approaches to Study Inventory (shortened version)
SEA	Significant event analysis
SSC	Student selected component
SOLO	Structure of Observed Learning Outcomes
RLS	Reflective learning scale
UHW	University Hospital for Wales
UME	Undergraduate medical education
UWCM	University of Wales College of Medicine

Chapter 1 : Introduction

1.1 Introduction

Recent changes in undergraduate medical education (UME.), led by the “Tomorrow’s Doctors” reports (General Medical Council, 1993; General Medical Council, 2003), have emphasised the need to reduce the volume of information that medical students are required to learn. At the same time there has been a move to improve the quality of medical students’ learning using innovative learning methods (General Medical Council, 1993). Increasing the volume of information students have to learn occurs at the cost of depth of understanding (Biggs, 2003 pp.46–47)

Having had some experience with reflective learning with undergraduate and postgraduate students (Grant, 2001; Grant, Berlin et al., 2003) I set out to examine its efficacy in raising the quality of medical students’ learning alongside a reduction in volume. This thesis explores reflective learning in the context of undergraduate medical education using a combination of methodologies. Interviews explore the effect of reflective learning at individual student level.

Reflection is claimed to help the professional trainee connect theory with practice (Habermas, 1974; Schön, 1987) and adopt a deeper approach to learning (Entwistle, 1997). The uptake of reflective learning in the education of some professions has been described as evangelical (Moon, 1999a).

In the education of professionals, reflection has been written about most widely in relation to the initial education of teachers (Hatton and Smith, 1995). Reflection has also been used in the education of health care professionals, especially nurses (Atkins and Murphy, 1993). Fewer studies have been written about the use of reflective learning in undergraduate medical education (Driessen, van Tartwijk, et al., 2003; Ker, 2001).

By better understanding the process of reflective learning we can maximise the benefit our students can derive from it as part of the curriculum (Mamede and Schmidt, 2004).

1.2 Definition of improved learning

I needed to be able to identify improved learning beyond the face validity of better learning that experienced teachers would recognise. In operationalising the question 'Can reflective learning improve medical students' learning', it was necessary to define improvement in learning unambiguously. Criteria were needed whereby any claim I made to have found improvement could be compared to definitions of improved learning based on research evidence. One option was to measure students' performance in examinations. This is by far the most commonly used method of measuring student learning and data would be easily accessible. However, after reading the literature on reflective learning, it appeared that exam results, mainly measuring quantity of learning, would not measure the qualitative changes in learning that might be expected from reflective learning. A method was needed that would examine the way students processed information. Reflective learning might change the way learners view the task of learning or at least make them think about how they learn.

The learning I was looking for was one that would support the development of professional knowledge and skills. This was knowledge that medical students could apply in clinical situations, transfer from one situation to another and integrate with the rest of their developed body of knowledge (Ausubel, 2000). Reflective learning should also raise students' awareness of deficiencies in their learning. In their training developing doctors need to address the demands of professionalism, in particular the challenge of dealing with emotionally difficult situations including death, dying and the breaking of bad news. So as it will be seen, I studied the work of authors who had researched student learning and

developed hierarchical scales of learning (Moon, 1999a). These scales present features of learning at increasing levels of sophistication.

In the next chapter I present a review of the literature relating to reflection in learning including an in-depth assessment of the evidence relating to reflection in UME. I also present the work of a number of groups of researchers who have defined criteria by which the quality of learning can be assessed.

1.3 Effects of making reflective learning compulsory

Setting students any work involving reflection presents a dilemma. Should reflection be compulsory? If so how does the teacher determine whether they have reflected? Since reflection is an activity that can only take place inside students' heads the teacher can, at best, ask for some form of evidence that it has taken place. Furthermore, students are used to getting a mark or grade for summative work. Previous studies have given students written tasks such as critical incident reports and other reflective, written assignments and asked students to hand these in for marking. In previous work I developed a rating scale to improve inter-rater reliability of grades awarded for students' reflective work (Grant, 2001). Other studies have tried to give the student more freedom by asking them to write a summary of a whole term's reflective writing and either to submit this or to answer questions on it in an oral examination (Driessen, van Tartwijk, et al., 2003; Woodward, 1998).

Learners, however, are motivated to gain the best mark. It may seem of secondary importance to them whether or not they write down their true thoughts or reflections when what they write will determine their mark. In previous work with reflective learning in final year medical students, I discovered that a small number fabricated the patients they wrote about in their Significant Event Analyses (See section 2.3.4) as they believed that this would gain them better marks (Grant, 2001).

At the time of commencing this study few papers were in print describing voluntary reflection in undergraduate medical students. Experimental work was needed to explore the effects of reflective learning in UME. It was important to find out what changes took place in students learning due to reflective learning where there were no external motivating factors such as examinations. I decided, after examining possible methodologies, to undertake a voluntary study in order to minimise the potential effects of bias due to assessment.

This thesis addresses the question of whether reflective learning can be beneficial in the initial professional education of doctors.

Chapter 2 : Literature review

2.0 Introduction

I set about this review of the literature by searching the ERIC and Medline databases and by identifying existing reviews in the subject of reflective learning (see 2.3.4). The work of Jennifer Moon (1999a; 2004) provided a comprehensive overview of the literature and the work of Hatton and Smith (1995) provided a review of the literature of reflective learning in relation to initial teacher training. I continued my review by examining work referenced by authors whose work I identified in my initial search.

This chapter introduces the theoretical literature on which reflective learning is based. I also present work that gives an evidence base for defining improvements in learning. The works of John Dewey, Donald Schön and Jürgen Habermas are covered. Experiential learning theory and the work of Kolb are also presented as a theoretical basis for reflective learning.

Reflective learning has been enthusiastically introduced in many settings (Hatton and Smith, 1995; Moon, 1999a). In terms of the education of professionals it has been used more in the education of pre-service teachers than in any other profession (Moon, 1999a). It has also been used widely in nursing education but the number of reports introducing reflective learning in nursing is smaller (Atkins 1993; Bulman, 2004). The number of studies published relating to reflective learning in undergraduate medical education (UME) is very small (Driessen, van Tartwijk et al., 2003; Ker, 2001).

Since this thesis addresses a question about improvement in undergraduate medical students' learning a clear definition of improvement in learning was needed. In order to address this I have drawn on the work of authors who have defined differences between poorer and better quality learning. Deep, surface and integrated learning are defined and I have examined the literature to see whether the criteria these authors have identified can be used to reliably identify improved quality in learning. I have analysed in detail those

studies carrying out primary research into the outcomes of reflective learning techniques in UME.

2.0.1 Guide to chapter 2

When I discussed my ideas for this thesis with my supervisors and colleagues I was asked what evidence there was supporting reflective learning. This is of particular relevance as the last decade has seen the growth of evidence-based medicine which has resulted in a requirement for medical practice to be underpinned by empirical research. The literature underpinning reflective learning appeared to divide into three categories, although there is overlap between these.

Much of the work on the constructivist model of learning (See section 1.2 above) is highly theoretical and has been developed by observation of learners rather than by empirical research (Moon, 1999a). This is true for much of the work on the development of the constructivist model and of the work of Schön (1983; 1987). Schön's work was based on observation of trainee architects and Habermas' work was largely based on philosophy and on Sigmund Freud's work on psychoanalysis (Habermas 1971; Habermas, 1974; Morrison, 1995; Morrison, 1996). Constructivism provides a model of learning in which reflection plays a significant part.

The second section of this chapter relates to the quality of learning. Not "how much does the learner know?" but "at what level is the learner's understanding?". Not "Can he/she repeat the learning matter parrot-fashion?" but "do they understand it?". Higher quality or deeper learning involves integrating new learning with prior knowledge and being able to generalise from it. This brings us into contact with a different body of literature written by a few authors based on empirical data, the main method of which has been interviews with students and teachers (Biggs, 1993; Entwistle, 1997a; King and Kitchener, 1994; Moon, 1999a; Moon, 2004; Perry, 1970).

The third section relates to the introduction of reflective learning in practice - in the lecture theatre or seminar room. Much of this literature consists of case reports and studies relating to the introduction of reflective learning where the evaluation has been carried out by the teacher responsible for the innovation and where the numbers of students is small (Bulman, 2004). Many such studies exist relating to the introduction of reflective learning in teacher education (Hatton and Smith, 1995) and nursing education (Atkins and Murphy, 1993; Atkins, 2004).

2.1 Theories of reflection in learning

2.1.1 Why study reflection in learning?

“Tomorrow’s Doctors” (General Medical Council, 1993; General Medical Council, 2003) called for integration in UME. Initial education of professionals often starts with theoretical teaching (Eraut, 1994) with the teaching of professional skills beginning later. It is often the case that when students commence skills training little effort is made to integrate it with what they have already learned (ibid). Integration is needed in medicine when students move from biomedical science teaching in the early years to clinical training, usually in the third, fourth and fifth years. Furthermore, much of the medical course is taught by subject experts (ibid) and this results in students being taught by a large number of individuals each of whom has relatively little contact with them and few opportunities to find out what is being taught by other teachers. As we subsequently discovered, the undergraduate medical curriculum can be perceived by students more as a process of getting over the hurdles of examinations serially rather than one of putting together the knowledge and skills needed to practise medicine.

My reasons for undertaking this study were to investigate reflective learning as a method of helping medical students to take more control of their own learning and to integrate learning from diverse sources.

Problem-based learning (PBL) has been introduced in UME (Schmidt, 1983a) as a way of integrating student learning and making learning more self-directed. I believe that reflective learning can also help students integrate their learning but without the major revision of the curriculum needed to introduce PBL (McCrinkle and Christensen, 1995). Previous experience using significant event analysis had shown me that learning tasks involving reflection can be introduced into the existing curriculum where appropriate and where circumstances allow (Grant, 2001; Henderson, Hogan et al., 2003).

In this section I present several definitions of reflection in relation to learning. As well as this I present the theory supporting reflection in relation to learning. In writing this section I have drawn on the work of authors from a number of backgrounds including psychology, philosophy and education.

Aristotle first drew attention to the distinction between theory and practice, which is important in the education of professionals (Habermas, 1974). Reflection supports learners in the making of links between theory and practice.

A number of models of reflection exist in relation to learning (Adler, 1991). One of the reasons why various definitions are given is that reflection relates to both cognitive activity and structured learning activity (Hatcher and Bringle, 1997)

In the cognitive domain, reflection is an activity in which a person questions their understanding and the assumptions upon which it is based (Dewey, 1933; Rodgers, 1992). John Dewey (1933) was precise in his definition of reflection. He described it as a meaning-giving process so that prior learning becomes an instrument to understanding future situations. Dewey said that reflection was the *mechanism* by which learning from one situation can be an instrument to understand another (Rodgers, 2002).

According to Dewey, reflective activity was triggered when a learner came across something that was at odds with their understanding causing a sense of disequilibrium. The desire to relieve this state motivated reflection through which the learner discovered what it was that made the new information and their previous understanding of events incompatible and brought about reconciliation between these different perceptions. This mechanism is discussed more fully under “constructivist theory of learning (See section 2.1.6). It was only when this reconciliation had been brought about that the learner’s sense of discomfort was resolved (Rodgers, 2002).

Dewey said that for reflection to take place, the learner needed attitudes that valued personal and intellectual growth of self and others. He also said that it worked best when the learner was working in community with others.

John Dewey’s work was problem-based and largely about achieving resolution (Morrison, 1995). His definitions of reflection are mainly restricted to cognitive activities. The work of Jurgen Habermas (1971; 1974) goes further and looks at the sociological implications of reflection (FitzGerald, 1994). Where Dewey mainly applied reflection to soluble problems, Habermas thought that reflection could help release people from problems trapped and repressed within their own psyche (Morrison, 1995; Morrison, 1996). He also thought that, through critical reflection, people could emancipate themselves from repressive forces (Habermas, 1972; Habermas, 1974; Morrison, 1995; Morrison, 1996). The terms critical thinking and critical reflection can be used to describe the kind of reflective thought being described here (Maudesley and Strivens, 2000). Mezirow’s definition of critical reflection (Mezirow, 1990) “A critique of the presuppositions upon which our beliefs have been built” is very similar to that of Habermas’ emancipatory level of reflection. Habermas said that there is a symbiosis between self-awareness and freedom (Morrison, 1995) and his work supports reflection in the development of an empowered practitioner and a fair and equal society (Morrison 1996). Critical reflection has been

employed in teacher training as a way of uncovering forces of constraint acting on both students and teachers (Smyth, 1989; Zeichner and Liston, 1987).

Morrison (1995) derives a schema of reflective practice taking place at three levels from Habermas' three *knowledge-constitutive interests* and his *ideal speech situation* (Habermas, 1991). The three knowledge constitutive interests are technical reflective practice, hermeneutic reflective practice and emancipatory reflective practice (Van Manen, 1977).

It is principally the middle category, hermeneutic reflective practice, that relates to reflective learning as practised in this study. Technical reflective practice mainly relates to improving current practice, reflection on the way a job is done, replacing one routine with another (Morrison, 1995), more akin to Schön's *reflection-in-action* (Schön, 1983; see below). Emancipatory reflective practice has a wider socio-political interest with the aims of freedom and social justice. Through critically reflecting on their situation and the repressive elements within it the practitioner is more likely to question and resist elements of inequity in their lives. Whereas there may be some elements of emancipatory reflective practice in UME it is hermeneutic reflective practice that connects to it most directly. The hermeneutic knowledge-constitutive interest is concerned with understanding, clarifying and interpreting meanings (Morrison, 1995; Habermas, 1974). The model supported is that of reflecting on practice from the basis of theory. This connects with the works of Donald Schön (1983; 1987) and it is Habermas and Schön who have been described as the two authors who took forward the work of Dewey (Morrison, 1996). Central to hermeneutic reflection is the critical questioning of the theoretical underpinnings of practice. The practitioner should, in other words, be constantly asking the question "Why?". He/she should not approach their work in a certain way because it has always been done that way or because they have been told to do it that way. Having critically examined the theoretical underpinnings of their practice, the practitioner should disclose them to others (Morrison,

1995). Disclosure is an important part of the reflective process. Hermeneutic reflective practice can also be defined as validating what is known and validation through disclosure has been described as the central function of reflection (Mezirow, 1990).

Reflection raises self awareness. Following Van Mannen's classification of Habermas' work (Van Mannen, 1977) reflection promotes self-awareness relating to the level of reflective practice. In technical reflective practice the learner will gain self awareness of their competence at a skill, whereas in emancipatory reflective practice the learner gains self-awareness of their ability to challenge the rules and the boundaries of all aspects of their life.

Schön (1983; 1987) carried out work with trainee architects and developed a theoretical framework for the cognitive processes of practitioners at work and in training. He postulated that experienced practitioners worked, most of the time, without being aware of the expert professional knowledge underpinning their actions. He called this "knowing-in-action.". He said that this was challenged when an action did not bring about the desired result. When this happened he said that they reflected, very briefly, while still carrying out the task, worked out why they were not achieving the required outcome and changed their action in order to correct the problem. Schön called this "reflection-in-action". Dewey described this as reflective practitioners exercising their judgement in choosing between alternative solutions to a problem (Morrison, 1995). After the action was complete the practitioner took time to think back over their action after it was over, why had there been a problem? How could this be prevented in future? This he called "reflection-on-action" which Schön defined as

Thinking back on what we have done in order to discover how our knowing-in-action may have contributed to an unexpected outcome. We may do so after the fact, in tranquillity or we may pause in the midst of action.

(Schön 1987, page 26)

Whereas reflection-in-action is the refining, short-term activity of a practitioner during professional activity and based on tacit knowledge (knowing-in-action) it is reflection-on-action that is most applicable in initial professional education (Morrison, 1996; Bright, 1993). Medical students learn in many situations where they are participant or observer. By reflecting afterwards they can consider what they have learned and how this fits in with their prior knowledge. They can also identify deficiencies in their knowledge when they reflect in this way.

2.1.2 Reflective practicum

Schön (1987) recommended that the conditions under which learners studied their craft were modified to optimise learning. He used the phrase “reflective practicum” to describe the learning environment that had been manipulated in this way. In the reflective practicum students could learn their craft while the conditions of normal day-to-day practice were modified to give more time and to reduce pressures. There should be time for reflection as well as for practice and observation (Murphy and Atkins, 1994). Traditionally, in medicine, very few concessions have been made to allow for the needs of learners. Teaching has taken place on ward rounds and in outpatient clinics where the pace has been reduced very little. However, improvements are gradually being introduced, skills laboratories exist in many medical schools which exist solely for the students’ learning needs and where the pace of learning can be set accordingly. When third year students at Cardiff go to GPs’ surgeries in groups of five, the students will see one patient who has been invited especially at a time when their GP teacher has no other clinical duties thereby removing pressure of time. The interventions in this study were designed to provide the conditions that would enhance reflection-on-learning particularly when the conditions of the reflective practicum were not available to the students.

Schön's model of reflection-on-action was one of retrospective critical thinking to construct and reconstruct events with a goal of developing oneself as a person and a practitioner (Bulman, 2004). Like Habermas' hermeneutic reflective practice, reflection-on-action is not restricted to intellectual activity as the emotions and feelings of the practitioner are also involved (Bulman, 2004). In their seminal work *Reflection: turning experience into learning* Boud, Keogh and Walker (1985) give a similar definition of reflection;

Reflection in the context of learning is a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and experiences.
(Boud, Keogh et al., 1985, page 19)

Boyd and Fales (1983) give the following definition of reflective learning in relation to experience.

Reflective learning is the process of internally examining and exploring an issue of concern, triggered by an experience, which creates and clarifies meaning in terms of self and which results in a change of conceptual perspective.

(Boyd and Fales, 1983)

2.1.3 What skills are necessary for reflection?

As well as needing some help to get started in reflection, it is also necessary to possess certain skills. These are described as self-awareness, description, critical analysis, synthesis, judgement and evaluation (Bulman, 2004; Atkins and Murphy, 1993). In a chapter entitled *Developing Underlying Skills in the Move towards Reflective Practice* Atkins (2004) gives advice and exercises aimed at enhancing these skills.

2.1.4 Reflection – summary

To summarise, reflection is an activity that involves revisiting experiences with a view to gaining further knowledge. The reflector questions their knowledge relating to the

experience and their underlying assumptions. Reflection is not restricted to cognitive activity but also involves emotions and affect. Reflection is an important tool in the connection of theory and practice, which is of particular importance in the education of professionals. Learners can achieve better management of their learning by using reflection (Hammond and Collins, 1991).

2.1.5 The artistry of professionals

Much of the work on reflection described above relates to the acquisition of professional knowledge and skills and critical reflection on them. However, most professional students and certainly medical students are not entering a technical profession where they will be addressing well-framed problems. Professional practice takes place in a milieu of uncertainty where problems are poorly defined (Clarke, James et al., 1996; Maudesley and Strivens, 2000; Schön, 1987). When students enter the clinical environment they have, on board, a volume of consciously learned theoretical knowledge. They then start to pick up a second body of tacitly learned knowledge by observing how practitioners deal with real-life problems (Greenwood, 1993). Schön described the way in which professionals practised their craft in this uncertain environment as artistry. He said that it was artistry that defined an exceptional practitioner. Trainees have much to learn from observing experts practice although it may be difficult, at times, for the student to understand what is happening and it may be difficult for the practitioner to verbalise the tacit knowledge underpinning their actions. Reflection has a great deal to offer students as they build up their professional knowledge and they begin to develop their own artistry.

2.1.6 Constructivist theory of learning

Constructivist theory is the model of learning upon which this thesis is based. The model of constructivism presented here is dialectical constructivism (Moshman, 1982).

This is a contextual meeting of exogenous constructivism based on knowledge structures from the environment and endogenous constructivism based on structures within the learner.

In constructivist theory, knowledge is what the learner constructs and no knowledge exists beyond the cognitive structure of individuals. The learner constructs knowledge by using, as well as by absorbing, information. Therefore the learner is also building and strengthening their learning when they are discussing what they know, explaining it to someone else or applying it to a problem. In constructivist theory, discussion of learning between student and teacher and between student and peers is important in construction of knowledge. Piaget said that it was important that children *did* talk in class in order to develop their learning (Ginsburg and Opper, 1987). In constructivist theory, where learning is a qualitative change in the learner's conceptual understanding rather than a quantitative increase in their knowledge (Fitzgerald, 1994) social interaction with peers and teachers can extend what a student can learn.

The rise in popularity of reflection in learning has occurred alongside the development of beliefs in constructivist learning theory (Bruning, Schraw et al., 1995; Moon, 1999a; Vygotsky, 1978). It is the learner who takes some piece of information and compares it with what they already know before changing their cognitive structure to accommodate it. The new knowledge thereafter forms part of the learner's cognitive structure. Obviously constructivist learning can be enhanced by the way in which material is presented to the learners (see section 2.1.9).

The Proximal Zone of Development (Vygotsky, 1978; Wertsch, 1985) describes the difference between learning that students could achieve alone and learning that they can only achieve with interaction with teachers and peers. Educational Scaffolding is a term used to describe this process of extending what the student can learn by interaction (Bruning, Schraw et al., 1995; Pressley, Harris et al., 1992).

2.1.7 Meaningful learning

Ausubel (1968) and others, working with the ideas of Piaget postulated that every learner possessed a certain body of learning. They referred to this body of learning as the cognitive structure. When a learner is presented with some new information he/she examines what knowledge he/she already holds in the cognitive structure that is relevant (Hinett, 2003). This process of comparing new information with existing known information is referred to as assimilation. The learner then examines the new information and their existing knowledge to see if there are any contradictions between the two. If contradictions exist then a process of accommodation occurs where there is some modification of the new information and/or the prior knowledge to make the two compatible. The new knowledge is then added to the existing knowledge. Ausubel calls this process “meaningful learning” (Ausubel, 2000). In time the prior learning subsumes the new learning and they are indistinguishable to the learner.

Having to learn by rote is often explained by the fact that the volume that has to be learned is too great to enable it to be learned by any more meaningful way. However, Ausubel points out that it is very difficult to learn much by rote learning. Because rote learning has no “hooks” from prior learning upon which to “hang” the incoming learning, the learner has to memorise facts in an “arbitrary and unsubstantive fashion”.

2.1.8 Experiential learning

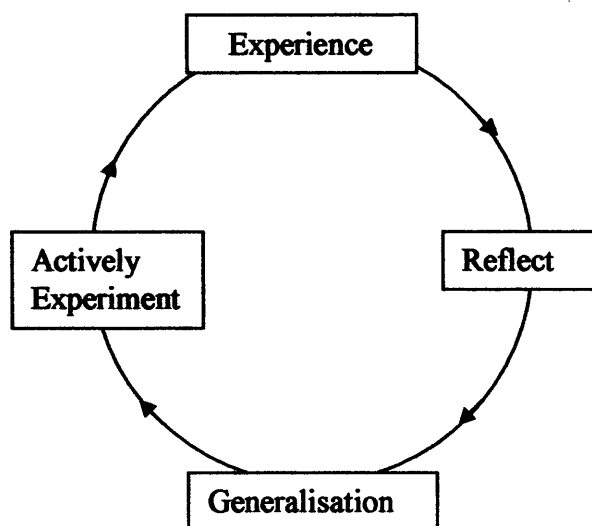
Experience has to be arrested, criticised, analysed, considered and negated to shift it to knowledge.

(Criticos, 1993)

Kolb’s view of the role of experience in reflection was very different from that of Habermas and his co-workers. He saw reflection as the key to helping students to learn

from experience. Experiential Learning is the name given to the theoretical work based on this. It has been widely adopted in the education of professionals (Kolb, 1984).

In theory each episode of experiential learning begins with an experience. For most learners this might take place in the practical part of their learning. For a medical student this may be an encounter with a patient.

Figure 2.1 the Kolb cycle

After an experience, the learner takes time to think over what he/she has experienced and what knowledge and skills were needed to deal with the problem. The student, at this point, takes time to examine what she/he already knows about the subject. Immediately the student's learning from this episode is enhanced by making this connection with his/her existing knowledge on this subject (referred to by Ausubel as the *cognitive structure*, see section 2.1.7). One outcome of this reflection is the identification by the learner of any gaps in their knowledge on this subject. Following Dewey's definition of reflection the learner is then stimulated to address these gaps in their knowledge and also to think of the wider context to which the learner may generalise her/his new knowledge. Boud, Walker and others have carried out extensive work looking at the application of experiential learning in different disciplines and how its benefits might be optimised (Boud, Walker et al., 1985; Boud, Cohen et al., 1993).

The experiential learning model has been taken up with enthusiasm by educators in many fields of education (Moon 1999a). For teachers, particularly those whose teaching is influenced by the constructivist model experiential learning and the Kolb cycle have face validity.

According to experiential learning theory, every episode of learning must commence with an experience in practice when, in practice, it is very unlikely that a learner will only ever learn from de novo experiences. One element of any reflective learning episode is for the learner to examine what they already know. It is hard to imagine that some learning does not occur by the learner connecting two or more pieces of knowledge they already possess and moving on their learning by doing that (Moon 1999a). When students revise for exams they are not usually taking on board new learning, they are taking another look at what they have learned previously. As they revise they develop new understandings, to integrate their learning, and deepen their understanding (ibid). The reflective learning cycle also appears to state that learning occurs at the experience, the input of raw data. However, learning can take place at all stages of the experiential learning cycle (Eraut, 1994). Even when the learner is trying out the new learning for the first time in the workplace they will be learning how their new theoretical learning works out in practice.

2.1.9 Socio-constructivism

The assertion that the learning process moves smoothly around the four points of the learning cycle has also been called into question (Eraut, 1994; Moon, 1999a). Learners may make many mini cycles between two or more points before completing one full cycle (Cowan, 1998).

The Kolb cycle, then, may not give a true representation of what occurs in learning from experience but it does provide a valuable model. It has been used to develop appropriate interventions by the teacher (see fig 2.2 and table 1) at different stages of students' experiential learning (Cowan, 2002). Cowan says that the interventions, a combination of input from the teacher and from the peer group, should be tailor-made for each stage of the Kolb cycle. His suggestions are shown in figure 2.2 and table 2.1. Cowan

gives the name *Socio-Constructivism* to these ideas of timing interventions according to the stage of the Kolb cycle.

Figure 2.2 Cowan’s recommended interventions at each point of the Kolb cycle (Cowan, 2002). Reproduced by kind permission of the author.

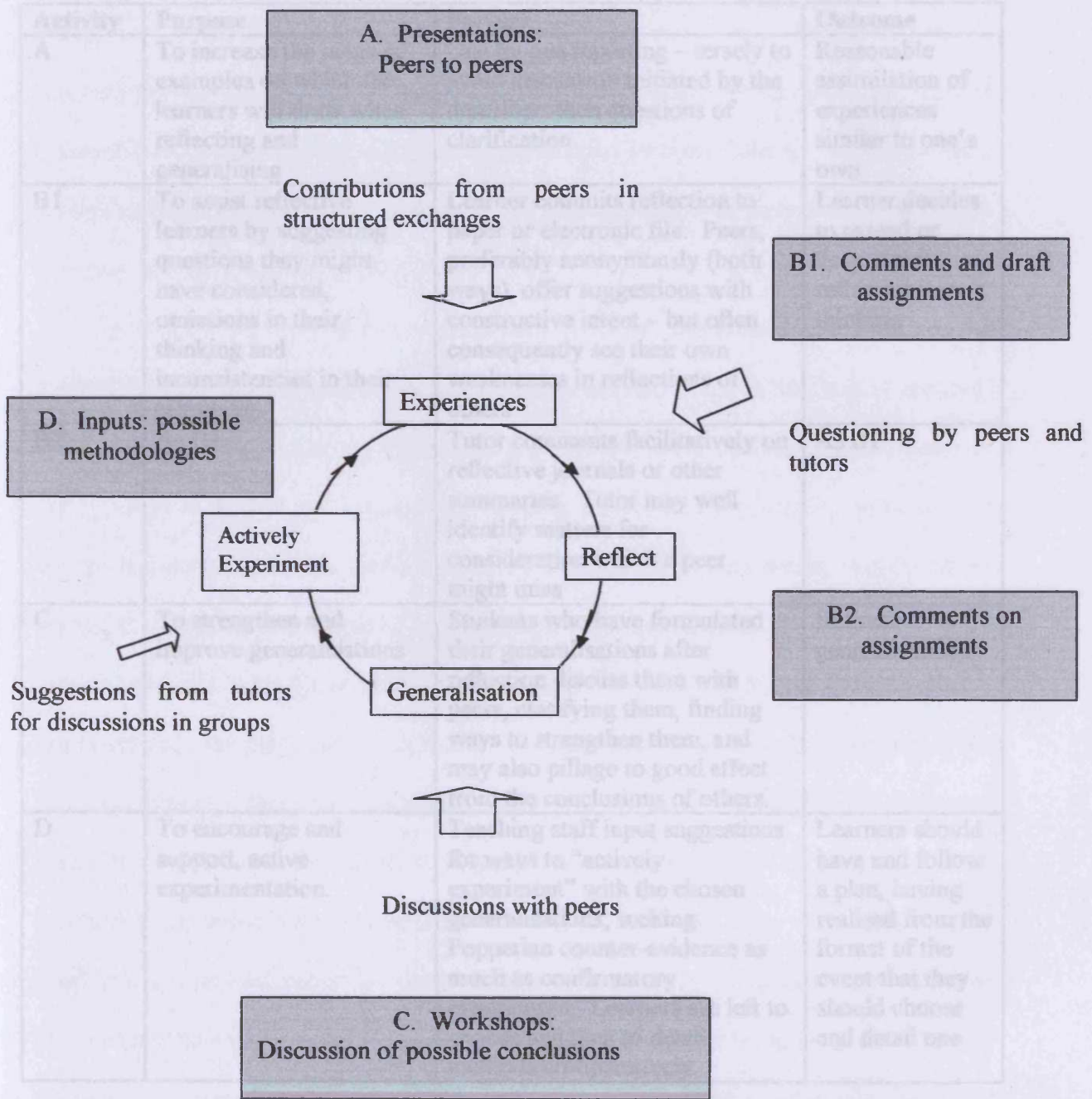


Table 2.1 Elucidation of Cowan's recommended interventions at each point of the Kolb cycle (Cowan, 2002). Reproduced by kind permission of the author.

Activity	Purpose	Format	Outcome
A	To increase the range of examples on which the learners will draw when reflecting and generalising	One by one reporting – tersely to avoid discussion initiated by the describer: then questions of clarification	Reasonable assimilation of experiences similar to one's own
B1	To assist reflective learners by suggesting questions they might have considered, omissions in their thinking and inconsistencies in their reasoning.	Learner commits reflection to paper or electronic file. Peers, preferably anonymously (both ways), offer suggestions with constructive intent – but often consequently see their own weaknesses in reflections of others	Learner decides to extend or deepen the reflective thinking
B2	As B1	Tutor comments facilitatively on reflective journals or other summaries. Tutor may well identify matters for consideration which a peer might miss	As B1
C	To strengthen and improve generalisations	Students who have formulated their generalisations after reflection discuss them with peers, clarifying them, finding ways to strengthen them, and may also pillage to good effect from the conclusions of others.	Refined generalisations.
D	To encourage and support, active experimentation.	Teaching staff input suggestions for ways to “actively experiment” with the chosen generalisations, seeking Popperian counter-evidence as much as confirmatory experiences. Learners are left to choose and then to detail methods co-operatively.	Learners should have and follow a plan, having realised from the format of the event that they should choose and detail one

2.1.10 Self-worth and motivation

In their endeavours to succeed in their learning, students strive to increase their sense of their own worth (Covington, 1984). If their efforts are on the basis that learning can be achieved through effort they have a healthy model for lifelong learning. However, there is a danger that their motivation will be, overwhelmingly, to avoid failure. This may have a paralysing effect on their learning reducing their willingness to take on learning tasks where they may end up being seen to have failed.

Motivation for learning has two sources. Extrinsic motivation often comes in the form of the need to pass examinations, rewards (which may come in the form of approval or respect from others), the ability to enter a profession, or an incentive from parents or family. A great deal of medical students' learning is motivated extrinsically; what is to be learned is determined by the curriculum. How students are to demonstrate that they have learned this material is determined by exams and other assessments. A student struggling to memorise their notes for an exam may be saying to themselves "If I can learn this then I can progress to the next year of my studies" but may not be aware of the relevance of the learning material to them after the examinations. For learning to be intrinsically motivated the learner has to have been the one to determine the necessity of what they are doing. The mechanism for intrinsic motivation is far closer to the work of Dewey and Ausubel. In a seminar a student recognises that there are aspects of the topic being discussed where his knowledge is flawed or absent. He decides to go away and fill these gaps so that when he finishes the course his knowledge will make him more able when he takes up a job in his profession. Because intrinsic motivation involves learning in relation to needs identified by the learner themselves there is a strong affective component. Acting on self-recognised learning needs can raise the learner's sense of competence and at the subject being learned. The feelings associated with intrinsically motivated learning are difficult to describe but

will be known to anyone who has successfully tackled a subject they knew they needed to learn (Schmidt, 1983b).

2.1.11 Self-efficacy in learning

Students' beliefs in their ability to learn a particular subject correlate with what they can achieve independently of their ability. In his work on self-efficacy in learning, Bandura (1992; 1997) carried out many studies examining its effect on learning outcomes. He thought that self-beliefs of efficacy have an effect on affective, cognitive and motivational processes. He discovered that self-efficacy improved learning outcome and that this happened in two ways. Firstly, students will do better in a subject where they believe that they can do well. Secondly, students with greater self-efficacy are prepared to persevere longer with problems, and are more willing to go back to problems they could not solve initially. Bandura points out that, according to social cognitive theory, the decision whether or not to take part in an activity is mediated by (affective) self-reactive and self-efficacy mechanisms. Whether or not a person feels that they can take on some activity to standards they are happy with may decide whether they take it on at all.

2.2 The structure of learning

2.2.1 Improving learning

Having set out to investigate whether reflection improved students' learning it was important to define improved learning in an evidence-based way that related to the constructivist model. If, at the end of the study, I claimed to have observed improvements in learning it was this body of literature that would provide the descriptive framework for the changes observed. As defined earlier, the changes I was looking for were not increased volumes of learning but changes in conceptual understanding.

Changes in student learning are usually measured by examinations and research has demonstrated that reflective learning is associated with improved exam performance (Newble and Entwistle, 1986; Sobral, 2001).

2.2.2 Learning research

Table 2.2 shows a comparison of four bodies of research which examine levels of sophistication in learning. All provide scales that define learning at different levels and all are based on interviews with learners. They differ, however, in the way in which they examine learning.

In their work Marton and other members of the Gothenburg School studied learners' approach to their learning (Marton and Säljö, 1976; Ramsden, 1992). Biggs and Collis (1982) developed their Structure of Observed Learning Outcomes (SOLO) taxonomy from the outcome of students' learning such as a piece of written work or an oral presentation. In developing their reflective judgement model King and Kitchener (1994) observed and questioned students as they tackled ill-defined problems (Moon, 2004). Perry (1970), by interviewing college students, developed a four-point scale, which described the way they perceived learning and their knowledge (Choudhury, 2004; Dahlgren, 1997; Moon, 2004).

Using a method they called phenomenography (Entwistle, 1997a; 1997b) Marton, Entwistle and colleagues studied students' approach to learning. Phenomenography emerged as a rigorous method of investigating student learning. This occurred because of dissatisfaction with the theoretical descriptions of knowledge being "processed" or "stored" which were in use at the time. These were thought unsatisfactory because they could not be tested (Entwistle, 1997b). Marton and colleagues wanted a method of researching that would describe what the student actually experienced which could be directly connected with learning outcomes.

Table 2.2 Hierarchical scales of levels of learning.

Author	Name of scale	No. of levels	Parameters	Levels
Marton et al (1976), Marton, (1997)	Deep and Surface approaches to learning	3	Approach to learning	<ol style="list-style-type: none"> 1. Surface 2. Strategic 3. Deep
Biggs and Collis (1982)	SOLO taxonomy	5	Observed outcome of learning	<ol style="list-style-type: none"> 1. Prestructural 2. Unistructural 3. Multistructural 4. Relational 5. Extended abstract
King and Kitchener (1994)	Reflective Judgement scale	7	Interviews with learners carrying out ill-defined tasks	<ol style="list-style-type: none"> 1 – 3 Pre-reflective. Thinking 4 – 5 Quasi-reflective thinking 6 – 7 Reflective thinking
Perry (1970)	Chart of development	4	Interviews with learners about their Epistemological beliefs	<ol style="list-style-type: none"> 1. Simple dualism 2. Complex dualism 3. Multiplicity 4. Relativism

What they chose was a qualitative method, which involved asking the students what they did and what they experienced when they were learning. The students had to explain events through their own frame of reference rather than it being interpreted by the researcher. When the data was analysed categories of description were developed and it was essential that extracts from the interviews were used to delimit each category. Phenomenography and the early work involving it was extremely important in research into learning and teaching and gave a new insight into what happened to the student when they were learning (Biggs, 2003). In later work phenomenography came to represent the belief that what is learned is what is constructed at the level of the learner (ibid page 12).

2.2.3.1 Deep, surface and strategic approaches to learning

The early work of Marton and colleagues involved asking students to read pieces of text and then answer written questions on it (Pask, 1976). They compared the students' answers with transcripts of interviews about the way in which they had approached the task. They discovered that some students approached the task with the intention of discovering the meaning of the text (i.e. what the author wanted to get across). This they described as a *Deep* approach to learning. The deep learner learns to understand the underlying concepts of the text. They do this by integrating the content with their prior learning. The deep learner examines learning material critically and looks for supporting evidence (Marton, 1997). Deep learners are more likely to pass examinations (Newble and Entwistle, 1986).

Other learners read the text and tried to memorise, sequentially, what the author was saying. They did not join together what they had learned from one section of the text with another and did not, therefore, develop an ability to put across the meaning of the text as a whole. The authors described this approach as *Surface*. The surface learner is motivated to get through the course and pass the required assessments. The surface learner would find it

difficult to make sense of new ideas and might suffer from pressure and worry due to academic work (Marton, 1997).

I do not believe that it was ever these authors' intention to suggest that approach to learning was a binary concept, that each learner had either a surface or a deep approach, which they took to every learning task. They discovered that learners developed a concept of what was required of them from each learning task and adapted their approach accordingly (Marton and Säljö, 1976). Learners who actively sought to understand the subject matter would do so whereas those who only set out to memorise the learning material for the purpose of reproducing it did not develop any true understanding (Prosser and Millar, 1989). If learners do not appreciate a task as having any relevance to their learning they were more likely to adopt a surface approach (Newble and Entwistle, 1986).

A third approach to learning was subsequently described. The learner who adopted the *Strategic* approach used whichever approach to learning would gain him best grades for each learning task (Entwistle, 1997a). The strategic learner is motivated to succeed at his courses. He was likely to be organised in his work, into which he would put a significant amount of effort. The strategic learner is well aware of the requirements of the exams and will try to produce work that meets the perceived preferences of the lecturers (ibid).

Support for these three categories of approach to learning came from factor analysis of a student study questionnaire. Three categories emerged; utilising, internalising and achieving. These are very similar to the surface, strategic and deep categories of Marton and Säljö (Biggs, 1979).

The description of the three categories of approach to learning led to the development of a questionnaire, the Approaches to Study Inventory (Entwistle, 1997; Ramsden, 1997). The inventory scores the learner's orientation covering the topics that emerged from the original interviews. Statistical analysis enabled several study orientations to be determined which linked together approach to learning with some of the other concepts measured by

the inventory. A Meaning Orientation linked together deep approach, comprehension learning and intrinsic motivation. Reproducing Orientation brought together syllabus-boundedness, fear of failure and strategic approach studying.

2.2.3.2 Learning outcomes and the SOLO taxonomy

Although the work of Biggs and Collis (1982) was also aimed at recognising *levels* of learning it differed from that of Marton et al. because it was based on the observed outcomes of learning rather than approach. They developed the structure of the observed learning outcome (SOLO) taxonomy (see table 2.2). The theoretical basis of their scale is partly from the developmental work of Piaget and partly from theories of information processing (Dahlgren, 1997). There are five levels of the SOLO taxonomy (see table 2.2) and the authors illustrate the five levels by giving five increasingly sophisticated answers to the same question showing greater generalisation, ability to relate different subjects to one another and ability to abstract to situations not experienced (Biggs and Collis, 1982; Dahlgren, 1997).

Table 2.3. Levels of SOLO taxonomy (Dahlgren, 1997).

Level	Description
1. Prestructural	In relationship to the prerequisites given in the question, the answers are denying, tautological and transductive – bound to specifics
2. Uni-structural	The answers contain “generalisations” only in terms of one aspect
3. Multi-structural	The answers reveal generalisations only in terms of a few limited and independent aspects.
4. Relational	Characterised by induction and generalisations within a given or experienced context using related aspects
5. Extended abstract	Deduction and induction. Generalisations to situations not experienced or given in the prerequisites of a question

Learning outcomes at the higher levels will show evidence of the student dealing with more than one theme (Biggs and Collis, 1982). Because it is related to observed outcomes of learning, the SOLO taxonomy is of use when developing learning objectives. It can help the teacher to write objectives that stipulate the level of understanding that is expected as well as the volume of knowledge (Biggs, 2003). Dahlgren (1997) concludes that the SOLO taxonomy’s strength, ie. Providing a widely applicable analysis of the outcome of learning is also its weakness in that it may not make it possible to take into account factors relating to individual learning tasks.

Performance on the SOLO taxonomy and approach to learning are correlated (Van Rossum and Schenk, 1984). Being a deep learner is a predictor of achieving a higher level on the SOLO taxonomy and achieving a lower score on the SOLO taxonomy is a predictor of surface learning.

2.2.3.3 The reflective judgement model

Like Marton and colleagues, King and Kitchener (1994) in developing the Reflective Judgement Model explored learners' concepts of knowledge and learning (Moon, 2004). They said that previous studies examining critical thinking had used well-defined problems, which probably had an answer and could be solved using a recognised method (ibid page 35). In their research into reflective judgement King and Kitchener used ill-structured problems, which, they said, required higher order thinking skills (King and Kitchener, 1994). Their research methods differed from those of Marton and colleagues, and Biggs, in that they quizzed students about the reasons for their actions while they were tackling problems (Moon, 2004). They serially examined the reasoning of a cohort of 80 people over a ten-year period during which time most made major advances through the educational system. There are seven stages to the reflective judgement model (see table 2.2) each describing a higher level in the development of epistemic assumptions (Kitchener and King, 1990). These assumptions are the basis for individuals attributing meaning and are the tools with which they solve problems. Descriptions of the seven stages of reflective judgement are given by defining each stage in terms of the view of knowledge and methods of justification of beliefs a learner uses at that stage (King and Kitchener, 1994, pages 14-15). In progressing from stage one to stage seven the learner's view of knowledge changes from a view of the existence of a right answer to every question to knowledge being the outcome of enquiry with possible solutions being weighed up according to evidence. At the lowest level beliefs need no justification since there is assumed to be only one truth and the learner believes what he/she has seen is true. At the most sophisticated level beliefs are justified probabilistically using a combination of factors including the weight of evidence, the likelihood of erroneous conclusions, and the implications of alternative explanations.

At the highest two stages where reflective judgement is reached the learner realises that their processes of reasoning influence the response they make (Moon, 2004).

What is being described here is a scale of views of knowledge and justification of beliefs with a dualistic belief in right or wrong at one end and a relativistic belief in there being numerous explanations for phenomena and the need to weigh up evidence to ascertain the most plausible. The task of learning and its outcomes are going to be very different at the two ends of this scale even if the learning material and the teaching are the same.

2.2.3.4 Map of progress of learning

Perry worked with students at Harvard in developing what he described was a “Map of progress of learners’ intellectual and ethical development” (Moon, 2004; Perry, 1970). His research methods consisted of unstructured interviews with students. Perry said that students passed through a number of epistemological understandings which he called ‘positions’. Like King and Kitchener he developed a hierarchical set of descriptions of students’ increasingly complex conceptualisation of knowledge and learning (see table 2.2). At the first level of his scale he described basic duality (Perry, 1970), which is very similar to the first level of reflective judgement and is based on a belief of absolute right and wrong. In the middle there is the recognition that experts may hold differing views, which he described as multiplicity (Moon, 2004; Perry, 1970). At the top end of his scale Perry described relativism, again, like the reflective judgement model based on the perception that evidence was required on which to make a judgement. Perry’s work differs from King and Kitchener by his belief in commitment. Perry said that at the relativistic level students recognised the need to make a decision based on evidence and that they made a personal commitment to their explanation of events. King and Kitchener disagreed with the need for personal commitment (Moon, 2004).

2.2.4 Expected level of epistemological development of undergraduate students

The work of King and Kitchener had an important implication for researchers and curriculum planners in higher education. The degree of sophistication to which students could be expected to use reflection in learning is likely to be limited by their level of epistemological development. In fact the highest level of development according to their model that could be expected of senior undergraduates is level four. This level represents a major step in that it is the first level at which students can tolerate uncertainty in knowledge. Learners at level four struggle with their lack of ability to validate knowledge in an uncertain world and put a lot of uncertainty down to the idiosyncrasies of the individual. There is an important practical point made about learners at level four. They have no difficulty in working out a well-structured problem but struggle with ill-defined ones (such as the kind of problem encountered every day in the practice of medicine).

A study measured the modes and conceptualisations of studying of first and final-year students in medicine and psychology. At the beginning many students in both disciplines had dualist epistemological conceptions. By the final year students in both domains showed a shift towards relativism but this was greater among the psychology students (Lonka and Lindblom-Ylänne, 1996). Staff at one medical school using portfolios with undergraduate medical students have found that their students struggle with having to reflect and need help in developing educational maturity (Hays, 2004).

2.2.5 Emotion and learning

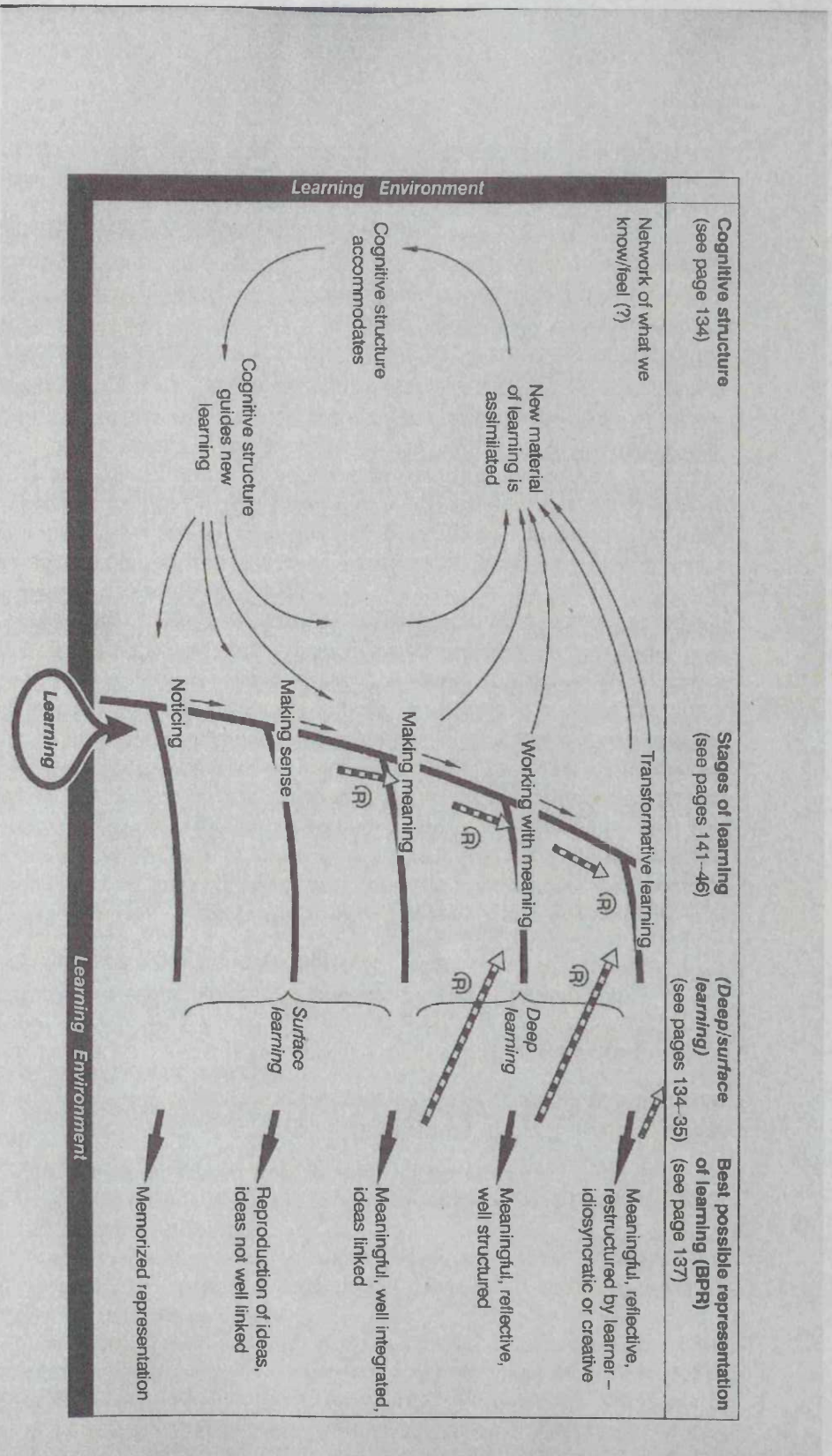
Emotion and learning cannot be separated. When someone learns something to a level of mastery there is a feeling of satisfaction separate from the cognitive changes associated with conceptual understanding (Entwistle and Entwistle, 1992). Entwistle and

Entwistle described a category of feelings related to learning which they called *provisional whole*. The learner felt a sense of satisfaction at having understood the material to be learned which was acceptable to them at the current stage of their learning but which they may develop further as their learning progressed (ibid).

2.2.6 Linking structure of learning and constructivism

The map of learning and representation of learning (Moon 1999a; see figure 2.3) brings together the work in this section on structure of learning with some work from section 2.1 on the constructivist model. It presents a model of the role of reflection in assisting learners to learn at higher levels of the scales of learning shown in table 2.2. The works of King and Kitchener, and Perry are represented by the stages of learning, the work of Marton et al. is represented by deep/surface learning and the SOLO taxonomy is represented by the Best possible representation of learning (BPR). The cognitive structure with the processes of accommodation and assimilation are represented on the left. At the lowest level of learning, Noticing, the learner is unquestioningly taking on board information. However as learning becomes more sophisticated the cognitive structure plays a greater part in learning and there is a greater process of accommodation. At the highest level the learner is not only interpreting new knowledge but is evaluating their frame of reference and the nature of knowledge itself. The striped arrows with the letter R represent the role of reflection. By reflecting on and re-evaluating prior learning, the learner can give new meaning to previously learned material particularly in light of new knowledge or insights in related subjects. In other words, reflection can enable the learner to deepen their learning without acquiring any new information (Moon, 1999a).

Figure 2.3 Map of learning and representation of learning. From Reflection in Learning & Professional Development: Theory and Practice (Moon, 1999a). Reproduced by kind permission of the author (Page references refer to the source book, not this thesis.).



2.3 Reflective learning in practice

The remaining section of this chapter is taken up with a review of published work relating to introduction of reflective learning into professional education. Earlier I put the case for reflection providing connections between theory and practice, in this section I present the work of authors with practical experience of getting students to take up reflective learning. Many are based on evaluations of reflective learning introduced to single classes or small groups of students within the context of a single institution. Of all the published studies examining reflective learning in professional education the majority relate to the education of preservice teachers (Hatton & Smith, 1995; Krause, 1996; Sinclair and Woodward, 1999; Woodward, 1998; Woodward, 2000;). I present the results of a systematic review of studies of reflective learning in UME (see table 2.3).

A number of studies have been carried out relating to the introduction of reflection into nursing and midwifery (Atkins and Murphy, 1993; Howarth, 1999), and professions related to medicine such as physiotherapy (Routledge, Willson, et al., 1997) and occupational therapy (Murray, McKay, et al., 2000). Some of these studies concentrate on outcomes of reflective learning and give little information about the process (Bulman, 2004).

2.3.1 Interventions supporting introduction of reflective learning

The purpose of this subsection is to review published work that presents interventions aimed at helping students benefit from reflective learning. The authors of these studies have had the considerable problems of defining reflection, identifying the reflective practitioner and identifying when reflection has taken place (Copeland, Birmingham, et al., 1993; Hatton and Smith, 1995). After the discussion of reflection in section 2.1 it would not make sense to assume that reflection was something that could be described as having

happened or not happened in binary terms. Some authors have used the descriptive terms developed by Van Mannen based on the work of Habermas to describe different levels of reflection (Hatton and Smith, 1995; Van Mannen, 1977).

A number of studies describe interventions specifically designed to help students get started with reflective learning (Woodward and Sinclair, 1998). In his work with student nurses Duraghee (1998) found purposefulness, activity, collaboration, critical thinking and confrontation, all valuable concepts for teachers wishing to introduce reflection in learning.

Smith and Irby (1997), in their work introducing reflective learning into the ambulatory care setting recommend, planning for experiences in carefully selected settings, facilitation of reflective observation, encouraging conceptual thinking, promoting feedback and testing of insights from experiences. They propose that if these suggestions are successfully introduced, the ambulatory care clinic will form a reflective practicum (Schön, 1987).

Problem-based learning (PBL) is a strategy that may encourage reflection in learning. By basing learning on discussion of written clinical cases PBL stimulates prior learning and integrates learning from different sources (Schmidt, 1993). When groups of students discuss the cases they explore what they already know before deciding their learning objectives (Schmidt, 1983a). Examination of prior learning in this way fits with the constructivist model of learning. How problem-based learning differs is that it uses cases written specifically for learning in a particular area whereas reflective and experiential learning are based on experiences that may not have been created specifically for learning. Reflective and experiential learning may, opportunistically, be based on real-life events.

2.3.2 Assessing reflective learning

It is usual in higher education for students work to be marked by a teacher and returned to them, preferably with feedback. In most cases there will be some element of

summative assessment in this process (Davis, Freidman-Ben David, et al., 2001). This kind of summative assessment does not sit easily with a form of learning that involves a student (at least in the case of a portfolio or journal) exposing gaps in their knowledge and critically questioning their learning materials and, possibly, their teachers (Boud, 2001). Also, if a piece of work is to be assessed, it is possible that their motivation will be to gain best marks rather than to maximise their learning (Grant, 2001; Linn and Gronlund, 1995).

In previous work using reflective learning with final-year medical students (Grant, 2001) I found that students fabricated the patients they wrote up in significant event analyses in order to score a higher mark. It was, therefore, an important consideration when designing this study to eliminate the possibility of students' reflective learning being biased by the effects of assessment. The possibility of fabrication in this study was minimised by removing all aspects of assessment from students' reflective learning. However, it would be possible to reduce the risk by making sure that significant event analyses were signed up by the clinical tutor who would have knowledge of the individual patients.

Various techniques have been used to protect students' reflective work from bias while using it as a base for assessment. Students either submit a written report or attend an oral examination where they give evidence that they have achieved the learning outcomes without the examiners seeing the actual portfolio (Woodward, 1998; Driessen, van Tartwijk, et al., 2003). Students at one medical school have the option of gaining exemption from their final examination in public health and general practice by submitting a portfolio demonstrating adequate experience and competence (Snadden, Challis, et al., 1998).

Clearly defined learning outcomes and coaching have been identified as essential features of learning and assessment using portfolios (Davis, Friedman Ben-David, et al., 2001; Driessen, van Tartwijk, et al., 2003). Separation of the supportive and formative role of the tutor or coach from the task of assessment can help to protect the confidential and

personal nature of the contents of students', reflective work. Friedman Ben-David, Davis, et al. (2001) give guidance to educators wishing to use portfolios in assessment.

In formative work students have been asked to assess their own performance (Murdoch-Eaton, 2002). When students' assessment of themselves has been compared with that of their supervisors, the supervisors' assessments have been found to be more favourable. A reason put forward for this was that students judge others by assessing performance but judge themselves by their perceived abilities (ibid).

When assessing students' portfolios, the teacher is examining the actual outcomes of the students' learning which is quite different from an assessment task (such as an exam question) created to sample the students' learning. Assessing authentic learning outcomes enables the teacher to assess the students' level of critical thinking.

2.3.3 Studies evaluating use of reflection in UME

Reflection in UME has not been studied extensively (Driessen, van Tartwijk, et al., 2003; Ker, 2001). To confirm this I carried out a systematic review examining primary research evaluating reflective learning in UME.

2.3.4 Systematic review of literature on reflection in UME

I searched the Medline database using "reflect\$" (\$ being a wild card) as a key word and then examining the outcome of that search for citations that had been coded for "medical education, undergraduate" as a MeSH (Medical Subject Heading) for years 1966 to 2005 (June). I searched for "reflect\$" as a text word, refining that search with medical education, undergraduate. No MeSH exists for reflection or reflective learning which made the use of the key word and text word searches necessary. A search of the ERIC (Educational Resources Information Centre) database from 1990 to 2005 (June) was also carried out using "reflection" and "portfolio" descriptors. The outcome of these searches

was examined for the descriptor “medical education”. I carried out a hand search of three medical education journals from January 1999 to June 2005: “Academic Medicine”, “Medical Education” and “Medical Teacher”. I examined the titles and abstracts of the studies identified by these searches and included any study which examined reflective learning in UME in the review. Nineteen studies were identified from this search and included in the systematic review, the results of which are shown in table 2.3

Table 2.4 Systematic review of studies investigating reflective learning in UME.

* = none given.

Author(s)	Methodology	n	Setting	Outcome
Beylefeld, Nena, et al., 2005	Questionnaire survey	128	Community placement in first year of undergraduate medicine	Reflecting on community placements stimulated students to reflect on the emotions they had experienced
Boenk, Odervald, et al. 2004	Validation of an instrument to measure student reflection in medical practice	195	4 th year medical students attending an ethics course	Semi-structured, observer-rated instrument to measure medical students' reflection
Boggs, 2001	Informal discussion plus website	*	Reflection on first clinical placement (3 rd year)	Students reflected on clinical experience and developed a list of good learning opportunities
Davis, Friedman Ben-David, et al., 2001	Analysis of student results Observer documentation Examiners evaluation q'aire Students evaluation q'aire Verbal report from student representatives.	126	Portfolio for 4 th and final year medical students used for summative (licensing) assessment	Portfolio assessment measures outcomes not easily assessed by other methods. A worthy addition to the assessor's toolkit.
Dreissen, van Tartwijk, et al., 2003	Semi-structured interviews	242	Portfolio (1 st year)	Portfolio, a useful addition to existing assessment tools
Fins, Gentileseo, et al., 2003	Participant observation involving reflection and journals.	*	Ethics and palliative care clerkship	Students were less defensive in dealing with palliative care issues. Hidden and informal curricula were addressed.

Table 2.4 Systematic review of studies investigating reflective learning in UME, continued. * = none given.

Author(s)	Methodology	n	Setting	Outcome
Grant, 2001	Questionnaire with open questions	78	Portfolio on final year attachment in general practice	Reliability of portfolio assessment was higher when rating was carried out by departmental teachers rather than by GP teachers. Significant event analyses stimulated little metacognitive activity.
Henderson, Hogan, et al., 2003	Semi-structured interviews and focus groups	300	Significant event analysis on general practice attachment	Proposes coping strategies that may help students with the conflicts brought up by significant event analysis.
Henderson and Johnson, 2002	Analysis of student structured emails from students to tutors	*	Third year (pre-clinical) of undergraduate medicine	Writing reflective emails facilitated scaffolding of learning from PPD workshops and prompt tutor feedback.
Ker, 2003	Semi-structured Questionnaire	6	Teaching intimate examination	Structured reflection periods enable medical students to develop their thinking skills alongside development of technical competence
Kidd and Nestel, 2004	Feedback on written assignments	340	Written reflective assignments	Giving written feedback on reflective assignments is time-consuming. Students level of engagement with reflective tasks varied
Lichstien and Young, 1996	Critical incident reports	*	Thematic analysis of students' reports	The critical incident technique promoted reflection on the meaning of clinical experiences. Reflective exercises can provide a window into students' experiences.
Lonka, Slotte et al., 2001	Content analysis of portfolios	91	Gynaecology attachment	A portfolio keeps learning outcomes in focus and encourages reflection.

Table 2.4 Systematic review of studies investigating reflective learning in UME, continued. * = none given.

Author(s)	Methodology	n	Setting	Outcome
Murdoch-Eaton, 2002	Comparison of students' self-ratings with ratings from supervisors	254	Independent project (3 rd year)	Students consistently rated their own skills lower than their supervisors
Murdoch-Eaton and Levene, 2004	Student questionnaire	218	Student appraisal	Individual appraisal for all students reduced their anxiety and enhanced their perception of their teachers.
Pololi, Frankel, et al., 2001	Field notes of groups and textual analysis of journals	20	Learning journal and facilitated reflection groups in first year ambulatory care placement	Students used journals and reflective groups to deal with the sociobehavioral content of early patient contact
Rees and Sheard, 2004	Student questionnaire	178	Portfolio assessment of communication skills. Second year students	Students who rated portfolio learning more highly got better marks for their portfolio, rated their reflective skills higher and were more confident about creating another portfolio.
Sobral, 2000	Reflective learning scale Self-efficacy scale Meaningfulness in learning scale	198	30 hour learning skills course	Reflection in learning associated with readiness for self-regulation of learning, a more positive learning experience and deeper learning.
Sobral, 2001	Grade point average (GPA) Reflective learning scale Approaches to Study scale	254	2 nd year, 1 st term	Reflection correlated positively with meaning-orientated learning and negatively with reproduction-orientated learning.

The studies included in this review (I have added work from my MHPE dissertation; Grant, 2001) vary in study design, in intervention and in the phase of the curriculum where they are introduced. Because of the variation in design it would be extremely difficult to combine these studies in a meta analysis. This reflects the context-bound environment in which many medical education studies take place. A large study of reflective learning with widely generaliseable results across many institutions and stages of the curriculum is probably not practicable (, Toon, et al., 2003; Leung, 2002; Norman, 2003).

All but one of the studies identified examine the introduction of an intervention designed to promote reflection in learning in UME. Sobral (2001) measures reflective activity of medical students in the absence of any intervention.

The features that separate these studies relate to defining reflection and measuring outcome. Features related to the intervention include single or repeated reflective activities, the involvement of assessment (summative or formative) and the involvement of written reflective activity (reflective journal or factual logbook). Evaluations vary; some involve a student questionnaire whilst some look at outcome measures such as examination marks. Several studies use qualitative interviews or focus groups. Davis, Friedman Ben-David, et al. (2001) evaluate the student portfolio in Dundee, which is part of the final examinations, using data from five sources. They, and Driessen, van Tartwijk, et al. (2003) describe portfolios used across a whole year or more of the curriculum; one used with first-year students and the other in Dundee which was used with fourth and final year students. Both involved assessment but the final year Dundee portfolio had the highest burden of rigor because it formed part of the licensing examination. This is not to say, however, that the portfolio did not contain work of a highly reflective nature. During the two years that they kept the portfolio the students completed 56 patient presentations (covering topics from a list of 100 core clinical problems). In compiling these, students were prompted to reflect on what they had learned from seeing the patient and to identify further learning needs. On top

of this the students wrote up 19 case discussions in which they demonstrated how their theoretical knowledge had enhanced their understanding of a theme. In carrying this out they were connecting theory with practice and having to process their knowledge in a deeper way. In Dundee the constituent parts of the portfolio had already been marked but were marked again by two examiners who confirmed or refuted the marks awarded previously. In Maastricht the portfolio was assessed by the student's mentor who would feed back as the year progressed if there was any perceived deficit. An independent assessor also marked the portfolio. Agreement was sought between student, mentor and assessor as to the student's performance. If there was disagreement the portfolio was marked by a second assessor and by whole the assessment committee where necessary. The authors of the Maastricht portfolio propose that assessment using a reflective portfolio like this one is a "worthwhile addition to existing assessment and learning tools". The Dundee authors put forward portfolio assessment as a method that makes it possible to measure outcomes that were difficult to assess in any other way, such as attitude.

The Maastricht and Dundee teams also share the importance they place on the clarity with which they inform the students of the expected learning outcomes (this reflects the outcome-based curriculum in Dundee). In the evaluation of the Maastricht portfolio it was discovered that reflection helped students define their own learning objectives.

One study evaluated reflection in the development of clinical skills. Students were learning intimate examination skills on a student-selected component (SSC) and reflective discussion groups were used to help students build their confidence in performing these examinations (Ker, 2003). The students used the groups to vocalise their strengths and weaknesses at intimate examination. Unfortunately only six students were involved in this study and although the students said that the SSC had made them reflect on their examination skills the paper lacks further detail about the benefits. Another study describes the use of a reflective technique for a specific learning purpose. At Weill Cornell University

medical students undergo a 2-week ethical and palliative care clerkship (Fins, Gentile et al., 2003). In their descriptive article which does not give the number of students who have been involved they describe how participant observation is used where students are relieved of any clinical responsibilities and are encouraged to observe the actions of the physicians and the reactions of patients and relatives. Reflection is facilitated by learning journals and seminars facilitated by physicians. Members of staff who form appropriate role models are selected as facilitators. Analysis of excerpts from students' journals suggests that they felt less defensive in relation to the treatment of individual patients enabling them to be more honest in assessing the efficacy of therapeutic measures. The authors say that these findings are from a preliminary look at the data and that they intend to carry out a systematic evaluation at a later date.

Only one study made students' emotional reactions to learning situations its primary aim. First-year students in Free State University in South Africa were given prompts to guide their reflective writing when they were on a community placement. The framework of prompts enabled them to deal with their emotions when they were confronted with the inequalities in health care rather than writing mere descriptive accounts (Beylefeld, Nena, et al., 2005).

Sobral's work (2000; 2001) makes a valuable contribution to this literature review because he was the only author who used validated questionnaires to measure aspects of students' learning in relation to reflection. However, the arbitrary grouping of students in the analysis of his data limits generalisation from data from the 2000 study.

In this study (2000) he measured the effect of a 30 hour study course on students' learning using four instruments (Nehari and Bender, 1978; Bordage and Grant, 1990; Sobral, 1998; Zimmerman and Bandura, 1992). He developed one of the instruments the Reflective Learning Scale (RLS) specifically to measure medical students' reflection in learning (Sobral, 1997). In the second study (2001) he measured medical students'

reflective activity at the beginning and at the end of a term in the second year at medical school. The intervention in the first study involved students working in small groups of five to seven examining current learning practices, discussing learning strategies, and receiving constructive feedback linked to learning goals.

In analysing the data from this first study Sobral divides the students according to the degree and direction of change of their reflective ability. This division is arbitrary and makes conclusions based on it questionable. Higher levels of reflection in learning were found to be correlated with higher levels of meaning orientation. Increasing reflection was also associated with higher levels of learner autonomy and stronger self-regulation of learning. He puts forward a theory that it is reflective processes that mediate a learner's self-regulation and their sense of autonomy. Although this theory is interesting, and might feel right to many teachers and learners, his methods make it impossible to conclude this from his data.

In subsequent work Sobral asked students to complete three instruments including the RLS at the beginning and the end of term. The other two instruments were; a shortened version of the Approaches to Study Inventory (sASI - Ramsden, 1997) and the Course Valuing Inventory (Nehari and Bender, 1978). There was no change in RLS score between the beginning and the end of term, although this interval seems short time to see a significant change in students' level of reflection. However, score on the RLS correlated positively with the Meaning Orientation Subscale of sASI and negatively with the Reproduction Orientation. This supports the conclusion from the first study that reflection is associated with deeper learning.

I evaluated the use of significant event analyses (SEAs) which were included in portfolios used by students in fourth and final years at Imperial College in London (Grant 2001; Henderson, Hogan, et al., 2003). I took part in both studies, in the first (Grant, 2001) as principal investigator and in the second (Henderson, Hogan, et al., 2003), as part of the

study team, I designed the study, analysed the data and wrote up the study. While they were on placements in general practice, students were asked to write up a small number of patients using a set of headings based on the Critical Incident Technique (Flanagan, 1954). The format of these was similar to the case discussions and patient presentations of the portfolio used in Dundee. Students were asked to write about patients of interest. The two studies were carried out using different methods of evaluation, the fourth year evaluation used focus groups and one-to-one interviews while the final year evaluation used an 18-item questionnaire.

The format of the portfolio in both attachments was similar and differed from written work in other parts of the curriculum. In addition the students spent most of their time at a general practice away from the medical school, on the final year attachment. They were then dependent on their GP teacher to act as mentor while they compiled their portfolio and the degree of preparedness of their tutor for this task varied. However, it was the finding of both studies that the GP tutor was central to the process.

The qualitative fourth year portfolio study detected a number of conflicts for the students compiling the portfolio. The authors divide this conflict according to its source, internal and external. Sources of internal conflict were, not wanting to discuss or commit personal feelings to paper, feeling forced to take part in a learning process that was unnatural and feeling forced to sit down and write for an over-structured chore. Not wanting to be seen to criticise clinical teachers also came into this category. Not wanting to show a clinical teacher up in a bad light also formed an external source of conflict, as did discussing feelings and not wanting to raise an issue involving strong feelings which were not shared by the group. The authors put forward some coping strategies that students have found useful. In keeping with the clear learning outcomes of the Maastricht and Dundee portfolios, one of the tutors' central roles, as far as the students were concerned, was to

make clear what the students had to do and what their significant event analyses should look like.

The questionnaire used to evaluate the SEAs with the final year students (Grant, 2001) was only moderately successful in determining the effect of reflection on the process of learning. Students said SEAs made them think more about the patient they based them on but no further detail was forthcoming about the effect this extra thought had on their learning. Responses were equivocal or negative to items about SEAs helping students identify what they knew or what they needed to know. In the free text part of the questionnaire a number of responses suggested that having used SEAs in the fourth year the students did not think they should have to use them a second time. Reflection and assessment clashed in this study and the questionnaire did not obtain much information from the student's viewpoint. In retrospect, one of the techniques described in subsection 2.3.2 above to enable students to present a summary of what they have learned either orally or in writing, might have reduced this conflict.

Lichstein and Young (1996) asked students on a general medicine attachment to write about their most memorable patient at the end of each month using the critical incident technique. They carried out a thematic analysis of the reports and found that they stimulated students to use reflection to explore the meaning associated with each patient and that the students' writings were often focused on non-clinical aspects.

Kidd and Nestel (2004) used a set of questions to help first-year students reflect on two sessions on communication skills. The questions were different to those used in SEAs and were focused on the specific task required of the students relating to communication. The authors read all the students' assignments and gave written feedback. They found that they were giving the same feedback repeatedly so they developed a proforma to make this task easier. Like other studies of reflective learning they found that some students were challenged by a reflective learning task. They found that the assignments varied a great

deal with some students writing very reflective work while others dealt with them with a surface approach. Like experience with the Maastricht portfolio the tutors found reading and giving feedback on the assignments laborious. The only other study to look at reflection in relation to communication skills used the format of a portfolio that was used to assess communication skills (Rees and Sheard, 2004). It is not surprising that students who scored highly on their questionnaire (positive opinion of portfolio assessment) were likely to rate their reflection skills highly and score high marks.

Two studies used reflection primarily as a way of supporting students' personal and professional development (Pololi, Frankel, et al., 2001; Henderson and Johnson, 2002). First year medical students wrote journal entries and attended fortnightly reflective learning groups where they explored the personal and emotional issues that arose during an ambulatory care attachment (Pololi, Frankel et al., 2001). They identified three major sources of stress related to clinical contact for these students; the role and responsibility of the physician, death and dying, and racial issues. Participation in the study was voluntary. Using a template, third year medical students at Cambridge wrote a structured email to their tutors after experiential sessions, which were part of their personal and professional development teaching (Henderson and Johnson, 2002). The students were asked to write what they learned from the sessions emotionally, factually, intellectually and practically. Writing these emails had the effect of extending the students' learning; they also enabled tutors to give feedback promptly.

2.3.5 Overcoming unfamiliarity

Many definitions of reflection are used including; connecting theory with practice (Schön, 1987), challenging assumptions (Brookfield, 1987), bringing about social emancipation (Fitzgerald, 1994), and making meaning (Dewey, 1933). Many authors report difficulty experienced by students when reflective learning is first introduced (Holm

and Stephenson, 1994; Krause, 1996; Westberg and Jason, 1994). For example, a student at Imperial College, in work described above, thought significant event analyses were “A bit hippyish”. Should the students be convinced by the same arguments as their teachers before they undertake reflective learning or should a top-down “this will be good for you” approach be sufficient? If students are going to be writing a diary or journal it is essential that they know from the outset whether this will be a private document or who is going to have access to what they write (Snadden and Thomas, 1998).

A frequent question from students when starting out with reflective learning is “why do we have to write this down?” (Moon, 1999b). They may assert that they reflect all the time informally.

It has been asserted that having to overcome the initial difficulties of reflective learning contributes to the satisfaction of having got to grips with it eventually (Krause, 1996). A frequent report is that learners, when faced with reflective learning for the first time, want to know if they are doing it “right” (Grant, Berlin et al., 2003). Some authors have suggested exercises that enable students to experience reflection in some form for themselves. The “My Life in a Bag” exercise (see box 2.1) has been used for this purpose. In it the students examine objects they have chosen as important in their lives and reflect on the reason for their choices. While they do this the tutor points out to them that they are reflecting and the way in which this is similar to reflective learning.

Box 2.1. My Life in a Bag: Exercise designed to help students understand the concepts involved in portfolio learning (Krause, 1996).

My Life in a Bag

Instructions given previous week

Bring ten (10) items to the seminar next week that represent something about YOU as a person. Include one item that is a certificate, award, or grade/transcript etc. If an item is too large to transport (e.g. a car, a painting) describe it briefly on a 3"x5" card. Possible items might include: photographs, books, ticket stubs, an essay you wrote, a poem, a soccer shirt, etc. These are ONLY SUGGESTIONS – be sure to choose things that say something important about you.

Instructions given on the day

- 1. Ask students to share their ten items with students sitting next to them.*
- 2. Then select the four items that best represent the self they want others to know.*

During the second activity the teacher should vocalise the similarities between this activity (collecting, selecting and reflecting) and keeping a portfolio.

Many professional courses have a reductionist approach but when reflective learning is introduced, learners are encouraged to face the reality that they are entering the messy world of practice where there is a great deal of uncertainty (Fitzgerald, 1994; Fish and Twinn, 1997). This may be the first time they have been faced with a pluralistic view of the world.

Teachers who have introduced reflective learning into the curriculum have found that students were helped in starting reflective learning by being given clear instructions how to go about their reflective learning tasks, by being given early feedback on their work and by being shown examples of previous students' work (Davis, Friedman Ben-David, et al.,

2001; Driessen, van Tartwijk, et al., 2003; Grant, Berlin et al., 2003). Clear learning outcomes will help and will give a clear message to the students about what aspects of learning are considered most important.

2.3.6 Portfolios and learning journals

Many studies that have introduced reflection learning have used a learning journal or portfolio as a vehicle for reflection (Cross, 1997; Davis, Friedman Ben-David, et al., 2001; Driessen, van Tartwijk, et al., 2003; Grant, Berlin et al., 2003; Snadden and Thomas 1998, Wade and Yarborough, 1996; Wetherell and Mullins, 1996; Williams, Wessel, et al., 2002; Woodward, 1998; Woodward, 2000; Zeichner and Wray, 2001). Learning portfolios can take many formats and just form a way of holding together a number of pieces of work with or without a reflective commentary written by the student (Moon, 1999b). However, the only studies involving portfolios that I have included in this review are those that use the portfolio as a method of encouraging students to take part in written reflection. Like portfolios, learning journals and diaries take a variety of formats. A learning journal has more reflective content than a logbook where the content is a more quantitative record of learning activities (Moon, 1999b). It is a requirement that medical students educated in the United Kingdom should keep clinical logbooks and personal portfolios as a way of identifying strengths and weaknesses (General Medical Council, 2003).

As discussed above, many students find reflective learning difficult or unfamiliar, and learning diaries have been introduced as a way of getting them started (Grant, Berlin, et al., 2003; Grant, 2001; Wade and Yarborough, 1996). Writing is essentially different from talking. By writing students can get in touch with ideas they did not know they had and can make connections within their understanding (Bolton, 1999). Writing clarifies an experience and introduces objectivity in relation to it (Walker, 1985).

The spectrum of logbooks, learning diaries and learning journals (some of which form part of a portfolio) is arbitrary and there is a great deal of overlap. The format of the journal or portfolio varies with each project because it is moulded by the needs of the particular curriculum and assessment methods of that institution. For example, the A5 logbook that students were asked to fill out as they went through an attachment in obstetrics and gynaecology (Lonka, Slotte et al., 2001). This was mainly a record of all the practical procedures students carried out. However, they also had a page describing each learning session where there were questions designed to prompt reflection such as “What did you learn?”. In the analysis (which was by textual analysis of the logbook contents) they found that students who wrote a greater volume in their portfolio were more likely to do well in the final examination. About 50% reported that they found the portfolio useful and being able to give feedback about teachers was popular. Twenty percent said that they liked the opportunity to advance their learning and many expressed pleasure that interest was being taken in their learning. Negative comments were made by about 16%. Many found having to sit down and write about each case laborious and some struggled with the question “What did you learn?”(Lonka, Slotte, et al., 2001).

A portfolio or logbook will have to meet the needs of each individual learning situation. However, research has shown that the greatest number of conditions is covered in medical students' logbooks if entries are made daily and that this is improved if students' entries are supervised (Raghoobar-Krieger, Sleijfer, et al., 2001).

Writing a journal provides the learner with conditions that improve learning. Journal writing has been described as using the page as “a meeting place on which different ideas can mingle” (Moon, 1999b). Writing a journal helps learners to reflect on their current beliefs and to consider alternatives (Carter, 1998). Having to sit down to write a journal forces the learner to make time and space for learning. In writing about a subject the learner demonstrates to himself or herself how well they understand the learning material.

If they cannot 'explain' the learning material to their journal they may not have a very good understanding. Moreover, writing encourages the deep approach because it demonstrates to the learner the level of understanding (i.e. a grasp of underlying concepts) needed to be able to explain the subject matter to a third party. Learners would not be able to do this with a surface grasp of the learning material. Journals have been used as a method of encouraging the development of complex thinking and learning skills (Moktari, Yellin, et al., 1996). They have been used extensively for this purpose in nursing education (Dobie and Poirrier, 1999). In a controlled study with first year university biology students half the class used a learning journal while a control group used scientific report. The journal group used more sophisticated metacognitive and cognitive strategies on a learning task as well as demonstrating more complex concepts of learning and greater integration of learning (McCrinkle and Christensen, 1995). Creative writing has been used to help the professional development of pre-clinical medical students (Hatem and Ferrara, 2001).

King and Kitchener (1994) argue that most students began higher education in a state of epistemological immaturity. This has been put forward as one explanation why many early medical students have not been able to write reflectively in a learning journal. The work of Lonka and Lindblom-Ylane (1996) suggests that medical students may be slower than students in other domains to mature from this level of immaturity (see 2.2.4).

Journal-writing can help students deal with ill-defined problems. Writing problems without an obvious solution encourages the learner to define the problem and to set it out with all its facets. By dealing with ill-defined problems in this way learners are using an approach at a higher point on the Reflective Judgement Scale (King and Kitchener, 1994). Reflective journals have been used in early clinical experience to transform the student from passive observer to active learner (Brindle and Ludman, 1996)

As well as creating good conditions for learning, journal- and portfolio-writing encourage reflection and all its benefits for the construction of knowledge which have been

elucidated earlier in this chapter. The blank page of the journal offers the learner somewhere that their ideas including their prior learning and new knowledge can mingle, it can form a stage for the proximal zone of development, and can scaffold knowledge construction. Reflection offers the student a way of approaching difficult problems because it is these and not simple, straightforward matters that learners choose as subjects on which to reflect (Moon, 1999b). Drawing, painting, the use of metaphors and taking photographs can all help students extend the degree to which learners explore their abstract knowledge when reflecting (Korthagen, 1993). Rainier proposed seven special techniques for journal writers when they were struggling to deal with a problem adequately by usual narrative means which were Lists, Portraits, Maps of Consciousness, Guided Imagery, An Altered Point of View, Unsent Letters and Dialogues (Lukinsky, 1990, pp. 230 - 231).

In the literature there is a variation in the degree to which emotion is included in reflection and journal keeping (Moon, 1999b; Walker, 1985). Writing a reflective journal gives the learner the opportunity to make connections between learning and emotion and to take greater account of the context of learning (Moon, 1999b). Reflective writing connects feelings and emotions with learning which is of particular importance in nursing and medicine where trainees are going to be coming across stressful emotional situations as part of their clinical work (Dobie and Poirrier, 1999; Moon, 1999b).

The style of writing in a journal is different to the more formal style of written course work, and is more conversational. Many students will not have written in this way before, particularly since the skill of personal letter writing is now practised infrequently (Moon, 1999b). A journal differs from other forms of writing in that entries are made over a period of time (Holly and McLoughlin, 1989). By exploring styles of writing, students can discover “power” or “voice” in expressing themselves, their learning and their emotions (Elbow, 1998). In a project where student nurses and pharmacists wrote journal entries about articles they had read in relation to their clinical work (Balkema, 1999) the journal

helped the students to gain confidence in their training, shape their opinions, define their professional goals and create a professional identity for themselves.

2.3.7 Journal format

Learning journals may take many formats. Indeed it is one kind of student writing in which they are encouraged to develop an individual style. However, different journal formats may be introduced in order to facilitate particular learning needs. Moreover, templates and headings are useful in helping students to get used to using learning journals and to get started with the reflective learning process.

The Critical Incident Technique (Flanagan, 1954; Dunn and Hamilton, 1986) was first introduced at the end of the Second World War to assist systematic debriefing of air force pilots who had been involved in near-miss mid-air crashes. The purpose was to learn as much as possible from these incidents to prevent future crashes. This widely used approach has been used to assist learners to set out reflective accounts of incidents in their learning (Brookfield, 1990; Ghaye, and Lillyman, 1997). It has been adapted for use in reflective learning where students are prompted to reflect by writing journal entries under a number of prompts or headings. Typical critical incident prompts would be; “What happened?”, “What do you think about the situation now?”, “What knowledge did you have about the situation?”, “What did you not know that you needed to know?”, or “What do you need to go and learn now?”. Similar headings are given under the description “Experiential Learning” by Stanton and Grant (1999).

Table 2.5 Twelve tips for promoting significant event analysis (Henderson, Berlin, et al., 2002).

Tip 1	The introduction of significant event analysis to the students is important. Spend time on this and make it relevant to everyday life by drawing on the students' past experiences
Tip 2	Explain the use of significant event analysis and its importance for students as a lifelong learning tool
Tip 3	Provide students with a framework for thinking about significant events and discuss possible emotional conflicts that may arise
Tip 4	Acknowledge that the process and language used in written guidance may be foreign to students, and explain it
Tip 5	Acknowledge that feelings may be evoked and that their recognition is an important part of the learning process
Tip 6	Make students aware that there is no right or wrong answer in significant event analysis
Tip 7	Encourage students to own the significant event analysis
Tip 8	Ensure that teachers are adequately briefed and trained
Tip 9	Teachers need to foster a trusting and open relationship with their students
Tip 10	Teachers who discuss their own significant events with students provide a positive role model
Tip 11	Ensure students have the opportunity to discuss their significant event analysis in a peer group
Tip 12	Help students see the role of significant event analysis in their ability to cope with difficult situations and personal housekeeping

Henderson and others have written their "Twelve tips for promoting significant event analysis to enhance reflection in undergraduate medical students" (see table 2.4). Advice contained within the 12 tips demonstrates the paradigm shift required of students and teachers when significant event analyses are introduced. Significant event analysis, in this context, can be used synonymously with the critical incident technique of Flanagan.

Dialogue journals contain regular entries from both students and teachers. The teacher reads the student's entry and scaffolds their learning by giving feedback (Moon, 1999b; Cowan, 1998). This dialogue can help the student in developing their own

reflective style of learning as well as in their learning of the subject. The support for learning derived from dialogue journals has been rated highly by learners (Cowan, 1998).

A study involving cycles of reflective conversation and journal-writing by mentor and mentee showed improvements in epistemological reasoning (Arredondo and Rucinski, 1998). The mentors gave written responses to the mentee's journal entries and the course supervisor responded to the mentors' journal entries. Improvements were more dramatic among the mentors, some of whom showed movement towards the upper stages of Reflective Judgement (King and Kitchener, 1994).

A study involving first year medical students writing a dialogue journal found that quiet students were given a voice. Students found that they could make connections between ideas and make connections between their studies and their personal lives (Ashbury, Fletcher et al., 1999). The journal gave both students and tutors a window on the student's personal and academic progress on the course.

Some educators in health care professions have found that by reading their students' portfolios they got a richer insight into what the students were learning and the effects that the curriculum and assessments had at the level of the individual student (Grant, 2001; Karlowicz, 2000).

2.3.8 Discourse and feedback

As well as being told that they are approaching reflective learning in the right way, learners stand to gain a great deal by receiving feedback on their work (Cowan, 1998). The way in which this is carried out needs careful consideration. The content of a learner's journal will vary depending on who is going to read it. If another person is going to read the journal the purpose of that person's seeing the journal will affect what the learner writes. However, if the student's journal is going to be assessed summatively then they will probably be motivated to write what will please the examiner and will gain them best

marks. This does not mean that journals cannot be used for assessment. Burns (1999) sets out ways in which assessment can be set up to drive learning towards sound reflective methods. Validity (i.e. the effect on students' learning) should be concentrated on rather than reliability (Gordon, 2003). Students can, also submit a summary of their journal or they may attend a viva voce exam where they are quizzed on their reflective learning where they may refer to their portfolio (see section 2.3.2).

Discourse on reflective learning can be oral as well as written. In one study it was concluded that science teachers in training did not fully master the task of keeping a portfolio until they used it to explain their views on their learning to a prospective employer (Loughran and Corrigan, 1995).

Students can bring up cases from their learning in practice for discussion with a mentor, with a tutorial group or with a peer group (Pearson, and Smith, 1985). The benefits to a student of regular discussion and feedback from a one-to-one mentoring relationship need no explanation. However, in a tutorial group (i.e. a group of students with a mentor) or peer group (no mentor), students may learn from their peers' cases as well as their own. Peers and teachers can also help a learner identify a problem when they are unable to identify it for themselves (Boud and Walker, 1993).

There is a similar argument about having to present diary entries to a peer group as was presented earlier in relation to having to make written entries in a learning journal. In explaining what they know to a group the learner is examining the level of their own understanding and has to develop knowledge to a deeper level where they can present and explain the learning material rather than just reproduce it. Careful attention needs to be paid to the ground rules of peer groups so that the students feel able to present their work in a safe environment where interventions will be supportive and they do not fear being criticised in an unhelpful manner (Westberg, 2001)

Although most programmes reviewed involved regular reflective learning there is value in well timed, once-off reflective learning activity (Boggis, 2001; Murdoch-Eaton and Levene, 2004). One format this has taken is a review of students' learning skills (Murdoch-Eaton and Levene, 2004). Students have also been asked to think back at the end of a clinical attachment on what they had learned. The purpose of this was to identify good learning experiences and to develop guidelines that would help future students to get the most out of the attachment (Boggis, 2001).

Reflective discussion in small groups with respected role models can help counterbalance some of the loss of idealism observed in medical students as they progress through their studies (Branch, 2001). As discussed under socio-constructivism, appropriate questioning by the teacher is key to facilitating reflection (Branch and Paranjape, 2002).

2.3.9 Summary – reflective learning in practice

In this subsection I will summarise what can be learned from the literature about introducing reflective learning into professional education.

Teachers who introduce reflective learning should expect students to find reflective learning unfamiliar and may find getting started difficult. Exercises are available to help students understand what reflective learning involves. Clear learning objectives and regular feedback from a tutor or mentor are also helpful.

Reflection encourages learners to take time and space for their learning, and encourages them to adopt a meaning rather than a reproduction orientation. Reflection encourages metacognitive activity in which the learner manages their learning as well as developing a clearer picture of their learning styles and their knowledge with its gaps. Learning diaries with various templates or headings prompt students to write reflectively. Discussion with teachers or peer groups can help extend the benefit students gain from reflective learning. In peer groups students can learn from their fellow students' reflections

as well as their own. The 'Twelve Tips' article (Henderson, Berlin, et al., 2002) provides advice for teachers using critical incident style learning journals.

Reflective learning correlates with deep learning and helps students connect theory with practice. It can be used in assessment right up to final medical degree level but care is needed to separate the highly personal reflections written by the student from the examination process. Examination of students' reflective portfolios enables assessment of aspects that would be difficult to assess by any other means.

2.4 Summary of Chapter 2

In this chapter I have used the literature to define reflection. This definition emerges from the work of the authors reviewed in the first section. Reflection involves the learner revisiting their learning, sometimes after an identifiable experience. When they reflect learners examine the episode or experience and compare what happened with their previous knowledge on that subject. Where they detect a discrepancy between what they observe and their prior understanding there is a sense of disequilibrium, which motivates the learner to examine the differences between what they knew previously and what they now observe. The works of Ausubel, Boud et al., Boyd and Fales, Dewey, Habermas, Kolb, and Eraut all support this model although they use different terminology and the way this model is presented differs slightly between authors. The model is constructivism. The learner's body of learning is referred to as the cognitive structure and the process of comparing differences between the cognitive structure and new information is called assimilation. Adaptation of the cognitive structure to take in new information is called accommodation. Biggs and Cowan go on to present ways in which teachers can work with this model to present learning material in an optimum way at different points in the learning cycle. The difference for teachers and curriculum planners, as far as the constructivist model is concerned, is that learning is only seen as being constructed by the learner. Telling learners

what they need to know is, in this model, of limited value, learning experiences have to be devised which stimulate knowledge construction by the learner.

I have examined motivation of learning and the differences between extrinsically motivated learning where the student needs to pass an exam and intrinsically motivated learning where the student learns because they know the intrinsic value of the material being learned.

The second section of this chapter presents the works of authors who examined the process of learning. This work is based on empirical research. The purpose of this section is to provide evidence that will enable me to say whether or not a student's learning has improved as a result of using reflection in learning. The authors define difference in learning by students approach to their learning, from the observed outcome of their learning and from their epistemological beliefs. King and Kitchener warn that undergraduate medical students arrive at university at a relatively unsophisticated level of learning and that by the time they leave they can still be expected to be at a level where they will struggle to deal with unstructured problems. The map of learning and representation of learning brings together the work of these authors and connects them with the constructivist model.

The last section in this chapter contains a review of reflective learning in practice in initial professional education. I have focussed on reflection in UME. but have included other studies because of the relative paucity of studies in UME.

The studies in UME vary in design. A number involve students keeping some form of reflective journal or portfolio. Most of these are structured according to a template or set of headings such as the critical incident technique. The proportion of the undergraduate course included in the reflective study varies; in some cases it is a small element, in others the reflective work covers one or more academic years. Also variable is the degree to which reflective work is assessed. A portfolio formed part of the final medical examination

where it was concluded that it made it possible to assess areas of the students' work that would be difficult to mark in any other way.

Reflection was found to be correlated with a deeper approach to learning, students who used reflection were more likely to enjoy their learning and reflection helped students to form their own learning objectives. Where reflection was associated with assessment, mentoring and clear learning outcomes were found to be important. Students did not take to reflective learning easily and found it unfamiliar. They needed guidance to get them started with the process of reflective learning.

Chapter 3 : Operationalising the question

3.0 Introduction

In this chapter I describe how I operationalised the research question. I present the possible options for addressing the question and my reasons for choosing the methods I used. I describe the intervention including recruitment of tutors, how we publicised the study and recruited students. Psychometric data is presented for the Learning Styles Questionnaire (Honey & Mumford, 1983), which we selected to compare learning styles between participants and non-participants. I present intended methods for collection and analysis of qualitative data with methods of validation.

The first part of this chapter is dedicated to presentation and analysis of data from three focus groups from the previous third year that examined the study proposal and gave their insights on it.

3.1 Pilot focus groups

3.1.1 Aims of the pilot study

The aim of the pilot focus groups was to find out what the students' reaction would be to the offer of a voluntary study into reflective learning. They were best placed to inform me how the study would fit in with the curriculum and how well it would be received by the students. I hoped they would be able to think back to the beginning of the third year and to how they would have reacted had the study been offered to their year. Students in the three groups were asked to comment on the planned study. They gave a student perspective on possible study designs. Some possibilities, including the use of a randomised controlled design, were discussed but not utilised.

3.1.2 Focus group invitees

Three groups of eight medical students were taking part in Student Selected Components (SSCs) in the department of general practice in Cardiff during the period May to July 2002. The three SSCs were based on care of chronic illness, preventive medicine, and literature in medicine. These students were selected because their presence in the department at the time was convenient but despite the diverse nature of the three SSCs they cannot be claimed to be representative of all the students in their year (see 9.1).

3.1.3 Conduct of focus groups

The three groups were held in the department of general practice timed to follow on from the participants' learning activities. On arrival students were given a brief description of the planned study. There was a single question on the sheet which asked the students what their reaction would have been had they been offered the possibility of taking part in the study at the beginning of their third year. The author facilitated the three groups with a second facilitator (HP or MR²) taking brief field notes and providing feedback. The groups were audio recorded and the recordings transcribed.

3.1.4 Analysis of focus group data

Data was imported into "N6" software (Richards, 2002), a package designed to analyse qualitative data. Nodes were created within "N6" to represent key themes then the content of each node was divided up into subnodes as further analysis was carried out (see appendix 6). This resulted in the creation of a node tree that formed the basis for the thematic framework. Nodes were created within "N6" for the principal categories and then these were divided to form subnodes. The node tree created in this way was then interrogated to discover which themes were brought up for discussion by more than one group and whether themes were

discussed within groups or whether the theme was the opinion of only one group member. RP provided expert supervision for the analysis of these data.

Focus group data is identified by the date the group was held (10602, 14602 and 8702. Where possible the individual respondents have been identified from the observers' fieldnotes in which case a suffix is given e.g. 10602_1).

3.1.5 Development of major themes

In holding these focus groups we aimed to explore the students' reactions to the proposal and their predictions as to how their successors would react to the study. Data was also collected on the students' learning experiences so far in the course and their opinions about how taking part in the study might help their successors. Therefore, the seven primary nodes under which the data was coded (see table 3.1) were grouped into four major groups; clarification of the project, possible barriers to participation, advice on the next cohort's reactions, and experiences to date.

Table 3.1 Nodes and subnodes developed in analysis of the transcripts of the three pilot focus groups.

Major groups	Nodes	Sub nodes
Students' advice on the next cohort's reactions.	1. Advice	Recruitment information Prediction of response Time and venue
	2. Time	Crescendo to intermediate MB Busy 3 rd year Study'll take too much time Do-able Time with friends
Students' experiences to date	3. How it would have helped us learn	Ward and lecture Career Small group Experience Look back
	4. Positive aspects of current learning	Time to talk Experiential learning Good lectures Prior learning Peer support
	5. Negative aspects of current learning	Bad lectures Unstructured ward time No feedback Not complaining
Possible barriers to participation	6. Concern for control group	Resentment Still keep diary What will you give them instead?
Clarification of the project	7. Students' questions	Study design Diary Tutorial group How will it help?

3.1.5.1 Students' advice on the next cohort's reactions

Students in all three groups commented that time presented a potential barrier to students taking part. The third-year timetable is extremely full and pressure on students' time appears to rise to a crescendo as they approach the intermediate MB exams in May. As well as needing to study for the exams there were a number of pieces of written work, which had to be handed in during the few months leading up to the exams.

As time went on time pressures got worse and worse I think a lot of it would have to be the medical school office would have to help you with time set aside because they're not very good at setting time aside. They put lectures in afterwards where you're meant to have seminars.

10602_1

The students in one group cited examples from their own timetable where oncology seminars had been added to the already full timetable with limited success. Timing of the tutorials was discussed in all three groups the students were only all reliably on the main medical school campus on Mondays and Wednesdays (when teaching was only in the morning) and these times were often fully timetabled with teaching activities. There are other activities already arranged at these times including sports on Wednesday afternoons.

The only day is Monday because Wednesday is a half-day and we go home. It might be better to have it on a Wednesday depending on what people's sporting commitments are. 'Cause they might say, when we had CMF¹ on a Monday, three Mondays then we could spend the 4th Monday with our friends. If we're meeting every week on a Monday or every fortnight then that's obviously less time we're spending with our friends. And, you know, when we've got some time off from our lectures, if you have it on a Monday lunchtime you might have some people saying I only spend 2 Mondays a month with my friends.

10602_1

¹ Christian Medical Fellowship

Although the time between one and two was always kept free for students to have lunch, the timetable before and after lunch could vary. Students said that they would be reluctant to hang around for a tutorial at one if they had a gap in the timetable between eleven and three. It was recommended that a variety of tutorial times be offered to accommodate students' other commitments.

Students in all three groups were able to verbalise the conflict between the potential benefits of taking part in the study and the amount of time it would take up. One student thought that the suggested amount of time was acceptable and could be easily be made available whereas another said that, despite the potential gains, the time commitment was high.

I'd find it helpful but I think it's a lot of time.
8702_c1

With organisation you could easily [do it]. I don't think that it would interfere with your work that much. Because, you know, three quarters of an hour every fortnight is not...I think it's do-able, the only problem is exam time.
10602_1

The students willingly gave advice on how to maximise the number of students recruited to the study. They thought that recruits should have the potential benefits of the study spelled out to them but should also receive very clear information what they were letting themselves in for. The students predicted that many students would put themselves forward for the study but a large number of those would drop out as the year progressed.

To me it sounds like it could be worthwhile. But one of the things I think about when I see it is I think students will be interested in doing it if it doesn't take up too much of their time if they're got lots to do especially with intermediate MB.
14602_1

Everything's so new at the start of the third year that if somebody's offering you an opportunity of help I think most people would be really keen to take it

because you haven't got a clue what you're going to face in the next year. And you have the year above telling you how terrible intermediate MB is. You just, [take] whatever help you can get.

10602_1

One student suggested that the students who put their names forward would be those who were more motivated.

3.1.5.2 Students' experiences to date

The students were able to voice clearly what they had found useful and what had not been useful in their teaching. Students identified their general practice and some hospital placements as being particularly useful when there had been time for them to discuss and reflect on what they had learned. They identified good lectures as ones where the lecturer gave an agenda at the beginning and a summary at the end. Clinical presentations were named as being more memorable and in particular a lecture on epilepsy where a video of a patient having a convulsion had been shown.

Do you remember the epilepsy lectures? That really interested me. I didn't know much about epilepsy before the lectures. It's quite a vague term isn't it? You think you know a lot about it but when you come to it you don't. I remember thinking in the lecture "God that's completely new to me". Watching the videos of those people fitting I'd never seen anybody having a fit before so I was really interested.

10602

This lecture had been contrasted with other lectures on neurological science in the preceding year when the lecturer was said to have used numerous scientific terms, which the students had not understood. Students in two of the groups spoke vividly of the frustration of attending lectures that they found of no use to them at all and some spoke of lectures that they could not understand.

I don't find lectures helpful at all. They are on random subjects that don't relate to the block you're doing. Well they might do. There's a one in 5 chance

they do. The lecture day is a bit of a break coz it's less intensive than the wards so you don't really concentrate.

8702

Because some of the lectures we've had have been really crap. 3 hours of a morning wasted we could have spent far better sleeping.

10602

Without prompting a number of students addressed the question of why they did not complain when they were in receipt of such bad teaching. Their reasons were not specific; *"you just put up with it"* and *"I don't suppose we are going to make any major changes in medical education."*

How it would have helped us learn

From the information given in the proposal supplemented by replies to students' questions the groups predicted ways in which taking part in the study might have benefited their learning. Students in one group said that taking part in the study would benefit their learning by bringing together learning from wards and lecture theatres.

You know, you've breathed it, you've talked it whereas with lectures, you know, you're just sitting there and there's a great difference between the 2 so I don't know how. I think it would be quite easy for patients contact, quite difficult for lectures.

10602

Experience was thought to be a good source of learning, students having learned best about conditions that they had seen. It was suggested that seeing a patient with a condition gave students a base on which to build their knowledge. One student said that he would reflect on his interaction with individual patients.

Taking part in the study was thought to be of benefit to students with several learning styles. One student said that taking part would make her use her brain and another said that she thought the study would stimulate her to learn because she only learned when she had to.

It was put forward that shy students who usually did not ask questions in lectures might find it easier to take part in the discussion in the smaller tutorial groups.

It'll include people that might just sit in a lecture theatre quietly, mute and then go out again. More chance for people to ask questions, to discuss situations they've been in with their peers. I presume it's going to be smaller groups, smaller group work.

14602

It was thought that a student would benefit from hearing other students presenting their cases, and joining in the discussion, as well as from presenting their own cases.

If you're discussing it as a group, throughout the year, if you're learning about other people's patients as well you're going to come across a much wider range of patients than you would do if you were just looking at your own.

8702

Presentation of a case one to two weeks after initially being seen would act as a trigger for the memory, it was thought. One student spoke of having set up some learning seminars with his flat-mates. He said that they learned that students who had been on different placements had sometimes learned different things or been shown to do the same thing in different ways.

Students consistently said that there was not enough feedback available on their work. They thought that reflecting on their own work might go some way to filling this gap.

”

3.1.5.3 Possible barriers to participation

At the time that the groups were held a randomised controlled trial was a possible study design and students in two of the three groups expressed concern for the students allocated to

the control group. There was a dichotomy of opinion; some students said that they would still keep a learning diary if this happened to them whilst others said that they would feel resentful and would withdraw.

Yeah, I can just imagine people who are really keen who are in the control group feeling incredibly resentful because other people are getting favouritism, they're going to do better.

I think um some people in the control groups would have liked to have the tutorials [explained] in that first introductory lecture. Will you explain how you go about it? I think if people were interested at that stage and they weren't able to be in the tutorials, weren't picked to do the study that some of them would still go away and....

10601_1

One opinion was that it would not be obvious until the end of the year how valuable participating in the study had been and therefore, only then would students allocated to the control group feel resentment most strongly. It was asked whether they would be offered something instead.

Students who are then put in the control group don't get any support. Would they be allowed, after the study has finished would they be offered, you know, any learning support, as they haven't had any throughout the study?

10601_1

3.1.5.4 Clarification of the project

Students in all three groups asked for further information about the study after reading the proposal. Their questions covered a wide spectrum but many focussed on the day-to-day design of the study such as which day the tutorial groups would run and whether the groups would clash with timetabled or extra-curricular activities. The learning diary brought up requests for detail in two of the groups; "What format would it take?", "Was it restricted to writing about patients?", "Who would keep the diary at the end of the study?". Interest was

expressed in one group about how the outcome was to be measured, in particular whether the grades in the intermediate MB exam would be included in the analysis.

One student asked whether we expected to see changes in the participants learning over the (academic) year and another asked whether all the tutors would be clinically qualified.

The students asked whether the tutorial groups would only consist of discussing the diary and how the tutorial group would contribute to the process of reflective learning. It was not surprising that students asked how the study would help them.

And is that what the tutorials are for, to discuss the diaries?

8702_c1 :

Is it only writing a diary? In the tutorials will they suggest other ways to reflective learn?

8702_c1 :

The learning by reflection though, would that be in the tutorials or when you go home and reflect on the tutorials.

8702

One student asked whether it would help with the portfolio they had been told that they would have to keep throughout their working lives.

3.1.6 Focus groups – discussion

The aim of these focus groups was to ascertain how my proposal would be received by the third year in medicine at Cardiff University (then UWCM). They enabled me to gain some insight into the life and the pressures to which the participants in my proposed study would be exposed.

Repeatedly students related the problems of pressure of time in this busy and highly structured year. The timetable with students being on all placements all over South Wales on three days out of the four-and-a-half day teaching week obviously reduced opportunities for tutorial groups. This problem was exacerbated by the fact that on the day-and-a-half when the students were all on the main medical school campus their timetable was very full.

The students' workload was unevenly timetabled with the intermediate MB exams and various pieces of course-work putting increasing pressure as the year progressed with less pressure in the autumn term.

Despite this students did not reject the proposed study out of hand. Members of all three groups saw the benefits and were able to say how they imagined it helping their successors' learning.

In giving advice on how to sell the study to the next third year the focus groups said that we should explain what was involved in taking part in the study and should include enough background to show that this was a project with a theoretical basis.

Although not related to the study the groups were eloquent in describing good and bad lecturers. They described a good lecture as one where the lecturer used signposting and summarising and also made them think. Bad lecturers talked in words they did not understand and spoke for too long and in too much detail about their favourite subject (see section 2.1.1).

Students in the groups thought that a randomised controlled design would leave some if not all members of the control groups disgruntled. Having been interested in the study and what was on offer but to then be allocated to the control group would be unsatisfactory. Some students thought that the students allocated to the control group would feel unhappier at the end of the year than at the beginning of the year.

3.1.7 Fitting the study into the third year timetable

One of the most difficult tasks that faced me was fitting in the tutorial groups at times that were convenient to the students. There was no time that was consistently free during the working day except for lunchtimes. Sufficient funding was available to provide a sandwich lunch for tutorial groups. The tutors were, therefore, asked if they would make themselves available on Mondays and Wednesdays at lunchtime or before the working day started. One tutor said he would be willing to hold a tutorial group between 8 and 9 on Wednesdays and the others made themselves available at lunchtime on Monday or Wednesday.

Study methods

3.2 The setting

In the first and second years, medical students are based in the School of Biosciences at Cardiff University. Their course consists of lectures and small group teaching with limited clinical contact. From the third to the final year they are based in the School of Medicine on the University Hospital for Wales (UHW) Campus although their clinical placements can be anywhere in Wales.

During the third year the students spend three days per week on clinical placements. For the other day and a half per week students are all based at UHW and teaching is mainly via lectures.

The subject matter during years two and three is arranged into ten panels (see table 3.2). Years two and three are examined summatively together in the intermediate MB examinations, which take place in May of the third year. Students sit one paper for each panel.

Table 3.2 Panels with abbreviations.

Abbreviation	Panel
ALI	Alimentary
CLIP	Clinical Integration
CVR	Cardiovascular/Respiratory
DGR	Development, Growth and Reproduction
HIS	Health in Society
HOM	Homeostasis
II	Infection/Immunity
MDTA	Mechanisms of Drugs and Therapeutics
MS	Musculoskeletal
NS	Neuroscience

Because students rotate around clinical placements it is not always possible for the content of the lecture course to match the subject of their clinical placements.

During the third year the students carry out an Oncology project in which they follow a patient with cancer for a number of months. Students submit a written account of their contact with this patient (Findlay, 1998).

3.2.1 Subjects

The third year at Cardiff is the year in which students begin their clinical training and start to spend a major proportion of their time with patients on the wards and in the clinics. At this time they have the major task of integrating the factual learning in biomedical science from the first two years with the clinical information they are learning from their patient contact. Third year students were chosen as the subjects for this study because I believed that reflection would help them integrate learning from these two sources.

The subjects for this study were those students who attended the introductory lecture. Of that group those who stated that they did not wish to take part are referred to as non-participants, those who said that they wished to take part are referred to as full participants unless they subsequently indicated that they wished to withdraw in which they are referred to

as initial participants. Because of the voluntary design it is possible that some students took little or no part in the study having signed up but continue to be referred to as full participants because they did not indicate that they wished to withdraw.

3.2.2 Study design

In planning this study it was necessary to choose a design that would enable me to determine whether changes were due to the intervention.

A randomised-controlled design was one possible way of evaluating the interventions while controlling for changes due to the curriculum. The intervention was complex and a significant difference between intervention and control groups might not reveal what was responsible for that difference (Medical Research Council, 2002). Randomisation and the use of control groups may not give the generalisable results in education research, where complex interventions are being evaluated, that they would in a clinical trial evaluating the effects of a drug (Jolly, 2001; Medical Research Council, 2002; Norman, 2003). Education research also needs to take the context in which it is carried out into consideration (Cowan, 1998).

At the end of the introductory lecture when only 35 students had enrolled for the study the decision about study design was taken on pragmatic grounds. It would be better to evaluate the study using in-depth interviews with this group. To have used a randomised, controlled design would have left only 17 or 18 students in the intervention group.

Although interviews with learners have been used by a number of researchers in education, caution is needed to ensure that the interviewer is not exerting any effect on the interviewee that is likely to introduce bias (Robotham, 2004).

3.2.2.1 Voluntary design

As discussed in chapter 2 reflection has been introduced in undergraduate teaching where students have to be assessed. Various techniques have been introduced which minimise the influence of assessment on students' reflective work (Davis, Friedman Ben-David, et al., 2001; Driessen, van Tartwijk, et al., 2003; Woodward, 1998). However, it was my intention in this efficacy study to evaluate reflective learning without any influence from assessment. Even making reflective learning a compulsory task without it being graded would have meant that students would, in some way, have to demonstrate that they had completed it satisfactorily. I therefore opted for a voluntary design where all 232 students in the year were invited to join in the study but where there was no coercion and there was no assessment involved. As well as enabling me to determine the effect of reflective learning on individual students who chose to take part this voluntary design would also enable me to ascertain the impressions the study had made on students who decided not to take part. In order to do this I needed to interview those students who had informed themselves about the study before deciding not to take part. Therefore, students who attended the introductory lecture but decided not to sign up formed the non-participant group in this study. Of the students who signed up at the end of the introductory lecture some dropped out before the end of the study. For the sake of clarity I have referred to the students who took part for the duration of the study as full participants and those who dropped out as initial participants.

3.3 The intervention

3.3.1 Learning Journals

Learning journals provide students with a basis for reflection in their learning (Moon, 1999b). I opted to use a format based on the Critical Incident Technique as a way of supporting students unfamiliar with reflective learning and keeping a learning journal. Each

entry in this format (see appendix 2) starts with a factual account of the event being recorded, then the student writes their reflections on this (they may be given prompts like “What knowledge and skills were needed to deal with the situation?” or “How well prepared were you for this task?”). In the third section the student identifies any deficits in their knowledge that have been revealed and finally the student writes a brief plan of how they plan to meet any learning needs that have been revealed. It is useful if students leave space at the end of each entry to enable them to add later information about encounters where they have used the knowledge they learned in response to that event. Students may need direction in helping them choose the topic or patient on which to base their diary entries (See appendix 2).

3.3.2 Tutorial groups

In presenting extracts of their learning diaries to teachers and peers, students have to frame their experiences and their responses differently to the way they would do this by writing the episode up in their diary (Pearson, 1985). When all students are following the same curriculum, particularly at the beginning, their learning needs will be similar and they may benefit from addressing learning needs identified by their peers as well as by themselves. The potential for students learning from each other’s journal entries was raised in the focus groups.

3.4 Learning styles

I wanted to detect whether some students were better reflective learners than others at the outset of the trial. If so I wanted to find out if this would make them more or less likely to sign up for the study. I also wanted to find out whether taking part in the study made any measurable difference in students’ reflective learning ability. After examining the literature I selected the Learning Styles Questionnaire (LSQa – given this designation to discriminate from the the Learning and Studying Questionnaire – LSQb used later) for this task (Honey and

Mumford, 1986). I chose the LSQa in preference to the Learning Style Inventory (LSI) developed by Kolb (Geiger, 1991; Kolb, 1975; Kolb, 1984) because of the psychometric problems associated with the latter (De Ciantis and Kirton, 1996; Allinson and Hayes, 1990). Honey and Mumford's instrument (LSQa) is preferable to the LSI because of the distribution of its scores, its temporal stability, and its construct and face validity (Allinson and Hayes, 1988).

It was important to select an instrument that was based on a construct of reflection that fitted with the construct on which I had developed my research question. In the experiential model of Kolb, on whose work LSQa is based, the learner thinks over an experience matching it with what they already know before developing theory by combining the new information with prior knowledge. This is congruent with the constructivist model of reflection upon which this thesis is based. I examined the subset of 20 "reflector" items from the LSQa (see appendix 3) to determine the degree of construct validity with my model of reflection. Their vision of a reflector appears to be a learner who likes to make up their own mind about the explanations for phenomena having first taken on board information from a number of sources and does not like to have to complete work under pressure of time which is in keeping with my construct of reflection. There are, however, several items that define a reflector as being someone who listens rather than talks in groups, which is less congruent with the model of reflection on which this study is built.

In developing the Learning Styles Questionnaire (LSQa), Honey and Mumford had attempted to develop an instrument which measured 4 learner characteristics which corresponded with the four points of the Kolb cycle (Kolb, 1984) (see section 2.1.8). The four characteristics (Kolb cycle points in brackets) were; Activist (Concrete Experience), Reflector (Reflective Observation), Theorist (Abstract Conceptualisation) and Pragmatist (Active Experimentation). LSQa has 80 items, 20 for each of the four characteristics.

LSQa also enabled me to offer an incentive to students who came to the introductory lecture in the form of an opportunity to discover their learning style. This gave them a chance to reflect on how they learned which was in keeping with the aims of the study. The manual (Honey & Mumford, 1986) contains guidance to help learners interpret their learning styles score and to help them to improve on their weaker characteristics. I was able to distribute this material with the questionnaire.

LSQa has been used largely with business and management trainees in the past but has been used with learners in many other disciplines including medicine (Fung, Ho, et al., 1993; West, 1982).

3.4.1 Psychometric properties of LSQa

Honey and Mumford (1986) found test-retest reliability, for their questionnaire as a whole, of 0.89 (Pearson's product-moment of correlation). For the four individual components they found coefficients of 0.92 for reflector, 0.81 for activist, 0.87 for pragmatists and 0.95 for theorist.

Two studies found the scales of LSQa to have high internal consistency (De Ciantis and Kirton 1996; Sims, Veres et al., 1989). These two studies found Cronbach alpha coefficients for the four LSQa subscales of; Activist 0.68 - 0.76; Reflector, 0.68 - .76; Theorist, 0.67 - 0.78; and Pragmatist, 0.64 - 0.75.

I selected the Learning Styles Questionnaire because it represented the best instrument to measure reflection in learners according to the constructivist model. It was supported by good psychometric data from the authors and from two other studies. Caution is required, however, in interpreting the findings. The construct validity and the psychometric properties of all learning styles instruments mean that results need to be interpreted with care (Ferrell, 1983).

3.4.2 Qualitative data

It was essential to choose a method of data collection that would best describe the effects of reflective learning from the learner's perspective. For this purpose one-to-one interviews were carried out and data was collected, transcribed and analysed. It was predicted that this would produce rich data about what was happening at the level of individual students. We were able to collect these data in the context of the third year of medicine at Cardiff. However, this is very different from examinations, which form the usual evaluation of students' learning. Where the interview data would give an account of what was happening to individual students *how* they learned and what they did when they were learning, their examination marks would give a measure of *how much* of the syllabus they had learned according to the parameters by which their progress was usually measured (and by which it was judged whether they could progress to the next year). The degree to which examinations measure depth of learning depends on the form of assessment and the wording of the individual items.

3.4.3 Examination marks and grades

All panels awarded results in the form of a grade A to F which was converted into a numerical score, four points for grade A, three points for grade B etc. Total exam points scores were compared for all groups.

On top of the ten panel exams the students sat the Objective Structured Integrated Examination (OSIE), which was a structured, written, clinical examination of modified essay question (MEQ) format.

As well as the mean mark for all examinations the marks for the OSIE and the clinical integration panel (CLIP) were compared separately because these two examinations most directly assessed the students' clinical abilities.

3.5 Methodology

3.5.1 Recruitment

Information about the study was circulated to all 232 students in the third year. An email was sent to all students and A4 flyers (see appendix 1) were circulated in lectures. Students were given information about the study and were invited to attend an introductory lecture.

At the introductory lecture (which lasted 35 minutes) students were given a short presentation of the theory of reflective learning and were told what taking part in the study would involve. Students were given a handout giving them information about the study (See appendix 2). . They were asked to complete LSQa and were given information how they could use their newly acquired knowledge of their style of learning to help them in their studies. They were also asked to indicate whether they wished to take part in the study. Irrespective of whether they wished to take part all students who attended the lecture were asked if they would be willing to be interviewed about their learning as part of the study.

3.5.2 Introductory seminars

Students who joined the study were asked to attend two introductory seminars, each of which lasted one hour. Further information was given about reflective learning and students took part in exercises designed to enable them to experience reflective learning. The students brought along a learning diary entry based on the critical incident technique to the first seminar and discussed any difficulties they had with the process and whether they had found it helpful with their learning. In the second seminar the students used the “My Life in a Bag” exercise to practise reflective learning (see Box 2.1).

3.5.3 Learning journal

Learning journal entries were set out under four headings; A factual account of the event, their reflections on that event, identification of learning needs that had been revealed and the student's record of using their new learning in the future (see appendix 2). Students were advised to choose subjects that were important to them when deciding what to write about. Guidance was given in the handout, the lecture and the seminars about this.

3.5.4 Tutor recruitment and training

I contacted teachers in my own department and teachers involved in communication skills teaching, all of whom were experienced small group teachers. Ten volunteered. I arranged a seminar in which I explained the study and the theoretical background. Every tutor was asked to bring a reflective journal entry with them and these were used as a basis for discussion.

3.5.5 Tutorial groups

Tutorial groups ran fortnightly between 1 and 2 pm. (except for one which ran between 8 and 9 am). The tutor acted as facilitator and divided the group's time equally between the students present. The students read out entries from their journals with discussion and reflective feedback involving all group members. Some tutors chose to present entries from their own journal to the group. After six weeks a number of initial participants had stopped attending the tutorial groups so I reduced the number of groups to four in order that there were enough students at each for a lively discussion.

3.5.6 Data collection and analysis

Data was collected from six sources in the evaluation of the Reflective Learning Study. Scores on the Learning Styles Questionnaire at the beginning and the end of the study and

results from the intermediate MB examinations. Transcripts of interviews with students were available as were transcripts of interviews with tutors and samples of participants' journals.

All 65 students who attended the introductory lecture were sent a copy of LSQa at the end of the study, which they were asked to complete and return. An email reminder was sent to students who did not respond to this request.

3.5.7 Interview data

An interview guide was developed and adapted for interviews with full participants initial participants and non-participants (see appendix 4, Please note that appendix 4 is the interview guide used with full participants. A modified version was used with initial participants and non-participants)) (Cohen, Manion, et al., 2000). Interviews were audio recorded and transcribed, and transcripts were analysed for emergent themes. "N6" software was used for this purpose.

With the aid of random number tables I drew up three lists of ten students from each of full participants, initial participants and non-participants. We approached students on these lists and invited them to take part in an interview. Interviews were held on the main teaching hospital campus or at the students' homes at times convenient to them.

We discussed the data when we had carried out nine interviews with full participants, four with initial participants and seven with non-participants. At this stage we decided that we reached saturation about prior learning and context but we thought we would benefit by collecting more data on the effect of participating in the study on students' learning. We, therefore, aimed to interview all full participants.

Interviews were carried out by three people, the author (AG), Elizabeth Metcalf, (EM) (who also carried out an independent analysis of the data) and Mags Rees (MR¹) (who played no other role in the study). Interviews were audio recorded and anonymised on transcription.

3.5.8 Analysis of qualitative data

After the initial few tapes had been transcribed a coding frame was developed by two members of the research team (EM and AG). Data was imported into “N6” software (Richards, 2002), and a thematic framework of nodes and sub nodes was created (see 3.4.1 and appendix 6). This resulted in the creation of a node tree that formed the basis for the thematic framework. Transcripts were coded according to this framework by two researchers who worked independently in order to maximise reliability with addition and amalgamation of nodes as determined by the analysis. The data was examined for evidence that supported and which conflicted with assertions that were emerging from the data (Erickson, 1986). Cases that conflicted with emergent themes (negative cases) were used to refine the categories.

3.5.9 Validity of qualitative findings

From the beginning of the analysis two researchers (AG and EM) worked on analysis of data and development of the thematic framework. The framework was begun after both had carried out a small number of interviews and examined all the transcripts. The qualitative data from this study divides into two separate sections and I have presented them separately in chapters 4 and 5 respectively. Firstly the data on the context, which covers the workload, the working environment, the culture including the information passed down by previous students. We had no preconceptions about these data beyond what we had been told by the students in the focus groups. Therefore, we were ready for the themes to appear from the data and we took a grounded theory approach (Strauss and Corbyn, 1998). The second part of the qualitative data relates to the evaluation of our reflective learning intervention. We adopted a thematic approach in the analysis of these data and were vigilant for any bias in our interpretation of the data.

Professor Roisin Pill (RP) provided expert consultancy to the qualitative data collection and analysis. The possibility of bias was discussed at research team meetings on a number of occasions.

Fiona Wood, an expert in qualitative research (FW) reviewed six transcripts without any discussion of our thematic framework. She produced a list that did not contain any themes that were not already in our framework but which was not as extensive as our list.

3.5.9.1 Triangulation

As well as analysing data from the students we were also able to examine a sample of student diaries and transcripts of interviews with all four tutors. These enabled us to get data from different sources and from different perspectives on what the participants' experiences were, both directly relating to the study and to their learning in general (Seale, 1999).

3.5.9.2 Audit trail

The thematic structure that I developed in analysing the data can be viewed in appendix 6. As well as describing the method by which the data has been analysed, I made contemporaneous memos during the process of analysing the data. I have used the memo facility of the "N6" software for this and have made dated memos in relation to individual nodes, subnodes and transcripts as the need has arisen. These entries enabled me to follow changes in my thinking about the emergent themes over time.

3.5.9.3 Participant validation

I sent a précis of the findings of the Reflective Learning Study (see appendix 9) to 20 students who had attended the initial lecture, 10 full participants and a group of 10 comprising mixed non-participants and initial participants. The text of the email is shown in box 3.1.

Box 3.1 email sent to 20 lecture attendees for participant validation.

Dear all.

Could you please spend 10 minutes of your time looking at this summary of the results of the reflective learning study and give me your feedback.

I have now thoroughly analysed the data and have drawn some conclusions.

I hope that you will find the attached brief (1 side of A4) summary interesting.

I would be very grateful if you could read it and send me a brief email with your feedback.

1. Is it accurate?

2. Have I missed anything?

Feedback from participants is a very important part of this sort of research and I would be very grateful if you could spend 10 minutes on this.

I would welcome your comments whatever your contact was with the original study

very best wishes

Andy Grant

3.5.9.4 Peer review

A number of opportunities were taken to present the findings from this study at academic meetings in order to gain feedback from peers. These included academic meetings within the department of general practice in Cardiff, at the expert workshop, at the Ottawa conference in Barcelona, July 2004 and the annual scientific meetings of ASME and AMEE

(see appendix 11). I submitted a research paper to Medical Education in February 2005 which has been accepted for publication (see appendix 10). I received constructive feedback from reviewers and from meeting delegates on this work. This had the effect of challenging my thinking on the work and changing the way the results are presented. In particular it helped me to clarify my ideas of the difference between the effects of the intervention and the effects of context. It also challenged me to be more precise about the changes in learning that could be attributed to reflective learning.

3.5.10 Reliability of qualitative findings

Seale (1999) states that reliability of qualitative research should be divided into two; 'internal' and 'external.' Internal reliability is similar to inter-rater reliability in quantitative research. It was addressed in this study by an independent researchers analysing transcripts and developing a thematic framework which was then compared with the framework developed by the study team.

External reliability refers to the replicability of the entire study. It can be improved by addressing five issues (Seale, 1999). A research report should identify clearly the status of the researchers. In the report of this study the role of the author as designer of the interventions and both interviewers as members of medical school staff have been addressed. Secondly the report should say as much as possible about the people who offered the data. Thirdly the report should describe clearly the social situation in which the data was collected. The participants and the context in which they were interviewed are described fully in chapter 5. Fourthly the report should elucidate the theories and ideas that formed the research and fifthly methodological reporting should be full. Both these points are addressed in this thesis.

3.5.11 Statistical analysis

The mean scores from LSQa for all participants (initial and full) and non-participants were compared using analysis of variance (ANOVA). Mean scores on LSQa at the beginning and at the end of the study were compared for all groups described above using t test for dependent means.

Performance at the intermediate MB examination, on mean total points score, OSIE points score, and CLIP mean points score were compared for full participants, initial participants and non-participants using ANOVA.

Results section

I have presented the results for the Reflective Learning Study in four chapters. In chapter 4 I present quantitative data. This includes the descriptive data for this study and the results of comparison of means for LSQa and examination results. I have carried out a separate analysis of the clinically-orientated examinations as well as comparing the total mean score for all the intermediate MB exams.

In chapter 5 I present qualitative data relating to the learning context, finishing with data relating to students' decision whether or not to take part in the study having attended the introductory lecture. Chapter 6 contains data relating to the effect of taking part in the Reflective Learning Study on participants' learning. Chapter 7 presents the results of six interviews carried out with third year medical students at the University of Manchester.

Results for the comparison of reflective learning skills between Cardiff and Glasgow students are presented in chapter 11, phase II findings.

Chapter 4 : Quantitative results

4.0 Introduction

In this chapter I present the descriptive statistics for the subjects involved in the Reflective Learning Study. I then present comparisons of mean scores at the intermediate MB exams for full and initial participants and non-participants. In the last section I present data on learning styles with comparison of mean scores on the four scales of the Learning Styles Questionnaire for full and initial participants and non-participants.

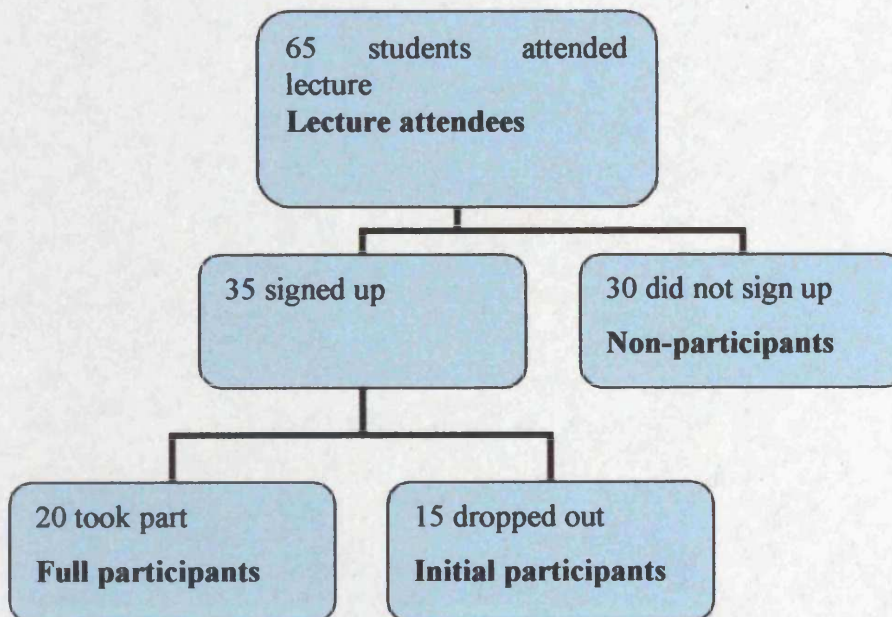
4.1 Descriptive statistics

Having read the material we had circulated about the study and about reflective learning, 65 out of 232 students in the third year came to the introductory lecture to find out more (See table 4.1 and figure 4.1).

Table 4.1 Comparison of students who attended and declined to attend introductory lecture by gender and final participation group.

	Total	Lecture non-attendees	Lecture attendees		
			Full participant	Initial participant	Non-participant
Male	87	66	6	2	13
Female	145	101	14	13	17
Total	232	167	20	15	30

Figure 4.1 Flowchart showing participation in Reflective Learning Study



4.1.1 Gender of participants

There was no significant difference (chi-squared test) in gender between the students who did and did not attend the introductory lecture, and also between those who did and who did not sign up for the study at the end of the lecture (see tables 4.2 and 4.3) Despite the absence of statistical significance, nine percent of the male students in the year and eighteen percent of female students signed up. This difference appears worthy of note and will be referred to in the discussion (see section 9.2.1). There was no significant difference in gender distribution between full and initial participants (see table 4.4).

Table 4.2 Comparison of gender distribution of students who did and who did not attend introductory lecture (chi-squared test).

Lecture attendance	Male	Female	Total	Sig* (2 sided)
Attended	21	44	65	.295
Did not attend	66	101	167	
Total	87	145	232	

*Fisher's exact test

Table 4.3 Comparison of gender distribution of participants (full and initial) and non-participants (chi-squared test).

Signed up for study	Male	Female	Total	Sig* (2 sided)
Signed up	8	27	35	.111
Did not sign up	13	17	30	
Total	21	44	65	

*Fisher's exact test

Table 4.4. Comparison of gender distribution of full participants and initial participants (chi-squared test).

	Male	Female	Total	Sig* (2 sided)
Full participant	6	14	20	.419
Initial participant	2	13	15	
Total	8	27	35	

* Fisher's exact test

4.2 Effect of participation on performance in examinations

4.2.1 Scoring of examinations

I adopted the scoring system used by the college of medicine whereby the students were given a grade from A to F for every examination. They were given four points for an A grade, three points for a B grade, two points for a C grade and one point for a D grade. Students were given zero points for an E or an F Grade. Within the category of fail, in which all students scored zero points, there was a subdivision the implication of which was that an F was such a bad fail that the student could not pass the examination overall

whatever their scores in other panels. Although this system is questionable I considered it important to use the scoring system by which actual pass/fail decisions would be made.

4.2.2 Distribution of data

The distributions of examination result data and the learning styles data was sufficiently close to normal for parametric statistical testing to be used.

4.2.3 Mean examination performance.

The mean performance at the intermediate MB exams was compared for the three groups (full participant, initial participant, non-participant) using ANOVA. There was no significant difference in the combined score from all intermediate MB exams (See table 4.5).

Comparison of mean performance (ANOVA) at the intermediate MB exams was also compared between full participants, initial participants, non-participants and the students who did not attend the introductory lecture also did not show any significant difference.

Table 4.5 Comparison of mean scores at intermediate MB exams (ANOVA).

Participant Status	n	Mean	Standard deviation	F	Sig.
Full participants	20	29.95	7.92	.799	.455
Initial participants	15	26.80	6.98		
Non-participants	30	29.83	9.06		

4.2.4 Clinical integration panel (CLIP)

The CLIP results were analysed separately because this was one of the most clinically focussed examinations presenting an opportunity to determine whether participation in the study offered specific help with clinical knowledge. No significant difference was found (see table 4.6).

Table 4.6 Comparison of scores for CLIP component of intermediate MB exam (ANOVA).

Participant status	n	Score	SD	F	Sig.
Full participants	20	2.80	7.79	1.916	.156
Initial Participants	15	2.73	0.80		
Non-participants	30	3.10	8.52		

4.2.5 OSIE

The OSIE (Objective Structured Integrated Examination) was a written limited response paper based on clinical scenarios. As this specifically evaluated the students' clinical learning, I also analysed the results for this examination separately.

Comparison of the OSIE marks did not show any significant difference between full participants, initial participants and non-participants (See table 4.7). Despite the lack of statistical significance, the mean performance of the initial participants was lower than the full participants or the non-participants. This is discussed in section 9.8.

Table 4.7 Comparison of mean points scores at OSIE (ANOVA).

Participant status	n	Mean	Standard deviation	F	Sig.
Full participants	20	2.75	1.16	1.884	.161
Initial participants	15	2.00	1.31		
Non-participants	30	2.67	1.24		

4.3 Learning styles

All 65 full participants, initial participants and non-participants were asked to complete the Learning Styles Questionnaire (LSQa) at the start of the study. Fifty-nine completed all four subscales and one initial participant completed only the activist subscale. There were no significant differences between any of the three groups' scores on the four subscales (Activist, Pragmatist, Theorist and Reflector) (see table 4.8).

Table 4.3 Comparison of mean scores on learning style questionnaire of participant groups ANOVA.

Subscale	Participant status	n	Missing values	Mean	SD	Std. Error	F	Sig.
Activist	Full participants	20	0	7.95	3.86	.86	1.52	.23
	Initial participants	14	1	10.00	3.47	.93		
	Non-participants	26	4	8.65	2.94	.58		
	Total	60	5	8.73	3.42	.44		
Pragmatist	Full participants	20	0	12.70	3.18	.71	.47	.63
	Initial participants	13	2	11.77	3.56	.99		
	Non-participants	26	4	11.88	3.08	.60		
	Total	59	6	12.14	3.19	.42		
Theorist	Full participants	20	0	12.70	3.20	.72	.35	.71
	Initial participants	13	2	11.85	2.82	.78		
	Non-participants	26	4	12.00	3.61	.71		
	Total	59	6	12.20	3.28	.43		
Reflector	Full participants	20	0	13.85	3.33	.74	1.05	.36
	Initial participants	13	2	12.46	3.93	1.09		
	Non-participants	26	4	14.15	3.39	.67		
	Total	59	6	13.68	3.50	.46		

Twenty-two students completed and returned LSQa a second time at the end of the study (12 full participants, one initial participant and nine non-participants – see comment 9.2.2). There were no significant changes in any of the LSQa subscales for full participants, non-participants or for the group as a whole (see table 4.9). For full participants and for full participants and non-participants combined the trend was one of increase in score on all four subscales at the end of the study compared to the beginning.

Table 4.9 Comparison of mean pre/post scores on LSQa for full participants, (t test for independent means, n=12).

Parameter	Paired Differences		95% Confidence Interval		Sig.
	Mean	Std. Deviation	Lower	Upper	
Activist pre/post	-.417	1.929	-1.64	.81	.470
Pragmatist pre/post	-.667	3.055	-2.61	1.27	.466
Theorist pre/post	-.917	2.353	-2.41	.58	.204
Reflector pre/post	-1.167	2.949	-3.04	.71	.198

4.4 Chapter 4 summary

There was no significant difference in performance in examination results between the full participants, initial participants and non-participants.

There was no significant difference in performance in the CLIP and OSIE examinations, which most directly measured clinical knowledge.

There was no difference in learning style between full participants, initial participants and non-participants. From the data available from the limited number of responders there was no significant change in learning style from the beginning to the end of the study.

The implications of the results presented here are discussed further in chapter 9.

Chapter 5 : The learning context

5.0 Introduction

Having set out to explore the potential effects of reflective learning for medical students it became clear by the first group of interviews that context played a major effect on its utility to medical students. In this chapter, therefore, I present data relating to the learning context at Cardiff, its effect on students' perception of reflective learning and their decision whether or not to participate in the study. The data comes from interviews with full participants, initial participants, non-participants and tutors. The data covers two main areas; the curriculum (the course, the teaching and the assessments) and the student culture. The term "Hidden curriculum" is sometimes used to describe student culture (Lempp and Seale, 2004), which refers to the code of behaviour among the students, passed down from year to year. The hidden curriculum is covered in this chapter. The timeline for the intervention and for data collection is given in box 5.1.

The focus groups (see section 3.1) were set up to gauge students' reactions to the study and the proposed interventions in the context of the third year at UWCM. However, the individual interviews in the main study provided more detailed data about third year students' learning.

Box 5.1 Reflective learning study time line**Reflective learning study time line.**

1 st week September 2002	Publicity of study by emails and flyers
30 th September 2002	Introductory lecture
October 2002	Introductory seminars
October to March 2002	Students kept learning diaries and attended tutorial groups
December to April 2002	Interviews with full participants, initial participants and non-participants
October to December 2002	Further interviews with full participants

5.1 The culture

There were some beliefs that were held by the student peer group about what was and what was not acceptable behaviour. There was a perception that it was not acceptable to be seen to be “keen” or to work any harder than was necessary. This had the effect of making some students secretive about the amount of work they did.

Everyone seems not to like someone who works hard and shuns [them] and calls them brilliant whereas you know the person might just be working hard and that's why he's producing results and there's a lot of lying that 'we didn't do any work' when they did work.

RLS 12

It was frowned upon to talk about medicine when students were gathered together socially.

It's not taboo in the sense that you couldn't dare bring it up, it's just you don't want to talk about [it], A, because there's a lot to do a lot of the time, and I think it panics people when they start talking about, what they are or are not doing, and that's just unnecessary, often the people that start talking about it are the people who have done it already.

RLS 13

There was a perception that these rules were necessary as part of the process of personality development necessary in becoming a doctor.

A lot of things that happen which no medical student or doctor talks about within themselves because you are looking vulnerable because as a doctor you have to stay on top of the situation.

RLS 12

5.2 My learning

Most of the interviews started with "Tell me about your learning". Most students' first response was to start explaining how they revised for exams. Many students displayed an awareness of two different forms of learning. The first was learning in response to the need to pass the next set of exams and to progress through medical school. The second form was much less formal involving the tacit learning of material as students sat in lectures or attended clinical sessions. Material acquired through this second type of learning was more often thought of as relevant to life as a future doctor.

5.3 Time and workload

Students said that they had to adopt a learning approach that enabled them to get through the large volume of work. Some expressed views that the educational value of their learning was diminished by the large volume of material. Pressure of work also pushed out any opportunity to think about the process of learning.

I've never really stopped to think of myself or how I learn. I think now that I like to have a structure to know what I have to learn. The way the course

is run we are never given that option because we have set things to learn with the main aim of passing the exams.

RLS 25

If it hadn't been for the fact that I had to learn certain things to pass the exams, I would have liked to have done it by thinking about what I had seen on the ward that day and go home [and] read about it but you have to cover a list of things that are required to get you through the exams.

RLS 25

We've got an exam in a fortnight I think it is and that's got something like 83 lectures worth of material in it.

RLS 14

Another group of students said that the volume of work had a deleterious effect on the quality of their learning.

The workload in the third year is getting to be huge, and it kind of strangles out any education from it, it's just, you just have to jump through so many hoops, it becomes less of a process it becomes more of a just tick that off the list, tick that off the list, what have you got next? ... Certainly this term the volume's getting huge, and yeah, it's difficult.

RLS1

You have to learn lots of facts to get through the syllabus and you have to start straight away to learn, you don't really have the time to stop to consider how to learn or sift through to see what would be the most useful things to learn. You really just have to start immediately at the front of the book and learn.

RLS 25

As a medical student you have to be like a sponge and soak it all up. You just have to get on and do it.

RLS 26

5.4 From lecture to exam

Most students described taking notes during the lectures while taking in very little of what was being said. This situation did vary, students were more likely to remember material from lectures they had found interesting. Sometimes, however, there were too many lectures in a day to make it possible to take much information in from them all.

A lecture is obviously the easiest way to get it across to you but you just write because, there is a lot of written information that you have to get down and quite often it goes in this ear and straight out onto the paper rather than actually going into your head at all.

RLS 20

It depends on the style of the lecture. I can't do a thing if all you're doing is hurting your hand to write as much as you can from the slides, you can't, you just have to, write, I just find those completely useless, and there's just too much of an information overload.

RLS 1

So I think the reason why I can't remember things is because you're too busy writing it down and while I do write them down in a lecture I'm too worried about just the actual words rather than the meaning of the words and so that's why I think I don't remember them.

RLS 16

I remember from lectures I've found interesting, but on a Monday when you've got five or six lectures and it's one after the other and it's the same topic you tend to switch off, sitting down taking notes, so no, I don't remember much about them.

RLS 3

Going to all the lectures and things, and just getting the notes down that I can possibly get, from what they show you on the screen and then basically just try and learn by reading it through over again.

RLS 21

This next student was unable to tell from her notes whether she had attended the lecture and taken them herself or copied them from another student.

I tend to find that if I miss a day for what ever reason, if I'm ill or what ever, if someone copies them, I don't remember that day any less than any of the other, which is really alarming.

RLS 13

5.5 Learning approach

A minority of students described a need to understand the principles underlying the material they were learning. They found things much easier to learn if they knew *why* things happened the way they did.

I always try and learn round methodical mechanisms and try and understand everything as opposed to rote learning. I always did that to a degree but maybe just a little bit more so now at university.

RLS 11

I like to understand what's going on behind it rather than learning the rote facts...you know, sodium's wherever and the potassium's the other, I need to understand why it's like that before I can - it's easier then for me to know in the future because if you just learn that one goes up and one goes down, you forget don't you.

RLS 20

It's learning things that you need to know and things that you want to know, and kind of, and just, I guess, taking a fair amount of responsibility for learning what you want to or need to learn.

RLS 14

5.6 Goals of student learning

We set out, in the interviews, to discover whether the goals of students' learning were directed towards gathering knowledge necessary to practice medicine in the future or towards passing the next exam.

...a lot of the time in the first and second year, if you learn something, you learn it to get good marks for yourself. In the third year when - there's something that is happening that the patient doesn't know what's happening, the house doctors are not really sure what's happening but they have.... real ideas and conflicting ideas and reasons for what's happening you want to find out what is exactly happening and that's what gives me a drive to go and find out.

RLS 12

It is hardly surprising that students' enthusiasm to learn depended on the relevance of the material they were learning. During the early years of the course, the students had struggled with the lack of apparent relevance of what they were learning to their future practice as doctors.

I couldn't do course work in the first year because [it] meant regurgitating facts. I couldn't do - I can't do regurgitating facts for no reason,
RLS12

...interest mainly, things I find interesting I'll learn and remember, yeah, if I know something is important and I can see that for myself then I don't usually have a problem learning it. I have great difficulty learning things that I find neither interesting or relevant, which luckily there aren't too many of, that's where I really struggle, because motivation's just not there.
RLS 13

Interviewer: *At the moment, can you see that any of your learning is orientated to beyond the exams or to when you're a house officer?*

Student: *That's when it's really, that's when you sit up and pay attention.*
RLS2

Many students said that most of their learning was in preparation for exams.

Interviewer: *How much of your learning is in response to the prospect of exams?*

Student: *Most of it (laughs) I don't think it should be that way. I think you should be learning, sort of to gain knowledge on the wards and for the clinical experience but at the end of the day it's the exams which make me work I think.*
RLS 18

Yeah, thinking beyond qualifying and also I suppose thinking exams, there's nothing like an exam to make you have to learn about something, but it's not a particularly satisfying way of learning ... but at the end of the day if you've got to pass an exam and there's going to be an exam you need to know about.
RLS 14

5.7 Essays and written work

As well as the clinical placements and the lectures the third year students were set a number of pieces of written work all of which were assessed. Not only were the students

unhappy about the extra workload these brought but also some felt that the subjects and the work required had little relevance to their training.

A lot of the essays that we have, I've said before, I find very frustrating, because a large amount of it is skills based, your ability to search Medline, your ability to find the articles that matter, to read them, criticise them, the skills to write a good essay, and I don't think that at this level they're skills that we need.

RLS 13

But it is quite annoying. A lot of what we have to do is you just - they give us an essay for the sake of giving us an essay because what I have to know in this essay, surely it's not part of the core curriculum because - I know it's not because everyone, you know, there are ten different questions and everyone is doing a different question

RLS 17

5.8 Lectures and lecturers

Many students voiced their dissatisfaction with the lectures and with individual lecturers. There was concern that the lecture course was poorly coordinated and that lecturers did not discuss with each other what they were going to cover to avoid gaps or unnecessary duplication. Some lectures were cancelled without notice and without being rescheduled. Nonetheless the students appeared dependent on the lecturers to give them the curricular content.

I don't think they talk to each other because they do these sort of 3 hour blocks on a Monday afternoon sometimes which will be Pharmacology of Migraine, the Pathology of Migraine and then something else on Migraine but half an hour of all of them will be identical because nobody has actually discussed what the last person said ... there are other times when somebody will assume that the other person has said this stuff and they haven't...

...people don't turn up to give the lectures. Like we had an exam 6 weeks ago or something and there was a question on shock. Well that happened to be a lecture that the lecturer didn't turn up ...

RLS 19

A few exceptional lecturers were described who put the lecture content across in a more meaningful way. Good lecturers structured the material to giving it meaning and making it memorable.

If there are diagrams and little kind of 'coat hangers' to remember things from like that, especially if the kind of 'coat hangers' take you back to the same kind of central idea and diagram.

RLS 1

So just somebody who sits down and says these are the five essential points that I want them to take away from this lecture and these are the ones I'm going to focus on ... Somebody who has thought about the topic they are going to talk about and has thought this is the essential information that they need to know.

RLS 19

Some students found that having handouts during the lecture meant that they already had the basic material of the lecture on paper and could then spend the time listening to the lecturer and annotating the handout.

5.9 Revision

Many of the students had well-established practices around revision, which they were reluctant to change. The process many of them described started with their lecture notes. What they then had to do was to memorise enough of these to be able to pass the exams. Many described a process of summarising or condensing their notes as they revised. A process of making notes from their original lecture notes was popular; some went on to reduce these further onto revision cards.

My learning style has always been to make notes on things and then just to make more notes on those notes and make notes on those notes. And that hasn't really changed.

RLS 20

When I'm revising, I take my lecture notes, which I write in pencil. The aim is to write them up sometime before I start revising but usually it's part of my revision process, go to my lecture notes and write them up neatly. Then I might, I quite like making revision cards and it's not so much I have to go back to revision cards and learn them, it's another way of writing things out. Sometimes I might just use a notebook and each page in a notebook is a lecture or something like that so a lot of my learning process is by writing.
RLS 17

I try to make separate notes, the notes that we take down during lectures are a bit haphazard and untidy, so I've tried to make separate notes and maybe integrate some stuff that I've read up in books.
RLS 3

Some students said that they referred to textbooks where the information in their notes was inadequate but this was rare. They used the word cram to describe the process of revision.

...read from lecture notes over and over again.
RLS 11

I use recall method where I read, I study what we've done before and I try to recall it by putting the book aside and seeing if I can recall the facts.
RLS 12

I kind of set myself an amount of time I'm going to spend to do something and cram what I can into that, but you have to prioritise because you can't fit everything in.
RLS 1

5.10 Resistance to new learning methods

Some students said that they were happy with their current method that had got them this far and that they did not wish to change. One student even went on to say that he thought it was dangerous to change his way of learning.

I've got a system that works, I don't need to be spending my time trying to adapt mine or develop it further that it might or might not work, might or might not be worth the energy when I've got all this other stuff to get used to.
RLS 31

The way I feel I probably learn is probably the best way for me, after a few years you kind of got that.

RLS 13

5.11 Assessments and exams

The students heard from their predecessors that Intermediate MB exams (at the end of the third year) were among the hardest they would come across at medical school. Some said that if it weren't for the exams then the third year would be very enjoyable.

You always see them in the library as well when it comes up to Intermediate MB. They make their own little like cubicle and they just live there 24 hours a day. It's a bit frightening. I can't see myself doing that though, not really one for like revising 24 hours a day, like all night every night.

RLS8

If every student was able to do the end of year exams or had the feeling that they would pass then the third year would become the best year in medicine. It's the end of year exams that makes people say that, [it is hard] not the content of the work.

RLS 12

The Multiple Choice (MCQ) and Extended Matching (EMQ) forms of assessment were unpopular. They were given as a reason by some students for reflective learning not being helpful to them. They felt that these examination forms demanded reproduction of facts, and that the memorisation of lists was the form of learning that was best rewarded. This was not thought to be compatible with reflective learning.

This kind of EMQ thing where you don't really get to show what you understand about a topic, it's more what random facts you can remember, ..., you're going to get a big list, and you're going to have to put the right box next to the right thing, so a lot of it was just learning lists.

RLS1

..., you'd have to change the way we're examined- [which] is not conducive to people who learn reflectively, because it's not about learning lists, it's about learning concepts, it's about learning ideas, and It's about learning general principles, it's not about long lists, as I understand it.

RLS1

5.12 The decision whether or not to take part

The data presented in this chapter gives insight into some of the forces acting on the students at the introductory lecture when they decided whether to take part in the Reflective Learning Study. In this next section I present data where students have described their reactions to the information provided about the study. I also present data showing what influenced student participation.

Three students took part because they were pleased to see that someone was taking an interest in their learning. One of these students subsequently dropped out.

I think it's good that people kind of do research into how we learn, and I think it's good that people are interested at this stage of our careers, so it's more of a kind of helping the process along rather than wanting to gain something myself...I thought it was a noble project, and a good thing.

RLS 1

I'm not sure whether in practice it's very realistic, but I think in principle it's a really good idea, I think anything that looks at the way we're taught in general, be it positive or negative has got to be a good thing, anything that attempts to challenge the way things are.

RLS 13

The lecture attendees' interest was engaged by a number of features of the proposed study, including the opportunity to have their learning style tested and by the tutorial groups.

I wanted to incorporate reflecting, in general, my interest at the start was the introductory talk and the email because it said oh, learn your type of learning and learn how to utilize it.

RLS 6

...thought that it was bound to do some good ... and I liked the idea of a tutorial setting to go through things and learn things

RLS 2

I did enjoy Dr Grants' lecture – I respect what he is doing. I volunteered for the process because it sounded interesting.

RLS26

A minority said that they thought reflective learning would be helpful but that the third year was not the right year to introduce it.

Well I'm always up for change, it's always handy if you can change your way of learning for the better, and I think it's a good idea to have that tutorial, the project, only [you] selected the wrong year.

RLS 3

Eleven students were motivated to take part because they were looking for a new or different way of learning. The dividing line between new ways of learning and improving current ways is arbitrary. This subnode, therefore, should be considered as containing improvement in current methods of learning and development of a new method of learning along a continuum.

I took on the study to start with thinking it would probably help me in that way, help me with other things and in that way help me towards exams and things like that. I'm not sure whether it has made a great deal of difference. (laughs) I think the concept, the theory of it definitely is there and maybe that will help me.

RLS 18

The next student's interest in reflective learning was motivated by a need to explore new ways of learning because of dyslexia.

I think since finding out I was dyslexic I think that I'm more open to alternative ways of learning. I think that it sort of encouraged me to look at how I learn at the moment and then find other alternative, further forms of like learning, not just kind of stick to, I don't know, reading a book and writing notes and maybe talk about things ... Just talking about things is I think really useful, a bit more interesting as well.

RLS 27

5.13 Chapter 5: Summary

The data presented in this chapter gives a picture of the context into which we were introducing reflective learning. There was little difference in the data obtained from full participants, initial participants and non-participants.

Although a number of students said that they thought reflective learning was a good idea, fewer thought it would help them in their studies in the third year. From the interview data it is possible to discover why this is so. At the end of the year the students were going to be examined using multiple choice and extended matching formats. Their lecturers set the papers and therefore the most reliable way of learning the material that was going to be included in the exam was to attend all the lectures. Students did little independent study and used sources other than their lecture notes rarely. For many students this resulted in their using memorisation techniques to learn their lecture notes. It is not difficult to see why students said that the course and the examinations would have to be changed before reflective learning would be useful to them.

Life in the third year, particularly in the spring term, happened under pressure of time. There were written assignments to be handed in and the intermediate MB exams loomed at the end of term.

The student culture that demanded that students played down the amount of work they did to their peers and made efforts not to appear keen also discouraged students from taking part. It was hard for them not to appear keen if they were taking part in voluntary learning activity in their lunchtimes.

Chapter 6 : Effects of reflective learning

6.0 Introduction

In carrying out this study I set out to examine if reflective techniques could help medical students in their learning. I was looking for change in student learning due to regular reflection facilitated by specific reflective learning techniques – learning diaries structured on the Critical Incident Technique (Flanagan, 1954) and reflective tutorial groups.

In chapter 5 I referred to the factors, which determined how and in what way individual students will have perceived the benefits of reflective learning. They evaluated what the study had to offer them against the background of their learning needs and the learning context. When examining the data relating to changes in students learning while taking part in the study it has to be born in mind that this was the year in which the students began their clinical placements. A completely new element had, therefore, been added to their learning environment. As well as being taught in lectures they were learning in the clinical environment for a significant part of their time. I was not able to control for this effect but when conducting the interviews we specifically asked about changes in learning attributable to the study (see interview guide, appendix 4). In analysing the data from the participant interviews I only attributed those changes in learning to reflection where the interviewee expressly made the link. The following quote is from a student who was aware of the difficulty in attributing any benefits in learning.

Whereas this year there are fewer lectures and it was more sort of based on the learning you did on the wards, and I think that it was a different way of learning anyway so it was hard to know whether I'd changed because it was the third year or changed because it was the study.

RLS 23 (full participant²)

² Illustrative quotes in this chapter are from full participants unless labelled otherwise

This chapter sets out an analysis of data from the participants describing the effect of taking part in the study on their learning. It gives specific data about the tutorial groups and the learning diary, evaluating these as tools to help learners get the most out of reflective learning. Nineteen out of twenty full participants were interviewed. Despite our best efforts it proved impossible to find a mutually agreeable time when we could carry out an interview with the twentieth full participant.

I present the effects of the publicity material and the introductory lecture on the learning of students who chose to have no further contact with the interventions on offer. The students who dropped out form an intermediate group and I also present data relating to the effect of their limited contact with the study interventions.

The tutors revealed that they had all, themselves, taken part in some reflective learning as well as facilitating their tutorial groups and I present data relating to this group's experience of reflection.

Also presented in this chapter are the participants' responses to the question "Will you continue to use reflective learning after the study is over?".

6.1 Changes to students' learning

This section presents data from participants on changes to their learning as a result of taking part in the Reflective Learning Study. We asked specifically "How has your learning changed *as a result of taking part in the Reflective Learning Study?*"

These benefits were coded under 4 main headings (see Box 6.1); "Awareness of my knowledge/learning", "Took control/integrated my learning", "Made me do what I do/should be doing regularly" and "Improved affect". Data relating to each of these categories is presented in detail.

Box 6.1 Themes under the node [study] improved my learning.

- Awareness of my knowledge/learning
- Took control/integrated my learning
- Made me do what I do/should be doing regularly
- Improved affect

6.1.1 Awareness of my knowledge/learning

The change most consistently attributed to reflective learning was an increased awareness of what participants knew and what they needed to learn. Some also described a raised awareness of their learning styles.

For some students this was the first time they had given any thought to how they learned.

The study made me think more about what I was doing, in medical school you have to learn lots of facts to get through the syllabus and you have to start straight away to learn, you don't really have the time to stop to consider how to learn or sift through to see what would be the most useful things to learn. You really just have to start immediately at the front of the book and learn... Looking back I think I would do things differently – I would think more about what I have to learn, look at the syllabus more closely rather than panicking and diving straight in and learning from the front of the book. ... I've never really stopped to think how I learn. I think now that I like to have a structure to know what I have to learn. The way the course is run we are never given that option because we have set things to learn with the main aim of passing the exams.

RLS 25

Students described how they moved away from sitting down before the exams and learning the contents of their lecture notes by rote. They were more likely to think first about what to learn, how important it was, and whether they needed to learn it at all.

I think it was just an opportunity basically to choose the things that were relevant and were - I mean sometimes the bits that were interesting - you know, if someone asked you a question and you thought well I probably should know the answer but I don't really want to know it, so it was - I picked things that I was interested in, that I needed to know.

RLS 20

I think it helps you to pick out things that you think you need to know and that are important so therefore perhaps you're pushing aside the things that you think are less important. So - you know, not consciously but you are sort of segregating the things that are important which you choose to do in your diary and the things that you don't think were as important.

RLS 20

...and the other thing is, which I'm already doing, is learning what's important.

RLS 24

I kind of am more aware of when I'm doing it now, so when I'm looking at that vital bit of information I should have known. I know that's what I'm doing, and I'm recognising it more now than maybe at the beginning, and I can put a name to it.

RLS 24

... I guess in many ways my style before the study is pretty similar to the way it is now, in that I try and sort of find out what I need to know and then I learn about it, I think probably I was slightly more into just cramming things in, and trying to just, learning long lists of sort of facts that I needed to know, so pretty much based around the exam syllabus that I had to know, and whereas now I guess I'm more interested in finding out what I need to know, analysing what I'm trying to learn about, then learning about it, so it's a bit more focused now probably.

RLS 14

I've learnt probably how to think about what I'm learning before I learn it, so try to, 'Do I need to know this? Is there an easier way of learning this? Why am I learning this? How can I learn it better?' Those kinds of questions I hadn't really thought about, it was much more assuming I could, I don't know, just sort of absorb things.

RLS 14

Participants cited an increased awareness of what they did and didn't know as a benefit of taking part in the study, deriving a degree of empowerment as a result.

Reflection helps you refine your knowledge, so I think reflecting in itself is a process of self-evaluation and flagging up areas where you need to brush up, and also reflecting on areas that you do know... I think that's very important, because in certain aspects of this degree you do get, constantly, you get smacked down by consultants, smacked down by registrars, because you didn't know something.

RLS 6

A couple of times we had sort of reflective [case discussions] that didn't, well I thought 'I hadn't learnt this a few months ago' but obviously I had because I remembered it today.

RLS 19

Most early reflections were around their performance in front of patients, particularly at history taking and examination. Their reflections on what they did not know were based on failure to know what to ask next when taking a history or being able to answer the consultant's questions on the ward round. In their reflections the students gave themselves little allowance for the fact that they are carrying out these tasks for the first time. They appear to have expected to arrive on the wards on the first day able to perform all the skills and to display all the knowledge needed to practise as a junior doctor.

You sit down sort of a couple of nights before this [tutorial] meeting and think Oh God; I've got to do some reflections for Monday or whatever. When you sit down the first thing that comes into your head. "What went badly this week?" "Oh well, I remember that really embarrassing", you know, "I really should have known about the risk factors for this, that or the other" and so it's an easier source to sort of to take from.

RLS 20

Well obviously sort of clerking patients and stuff like that because I was reflecting back over what I could have asked afterwards.

RLS 23

Participants described how taking part in the study enabled them to develop more sense of the body of knowledge they were developing. Through reflective learning they

were choosing what they thought was important to learn and were intrinsically motivated to build this structure because they would need it in the future when they became doctors. One student eloquently described how this reduced the importance of exams as source of motivation for her.

...much based around the exam syllabus that I had to know, and whereas now I guess I'm more interested in finding out what I need to know, analysing what I'm trying to learn about, then learning about it, so it's a bit more focused now probably.

RLS 14

I just get more out of it sort of thing. It's quite nice to look at what you do and what you don't know, and what you don't know actually going and finding out.

RLS 21

One benefit of participants having a raised awareness of the extent of their knowledge was being able to target any gaps.

The best thing about was that you pick your weak points and you learn about them

RLS 20

That's where you get the most benefit, you're reflecting and learning, seeing where you need to improve or seeing where you did well, and actually keeping that up.

RLS 6

I just get more out of it sort of thing. It's quite nice to look at what you do and what you don't know, and what you don't know actually going and finding out

RLS 21

Participants developed awareness, not only of what they knew, but also of their individual learning style. For some this was a source of feeling empowered.

It has made me think differently – it has made me think what I need to know and it has made me think about how I learn - how and why I do what I do.

RLS 25

It did just make me a bit more aware of different ways to like, to try to learn.

RLS 28

By taking part in the study this participant felt greater confidence in her learning style even though it differed from her peers' styles.

I think I've become a little more conscious about how I study, and somehow that's different from how other people study, I think sometimes that I feel that I should be studying like everybody else, or somebody else writes and writes ... their notes out again, but I don't find that useful, so I think it really highlighted that my learning techniques were very different and that was o.k. ...I think I'm a little more visual and I like to reduce things down, it doesn't, you know, writing out my lecture notes 10 times isn't going to help me, you know, it doesn't matter how many times I do that bit, if I make notes from my lecture, you know produce notes, sort of bullet points, that's an awful lot more helpful to me and it takes a third of the time that it would for me to, you know, write it all out over and over again....Yes, it definitely made me think about it, think about how I studied, ...to realise that was what worked for me, so I think I stopped trying to emulate other people's studying techniques and realise that that wasn't particularly useful for me.

RLS 29

It sort of does quite slowly and softly mould your thinking and it's not until you look back on it that you realise that it probably does change how you go about things and think about things.

RLS 30

6.1.2 Took control of / integrated my learning

Being more in control was a consistent benefit cited for reflective learning. This gave participants a sense of ownership of their learning.

I guess I've spent more time learning about stuff I've then judged to be useful, so exams will probably become less important to me as some kind of incentive to work, because I'm learning now, hopefully, for my own benefit, and hopefully it's some kind of investment for me; and I think changing that kind of mind set makes learning a bit more enjoyable.

RLS 14

Participants described a more integrated approach to their learning as a result of taking part in the study. One said that instead of learning all the material for one panel² then another she tried to learn all the overlapping material for one topic across all the panels.

The way I revised for my intermediates by going, not straight through a whole panel and doing them all separately, but actually trying to incorporate everything that's the same for each panel. In a way, sort of, going over the same things. I think that kind of helped a lot.

RLS 23

She was, in other words integrating her learning in the most meaningful way for her rather than learning according to the order in which things appeared in her lecture notes or were divided up by the panels.

The act of writing about encounters and then reflecting on them stimulated this student to seek information from multiple sources.

That's what I've perhaps got out of it most of all, that I found that, thinking about what's happened and then writing it down, and then reading up and finding things, you know, answers to questions, not just reading but asking people, watching things, seeing things, doing things, and then, then trying to put it all together and then talking about it, I've found that kind of pattern quite helpful.

RLS 14

One form of integration was between learning from factual sources such as lectures and learning from patients. For this participant it took factual learning and a relevant patient to consolidate learning.

If you leave it and you're revising you think 'oh I think I saw a patient with it', that's not going to help whereas if you're revising you think 'oh yes, I looked this up earlier and it's related to this patient' and you've got it all there already... I think if you see another patient with something you can think 'I've seen this before'.

² The second and third year curriculum is divided into ten panels see Section 3.2, table 3.2.

RLS 17

This student found that the real life experiences of the wards were where reflection was of greatest value.

Where I think, here the reflective element does come into it's own is when you're actually trying to deal with real experiences, sometimes when things go wrong it feels like it goes really wrong, or when things go right, there's sort of the buzz that you get from that and I think reflecting on that, is an awful lot more useful in that sort of real life situation.

RLS 29

Participants said that as a result of reflection their learning was deeper, more based on understanding and, in one case, more critical of the material being learned.

Um, well certainly from the reflective learning, the thing that I sort of have used is the thing of looking at things from a different angle, so I wouldn't take for granted what's said, In a lecture or anywhere else I would try to back it up with something else. So I prepare myself to make sure I have all the information,

RLS 30

In general, reflection helps you refine your knowledge...

RLS 6

6.1.3 Made me do [routinely] what I was doing anyway

A small number of students demonstrated familiarity with reflection in learning but said that what the study had done was to enable them to benefit by using it in a regular structured way. The tutorial groups and the learning diary provided them with the necessary impetus to use reflection as a regular part of their study.

In the second quote here the participant got his written work done more promptly and wrote up the notes of the patients he clerked the day he saw them. He was prompted to add a summary to his clerking rather than giving the bare facts, as he would have done

previously. For the third quote the participant has been prompted to identify routinely what they need to learn.

I did like the structure it gave and when I think about it I do use that process mentally – I would use it to think through cases.

RLS 25

The one thing that I still do, which I got from it was as soon as, if I clerk someone, like I clerked someone today one of the things I picked up from the reflective learning is that you try and get it typed up and written up today, rather than wait until next week or the last minute, so that's one thing I don't.....I think I still do that so I have my stuff now, I type it out today ...normally what I would do before I got introduced into reflective learning thing is that I would just type it up as it is, I wouldn't write a summary or find, you know, something that summarises the whole thing, so I would write it up and leave it as it is, but now I usually add half a paragraph or two paragraphs about the disease or something or whatever it was related to.

RLS 30

It just helped me to get a structure to it and a routine to pick out the things that you need to know and then a way of going about it, sort of a format for approaching it.

RLS 20

For a group of participants it was the diary that made them actually sit down and write up cases they had seen. Similarly having a tutorial group in two days time stimulated some students to think back what they had seen over the last week and write a diary entry.

I think the main thing was I got out of it, perhaps the discipline of actually doing it; reflecting upon things, sort of understand the knowledge base and theory behind it.

RLS 18

I was probably doing it before but I'm more aware now that that is actually reflective learning what I'm doing, because I think I probably was what I was doing before but I think I actually do it not necessarily writing it down, but doing it in my head.

RLS 21

Yeah, I mean having the tutorial there, which is kind of aimed at discussing what you've reflected on kind of focuses you onto kind of, it kind of keeps you accountable for learning.

RLS 14

I think I've gained quite a lot because I think I do look at it slightly differently now. Whereas before I might have reflected 'oh I need to do some work' - I might not have done it. I think I'm also more likely to think it's a good idea to write this down now because before I might have looked something up in Kumar & Clark or something, just read it... If I find something interesting, I'll retain it but if I'm really tired I won't and writing it down is probably better than just reading it.

RLS 19

6.1.4 Positive affect

Five participants described a different affectual component to their learning. Part of this was as a result of learning in response to learning needs identified through reflection.

It's sort of rewarding, you sort of think 'oh I remember that last week. I'm glad I did that' and it has been quite encouraging so I think it's sort of quite a nice little cycle when you do a little bit of work and then you realise it helps and so it kind of encourages you to do a little bit more and so it's quite, yes, I think it's just an encouragement. (laugh)

RLS 20

This student identified a positive affectual component to learning in response to needs that she had identified for herself through reflection.

You've seen millions of patients and that sort of thing but when you just pick up on the one or two things and then you go away and you learn about those, you know, you feel a sense of achievement and it's an encouragement to do the same again next week because you know you got somewhere.

RLS 20

When asked in the interviews whether they had discovered a new method of learning (which had been an incentive for many students to come and find out about the study) the participants almost all said that they had not. However, examining the changes the participants attributed to taking part in their study, most of them did change the way they learned. Because they were still sitting down with their books and lecture notes and learning for examinations it appears that they thought that they were learning in the way

they always had but there were changes in the way in which they approached learning tasks.

I suppose, I've obviously not learnt a new method of revising because my own method of revising was exactly the same but I suppose its kind of when you're in a situation now, I suppose its nice to sort of reflect on and later on you think, oh you know, this is what I've done in the day and I've learnt something so I think you kind of do reflect on things without realising that your doing it.

RLS 21

Full participants said that they connected clinical and factual learning and developed a clear idea of what their learning needs were. They had a structure for their reflection and had a better idea of what they did and did not know. One learner described being more accountable for their learning.

The time pressure on the students is covered in detail in chapter 5. This participant felt that they might have got more out of the study had it not been for the time pressures due to the course.

Int: "Has your learning changed as a result of the study?"

S: I don't think it has so much. I think it would have done if I had more time to focus on the study itself. Because I was doing kind of - well the first term was fine but because this term I've just been a bit snowed under with everything, all the coursework and everything, I haven't really had that much time to sit down and think oh I need to learn this, I need to learn that. I've been thinking about it so that I can put something in my journal not because I should have been thinking about it.

RLS 19

6.1.5 Negative cases

Sixteen of the 19 full participants interviewed described qualitative changes in their learning that fitted into at least one of the four themes described above.

Transcripts for the three negative cases were examined. The first participant attended the introductory seminars but did not attend any of the tutorial groups and her only participation in the study was to write a logbook-style diary at the end of the first two

clinical attachments. The second said that reflective learning as introduced in this study was at variance with his style of learning despite the fact that he did attend tutorial groups into the second term and said that he found these enjoyable. He also gained significantly from the support the reflective learning techniques gave to the process of his learning.

Yes, for me in the first place the process was quite helpful while I did it for a term and a half.

RLS 30

A case can be argued for including both these students in the initial participant rather than the full participant category. The third negative case was a participant who decided to join in despite feeling that she already had a way of learning that suited her. She said that she could see how some students might find the reflective learning techniques used in the study helpful but didn't find them particularly helpful herself. She said that the study had helped her to structure her work better but that she found that the suggested diary structure was something she did in her head anyway. She missed one of the seminars because of a mix-up over the venue and when she went to her first tutorial group she was the only student there. She did attend the first amalgamated tutorial group but admitted that her enthusiasm was waning by that time.

6.1.6 Changes to learning – conclusions

The data in this section, relating to 19 participants interviewed, does give a clear picture of the effect of reflective techniques on their learning. I believe that during the data collecting all efforts were made to collect data about learning changes resulting from participating in the Reflective Learning Study. These benefits relate to metacognitive activity (awareness of cognitive structure and awareness of learning styles), depth of approach and process of learning (including intent to understand rather than to reproduce,

and integration of learning from different sources), structuring of reflection to make it a routine part of learning, and self-confidence and self-efficacy in learning.

6.2 The learning diary

Some participants did not keep a learning diary while for others it was the only component of the study with which they engaged. The majority of participants kept a diary and attended tutorial groups. The diary kept participants on task and gave them a reason to carry out some form of regular reflective learning. For some the motivation was to have something in their diary to discuss at the next tutorial group but for most the diary alone would probably not have been enough to keep them engaged with regular reflective learning. Of the initial participants who dropped early some cited their disinclination to go to their tutorial groups when they had not written anything in their diary. It might have been unfortunate that the word “present” was used in the lecture as students might associate case presentations with a very well prepared case history given to a large group, and on which they may be assessed. The study was looking for a completely different contribution where the students only described the learning event in enough detail to stimulate a reflective discussion by the group members.

Each student’s diary was unique but the diaries that were submitted for analysis (total 6) varied along a spectrum from a factual record of what the student had learned to a reflective journal with identified learning needs at the other.

I have presented two diary excerpts here, but in order to give a full picture of the breadth of different diary formats I have given excerpts from three others in greater volume in appendix 5.

The HO taught us how to do an abdominal examination properly for an exam and went through the process from start to finish. She explained at each stage why she was doing that particular part and what she was looking

for. She then asked D to do the first part of the examination and then me to do the 2nd part and present our findings as if we were in an exam situation.

I felt fairly comfortable when HO was going through it that I know a fair amount of what to do.

I didn't feel very confident in doing it though.

I knew what to do when prompted.

Not sure why I was doing something or what I'm looking for/what it means

I think I need to know a bit more theory of why I'm doing something to become more confident as well as more practice.

I think I need a system in my head that I then need to practice.

D1

I was a little apprehensive before meeting Mrs. M, as I had minimal information about her, (her address, contact details, and diagnosis – 'GIST')

I had never spoken to someone with cancer before. I was unsure of her state of mind or how recently she had been told of her diagnosis (if she had been told at all), and how she had taken the news. My past experiences of the family case study, (following the development of a baby in a family) gave me confidence to approach Mrs. M and get to know her, and for her to get to know me too. However, I need not have felt nervous as she was very friendly and easy to talk to.

I need to know what the boundaries are for talking to Mrs. M about her condition, when she asks me for information or advice. I also need to further my knowledge of diagnosis and effects of her treatment. This will help me understand how she is feeling and what her needs are.

Once I have gained this knowledge I should be prepared to answer Mrs. M's questions, either by referring her directly to the doctor, or by answering her comfortably and with confidence that I'm not telling her anything that I'm not entitled to say. Now that I have a good idea of what Mrs. M is like, in terms of her attitude towards the diagnosis, I should plan my future interviews in advance, in a structured manner, so that I need not to take too much of her time, as she told me herself that talking tires her easily.

D2

I have attempted to give samples representative of each diary. As well as varying in the degree to which the entries are reflective, they vary in the primary focus of their reflection. D1 focuses her reflection on what she knows, what she needs to know and how confident she feels. D2 by comparison, reflects about preparing herself for a patient with cancer that she is going to see on a number of occasions as part of the oncology project. One problem that vexes her is how to answer the patient's questions without stepping outside her role as a medical student. Her reflections contain very little about knowledge and a great deal about how best to communicate with the patient in this emotionally difficult situation. She is reflecting on her professional role.

At the launch of the study the students were advised about choosing encounters on which to base their diary entries. A list of suggestions was given (see appendix 2), the theme of which was they had to be encounters important to the individual student. In fact all the participants' reflections were based on patient encounters. Students said that this is where the study was of greatest use to them, some said that they didn't see how reflective learning would work in relation to other aspects of their learning such as lectures. This student chose a logbook-style diary using it to prompt reading as time allowed.

I do keep a record of what I've been taught on the wards and tend to read up when I've found time.
RLS3

Several students said that the study had not helped them with their exams but that they were not surprised about this since the exams seemed mostly to do with the lectures. Their reflective learning related to the study had was almost exclusively to do with their clinical learning.

Some students experienced difficulty in choosing patients on whom to reflect. Participants were used to being told what to learn and found trusting their own judgement about this unfamiliar.

We had two weeks to sort of find two experiences but I always found that by the end of the week I was – I'd be on the wards trying to find something. It didn't really come naturally to find something and then to like 'oh how can I reflect on this?' I think it's – as a concept we've never been taught to sort of do, so it was quite difficult. It was unnatural by the end of the week trying to think of something and I think it shouldn't be like that, you shouldn't be thinking of something, it should have just – like you've already thought of it, kind of thing.

RLS 27

I also didn't know really exactly what to write in the actual diary, that was another thing. I couldn't just sit down and write, I thought well what do I write? I did ask Dr n (tutor) and she did actually point me in the right direction but then it was just like a matter of, well I haven't got time to do it any more. If I'd actually gone and tried to write it down after she'd told me, I probably would have found it easier than before.

RLS 21

For some students the easiest encounters to remember were ones where they had got something wrong or they had been asked a question on a ward round which they couldn't answer.

Well most of our reflections were - I was asked this on the ward the other day and I knew I should know it but I didn't, so I went away and I looked it up and most of my reflections in the folder are all sort of gaps in factual knowledge. There were times, especially early on when we didn't know what we needed. We didn't have the factual knowledge to be missing it, if you know what I mean and the earlier ones therefore were more sorts of "well I was nervous about this" or "I knew how to do this but I rushed it and so I got it wrong". And my earlier reflections were less academic and more - but as the course went on obviously you're just so aware of all the things you're missing when you're constantly getting sort of questioned on the ward but that was the main focus and the easiest source of reflections when you know, you sit down sort of a couple of nights before this meeting and think Oh God, I've got to do some reflections for Monday or whatever.

RLS 20

This student is describing a period at the very beginning of the year when she did not know what she was supposed to know. This was a period of unconscious ignorance. The reflection appears to have helped her come out of this by identifying the material she

needed to learn. Not all students found it difficult to identify episodes from their learning to write about.

I usually write down what sort of sparked me off, the learning experience, what started me off to want to come and learn a bit more. Then I'd write down what I want to learn a bit more about... and then I'd write usually sort of in note form about what I've learned and I did try and come back and say if I'd used it but it doesn't always happen. Sometimes I just make a note of something that I want to learn and it doesn't, you know, I don't have time to look it up."

RLS 17

The diary was the part of the study students could most easily use alone. At least one non-participant did this. She described the diary as a useful record of her learning.

[I recorded] patients with different conditions and what could have caused them, treatments, clinical perspective... It probably makes you realise you know, defects in your learning or whatever and keeping a record so you can go back and look up things, and also so that you'd remember things as well.

RLS3 (non-participant)

From this description it is clear that she mastered the process of keeping a reflective learning diary. Undoubtedly, for some students the act of sitting down and writing about an episode in their learning was helpful. Here students talk about benefits to their learning involving metacognitive activity and of activities that are likely to help them integrate their learning into the cognitive structure.

I have found that writing stuff down after I've seen something, trying to crystallise in my mind what exactly are the important points, I've found that quite helpful.

RLS 14

My format is simply a blank piece of A4, usually split in two, and if I have a eureka moment, I will reflect on that and write it down

RLS 6

It may be sometimes if you write things down, sometimes it helps you to see them more clearly than if they're just floating around in your head in no particular order and if you start to write them down they kind of, you can kind of start to see the link between them and perhaps you know, if I got rid

of this thing then all the other emotions and stresses would perhaps sort themselves out.

RLS 9 (non-participant)

Most participants said that they did not spend a great time each week on their learning diaries. The amount of time available varied depending on the other demands made by coursework, and other factors unrelated to the study.

I'd usually spend about an hour or so but it depended on which subject I had chosen. If it was an academic one it would usually take a little bit longer so it just depended on how tricky the subjects I picked up were, usually about an hour or so. It depended, obviously, on the workload for the week.

RLS 20

Probably once a fortnight or so.

RLS 14

For the participants (and some non-participants) in this study the learning diary structured reflective learning. For some having the act of writing about the episode seems to have helped them to process the information in a way that was helpful to their learning. The act of finding a suitable encounter on which to base an entry in their diary was a source of stress for some students. I have been able to illustrate the variation of format that participants adopted when writing their diaries.

6.3 Tutorial groups

The tutorial groups formed the second reflective learning intervention in this study. Their role was to facilitate reflective learning in two ways. Firstly to enable participants to discuss with the group the cases they had written up in their diaries thus extending their reflection on that topic through debriefing (Pearson and Smith, 1985). The second role was to encourage participants to persevere with the reflective learning techniques and to offer help with any problems they might have.

6.3.1 Benefits of attending the group

One of the most popular outcomes of the study was the ability by the group members to discuss what they had been learning and to find out what their peers had been learning on different placements. This enabled them to find out if the other group members had been taught to do things differently at their placements and, more importantly, to find out if they were keeping up with their peers' progress. As discussed in chapter 5 the student culture made it difficult to discuss these matters during free time.

...because it was during the day and you were there to talk about medicine, we did talk about things and had a big old moan about 'oh this is really hard' and have you done this coursework yet and – So yes, it was good.

RLS 27

I've found if there's one thing that this project, the Reflective Learning Study has been good at, that is there's 2 or 3 of us, just get together with the tutorials and discuss the way we've done things, which is quite interesting...

Yeah, and it's quite interesting to talk about the different ways in which we learn, who finds what useful.

RLS 24

Yes. Just to be able to talk that through. It gives you an idea of sort of what other people are learning and that you're on the same sort of level. I think it was nice to talk to other people on my course and see what they thought, how their placements were going and where they thought they were lacking in information because often it was quite similar.

RLS 19

One student said that she valued regular contact with a senior doctor, which did not happen otherwise as part of the medical course on a regular basis. All students who attended tutorial groups regularly appreciated the tutor's input although each tutor's contribution was unique. Two tutors kept diaries themselves and shared their entries with their group, which was valued by their students who compared their tutor's reflections with their own.

He reflects as well, he shares what he's learnt so that's quite useful from that point of view to see how things are modelled, and also to remember consultants are learning as well... We're all on some big learning curve.

RLS 14

This student appears to have appreciated the informal, non-competitive atmosphere of the group in relation to the new, clinical, learning environment.

We were quite a small group, I think we actually got merged into two groups in the end, and there was rarely more than four or five of us and it was nice to talk in an environment where it wasn't about competing over anything and it wasn't, you didn't have to talk about the whole facts all the time, you could say you know, just talk about experiences a bit more, what you thought about things, um so I really quite enjoyed them...

We often talked about anything that we'd written in our reflective learning diaries or things that we hadn't but we would have done. 'cos we were in such a steep learning curve at the time, we'd gone from a completely theoretical background and then thrown into this deep end and I think that it really helped to be able to talk about especially when things go wrong, although not necessarily when they go wrong but especially you know there are some people in our group who'd had consultants who were particularly harsh and told them off in front of patients or called them up for making mistakes which were really quite acceptable mistakes for somebody who had never done something before, um and it can be so disheartening and I think to talk about that and to sort of...

RLS 29

Along with the learning diary the tutorial groups formed a central focus to the reflective learning activities of this study. Attendance at all the tutorial groups was lower than predicted which may have been due to competing pressures on students' time or could have reflected their wish to keep the diary but not attend the tutorial groups. Tutors reported that they had one or no students turning up so the number of tutorial groups was reduced in November from ten to four. Even with this smaller number of groups only three or four students turned up regularly. The four groups adopted a similar format; gathering as soon as possible after 1.00 pm (8.00 am in one case), having lunch, having a general discussion about the hot topics of the week then going round the group with members in turn reading out or telling the group about the incidents they had chosen to reflect upon.

It's open floor discussion about, firstly it's what did you put in your diary, have you reflected on anything, how have you learnt those things, it's just seeking different avenues, how people went around searching for information, how they dealt with the fact that they reflected, what they actually did about it; I think that helped other people strive towards different methods of coping with learning.

RLS 6

I think we set the agenda pretty much all the time. It very much depended on what we brought up at the meetings and then the supervisor would then base it around what we were talking about.

RLS 18

People had read up about things that they had seen on the wards or they were talking about, um, you know things that, were like difficult situations they might have been in and how to get round it basically, and how to enhance their learning

RLS 3

There was some evolution of group format over time. This participant describes a move away from the critical incident format that had been suggested for diary entries.

It's less sort of rigid now, we tend to have a discussion about what we've done and how we'd do it differently, that sort of thing, as opposed to this is what I've learnt, this is what I could have learnt, this is what I recorded, this is what I did about it around the table, it's much more sort of general discussion on how we're finding it.

RLS 13

The group format depended on members turning up with entries in their diaries. As the workload increased during the year, students had less time to write regular diary entries. One role that the tutors had to develop was to encourage the students in their group to think back over the preceding few weeks for encounters that they would like to discuss with the group when they had not written any up. Not all students made any effort at keeping a diary; some did not consider that they had the time. There were some students who attended the tutorial groups regularly without keeping a diary. From their willingness to attend the tutorial groups they appear to have been getting some benefit from attending.

Some students said that they used the framework suggested for the learning diary as a template for thinking about the patients that they saw.

6.3.2 Topics for discussion in tutorial groups

In keeping with the topics on which students based their diary entries, topics discussed at the tutorial groups were based on patients the students had seen. At the beginning of their clinical training the students' learning needs were similar. Many of the topics presented at tutorial groups were also of value to all students not just the presenter. When one student brought up a topic it raised the other group members' awareness that this was a topic they also needed to learn.

Generally when there's something that you're missing, it's something the others should know as well so it was - we usually sort of fed back and shared that because obviously if you're not asked that question, then you don't know that you don't know the answer and then someone says oh someone asked me the other day about the risk factors for hypertension and you sit there and think oh gosh I don't know either, so we all used to share like what we had actually learnt as well which was good because it was almost like reflection was half the work because you didn't actually sort of have to go away and do it, somebody else has done it for you in a way.

RLS 20

6.3.3 Role modelling and emotionally difficult material

Although the majority of the cases the students chose as a subject for reflection were about their level of factual knowledge in relation to patients they had seen, a few related to the feelings they encountered in their clinical learning. One theme for this was death and the breaking of bad news.

RLS 24

I'm Christian and I've got quite a good support network from that point of view anyway, so I don't know how much of a difference it makes. I remember one time there was a cardiac arrest, it was one of my reflective learning experiences, it was the first death I'd seen, and, it's quite strange really because my, the conclusion that we all came to when we were talking about it was that the reflecting actually became the learning for things like,

for things like death, things where, I mean, of course there's learning, you need to know how to sign a death certificate, how to certify someone dead and so on, but the learning, the real learning at this stage, I mean that could all wait, all those things, but the reflecting about why, when does this person who had a soul or a something, when did that become a shell, is it a shell, what is life, was really quite philosophical, quite deep questions, and I guess reflecting on them is about all you can do really.

RLS 14

Another theme was students' reaction to the behaviour of clinicians with patients.

Usually, quite often, there's quite a lot of discussion on good and bad practice that we've seen and why we think that's bad practice and comparisons with that

RLS 24

Two tutors did comment, however, on students' reluctance to base their reflections on the clinical practice they were observing.

What was interesting was that a lot of the time they were sort of looking Without people looking at how people were practising... 'We don't want to be like that'.

T1

There was, you see they wouldn't, for example, one of them was working for a terrifying consultant, well now that would actually have been a good reflective one but she wasn't going to tackle that one. Perhaps because she was talking to a consultant... possibly.

T3

6.3.5 Tutorial groups – conclusions

I have been able to present data here from students and tutors that demonstrate that the tutorial groups, led by the tutors, were able to fulfil their dual roles of discussion of diary entries and facilitation of the reflective learning process. The participants did discuss their diary entries and the tutors provided a great deal of support for reflective learning. The tutorial groups also provided a forum for students to compare their progress with their

peers. There were occasions when students received support in relation to emotionally distressing situation such as the death of a patient and being humiliated by a consultant. These were not roles that had been planned in advance and may reflect needs that are not addressed elsewhere for example by the pastoral tutor scheme. The use of the groups to compare progress is, in part, a reflection of the student culture (see section 5.1).

6.4 Benefits to initial participants and non-participants

I really enjoyed the tutorial groups. There were three students in my group we met at 8am. I went for quite a few weeks then dropped out because I found it difficult to get up in the mornings. We talked about specific topics and how we were getting on.

RLS 26 (initial participant)

Students who did not sign up for the study or who dropped out at an early stage did not react negatively to the ideas behind it.

It's important to me now, maybe not in the set up that the Reflective Learning Study's been, um, how can I put this, if you get something wrong, if you're bad at something, or even if something goes well, you do look back on it and you think what could you do differently and could you do better again, and it's important to have some kind of ongoing assessment of yourself, how successful you are, and whether you can improve, so I think a bit of reflection at every stage is never, not, too much otherwise it can become kind of vain or bitter, but a bit of reflection at every, almost everyday, is worthwhile and good.

RLS 1 (initial participant)

Interviewer: Sure but what I'm asking you is do you think that writing a journal might help you deal with the emotional aspects of your working life as a medical student?

RLS 12: *Oh yes, most definitely, yes.*

(non-participant)

Some non-participants said that the study was incompatible with the course and in particular with the way it was assessed. Others felt that they would need to have some of

the current course requirements reduced or dropped before they would have time to take part in reflective learning activities such as those used in the study. Some had, as a result of the course material and the introductory lecture, developed a different way of thinking about their learning.

Yes, yes, it told you about reflecting on what you've learned and things like that and I thought well yes, because I was kind of doing it but I didn't realise that it was like a whole way of learning, you know, you just think oh it's a lot easier...and then looking at it I thought oh if I could add that little bit in as well that would kind of improve the way I learn and so I thought I could do it on my own really without having to give up my sort of - although it was only two hours, you know.

RLS 9 (non-participant)

6.5 Tutors' feedback

As well as giving invaluable insights into the study as experienced by the students, all the tutors, in their interviews, talked about their own learning and how it had been affected by taking part. The tutors were senior clinicians with experience of teaching medical students. All tutors were communication skills teachers but none of them had experience of reflective learning in the format used in this study. They all described regular informal reflection as part of their practice of medicine.

It's a form of learning that I'm not very good at. I think that it means thinking about what you are learning, sometimes thinking about it before you've learnt it as well as while you're learning it and after you've learnt it. Ideally you ought to put aside time to think about what you're learning, whereas in truth what happens to me is that I learn, I reflect while I'm in the car or all sorts of other places and you're making connections all the time. So I'm not sure I'd do it in the way that we've been trying to encourage the students maybe that's a little bit of a farce or a sham on my part but it's certainly something that I wished I had learnt how to do earlier and become a regular way of re-enforcing my learning

T2

The tutors did describe how their own learning had benefited by taking part in the study. This tutor said that her own reflections, undertaken as a result of being involved in the study, led to changes in her practice of medicine.

What did I get out of it...? I mean No.1 there are various [clinical conditions] that I now manage better ... Because of it, you know so direct practical I am better at managing various conditions...

Although I am a GP a lot of what I do is very specialist and it opened me out again just to, you know it's very easy to say 'I know [what] I can do [and] what I can't do' so it made me start thinking again.

T4

Indeed from one tutor's words it is possible to see that they had experienced intrinsically motivated learning. One tutor specifically appreciated having time with students outside their own speciality. In the first entry here the tutor describes giving guidance on issues of professionalism.

A lot of what I did was talking with the students. Not just about information but also about how you practise medicine, how you approach problems, how you approach difficult situations. You know we talked about people who had died.

T 4

It's also meant that I've spent a lot more time with my registrar on reflection in learning.

T 2

Another described how talking about reflective learning had been a great help to him in a job interview.

I had an interview last week for my next job, it's the first interview I've had for 25 years, and because I was being interviewed by the head of teaching in the university, it was largely about teaching and learning and a lot of it was actually about reflective learning ... Mercifully I think it might have got me the job actually by doing this.

T 3

6.6 Will I keep doing it?

One measure of the perceived usefulness of reflective learning activities is whether the participants planned to continue with them after the study ended. All the students were asked if they would continue to keep a learning diary. Twelve participants (approximately two thirds) said that they would continue to use the techniques they had used as part of the study. One student who had not taken part in the study said she would continue to use reflective learning techniques, another thought that she might use the structure when thinking about patients that she had seen.

I will be thinking more responsibly, I'd think that OK I'm going to be a doctor I need to get some information which I can use. That should push me towards using a good way of studying and from that point I would look at the different good ways and that would bring me back to the reflective study.

RLS 24

Int: *Is it something that you can see yourself doing after the study has finished?*

Student: *Yes, hope so. I can see how it works, how you should sort of reflect on things afterwards and that should help you remember things for the future. Yes, I hope I keep doing that. I don't know whether it actually does help me to remember things but I'll still keep it going. Yes.*

RLS 18

It's a more structured way of doing it and if I had the time I'd like to do it as an ongoing thing so just a sort of a formal way of learning the skill of reflecting.

RLS 20

For things on the ward yes, I think it can be very useful to have a little notebook of little things you've learnt, just isolated things. ...Something, you know, just so you can look back at them.

RLS 19

The students varied in the way in which they thought they would continue using reflective learning techniques. For some it was a change in the way they structured their learning, for others it was the learning diary functioning as a logbook.

6.6.1 Participant Validation

A précis of the findings of this study covering one side of A4 (see appendix 9) was circulated to 20 students (10 full participants and 10 initial participants and non-participants combined)in February 2005 (two years after the study ran). Five replies were received, four from full participants and one from a non-participant. None of the students who replied contested anything that was in the summary although one respondent did reply in detail regarding the effect of the exams on his learning style (see figures 6.1).

Figure 6.1 Email from 5th year student in response to request for participant validation.

Hey there

I was someone who dropped out and was subsequently interviewed at the end of the study

I think the summary is fair, but feel that students who said they benefited from reflective learning may have been a bit of a self-selected group. I think that this is one of many methods of learning.

If you want to know why more students (like myself) don't use reflective/deep learning methods (which I think lead to a better understanding of principals and concepts) get your hands on some intermediate MB exam papers - if you can catch a look at our years' (2003) I think they'll stand as a good example. The EMQ format very much revolves around knowing lists of facts as opposed to concepts. It's almost impossible to test for conceptual knowledge in a multiple-choice format. Students will inevitably learn to pass exams (especially in such a heavily examined course) and I don't think reflective learning is conducive to success in these types of exam. It is my view that the problem lies in the means of assessment, as opposed to reflective learning. I revised for some of my intermediates in a "reflective" way and some by rote learning. I did much better in those I crammed and learnt lists for, however I remember the material I learnt by concept and with links to clinical cases much much more clearly.

Hope that's of some help

The comments received in response to the request for participant validation related to matters that had been covered in the original analysis. These included problems with loss of time and the possibility that more students would take up reflective learning in the first year before their patterns of learning became so established. Only one student commented on the difference taking part in the study had made to his subsequent learning. (See figure 6.2).

Figure 6.2 Email from 5th year student in response to request for participant validation.

Dear Dr Grant,

Many thanks for your summary of the findings of your study. I am still grateful to have taken part. Although I did not attend all sessions, the reflective learning model has been used constantly in most of my training since and more recently with writing my portfolio in my final year.

I feel I made a good choice when I signed up in the third year and I am very likely to always consider this model of learning for the rest of my career.

Finally in answer to the points raised, I feel that the views expressed are accurate and reflect some of my thoughts about the experience.

Many thanks

6.7 Chapter 6 conclusions

Most students who took part in this study described changes in their learning that suggested greater integration of learning and increased metacognitive activity. They were using more thought whose purpose was to monitor and control other cognitive activity, particularly learning. Nearly two thirds of full participants said that they would continue to use the techniques they had used during the study. Some students had been given a structure on which to base the kind of learning they felt they should have been doing

anyway and some described a positive affectual component to their learning as a result of reflective learning.

Unexpected benefits were detected. The most prominent benefit being a peer group in which students could discuss their learning and compare progress with peers. The small groups provided an opportunity for tutors to provide some pastoral support which was clearly welcomed by full participants.

These results are positive and encouraging but can only be examined in the light of this efficacy study. These data demonstrate that most students who took part in this voluntary study experienced deeper learning with greater metacognitive activity as a result. Since this study never set out to ascertain whether reflective learning would benefit all medical students it is not possible to generalise widely from these findings. Because the study was voluntary the small proportion of the target population who did come forward may have already had an affinity for reflective learning.

No student was forced to write something in a diary, or present something at a tutorial group, as a curriculum requirement. These activities of this study were only undertaken by students who had chosen to do them. Further research is needed to determine whether the same changes would be seen if all medical students took part in reflective learning activities on a compulsory basis. One factor that may have put off some potential participants, the desire not to appear keen in front of peers, would not be a factor in a compulsory study.

The third year was chosen for this study because it represented the crossroads between factual and clinical learning. Despite consultations with the pilot focus groups I underestimated the effect of the workload.

In some of the interviews it became clear that some students look upon the fourth- and fifth-years at Cardiff as being the clinical years with the third year being overshadowed by the lecture course and the intermediate MB exams. Many students said that I should

have introduced the study in the first year although first year students are wrestling with being at university and also with a high workload. It does appear that as time goes on some students become reluctant to change their learning methods.

Chapter 7 : Manchester interviews

7.0 Manchester interviews – introduction

During discussions of the data from the early interviews and the emerging themes the question was raised whether the responses we were getting in relation to context would be the same if we had interviewed students at any medical school or if they were peculiar to Cardiff students. Only limited time and resources were available to address this question. Two researchers (AG and EM) were able to spend one day travelling to another UK medical school to interview as many students as possible using the part of the Reflective Learning Study interview guide that related to context. We targeted a medical school with a curriculum different from that at Cardiff and chose Manchester where the curriculum is based on problem-based learning (PBL). A member of staff there agreed to recruit students willing to be interviewed. It was not possible to choose interviewees at random or to sample in a purposive way but our contact was able to recruit six students.

It is worth bearing in mind that these interviews in Manchester were meant to determine whether the context at another medical school had the same effect on learning as did the context at Cardiff. This was, therefore, a departure from the original research question and an exploration of a second question that arose during data collection and analysis i.e. the effect of context. Lack of time prevented further comparison between Cardiff and Manchester for example comparison of scores on LSQa.

During the analysis of the interviews in Manchester new nodes emerged relating to the control of learning and it is for this reason that these data are presented using different headings to those presented in chapter 5. A comparison of data relating to context at Cardiff and Manchester is presented in section 9.9.

7.1 Information from students in previous years

In contrast to Cardiff, Manchester students in higher years told students at the start of the third year that they would probably enjoy it.

Yes, most of them said that you're going to like 3rd year because it's not like your 1st and 2nd year and you'll enjoy it very much.

M6

I think if someone from 2nd year were to ask me yes I would say that 3rd year has been wonderful

M6

7.2 Defining the syllabus / learning objectives

What stood out from the Manchester interviews was the way in which the body of knowledge the students were required to learn was defined. For the Cardiff students this was the content of the lectures but for the Manchester students it was the learning objectives from their PBL groups (see box 7.1). This appeared to make a significant difference in the degree of control the students had over their learning.

Box 7.1 Problem-Based learning; the “seven steps” (Schmidt, 1983a).**Day 1**

- 1. Group clarifies any terminology**
- 2. Discussion of phenomena involved in case**
- 3. Discussion of what group already knows**
- 4. Brainstorm what needs to be learned**
- 5. Develop learning objectives**

Day 4/5

- 6 Group share what they have found in response to learning objectives**
- 7 Group defines any further learning.**

The Cardiff students took the passive role of writing down what their lecturers said whereas the Manchester students, from the time they read their PBL case, were in charge of drawing up their learning objectives under the tutor's guidance. The tutor in a problem-based learning group is not meant to be a subject teacher but does have the recommended objectives for each case in front of him/her and would expect to intervene if the group's discussions went too far from the intended learning outcomes. A student described very clearly, how the group were able to share and mobilise their knowledge during the initial discussion of the case, before they had drawn up their learning objectives.

I think there's a rigid structure that everyone wants to stick to with when you actually start getting into it and doing it you don't stick to it. Everyone instinctively knows what you should or shouldn't be talking about and when it starts, I get as much out of the opening of a case as I do out of the closing

of the case. I think both of them, it's very easy to sit down with the opening of the case and say well these are my cues and these are my objectives and really anyone can sit down [its] quite obviously this and this, stares everyone in the face but obviously you're not going to get anything out of doing that because anyone can do that at home. I think from both the opening and the closing in the discussion which when I read the opening there will be 20 things that I don't know anything about, but there maybe one thing that I do know about and you just sit there and even talking almost like the blind leading the blind there will always be something someone knows a bit about and somebody else knows someone who had something, and by the end of the opening I understand a whole lot more about the case. Without going away and reading one thing about it, you raise questions just by talking about it and people will be able to answer it, and so I can learn a huge amount by just opening it, and then you go away obviously and study it and then come back. And then coming back you close, almost raising as many questions as opening it does, but you can never continue, so you have the discussion again. Everyone has read the same books, there's no need to read it to each other and discuss it but you talk about it and you raise questions.

M1

At the end of the first problem-based learning seminar the students knew what it was they had to learn by the next session. It was then up to them to identify sources where they could find this information. Lectures might form one source of this knowledge, as might textbooks, journal articles and the Internet. Some students were more fortunate than others in having their clinical firms correspond to the PBL cases. The Manchester students (irrespective of whether they had spent their first two years at Saint Andrews or at Manchester) appeared more confident in their learning, which was accompanied by a better affective component to their studies.

When I did [the] OSCE in July usually immediately before my exams I'm so stressed out and panicking cramming as much information as I can into my head which for the progress test³ I did reading anything and everything I could get my hands on. When it came to the OSCE for the week before, you think 'it's a week before the exam I'm going to focus and practise' and after 2 or 3 days you got to the stage where I was sitting there and we were in groups with people and you're practising and you're thinking well I can do

³ In the progress test, the third, fourth and fifth year medical students all sit the same multiple-choice paper twice a year. The pass mark increases for each year.

this, I know this, I understand this, I've been doing this all year. I don't need to sit and memorise this and learn this now until it actually got to the stage on the day of the OSCE and I was sitting in my first station, (a rest station,) so I was just sitting there, which normally you would think could be quite an intense experience just making everything worse and I said there's nothing they can throw at me today that I can't do. I know that I can do it.

M1

I think the way the Manchester course is run I think it's good for the future because it's making me think on my feet and rather than just sitting in lectures and being quite passive, it's making me go away and work things out for yourself and find ways in which to learn, like going to clinic and things and so I think it's making you into a more well-rounded doctor for the future.

M4

Some of the students interviewed in Manchester had only started there in the third year having studied for the earlier part of their course at St. Andrew's. The course there was similar to the Cardiff course being based on lectures and the students described a process of taking lecture notes and learning them for exams. Manchester students appeared to learn more in collaboration with their peers. By attending PBL groups the Manchester students were more used to working collaboratively. This was enhanced by the Study Partner Scheme where all students were paired with a fellow student. Study partners supported each other in their learning and were sent to clinical placements together.

There was a consensus among the Manchester students that an important determinant of the outcome of problem-based learning was the contribution of the tutor.

Big differences between what you gain and what you expect from a PBL session depending on who the tutor is.

M3

Although there was variation in both groups there appeared to be a stronger orientation of learning towards preparation for life as a doctor amongst the Manchester students as opposed to a greater orientation toward passing the next set of exams in the

Cardiff group. One Manchester student remarked that they had to learn all the knowledge by the time they qualified but not for any single set of in-course exams.

There's such a huge amount that at some point you need to cover, but because you can't cover it all in such a short space of time for the exam at the end of the year, you have to cover it all by the end of your 5 years, everyone has a little bit that they've learned about and nobody has done the same part so you kind of, when you sit down and talk to people about what they've been learning about, because you've been on one firm and they've been on another, they will have learned a huge amount about one area, and you know nothing about that, and you've learned completely differently.

M1

Since moving to Manchester the style of learning has certainly changed a great deal and emphasis is on what is important from the learning has changed from 'I need to pass an exam in May' to 'this is what I need for the rest of my life. I have to know this for good'.

M3

There was far greater similarity in clinical teaching at the two medical schools than there was in learning of factual information. In both establishments teaching quality varied from attachment to attachment and in which grade of clinician undertook most of the tuition. The quality of teaching was inversely proportional to the number of students around the patient's bed.

We've got sort of bedside teaching on the wards that we have with everyone, which can either be a total disaster if there are 10 or 15 of you trying to cram around the bed, or it can be fantastic.

M1

Like the Cardiff students the Manchester students found it harder to ask questions in larger groups. What was different in Manchester students was the "sign up scheme", where students could sign up for outpatient clinics appropriate to their PBL cases.

The sign-ups we go to relate each patient with what's in the PBL case.

M6

There was consensus between students at Cardiff and Manchester that it was easier to learn about a condition when they had seen a patient or patients with that condition.

I think when you're actually doing things and seeing things it's a lot easier to remember than just reading through all the text books and writing things up.
M5

The way in which students at the two establishments were assessed was different. In Cardiff students had ten written examinations as well as a clinical and a communication skills exam during the third year. In Manchester, the students undertook an OSCE and a true/false test (the progress test) at the end of each semester (a semester comprised a 14-week period of time broken up into two seven-week PBL blocks). The questions on the progress test paper are mixed up and the students said they found it daunting, because they had to wade through a number of questions before they found one they were able to answer. One student recounted how they had been told that it was impossible to revise for the progress test. However, all students said that they did revise for it.

I do, but again that's a personal thing. Dr. D will tell you that you are not meant to revise for the progress test, which is the written exam. He says it is a non-revisable exam which is utter rubbish because every exam is revisable for, it's just the type of revision you do, so he thinks you should just spend all your time on wards, which makes sense, but the only problem is if, for someone like myself, who is not fantastic at remembering things I have to sit down and read it again, and to do that I have to revise.
M2

7.3 Manchester interviews – conclusions

The data presented in this chapter were collected to examine a question which arose during analysis of data from the original study .

When reading the transcripts of the Manchester interviews the difference between the perceptions of the task of learning and the degree of self-directedness between the two groups of students was striking. It is the problem-based learning cycle, with students developing their own learning objectives, which appears to be responsible for Manchester students' greater self-directedness. The fact that the two groups of students responded in a very similar way to the teaching conditions on the wards suggests that when faced with similar learning conditions they might learn in the same way. These data from Manchester students have to be viewed with caution since it was only six students that we were able to interview and they were described as not typical ("keen").

The difference in approach to learning and perception of learning in groups of students from two medical schools with different curricula is an unexpected finding of this study. These findings will help shed further light on the interpretation of the data from the Reflective Learning Study but should be tested further with a study which specifically addresses the question "Do medical students at schools with different curricula have differing approaches to learning?" This question will be addressed in the phase II study (see chapters 10 and 11).

The data presented here have a pivotal role in focusing the importance of the context into which an educational intervention is introduced. If I had introduced reflective learning at Manchester it is likely that these students who are more used to directing their own learning and putting their learning together for their future as a doctor would have found reflective learning easier to take on.

Chapter 8 : Expert workshop, Cardiff, October 2003

8.0 Introduction

Finding evidence-based support for reflection in medical students' learning was difficult. Many of the studies were small and involved descriptive work (see section 2.3.3). It was decided to invite experts in the field of reflective learning, both generic experts in the subject and experts in medical education, to a one-day workshop in Cardiff. As well as developing a consensus about the evidence base for reflective learning I wanted feedback from a panel of experts' about the findings from the Reflective Learning Study and my interpretation of them. I also wanted to get expert advice on taking my findings forward.

8.1 Setting up the workshop

8.1.1 Delegates

Regina Conradt, University of Oxford (work on portfolio learning in UME).

John Cowan Herriot Watt University (author of "On Becoming an Innovative University Teacher", 1998).

Tim Dornan University of Manchester Medical School, (author on clinical teaching).

Helen Houston Vice Dean and Head of Department of General Practice, Cardiff University.

Jean Ker Department of Medical Education, University of Dundee (MD thesis "The development of an instrument to assess professionalism - the reflective ability of medical students in an outcome-based curriculum", 2001).

Paul Kinnersley Reader in General Practice and co director of the communication skills unit, Cardiff University.

Jennifer Moon, University of Exeter (Author of "Reflection in Learning & Professional Development: Theory and Practice", 1999; " Journals: A handbook for academics, students

and professional development”, 1999; *A Handbook of Reflective and Experiential Learning: Theory and Practice*”, 2004).

John Parnell, School of Social Sciences, Cardiff University (Special interest in reflection in teacher education).

Charlotte Rees, Peninsula Medical School (author of several papers on portfolio learning in relation to communication skills and professionalism).

Nigel Stott, emeritus Professor of General Practice, UWCM.

John Sweet, School of Dentistry, (UWCM),

Paul Wilby, School of Health Sciences, UWCM.

8.1.2 Workshop programme

The workshop began with a presentation of the Reflective Learning Study.

Four delegates each made fifteen-minute presentations under the following headings;

- Deep and superficial approaches to learning
- Constructivist learning and the cognitive structure
- Experiential learning
- Using reflective learning to enhance medical students' learning

The first three were included to provide an overview of the theoretical basis for reflection in learning. The last was included to address the problems of introducing reflection into UME.

The last hour of the day was dedicated to discussing how the work from the Reflective Learning Study might be taken forward.

8.2 Feedback on the Reflective Learning Study

Since the findings of the Reflective Learning Study have already been presented in detail, I have not repeated them in the format presented at the workshop.

The apparent incompatibility between the reflective learning techniques offered by the reflective learning and the Cardiff third year curriculum was discussed. Delegates thought that students would be less willing to take part in learning activities that were voluntary and not going to be assessed. It was suggested that in further work the possibility of other reflective activities be explored.

There was a discussion about the limited levels of reflection, which lay within the capabilities of most undergraduate students. It was thought that students' level of learning could progress during their studies.

8.3 Theoretical base of reflective learning

I have presented here a short précis of what each of the four delegates presented on different aspects of theory underpinning reflective learning. There is some overlap with material presented in chapter 2 but I have repeated it here, briefly, to provide as good an overall picture of the workshop as possible.

8.3.1 Superficial and Deep approaches to learning

John Sweet presented the work of Marton and colleagues (1976, 1997). They looked at learners' *approach* to their work and their beliefs about learning. In their early work they asked students to read a piece of text and then interviewed them about the way they had approached it. They described two ways in which the text might be approached. In the 'atomistic' approach the learners read the text in small chunks and tried to learn the contents of the individual chunks. They did not, however, attempt to make sense of the text as whole. On the other hand students who approached the text in a 'holistic' way attempted to find out the meaning of the text as a whole. In general students achieved what they set out to achieve in terms of determining the meaning of the text.

Marton and colleagues used analysis of interviews as the primary source of data for their research. They called their approach to analysis *phenomenographic*. The researcher examining the transcripts of interviews using her/his own point of view while “bracketing off” other viewpoints distinguishes this, they said.

8.3.2 Constructivist learning and the cognitive structure

Jennifer Moon gave an explanation of constructivism as a model of learning. In this model newly learned material is taken into the learner’s network of knowledge. In the constructivist model when a learner is presented with new material they need to examine it in light of what they already know - a process of *assimilation*. In order for the newly learned material to be taken into the learner’s body of knowledge it might be necessary to adapt what is known already or the new learning or both. This is called the process of *accommodation* and is the stage of learning where reflection takes place. Jennifer agreed that there is no research evidence to support constructivist theory itself; it is a way of believing how learning occurs but many studies have been carried out based on the constructivist model. In constructivism the task of the teacher is different to more traditional models of learning. If learning is the process of assimilation of information by the learner and its accommodation into the cognitive structure then the teacher needs to present information in a format that is easily assimilated and to organise learning activities that facilitate the process of accommodation. Asking appropriate questions is one of the most commonly used facilitative activities used by teachers but many others exist.

8.3.3 Experiential learning

John Cowan began by describing approaches to research that can be carried out by a teacher in the classroom environment. He said that teachers should carry out action

research studies, in their own classroom, investigating research questions that are relevant to their own situation. He emphasised the importance of involving students in the research.

John pointed out that experiential learning is a much-used term and has been used to mean many things by many authors. His definition of experiential learning was the development of learning experiences that have been specially designed for a particular purpose in learning. Specific questions can then be asked to enable to student to derive maximum benefit from the experience. A student had once told John that he no longer needed him, having reached the stage where he knew what questions were going to be asked.

Tim Dornan asked whether experiential learning structured in this way could be relied upon to enable a medical student to learn all the knowledge and skills they need. Medicine is far from being the only profession where its trainees have to learn a minimum amount before they are safe to practice. What they have covered in the curriculum and in exams is a poor predictor of how much they will retain. (discussed in 8.6)

John Cowan has pointed out that it is possible to take experiential learning one stage further through socio-constructivism (Cowan, 2002; see section 2.1.9). Social interaction at each point in the experiential learning cycle can ensure that learning is optimised. Students can easily be taught to act as facilitators for each other and to ask each other the questions.

8.3.4 Reflection to enhance medical students' learning

Jean Ker introduced the use of an evaluation instrument for reflection in UME. A search of the literature had revealed very few studies relating to reflective learning in medicine.

The term reflection, she suggested, was an off-putting term for many students. A more constructive outcome might be achieved by saying at the end of a teaching session

“What have you learned?” rather than “Now go and reflect”. There is a need for reflection to be moved into mainstream medical education and for it not be seen as an option.

“Think Spots” provide an opportunity for students to think about a learning session that is coming to an end and thinking over what has been learned that session. Students should consider whether they think that the material they have learned in the session that this is something that they will need in the future.

Jean described written, timed submissions completed by final-year students, which encourage them to reflect on their progress and their learning needs. The benefits of written reflections to semantic memory are described by a number of authors including Hatton & Smith (1995). Dundee students complete a portfolio that forms part of their final (licensing) assessment. To address the conflict between writing a true reflection and gaining best marks they do not submit their portfolio but a summary in which they state how they have progressed. Jean presented the outcome measure she has developed for portfolio learning, which evaluates the portfolio process and determines whether the students have presented evidence of their progress. It determines whether students have identified learning needs by evaluating their progress.

8.4 Discussion

Jennifer Moon told the group how the work of a number of authors (including Perry, and King and Kitchener) has described a spectrum of complexity of learning. The least sophisticated level is where students expect to get given the right material by the teacher and think in binary terms of right and wrong. As learning becomes more complex, learners become open to a degree of uncertainty but still think that a correct answer exists. In the most complex levels of learning students recognise the need to be able to prove their point of view and the place of emotion in learning is recognised. Only learning at the highest levels is likely to be associated with the deepest reflection (King and Kitchener, 1994).

John Cowan said that students decrease in their willingness to reflect as they progress through higher education, regaining their willingness to reflect some years after they have left it. Reflection has a part in helping students to move their learning to the more complex levels. Male students were thought to be less willing to take part in reflection, or to respond to questions such as “how did I feel about that?”. JS (John Sweet) emphasised the importance of debriefing sessions in helping students to take stock of what they have learned and how this fits into their cognitive structure (a way of “stopping it being lost”). Reflection does already form an important part of the course for teachers at Cardiff University, John Parnell advised. Other professions are ahead of medicine in introducing reflection into undergraduate education.

During the course of the day, forms in which reflection can be encouraged in undergraduate education were discussed. JC described how he asked students to ask themselves a question they don't know the answer to but which they would find useful. JM (Jennifer Moon) said that students could reflect on their learning when revising, and that reflection could help to move their understanding to a deeper level.

8.5 Further research

There were many suggestions for further research such as making reflective learning compulsory, and embedding reflection in mainstream learning. John Parnell suggested that Cardiff medical students might be asked to write and submit a three-monthly report on their progress to a tutor.

However, the discussion went beyond how better to introduce and evaluate reflective learning. The suggestion was to investigate the effect of context on medical students' learning and their ability/willingness to take part in reflective learning. It was suggested that we compare reflective learning skills in medical students from different medical

schools with different curricula following on from our observed differences between Cardiff and Manchester students.

8.6 Reflections on the workshop

There was a marked contrast during the day between the learning described by the students interviewed and the more sophisticated forms of learning discussed which are associated with deeper reflection. The discussions highlighted the tension in UME between the depth of learning and the breadth of material to be covered. "Medicine is a knowledge-based profession" is how this was expressed. However, the evidence from the Reflective Learning Study was that having to cover a great breadth of material pushes students (even those with a naturally deep approach) to adopt a surface approach. They are clear in their minds that this is the approach required to pass exams. It can be argued, therefore, that if students learned less, and were encouraged by, amongst other things, their forms of assessment to take a deeper approach to their learning, the outcome might be that they end up with more accessible knowledge.

It was asked whether learning exists that does not begin with experience and it was thought it does not. The problems used in problem-based learning form an experience, albeit one removed from the untidy nature of real-life practice. At present these written cases, where the content is carefully controlled, and uncontrolled real-life cases form the experiences for much medical student learning. At present the degree to which a reflective practicum (Schön, 1987) is offered varies between medical schools. Skills laboratories offer one possible way of manipulating conditions to provide such a reflective practicum. There is often no formalised encouragement that students define their learning objectives/needs after seeing real-life patients, as there is when they are going through a PBL case.

8.7 Expert workshop – conclusions

I was privileged to have the attention of this panel of experts on my work for a whole day. Because there were clear objectives for the day I am able to examine whether they were met.

The four delegates, who spoke, between them, covered a wide area of educational literature. This confirmed my working under the constructivist model. It also confirmed my use of the work on surface and deep learning which has its basis in rigorous research. It was emphasised that research in education has to take account of the context rather than to try to exclude it. The last presenter, Jean Ker, presented work specific to UME. This was similar to the work presented in this thesis. She made a number of suggestions how to make further reflective learning interventions more congruent with students' teaching and learning.

To have feedback on the results of my own work from this group provided a source of validation. The feedback was pragmatic and sensible and appeared to come from the group's own experience as teachers and educational researchers.

The biggest single change in my thinking about this research was to think more about the effect of the context, the curriculum and the student culture. This should take precedence over continuing to study the effect of reflective learning interventions on students' learning.

Chapter 9 : Discussion of the Reflective Learning

Study

9.0 Introduction

In presenting a discussion of the Reflective Learning Study in this chapter I have tried to identify the important outcomes of the study. The findings go beyond evaluating the introduction of two reflective learning interventions to third year medical students. The impact of the data from the Manchester interviews and the insights from the expert workshop need to be reviewed in addition to the data from the original interviews, LSQa and the examination results. I have included in this discussion the unexpected effects of the interventions especially the tutorial groups. I present a critical evaluation of the methodology and identify what can be learned from this with future research in mind.

At the end of this chapter I present the options for future research and give my reasons for choosing a comparative study of medical students' reflective learning skills in different medical schools as the research study to take forward the findings of the Reflective Learning Study.

9.1 The learning context at Cardiff

Despite the primary aim of the Reflective Learning Study being to evaluate the introduction of reflective learning techniques, it was necessary to evaluate the learning environment into which we were introducing them. I had received information on the learning context from the focus groups but when I came to analyse the RLS interview data it was apparent that the context exerted a stronger influence on the students' learning than had previously been predicted. It is possible that the samples who took part in the focus groups, selected for convenience did not give as full a picture of life for third year students as a more purposive sample may have done.

Several ethnographic studies have been carried out over a number of years of the context in which medical education takes place (Atkinson and Heath, 1981; Becker, 1961;

Seabrook, 2004) and it was not the aim of this thesis to carry out another such study. However, the context in which this study was carried out was a major factor when analysing the data. Our study investigated the “hidden curriculum” (Dwinnell and Barley, 2000; Lempp and Seale, 2004) by providing the students with space in which they felt able to speak openly about the context and the effect it had on their learning. The context was reflected in how useful the students perceived reflective learning to be to them and in the number of students who signed up for the study. Indeed the focus groups predicted that many students would sign up for the study whereas 35/232 (15%) in fact did. The principal forces affecting the students’ learning were the workload, the volume of material to be learned, the pressure on students’ time, the apparent demand from the exams for factual information and the supply of the factual information via lectures. Research with nursing students, which supports these findings, has found that anxieties about covering all course objectives distracted students from reflection (Baker, 1996).

The effect of examinations on students’ learning was powerful, and the EMQ format was particularly unpopular. The students said these exams did not allow them to demonstrate their understanding of the subject and rewarded the reproduction of lists. The volume of material the students had to learn came up repeatedly and is common to several of the factors in the list above. As far as revision was concerned students seemed to perceive the task mainly as one of reproducing and to use a surface approach (Entwistle and Entwistle, 1992).

Gaining the respect of their teachers was important to students. A good learning environment was described as one where they could open their mouths to ask or answer a question without fear of being humiliated. It was obvious to the students that some teachers cared about their learning; the students appreciated this and enjoyed being taught by those members of staff. Some clinical teachers made their lack of interest in students obvious either by their absence or by their apparent hurry to get the teaching over. Many students

told stories of hanging around for hours not knowing whether their timetabled teaching was going to happen.

The volume of information that had to be assimilated in order to qualify as a doctor who was safe to practice was discussed at the expert workshop. One of the delegates said that medicine was a “learned profession”, one where the possession of a certain body of knowledge was part of being a member of that profession. They asked whether reflective learning would supply a doctor in training with sufficient knowledge for future practice. This delegate appeared to be saying that high volume teaching methods such as lectures are the only ones that will deliver sufficient information and that reflective, learner-centred strategies may be deep but will not cover the subject area. This is a teacher-centred argument, where the teacher determines what the student is to learn. However, constructivist theory states that only the learner can construct knowledge and it is only by working with this construction and at the students’ pace that any learning can take place. Therefore, it is important when designing a curriculum, however high the factual load, to create learning tasks that are aligned to construction of knowledge by the learner. Learning activities need to present information to the learner in a way that they are best able to assimilate. If there is a lot to be learned the argument that surface learning (associated with poor recall and understanding, and with no creation of “hooks” in the cognitive structure) has to be used does not stand up. The students risk learning less not more *and* the quality of the learning is likely to be poorer (Ausubel, 2000).

A small number of students were sufficiently motivated to take part by a wish to help any study looking into their learning. This suggests the presence of a strong desire to see current methods of teaching and learning change (“*Anything that challenges the way things are*”). This reflects upon the current course and students’ opinion of it.

9.2 Study design

9.2.1 Recruitment

There was no significant difference in gender between the students who did and did not sign up for the study at the end of the lecture. It was notable, however, that nine percent of the male students and eighteen percent of female students signed up. From these data it is only possible to speculate what the reasons for this difference might be. Comparison of age and ethnicity may have given helpful information.

9.2.2 Voluntary participation

The voluntary design of this study was unusual within research into reflective learning in undergraduate medicine. It meant that full participants were able to relate their experiences of taking part in the study and in what way reflection had changed their learning but of equal importance it meant that those who chose not to take part were able to give their reactions to reflective learning and how it related to their current learning situation. All students interviewed were able to say how reflective learning related to the curriculum and the context. Some saw it as potentially helpful with learning but not in relation to their current learning situation.

Despite our best efforts it is not possible to say that all changes in learning were attributable to the interventions and in particular that there was not some effect due to the move to clinically-based learning.

Putting the decision whether or not to take part in the study in the hands of the students meant that only a relatively small number of students were recruited. Out of a year-group of 232, only 65 students came to the introductory lecture and 20 students continued to take part throughout the study. It was possible, however, to collect rich data

about the learning context and the effects of reflective learning via the interviews but the small number of participants made quantitative evaluation difficult and may be responsible for the absence of statistically significant differences in LSQa scores and examination results. The response to the request for all introductory lecture attendees to complete LSQa for a second time was particularly poor. It is possible that for students who had only attended one lecture two terms previously or dropped out of the study the requests may have appeared to have little relevance.

The delegates at the expert seminar expressed no surprise at the low level of recruitment. The consensus was that most students work when they have to and where their performance is going to be assessed.

The reason for choosing a voluntary design was to enable reflection to be assessed in isolation from any bias due to assessment. The danger is that once students are being assessed and given a grade for reflective activity they will try to carry out that activity in a way that will gain them the best grade.

In order to maximise the reflective nature of the learning journal the personal ownership by the student was emphasised. This may explain why only six full participants out of 20 responded to the request for submission of journals for anonymised analysis. This reduced the breadth of scope possible in the textual analysis of the journals.

9.3 Benefits of reflective learning

These data show that reflective learning helps medical students become more self-directed and more focused in their learning. The participants' learning was deeper in approach and more integrated. Participants in this study said that they were better able to recognise what they needed to learn, (i.e. to formulate their own learning objectives) as a result of taking part in the study. All the respondents were focussed on learning for examinations but the participants said they were less likely to try to cram everything and

more likely to try to identify what was important. Participants' learning was focussed on their future as doctors as well as the forthcoming examinations).

A positive feedback loop was described where students felt positive about learning using reflective techniques. This had its basis in identifying the need to learn the particular material for themselves. Having experienced positive feelings associated with learning in this way students were encouraged to continue using them. Some participants said that they thought that examinations would be less of a source of incentive for them to learn as reflective learning techniques made them feel they were learning more for themselves and for their future as doctors. In their early stage of clinical medical training the students were helped to change their state of unconscious ignorance (i.e. being unaware of what they did not know) to one of conscious ignorance. As well as their own reflections the reflections of other students in the tutorial groups helped with this process.

The original research question "Can reflective improve medical students' learning" is addressed by the material presented in this section. Using the criteria for improved learning identified in chapter 2, my data show evidence of improved learning as a result of reflective learning (see 12.1). A deeper approach and more integration of learning are fundamental criteria of the Gothenburg group and the SOLO taxonomy respectively (Marton, 1997; Biggs and Collis, 1982). This efficacy study addresses the question "*can* reflective learning improve medical students learning" but I suggest that further work introducing reflective learning to all medical students should be pursued. This should be carried out taking into account the need for alignment between reflective learning and the curriculum.

Although the number of participants in the study was small, 12 out of 19 said that they continue to use reflective learning after the study had finished. This suggests reflective learning had proved helpful with their studies. This is supported by the response of one student to my request for participant validation of the data, who said that he had continued to use reflective learning and would probably use it throughout his career.

Duraghee (1996) evaluated changes in student nurses' learning processes 1 year after a reflective learning intervention and found that changes due to the intervention were sustained. In particular he found that they linked theory with practice and thought critically about their work.

9.4 Effects of the context on participants' experience

We asked all the participants what they wanted out of the Reflective Learning Study and whether they had achieved those aims. None of those who had wanted to find a new way of learning had succeeded in doing this. However, nearly all participants described changes in their learning as a result of taking part in the study and I conclude that the study helped them to use their existing learning methods differently. They could not adopt a completely new way of learning because the demands of the curriculum had not changed. It was the curriculum and the examinations that determined the learning method that the students used and it was beyond the scope of this study to enable students to change this.

9.5 Emotionally difficult material

Reflective learning helped participants deal with emotionally difficult material. Undoubtedly there are other ways of helping students deal with such distressing material but none were obviously available at the time of the study. A participant said that questions like "at what point does a person become an empty shell?" were the reflections for her after witnessing an unexpected death. Every medical student is going to come across situations like this and, even where pastoral support is available, a further accessible resource is extremely useful and may prevent students from feeling unsupported.

9.6 The effects of the group

Some of the tutorial group functions were related to reflective learning and some were not. This may reflect the fact that there was relatively little small group work in the third year. The tutorial groups presented an opportunity to talk about matters relating to learning and coursework. It is not surprising that some of the benefits that the participants rated most highly were, in fact, spin-offs of small group function (Westberg and Jason, 1996).

The benefits of the group relating to reflective learning consisted of increased awareness by participants of gaps in their knowledge. Students were made aware of gaps in their knowledge by their peers' presentations as well as their own. This meant that the student was alerted to new learning needs that their peers had initially identified in relation to patients they had seen. This further raised the awareness of the students of what they did not know.

For some students discussing their progress with their peers and comparing teaching at different placements were the most important reason for attending the tutorial group. For one student regular contact with the tutor (a senior clinician) was something that she did not get anywhere else and which she rated highly. These findings give information on the context from another angle. The students were glad to get these needs met in the tutorial group because they were not being met elsewhere. In a different curriculum with more small group work this may not be the case.

Interviews with tutors provided a rich source of data about the functioning of the groups and of the effects of context on students learning. The data from the tutors added little, however, to the data from the interviews with the students in relation to the initial question about the effect of reflection on student learning.

9.7 Why non-participants chose not take part

Many students thought that the workload in the third year gave them too little time to take part in the study. At the beginning of the year when we were recruiting the workload was not great but the students were aware that it would increase and their senior colleagues had told them that this was a very busy year and that they were going to be under great pressure of time. A smaller number thought reflective learning would not help them to “jump through the hoops” that the curriculum demanded. Some students although they could see the benefits of reflective learning, did not think it would help them get through the medical curriculum. Having heard about the study one student said that he could get the benefits of reflective learning on their own without taking part.

It is possible that students felt inhibited from giving us other reasons for not joining in. Since EM and I carried out the interviews, it is possible that the students stuck to these two reasons because they were the most comfortable to voice in front of a member of medical school staff who was identified with the study.

No student said that they did not join in because of the phenomenon of not appearing keen. Respondents talking about other students only referred to this, none admitted to it affecting their own decision whether or not to participate.

There was reluctance among the non-participants to change their way of learning when it had enabled them to get this far in their medical training. Some went on to say that they thought we should have introduced the study into the first year before students' patterns of learning had become so established. This lack of willingness to try a learning strategy that might improve learning suggests fear of failure as a motivating force for these students (Covington, 1984).

The students who dropped out of the study all said that they did so because of clashes with other activities or other pressures on their time.

9.8 Examination results

My comparison of examination results from students who took part in the study and those who did not showed no significant increase in total examination score for the full participants when compared with the other groups. The lack of statistical significance may be due to the small size of the participant group.

There was also no statistically significant difference in the scores on the two clinical exams, CLIP and OSIE. However, despite the absence of statistical significance the mean performance of the initial participants was lower than the full participants at the OSIE (median scores at OSIE, full participants, 3, initial participants, 1, non-participants 3 – see table 4.7). It is only possible to hypothesise what the explanation for this finding might be. It is possible that of the students who signed up for the study those who were making good progress with their studies continued their participation in the study while those who were having difficulty dropped out. It cannot be claimed that it was participation in the study that caused the higher OSIE scores of the full participants since they were no higher than the scores of the non-participants

9.9 Different contexts at two medical schools

At the outset there was no plan to interview students in Manchester but when we began to analyse the early interview data from the Cardiff students it became obvious that learning context was of great importance. My concern was whether what we were hearing about the effects of context on students' learning at Cardiff would be the same if we interviewed medical students at any other medical school in the United Kingdom. As soon as we did carry out and analyse the extra interviews it became obvious that the data we collected in Manchester was different from the data we had collected in Cardiff. What was most striking about the Manchester data was the students' sense of control of their learning, of not being at the mercy of their lecturers for being told what they needed to learn and

being able to find out the information they needed for themselves. It has been said that medical students perceive their task as a “one-time mastery of facts” which they are not able to apply and that they do not perceive themselves developing their knowledge for a life as a doctor (Awbrey, 1985). This was more so among the Cardiff students than among those in Manchester. The biggest single factor in the different perception of learning was the delivery of the curriculum via problem-based learning cases in Manchester, which provoked the students to think about their prior learning and forced them to develop their own list of learning objectives for each case. The sign-up⁴ system also helped students to arrange clinical experience relevant to their learning. In the interviews the Manchester students said that they were not unequivocally in favour of the progress test but that it did have the effect of focussing their learning towards the knowledge they would need to practice as a doctor and away from crossing the next (examination) hurdle.

The Manchester students had a greater degree of self-regulation in their learning and greater self-efficacy. This supports work on self-regulation of learning, which demonstrates connections between self-regulation and motivation (Boekearts, 1997).

The difference between Cardiff and Manchester students can be described by how active they were in their learning. While Manchester students were actively involved in developing knowledge Cardiff students passively sat in lectures expecting to be given all the information they needed to learn.

Because of the limited number of interviews we were able to carry out there we did not develop much data about the effect of student culture on learning at Manchester although data relating to teaching on clinical placement was very similar to that collected in

⁴ Sign-ups are bookable slots at outpatient clinics that enable students to match their clinical experience to their learning in the PBL cases.

Cardiff. Teaching on placements varied widely with staff at different levels of seniority taking responsibility for teaching from pre-registration house officer to consultant.

9.10 Feedback from unplanned sources

There are two further pieces of information that are worth presenting here neither of which are from planned sources. Both are single, isolated, pieces of information but are, nonetheless, significant.

The first comes from one of the tutors who decided to keep a learning diary herself. She said that as a result of keeping a learning diary she had changed the way she managed several clinical conditions. If the intended outcome of medical education research is directly or indirectly improved patient care then most measured endpoints are surrogate ones. This tutor, however, is reporting a change in her clinical practice as a result of reflective learning. The clinical effects of the intervention should be measured objectively rather than be described by the practitioner himself or herself but the benefits seen here are nearer to patient care than those from most medical education studies (see 12.3.2)

The second item is the response of a final-year student to the request for participant evaluation. He stated that the benefits of reflective learning had persisted after he took part in the Reflective Learning Study. In particular he had continued to use reflective learning, and had found it useful in the portfolio he had been keeping on the final year general practice (Medicine in the Community) attachment and thought that he would continue to use reflective learning throughout his career as a doctor. He said he was glad that he had taken part in the study. This was an unsolicited testimonial. When I presented the Reflective Learning Study findings at an academic workshop in the department of general practice in March 2005, it was commented on that this student appeared to appreciate the full benefit of participating in the study only in retrospect. One of the focus group participants had also said that she could see the potential benefits of the study when looking

at the proposal at the end of the third year but was not sure if she would have been able to see the benefits at the beginning.

This raises a dilemma; third-year students advised us to introduce reflective learning in the first year before students became too set in their learning methods. However, it seems possible that students might be better able to learn from critical incident reflective accounts later in the course possibly as they mature and/or as they build up more clinical experience. This may have been answered to some extent at the expert workshop when the delegates suggested the different techniques they employ to get their students to reflect. At the end of a first-year lecture or seminar, getting students to summarise what they have learned “To prevent it from being lost” may be more appropriate. John Cowan, particularly, emphasised the need to use the correct intervention to facilitate reflection at any particular point in a student’s learning.

9.11 Preparation for the future

It was pointed out at the workshop that the critical incident template used in the RLS is very similar to the one used in GP appraisal in Wales. Reflection is going to be a central part of the appraisal and reaccrreditation procedures used for all doctors in the United Kingdom (General Medical Council 2000). Students who use these techniques in their undergraduate training will, at least, be used to the procedure when it becomes a requirement of their continuing to practise.

9.12 Learning styles

There was no difference in learning styles and in particular no difference on the reflector subscale of LSQa between participants and non-participants at the time of recruitment. In other words, these results fail to identify a group of students who are natural reflectors by the parameters of the LSQa. The sample for this study was the 65

students who came to the lecture to find out more about reflective learning after reading the publicity material that had been circulated. Because we only collected data from the attendees of the introductory lecture we do not know whether these 65 students have a significantly different learning style from the rest of the year group. It is possible that the students who attended the lecture have different learning styles and are more amenable to its benefits than their peers. We do know that there was no detectable difference in learning style between participants and non-participants. It would have been useful to have some of the students who did not come to the lecture complete LSQa. When the study was planned it had been expected that a bigger proportion of the 232 students in the year would attend the lecture.

The response to the request for all 65-lecture attendees to repeat LSQa at the end of the study was poor. The response to this request may have been improved by administering LSQa by email or by sending out email reminders. The data that we did receive did not show any difference in LSQa score before and after the study so it was not possible to say that using reflective learning techniques for two terms brought about any significant change in learning style and in particular the data did not demonstrate that taking part in reflective learning makes a learner a stronger reflector.

What can be inferred from the interview data is that some students were strategic learners. They were aware of the wish to use deeper learning styles but adopted a surface approach because this is what they thought best met the demands of the curriculum. I have been able to observe in this study that learning styles are likely to change according to the context and are not stable characteristics for any one learner. The observed effect of the context was students' learning being pushed towards a surface approach. Therefore, the only effect that can be said to be supported by these data is that a curriculum that is based on learning and reproducing factual information is likely to make deep learners adopt a surface approach. However, it is reasonable to hypothesise that a curriculum that

demanding conceptual understanding is likely to have the effect of making learners adopt a deeper approach.

9.13 Relationship to other research

Participants in this study were, as a result of taking part in reflective learning activities better able to decide what it was they needed to learn. Driessen, van Tartwijk, et al. (2003) also found that reflection helped students to determine their own learning objectives.

Participants of this study also cited greater integration of learning as a benefit of taking part. This is a characteristic of deeper learning (Moon, 1999a).

In this study students said that they felt more positive as a result of learning involving reflection. They said that learning done in relation to self-identified learning needs gave greater satisfaction. This satisfaction was sufficient for one participant to say that it encouraged her to continue to use reflective learning. This connects with other work where medical students who used reflection enjoyed their learning more (Sobral, 2000)

Changes in participants' perception of the task of learning in this study altered their approach to their learning to one of deeper understanding, rather than using the surface approach and memorising the material that had to be learned. Marton and colleagues concluded that students' achievements in learning correlated with their perceptions of what the learning task involved (Marton, 1997).

The LOT model proposes that teaching should be directed towards helping learners to gradually internalise the role of the teacher and become self-guided in their learning in cognitive, affective and metacognitive domains (ten Cate, Snell, et al., 2004). Students in this study showed increased self-guidance in all three of these domains.

9.14 Further research

The Reflective Learning Study was an efficacy study. Further research should assess whether the benefits from reflective learning seen in this study could be extended to all medical students. In order to do this reflective learning should be embedded within the curriculum and timetabled as part of the students' working day. The advice of the workshop delegates should also be borne in mind; to make reflective learning part of mainstream learning and to avoid jargon including the word 'reflection' ("the R word"). It would be important, to minimise the effect of assessment by making it supportive and formative. Mentoring and clear learning objectives have also been shown to maximise the benefits of reflective learning (Driessen, van Tartwijk, et al., 2003; Davis, Friedman Ben-David, et al., 2001). Reflective tasks should be as closely aligned as possible with students' learning. Questions, peer group and other learning activities should be carefully timed to match the stage of students' learning (Cowan, 1992; Biggs, 2003).

We asked the students when would be the best time in the curriculum to introduce reflective learning. The most popular time was the first year. The reasons for this were that students developed their way of learning, or adapted their previous methods when coming to medical school. Students are almost certainly told by students in years ahead of theirs that the cycle of writing down everything that the lecturers said and memorising it for the exams is how to get through medical school in general and the third year in particular. If students are able to challenge this by experiencing the benefits of reflective learning for themselves before their learning patterns are laid down in their first year they will be able to make up their own minds which learning strategies suit them best. If, on the other hand, they get through their exams as far as the third year by cramming their lecture notes they might be much more reluctant to change this way of learning that had been successful this far. This was reflected in the comments of some of the non-participants who thought that

changing their way of learning would be risky, even dangerous. Cowan (1998), whose work has involved close observation of students using socio-constructive learning strategies, commented that students decrease in their willingness to change as they progress through higher education. In combination these factors add up to give strong voice to an argument for further research into reflective learning being with first-year students.

A longitudinal study would determine whether students who have used reflection in learning continue to use it after the initial drive when it is introduced and any regular mentoring has ceased and whether this has any effect on their performance in exams or career choice.

Problems of timetabling tutorial groups and of students not wishing to be seen taking part might be addressed by holding internet-based, virtual, tutorial groups.

The greatest single effect on the students' willingness to take up reflective learning was the learning context. Most of the Cardiff students did not get involved in reflective learning at all and those we interviewed said they did not do so because of contextual factors. We also detected that the context at two different medical schools had markedly different effects on students' learning. Therefore a study needed to be carried out examining the effects of context on students' learning; can it make learning approach deeper or more surface? Can it make students more likely to reflect regularly as part of their learning? Can it make students more or less self-confident learners? Can it make students' learning more or less enjoyable? Can it help students' learning prepare them for their career as a doctor?

9.15 Reflective learning study – conclusions

The study showed that the context in which reflective learning is introduced would have a potent effect on its usefulness to the learners. Our intervention was not sufficiently flexible (Boud and Walker 1998) to adapt to the needs of the Cardiff students.

These findings show that reflective learning can help learners improve their learning where improvement is defined by the research-based hierarchies of learning defined in chapter 2.

Because of these findings and also our findings from our interviews with students from Manchester, we decided to make our next study one into the effects of different contexts on medical students' learning. Rather than continuing my work studying reflective learning in the minority of students who found it valuable (roughly one in ten), I wanted to explore the factors that affect students' receptiveness to strategies capable of helping them to learn in a deeper, more integrated way.

9.16 The phase II study

When I planned the Reflective Learning Study, I had not expected contextual factors to exert as powerful effect as they proved to do on students' willingness to participate in reflective learning. In our interviews in Manchester we found students whose learning processes demonstrated the self-direction we only found in Cardiff students after they had taken part in reflective learning. A study comparing first and third year medical students at a traditional and an innovative medical school found significantly higher levels of meaning orientation (Lancaster Approaches to Learning Inventory) in the students from the innovative school than from the traditional (Newble and Clarke, 1987). This poses the question "Do different medical school curricula nurture different levels of self-direction of learning, approach to study, self-efficacy and positive affect in learning?" This question was addressed in the Phase II study.

In order to operationalise this question it is necessary to identify at least two medical schools with different curricula, going on our work so far Cardiff and Manchester would be obvious schools to include. However, logistically this was impossible so I approached members of staff at Glasgow medical school who were willing to involve their final year

students in a comparative study. The reason for choosing Glasgow was that, like Manchester, it had a curriculum based on problem-based learning. It was necessary to decide what outcomes of reflective learning should be examined and to either find an existing validated instrument or instruments that measure these characteristics or to develop an instrument that can do this. This will be pursued in detail in the next chapter.

Chapter 10 : Phase II methodology

10.0 Introduction

In this chapter, I define changes that would be desirable as outcomes of reflective learning. These changes are based on the literature search and the findings of the reflective learning study. They might be termed evidence-based learning improvements. I then describe the instruments I chose to measure these outcomes and, with supporting evidence, present my justification for using them in this study.

I selected three instruments. These were the Learning and Studying Questionnaire (LSQb), the Self-efficacy in Self-Directed Learning Scale, and the Reflection in Learning Scale (RLS).

10.1 Desirable outcomes from reflective learning

10.1.1 Approach to learning

I chose the Learning and Studying Questionnaire (LSQb) which has been developed by the Enhancing Teaching-Learning Environments (ETL) Project at Edinburgh University (Entwistle, McCune, et al., 2002; ETL project, 2002).

The LSQb was designed to measure students' general learning orientations and approaches to studying. It comprises three sections; Learning Orientations, Reasons for Taking This Particular Course Unit, and Approaches to Learning and Studying (See table 10.1).

Table 10.1 Scales and subscales of the learning and studying questionnaire LSQB.

Scale	Subscales			
	1	2	3	4
Learning orientations	Intrinsic orientation	6 single items		
Reasons for taking course unit	Intrinsic reason	Extrinsic reason	1 single item	
Deep approach	Intention to understand	Relating ideas	Use of evidence	
Surface approach	Unreflective study	Fragmented knowledge	Unthinking acceptance	Memorising without understanding
Monitoring study	Monitoring effort	Monitoring understanding	Monitoring skills	
Organisation of study	Study organisation	Time management		
Effort management	Concentration	Effort		

The first section Learning Orientations consists of ten items. Learning orientations are defined as

'All those attitudes and aims that express the student's individual relationship with a course of study and the university'

The authors developed the categories in the first section from interviews with students. They are based on four main functions of higher education (Beaty, Gibbs, et al, 1997, p. 76); vocational, academic, personal and social. The two main categories in this section are intrinsic and extrinsic. They determine the learners' focus of interest in the course of study (intrinsic for personal learning and growth, and extrinsic to gain qualifications or other external benefits). As well as these two categories the authors introduce two other items. 'Independence' which describes an expectation that higher education will help a student develop as a person and boost their self-confidence. The second, 'lack of purpose', denotes an absence of either intrinsic or extrinsic orientation. Factor analysis found that the three items for intrinsic orientation and the item for

independence suggested a single clear factor (see appendix 8) but the items for extrinsic motivation and 'lack of purpose' did not hold together consistently and are, therefore, included as single orientation items. The second section of LSQb is an investigation of students' reasons for choosing to study a particular course as part of their degree.

Section three is the last and longest section. Its 36 items form the Approaches to Learning and Studying Inventory (ALSI). It comprises five scales; deep approach, surface approach, monitoring studying, organising studying, and effort management (see table 10.1). The ALSI has been developed from earlier inventories. The authors checked the language used carefully to make it colloquial and ran pilot studies to minimise the number of items.

The deep approach scale combines intention in study and study process. There are three subscales; intention to understand, relating ideas (which also relates to constructivist learning), and use of evidence. Relating ideas and use of evidence connect to the work of Pask (1976) on serialist and holist approaches to studying text.

The surface approach scale is made up of four subscales; unreflective studying, unthinking acceptance, memorising without understanding, and fragmented knowledge.

A feature of the ALSI that was of value in this study was that it measures surface and deep approaches to study on two separate scales. Since students have the capacity to use surface approach in some contexts and deep approach in others it was necessary to measure the two approaches separately and not as opposite poles of a one-dimensional concept.

The authors of LSQb advised me that some modification of the instrument might be required for use in this study. Item g ("I want to study the subject in depth by taking interesting and stimulating courses") was not relevant to medical students who have relatively little choice in the course components they take and so it was omitted. Once qualified, doctors rarely experience difficulty finding employment. Likewise the "why I chose this" course scale was not relevant to medical students and was omitted. Item h "I

mainly need the qualification to get a good job when I finish” was reduced to “I mainly need the qualification” also because of the relatively good employment prospects for medical students.

10.1.2 Self-Efficacy for self-regulated learning.

Comparing our interview data from Cardiff and Manchester, there appeared to be a difference in students’ belief in confidence in regulating their own learning. This relates to the work of Bandura and others on self-efficacy, and in particular self-efficacy for self-regulated learning (Zimmerman, Bandura, et al., 1992). A learner that believes in their ability and power to direct their own learning will have greater belief in their own potential for academic achievement. Also, academic ability is improved when learners set their own learning goals. Learners with greater self-efficacy for self-direction in learning and greater self-efficacy for academic achievement will set themselves goals. Goals, the authors state, specify the requirements for success in learning.

Zimmerman, Bandura et al.’s Self-Efficacy for Self-Regulated Learning Scale, is based on these principles. The scale was designed for schoolchildren and needed to be modified. I took care to minimise any change in meaning but plainly questions containing inappropriate terms needed to be changed. For example, item 1 “*How well can you finish homework assignments by deadlines*”. Because modification was restricted to minor changes in wording validation data was not carried out on the modified instrument.

In their work with school pupils the authors found an alpha coefficient of .87 for the scale’s internal consistency

10.1.3 The reflective learning scale

The paper giving the psychometric properties of the Reflective Learning Scale is published only in Portuguese. I was fortunate to have assistance from an interpreter but some information about the instruments used for validation was incomplete.

The reflective learning scale (RLS) was devised by Sobral specifically to measure reflection in learning by medical students (Sobral, 1998; Sobral, 2000; Sobral, 2001). The two instruments I have already presented measure approach to learning and confidence in ability to self-direct in learning. Sobral's scale, however, measures reflective activity. The items in his questionnaire (see appendix 7) specifically ask about reflective activities during the *process* of learning.

The RLS was validated by a study involving 225 medical students at the University of Brasilia. Scores on the RLS were correlated with those from four other instruments (see table 10.2). These were; the efficacy scale for self-regulated learning (Zimmerman & Martinez-Pons, 1988), the Cognitive behaviour survey a 6-item Questionnaire on Cognitive constructs (Mitchell, 1994), and the autonomy scale of self-driven learning (Sobral, 1997). The respondents' results on the RLS were also correlated with their examination results six months later.

Table 10.2 Validation of Reflective learning scale (Sobral, 1998).

Scale	No of items	Authors and date	Correlation with RLS	P
Efficacy Scale for self-regulated learning	11	Zimmerman and Martinez Pons 1988	$r=0.58$	<0.001
The cognitive behaviour survey	6	Mitchell, 1994	$r = 0.53$	0.001
The autonomy scale of self-driven learning	5	Sobral, 1997	$r=0.55$	<0.001
Significant direction learning scale	6	*	$r = 0.32$	<0.005
Performance at examinations	N/A	N/A	$r=0.32$	<0.005

*The author states that this is a shortened version of another scale (Sobral, 1998).

The RLS correlated significantly with the cognitive conducts questionnaire by Mitchell (1994; $r=0.53$, $p<0.001$). There was a correlation ($r=0.32$, $p<0.005$) between RLS and performance in the examinations 6 months later. Sobral detected Construct validity between the RLS and the following instruments; self-regulated learning ($r=0.58$, $p<0.001$), significant learning orientation ($r=0.32$, $p<0.005$) and self-driven learning ($r=0.55$, $p<0.001$). The internal consistency of the RLS, examined using Cronbach's alpha was 0.81.

10.2 Method

10.2.1 Subjects

Final year students at Cardiff and Glasgow medical schools were asked to complete the pack of three questionnaires. Glasgow medical school was selected for this because of the similarity with the Manchester PBL curriculum. Because of the wide distribution of clinical sites it was not possible to administer the questionnaire to Manchester University final year students. To facilitate administration at Cardiff and Glasgow the questionnaire was distributed when all the students in the year were assembled for a lecture. Completed questionnaires were collected before students left the lecture theatre.

10.3 Statistical analysis

Comparison of mean scores of students at Cardiff and Glasgow can be carried out using t test for independent means once the data has been examined for approximation to normal distribution.

In order to measure the performance of the questionnaire as a whole and of the component instruments it will be necessary to measure the internal consistency of the constituent parts of the questionnaire using Cronbach's alpha.

10.4 Phase II questionnaire summary

I put together a questionnaire pack made up from three validated instruments in order to compare the effect of the curricula at two medical schools on their students' learning. The learning and studying questionnaire and the self-efficacy in self-directed learning scale measured changes in learning identified as desirable in Chapter 2. The same changes were found to result from reflective learning in the Reflective Learning Study. The reflective learning scale enabled me to find out if students at the two medical schools are using reflection as part of their regular learning at a similar level.

This questionnaire addresses a question on the effect of context on medical students' learning. The result will tell us whether differences exist. If differences are detected further work will be necessary to determine the reasons for those differences.

The results are presented in the next chapter.

Chapter 11 : Phase II findings

11.0 Introduction

The findings from administering the pack of three questionnaires to final-year medical students in Glasgow and Cardiff form the content of this chapter.

In the last section I discuss the meaning of the results in relation to my previous work, the limitations on what can be inferred from them and possible directions that further research may take.

11.1 Respondents

At Cardiff 154 out of 241 (64%) final year medical students completed the questionnaire and at Glasgow 237 out of 253 (94%) final year students completed it. The Cardiff students completed the questionnaire in October 2004 and the Glasgow students completed it in April 2005. The gap between administration of the questionnaire in Cardiff and in Glasgow was a result of the small number of opportunities in the respective schools' timetables. This interval in administration of the questionnaire was thought preferable to the much smaller response rates that would probably have resulted had the questionnaire pack been administered by post or email.

The age, gender and age at entry to medical school for the participants are given in table 11.1. There were no statistically significant differences in age ($p = 0.10$, Independent samples t test) or gender ($p = 0.246$ Chi-squared test).

Examination of educational level prior to entry to medical school shows a higher number of Cardiff students having taken a gap year prior to commencing medical school and a higher number of Glasgow students having acquired a university degree prior to admission (See table 11.2).

Table 11.1 Age, gender and age at entry to medical school of questionnaire respondents (Percentages given in brackets).

	Cardiff N = 154	Glasgow N = 237	Significance
Age	23.34	23.66	0.10
Male	44 (28.57)	81 (34.18)	0.246
Female	110 (71.43)	156 (65.82)	
Age at medical school entry	18.83	18.57	0.202

Table 11.2 Educational activity prior to entering medical school of questionnaire respondents (Percentages given in brackets).

Educational level	Cardiff N = 154	Glasgow N = 237
Secondary school	108 (70.12)	192 (81.1)
Gap year after secondary school	36 (23.4)	20 (8.4)
University	5 (3.2)	22 (9.3)
Full time work	5 (3.2)	1 (0.4)

11.2 Analysis of data

11.2.1 Comparison of means

Two of the instruments included in the questionnaire pack, the reflective learning scale (RLS) and the self-efficacy in self-directed learning scale each comprised a single scale. The third, the learning and studying questionnaire (LSQb) comprised 6 scales. Most of which were made up of a number of subscales. In analysing the results, therefore, it was necessary to compare mean scores on a total of 22 scales and subscales.

Where a large number of means are being compared, the levels at which differences are considered statistically significant needs to be calculated. After taking statistical advice I used Bonferroni's calculation to do this. This states that the p value at or below which statistical significance can be inferred is calculated by dividing the conventional 0.05 significant p value by the number of comparisons carried out (in this case 22). Therefore, for the interpretation of the results presented here significance should be considered if p is equal to or less than

$$.05 / 22 = .00227$$

Some students did not respond to some items. Although these blank responses were relatively few, that student's responses for the subscale and scale to which the blank item contributed were excluded.

11.2.2 Distribution of data

The distributions of data obtained by Cardiff and Glasgow students completing all scales were sufficiently close to normal for parametric statistical testing to be used.

11.3 Questionnaire data: Comparison of means

11.3.1 The Reflective Learning Scale (RLS)

Glasgow students scored significantly higher on the reflective learning scale (see table 11.3).

Table 11.3 Comparison of mean score on reflective learning scale (t test for independent means).

Mean score		Mean difference	Significance (2 tailed)
Cardiff n = 142	Glasgow n = 214		
58.55	63.35	-4.80	.001*

*Significance at or below .002

11.3.2 Self-Efficacy in Self-Directed Learning

Glasgow students also scored significantly higher on the self-efficacy in self-directed learning scale (see table 11.4).

Table 11.4 Comparison of mean score on self-efficacy scale for self-directed learning (t test for independent means).

Mean score		Mean difference	Significance (2 tailed)
Cardiff n = 143	Glasgow n = 221		
50.69	54.50	-3.81	<.001*

*Significance at or below 0.002

11.3.3 Learning and Studying Questionnaire (LSQb)

Glasgow students attained significantly higher mean scores on the organised study scale (19.86 against 18.1, $p = .001$) and its study organisation subscale (6.43 against 5.67, $p = <.001$ - see table 11.5).

Cardiff students scored significantly higher on the unquestioning acceptance subscale (5.56 against 4.92, $p = 0.002$)

Table 11.5 Comparison of mean score on scales and subscales of the learning and studying questionnaire (LSQB), (t test for independent means).

Scales in blue type, subscales in red

Scale/subscale	Cardiff		Glasgow		Mean difference	Significance (2 tailed)
	n ¹	mean	n ¹	mean		
Intrinsic orientation	153	4.58	234	4.40	0.18	.243
Deep approach	149	27.32	226	28.85	-1.53	.006
Intention to understand	149	6.97	228	7.40	-0.43	.009
Relating ideas	150	13.50	228	14.33	-0.83	.007
Use of evidence	149	6.84	233	7.11	-0.27	.138
Surface approach	148	22.49	255	21.71	0.78	.192
Unreflective study	149	5.52	232	5.12	0.40	.038
Fragmented knowledge	150	5.33	229	5.17	0.30	.209
Unthinking acceptance	151	5.56	229	4.92	0.63	.002*
Memorising without understanding	151	6.04	227	6.50	-0.45	.029
Monitoring study	141	27.23	226	27.54	-0.30	.564
Monitoring effort	150	6.83	228	6.82	.01	.960
Monitoring understanding	148	10.57	232	10.81	-0.24	.294
Monitoring skills	148	9.84	229	9.92	-0.08	.564
Organisation of study	147	18.10	228	19.86	-1.76	.001*
Study organisation	152	5.67	228	6.43	-0.76	<.001*
Time management	147	12.42	229	13.40	-0.98	.007
Effort management	148	20.90	227	21.62	-0.72	.113
Concentration	150	6.57	234	6.56	0.01	.971
Effort	150	14.37	227	15.09	-0.72	.031

¹n varies because different numbers of students omitted items from subscales

*Significance at or below .002

11.4 Internal Consistency

The internal consistency of the whole questionnaire was 0.881 (Cronbach's alpha). The Internal consistency of the three questionnaire components were RLS 0.905, Self-efficacy for self-directed learning 0.855 and LSQb 0.793 (Cronbach's alpha)

11.5 Discussion of questionnaire results

A greater proportion of Glasgow students (94.8%) completed the questionnaire than did at Cardiff (63.8%). This is possibly due to the questionnaire being administered in Glasgow at a revision lecture near to the final examinations when students' motivation to attend may have been higher. The higher proportion of Glasgow students having acquired a university degree prior to starting medical school might predict more sophisticated learning style among that group (King and Kitchener, 1994). Further statistical analysis might determine the significance of a higher graduate intake at Glasgow and of a greater proportion of the Cardiff intake having taken a gap year.

It was not possible to determine whether there were differences in learning approach at the time of admission to medical school between Cardiff and Glasgow students. It is likely that a greater proportion of Glasgow students were educated in the Scottish system compared to Cardiff students who are more likely to have been educated in the Welsh and English system. Furthermore, I did not have access to data relating to the number of overseas entrants to either school.

Glasgow students demonstrated greater reflection in learning, greater confidence as self-directed learners and are more organised in their learning. Cardiff students were more likely to accept learning material that was presented to them uncritically.

These differences represent a significant advantage in learning ability among the Glasgow students as they complete their last year at medical school and begin their medical

careers. It is possible that some of this difference is due to the time in the academic year when the questionnaire was administered at the two institutions.

The self-efficacy in self-directed learning scale measures students' sense of ability to achieve their learning objectives while taking charge of their own study activities.

The difference on the organised study scale of the LSQb shows that there is a statistically significant difference between the ability of Glasgow and Cardiff students to organise their own study. Students who are more organised in their study may be able to achieve more and to better integrate their learning.

Being closer to their final examinations it is also possible that the Glasgow students might have taken a more superficial approach to learning. However, this is not seen in the data.

By demonstrating a difference in scores on the reflective learning scale these data demonstrate a difference in the degree to which reflection forms part of the day-to-day learning practice of Cardiff and Glasgow students.

11.4.1 Deep approach

Differences were detected between Cardiff and Glasgow students on the deep approach scale ($p = .006$). Differences were also detected on two of the deep approach subscales (Intention to understand and relating ideas, $p = .009$ and $.007$ respectively). Caution is required in interpreting these results since they are not significant at the $p = .002$ level derived using Bonferroni's calculation. However, since a deep approach represents important differences in learning these results are worthy of further comment.

In chapter 2 I identified that a deep approach to learning is an evidence-based parameter of improved learning. It appears that Glasgow students take a deeper approach to their study than Cardiff students. This will mean that Glasgow students will learn in a more conceptual way that will be more meaningful. Deep learning is more likely to result

in a cognitive structure where new learning is related to prior learning making the material learned more accessible to the learner. Deep learning is also correlated with better performance in examinations (Newble and Entwistle, 1986). They scored higher on two subscales; intention to understand and relating ideas. When Glasgow students approach a learning task they will have discussed it in a problem-based learning group and will have decided their learning objectives with their peers. Cardiff students will be learning from lecture notes, which may not provide clear learning objectives. The Glasgow students will have a clearer idea of what they want to know when they approach their learning; making relating ideas, an intention to understand and a deep approach more helpful.

Further work examining this finding would be valuable. The data presented here do not tell us why there are any differences in deep approach to study between Cardiff and Glasgow students. If the difference is confirmed then it would be helpful to curriculum planners in Cardiff, Glasgow and other medical schools to explore the features of medical school curricula that make students more or less likely to adopt a deep approach to their learning.

11.4.2 Comparison with previous research into problem-based learning.

Research has been published examining the preparedness of medical students for life as a pre-registration house officer (Prince, van Eijs, et al., 2005; Antepohl, Domeij, et al., 2003; Whitehouse, O'Neill, et al., 2003). A systematic review of problem-based learning revealed two studies examining comparing PBL and non-PBL curricula on approach to study (Learning and teaching support network-01, 2003). Both found deeper learning approaches among students from the PBL curricula. Neither study used the instruments used in this study which would have made direct comparison with these results possible. This increases the need for further work examining the effect of a medical school curriculum that includes PBL on medical students' reflection in learning, approach to

learning and self-efficacy for self-directed learning. This work will enable these findings to be confirmed and examined further.

Chapter 12 : Conclusions

12.1 What this research says

12.1.1 The Reflective Learning Study: Changes in learning in relation to identified criteria.

The Reflective Learning Study addressed the question “Can reflective learning help improve medical students learning?” The study showed that taking part in reflective learning activities changed the way medical students learn. When the participants defined what they needed to learn rather than trying to memorise their entire lecture notes they were approaching their learning more deeply, as defined by Marton and colleagues (Marton, 1997). When the participants were integrating learning from different sources, as a result of taking part in the study, they were demonstrating evidence of higher level learning as defined by the SOLO taxonomy (Biggs and Collis, 1982). When a participant said that he was examining what he was told in lectures more critically his learning was placed on a higher level on the Chart of Development (Perry, 1970) and the Reflective Judgement Model (King and Kitchener, 1994). Therefore, improvements in learning were observed in students who took part in reflective learning as defined by the evidence-based parameters defined in chapter 2 (see table 2.2).

12.1.2 Curriculum, context and culture

Data collected during the Reflective Learning Study made it possible to gain a clear idea of the effect of the curriculum and the learning context at Cardiff on students’ interest in reflective learning. Some students’ perception was that, theoretically, reflective learning would be useful to them but they did not think that it would help them much with the current curriculum and assessment methods. We would have to change the methods of teaching and assessment and get rid of exams that demanded reproduction of lists before

reflective learning would be beneficial, they said. The culture amongst students to play down the amount of study they did in front of their peers may have discouraged some students from enrolling.

The interviews carried out in Manchester played a key role in the development of ideas in this thesis. The data from those interviews made it clear that the learning context at different medical schools varied and that this variation made a difference to students approach to their learning. The variation between Cardiff and Manchester related to differences in quality of learning defined in chapter 2. These included approach to learning, motivation and self-direction of learning.

12.1.3 Phase II study

The phase II study demonstrated that there are statistically significant differences in reflection-in-learning, self-efficacy in learning and organisation of study between final-year medical students in Cardiff and Glasgow. Differences in reflection in learning showed that Glasgow students used more reflective techniques in their practice of learning. Glasgow graduates are more likely to start their working lives, used to using reflection as part of their learning, confident in their ability to direct their own learning, and more organised in their study. These qualities will be of value to newly qualified doctors as they start their working lives, as they will be to medical students. Reflection on practice has a great deal to offer newly qualified doctors as they build up their levels of experience and expertise (Schön, 1987).

At a lower level of significance was the difference found between mean scores on the Deep approach scale of the LSQb. The work of Marton et al (1997; Entwistle, 1997a) shows that students who use a deep approach are more likely to develop a conceptual understanding, and to be less motivated by fear of failure. This finding is, therefore, worthy of note even at lower significance and warrants further research (see section 12.3). Deep

learners work is likely to be placed on a higher level on the SOLO taxonomy, indicating a more complex structure of learning (van Rossum and Schenk, 1984).

12.2 Limitations of this work

12.2.1 Consequences of a voluntary study

The Reflective Learning Study was carried out with a voluntary design to remove any bias due to assessment. This resulted in a small number of participants, 35 at the beginning of the study declining to 20 at the end. However, I was able to access rich data from the full participants about the effects of the interventions on their learning. Moreover, I was able to ask students who were informed about the study why they decided not to take part. It was a conscious decision to concentrate resources on interviewing the students who attended the initial lecture in order to collect data from those students who had made some effort to inform themselves about reflective learning before deciding whether or not to take part in the study. This did not, however, enable me to explore the opinions or the learning style of the majority of students in the year who did not attend. This made it impossible to discover whether the self-selected group of 65 students who attended the lecture differed in their learning styles from their peers in the rest of the year.

12.2.2 Reasons for differences observed in the phase II study

The findings of differences between learners in Cardiff and Glasgow do not give any explanation as to causality. The most apparent difference is that Glasgow has a problem-based learning curriculum while in Cardiff the curriculum is integrated but relies more on lecture teaching. The phase II data does not make it possible to infer whether problem-based learning or any other difference between the two schools is responsible for the differences seen. It is probable that more than one reason exists.

I was not able to investigate whether there was any difference between the admissions procedures at Cardiff, Manchester and Glasgow or between the applicants for the two schools. It is unlikely that this alone is responsible for the differences observed. Investigation of differences at admission might involve comparison of admissions data held by the three schools on educational background, age, ethnicity of students at entry. Administration of the questionnaire pack to students in their first few days would demonstrate whether there was a baseline difference in students on admission to medical school at Manchester, Glasgow and Cardiff.

12.3 Further research

12.3.1 Further research into learning context

Further research should investigate the effects of context on reflective learning. An in-depth study should investigate the differences between students in Cardiff and Glasgow. This would investigate what features of admissions policy; curriculum and learning culture might be responsible for the observed differences. The aim of this study would be to identify features that might be adopted by medical schools in order to foster the features of reflection-in-learning, self-efficacy in self-directed learning, organised studying and deep learning seen in this study. A qualitative approach with comparison of data from multiple sources including course documentation, interviews with students, teachers and opinion formers would enable breadth and depth of data collection. In particular the effects of teaching methods and assessments on learning should be investigated as these proved to have a key role in the uptake of reflective learning. The results of this study would be descriptive with the possibility of a number of hypotheses emerging from the data. These hypotheses would then have to be tested with appropriate methods being selected.

The reflective judgement model and the chart of development suggest that learners naturally progress to higher levels of learning. It would, therefore, be valuable to ask the students who completed the questionnaire to complete it again in five and ten years time to see to what extent the differences between Cardiff and Glasgow graduates persist.

12.3.2 Further research into reflective learning

The reflective learning study showed that, in Cardiff, further work on introduction of reflection in learning could only take place widely as part of broader curricular change (see 12.4)

The combination of the interview-based study in the reflective learning study and the comparative work in the phase II study have created a pack of instruments with great potential value for measuring reflective learning among medical students. These can be used to measure differences in reflective learning skills among students on admission at different medical schools. This will address one question raised by the phase II study about the part played by differences in students at admission to the observed differences in learning among final year students. The questionnaire pack also offers a validated method of comparing further interventions designed to improve the quality and depth of students' learning.

I. demonstrated differences in learning characteristics between final year students at Cardiff and Glasgow It is important to identify and enhance those features of the Glasgow course that make their students more likely to graduate deep learners who use reflection in learning and who are confident self-directed learners. Measures of educational environment will be valuable in comparing conditions at Cardiff and Glasgow.

A longitudinal study would make it possible to determine whether benefits in learning from taking part in reflective learning were sustained after the initial support had

been withdrawn. The response of one participant to the request for participant validation suggested that, for him, this had been the case.

The changes in clinical practice described by one of the tutors when she reflected on her clinical work using the critical incident format warrants further evaluation. Although the aims of this thesis relate to UME a technique that offers clinicians a way of improving their practice through reflection is worthy of exploration. A qualitative study interviewing clinicians keeping reflective journals would enable this phenomenon to be explored further. Models similar to the significant event analyses used in the reflective learning study are now being used widely in GP appraisal. This provides a large database for quantitative study of the outcomes of significant event analyses by practising clinicians.

12.4 Implications for practice in Undergraduate Medical Education

This study demonstrated that reflection can help students learn in a focussed, integrated, self-directed way. However, for these changes to be achieved in the undergraduate medical curriculum the demands of the course and the assessments need to be compatible with reflective learning. For students to engage with reflective learning they need to be able to see that reflective learning will enable them to achieve their intended learning outcomes and pass their assessments. It is necessary to return to the arguments regarding volume versus quality of learning in undergraduate medicine as discussed in chapter 1 and at the expert seminar. The Cardiff students were aware of the benefits of reflective learning but were overwhelmed with the volume of material to be learned to take advantage of these benefits. If curriculum organisers want their students to take part in deeper learning, with greater integration and more self-direction they will need to reduce the volume of material to be learned. It can be argued that material learned using deeper learning techniques is retained in a more meaningful way resulting in more rather than less useful material being retained in a form that is accessible and useful to the learner

(compared to high-volume surface learning approaches). Further research is needed to explore this hypothesis.

Methods of assessment would have to be considered carefully if reflective learning were to be embedded in the curriculum. Methods would have to be selected that made the student feel that reflective learning would help them to succeed. The Cardiff students were quite clear that reflective learning would be little help in preparing them for the MCQ and EMQ examinations. One of their criticisms of this examination form was that it did not enable them to demonstrate depth of understanding. This brings the argument back, once again, to the discussion of volume versus depth. Reflective learning enables depth of learning so forms of assessment are needed that reward this. Written and/or oral assessments are needed where the student can explain and demonstrate their understanding. Written assessments such as essays and case reports can offer students the opportunity to demonstrate their understanding as can oral presentations. Portfolios provide students with a method of demonstrating their development of understanding over time and offer the examiner multiple samples of the students work on which to base his/her judgement. I have referred to portfolios used in medical education throughout this thesis, in particular to those in use in Maastricht and in Dundee. The authors concluded that portfolios offered an extension to the examiners' toolkit and an opportunity to examine areas of learning difficult assess using other methods (Davis, Friedman Ben-David, et al., 2001; Driessen, van Tartwijk, et al., 2003).

From the interviews we carried out in Manchester, PBL would appear to be one form of curriculum associated with similar outcomes to those of reflective learning. In particular the PBL students were more self-directed and were less motivated by the need to pass the next examination. The process of PBL students examining their knowledge when beginning a new case is similar to the process of reflection and identification of gaps in current knowledge.

12.5 Direction of further work

I believe that the Reflective Learning Study and the phase II study provide evidence that can support further changes in undergraduate medical education. Further work should be focused on helping medical students develop a deep learning approach, learn with greater integration and learn critically using an evidential approach. Reflection has a great deal to offer in helping learners develop these qualities but it should be investigated alongside other interventions.

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Appendix 1 Reflective learning study flyer

Third year reflective learning study 2002/2003

You have the opportunity to take part in a study of reflective learning which will be an ideal support to your learning as you put together your factual knowledge with your clinical experience in the wards and clinics.

What is reflective learning?

Reflective learning involves reviewing some of your learning encounters. In this study we are going to be using learning journals for this purpose. After reflecting the learner asks him/herself "What do I already know about this subject? What do I need to go and learn?" The last part of the cycle is bringing new knowledge into use in similar situations to the one that provoked the original analysis.

Why a research trial?

We believe that reflective learning has a great deal to offer medical students, but that some support to learners as they start using reflective learning improves the outcome. This belief is based on education theory and on experimental work. We hope that, with your participation, we can prove through rigorous research that reflective learning is beneficial to third-year medical students' learning. In order to do this we are going to run a controlled trial.

Participation in the study is entirely voluntary and the learning journals will not be marked.

What next?

On 30th September a presentation of reflective learning and the trial will be made to all students in the third year. A handout will be also given out with basic information on reflective learning and keeping a learning diary. After the presentation you will be asked if you wish to take part. Those who do will be randomly allocated to active learning support or control. The students in the active learning group will have two tutorials on how to get the most from reflective learning. They will also join a tutorial group once every two weeks where they will be given advice and support on reflective learning and will discuss their diary entries with the other group members. A member of staff will facilitate these groups but there will be no active teaching. Students allocated to the control group will not receive any further support for their reflective learning except for the handout. I will try to deal with any questions you may have at the presentation.

I hope that you will join the study.

Please feel free to contact me by email after 23rd September grantaj@cardiff.ac.uk.

Appendix 2: Introductory lecture handout

Third year reflective learning study 2002/2003

Definition

There are many definitions for reflection but “making meaning” is a good one for the way it is going to be used in this study. Reflection has a function of connecting new and prior learning which will be particularly helpful at this stage in your studies.

30th September

After the presentation you will be asked to indicate whether you would like to take part in the study. If you do wish to take part you will be randomised to the intervention group or the control. Students allocated to the control group will not receive any further support. They are encouraged to keep a learning diary and to form self-lead tutorial groups. Students who are allocated to the intervention group will be invited to take part in two seminars on reflective learning giving theoretical information about reflective learning. The seminars will also give students practical experience of learning by reflection. As well as these sessions, aimed at getting the participants started on reflective learning the students in the intervention group will attend a tutorial group once a fortnight. These will be an hour in length and will (almost all) take place at lunchtimes. A sandwich lunch will be provided.

All students are asked to complete the Learning Styles Questionnaire.

Reflective learning

There are four essential elements to reflective learning;

1. A learning experience (usually a clinical encounter)
2. Reflection on that experience. What happened? What knowledge/skills did I already have? What knowledge/skills were needed?
3. What gaps in my knowledge have been revealed. How can I fill these gaps?
4. Applying new knowledge in similar situations.

Using a learning journal

A learning journal serves as a set of prompts to take you through those four steps. So each entry in your journal should have four headings;

1. A factual account of the event.
2. Your reflections
3. What you now need to know and how you plan to address those learning needs.
4. How you have subsequently used that new knowledge

It is useful to set out your entries in the journal in a way that makes these four parts of each entry distinct.

There is no prescribed number of entries you should make in your journal. Aim to make about two entries a week at the start. You can, subsequently, make the number of entries that suit you.

Remember that keeping the learning journal is solely to help you with your learning.

By reflecting on your clinical encounters you are;

1. Connecting what you are learning now with what you have learned about the subject in the past. This is well recognised as a way of enhancing learning
2. Developing a sense of what you know and what you still need to learn.
3. Getting better insight into your learning styles.

Points two and three will help you develop independent learning skills.

How do you choose what to write about?

The cases that are most rewarding are those that have exercised your mind in some way. This can be ones that were particularly difficult or where you thought there were gaps in your knowledge. Equally these can be situations that you enjoyed or found satisfying.

There is no substitute to keeping a learning journal for developing a sense of what is useful to write about. It will probably take a while to really feel the benefit of keeping a reflective learning diary.

Tutorial groups

Tutorial groups have two functions;

1. To help you get started and to encourage you to keep going with your learning diary. Particularly at the beginning, your tutor and your peers will be able to help you with any problems you may have
2. To discuss some of your diary entries with the group. You won't be forced to read out anything you don't want to. Having to read out an entry in itself forces you to think about it in a different way and having the reflections of the other group members can be very helpful.

Tutorial groups will be held on Monday and Wednesday between 1pm. and 2pm. One tutor has offered to lead a group between 8 and 9 on Wednesday mornings.

Students who are allocated to the control groups are encouraged to form their own self-lead tutorial groups.

Collection of data

During the course of the trial I will be contacting students requesting asking them to meet me for a one-to-one interview or a focus group. All the data collected will be treated with complete confidentiality. At the end of the trial I will ask all students to repeat the learning styles questionnaire and two other questionnaires.

Participation in the study is entirely voluntary and the learning journals will not be marked.

Please contact me by email grantaj@cardiff.ac.uk before 16th October if you would like to take part in the study.

Response sheet

Name

Address
.....
.....

Telephone
Home
Mobile
Email

1. I would / would* not like to take part in the reflective learning study

2. I would like to attend a tutorial group on
Monday / Wednesday morning / Wednesday lunchtime*

*please delete

Learning style scores

Activist

Pragmatist

Theorist

Reflector

Appendix 3 :The Learning Styles Questionnaire

LEARNING STYLES QUESTIONNAIRE

revised 1986

This questionnaire is designed to find out your preferred learning style(s). Over the years you have probably developed learning 'habits' that help you benefit more from some experiences than from others. Since you are probably unaware of this, this questionnaire will help you pinpoint your learning preferences so that you are in a better position to select learning experiences that suit your style.

There is no time limit to this questionnaire. It will probably take you 10-15 minutes. The accuracy of the results depends on how honest you can be. There are no right or wrong answers. If you agree more than you disagree with a statement put a tick by it (✓). If you disagree more than you agree put a cross by it (x). Be sure to mark each item with either a tick or cross.

- 1. I have strong beliefs about what is right and wrong, good and bad.
- 2. I often act without considering the possible consequences.
- 3. I tend to solve problems using a step-by-step approach.
- 4. I believe that formal procedures and policies restrict people.
- 5. I have a reputation for saying what I think, simply and directly.
- 6. I often find that actions based on feelings are as sound as those based on careful thought and analysis.
- 7. I like the sort of work where I have time for thorough preparation and implementation.
- 8. I regularly question people about their basic assumptions.
- 9. What matters most is whether something works in practice.
- 10. I actively seek out new experiences.
- 11. When I hear about a new idea or approach I immediately start working out how to apply it in practice.
- 12. I am keen on self discipline such as watching my diet, taking regular exercise, sticking to a fixed routine, etc.
- 13. I take pride in doing a thorough job.
- 14. I get on best with logical, analytical people and less well with spontaneous, 'irrational' people.
- 15. I take care over the interpretation of data available to me and avoid jumping to conclusions.
- 16. I like to reach a decision carefully after weighing up many alternatives.
- 17. I'm attracted more to novel, unusual ideas than to practical ones.
- 18. I don't like disorganised things and prefer to fit things into a coherent pattern.
- 19. I accept and stick to laid down procedures and policies so long as I regard them as an efficient way of getting the job done.
- 20. I like to relate my actions to a general principle.
- 21. In discussions I like to get straight to the point.

- 22. I tend to have distant, rather formal relationships with people at work.
- 23. I thrive on the challenge of tackling something new and different.
- 24. I enjoy fun-loving, spontaneous people.
- 25. I pay meticulous attention to detail before coming to a conclusion.
- 26. I find it difficult to produce ideas on impulse.
- 27. I believe in coming to the point immediately.
- 28. I am careful not to jump to conclusions too quickly.
- 29. I prefer to have as many sources of information as possible - the more data to think over the better.
- 30. Flippant people who don't take things seriously enough usually irritate me.
- 31. I listen to other people's points of view before putting my own forward.
- 32. I tend to be open about how I'm feeling.
- 33. In discussions I enjoy watching the manoeuvrings of the other participants.
- 34. I prefer to respond to events on a spontaneous, flexible basis rather than plan things out in advance.
- 35. I tend to be attracted to techniques such as network analysis, flow charts, branching programmes, contingency planning, etc.
- 36. It worries me if I have to rush out a piece of work to meet a tight deadline.
- 37. I tend to judge people's ideas on their practical merits.
- 38. Quiet, thoughtful people tend to make me feel uneasy.
- 39. I often get irritated by people who want to rush things.
- 40. It is more important to enjoy the present moment than to think about the past or future.
- 41. I think that decisions based on a thorough analysis of all the information are sounder than those based on intuition.
- 42. I tend to be a perfectionist.
- 43. In discussions I usually produce lots of spontaneous ideas.
- 44. In meetings I put forward practical, realistic ideas.
- 45. More often than not, rules are there to be broken.
- 46. I prefer to stand back from a situation and consider all the perspectives.
- 47. I can often see inconsistencies and weaknesses in other people's arguments.
- 48. On balance I talk more than I listen.
- 49. I can often see better, more practical ways to get things done.
- 50. I think written reports should be short and to the point.
- 51. I believe that rational, logical thinking should win the day.

- 52. I tend to discuss specific things with people rather than engaging in social discussion.
- 53. I like people who approach things realistically rather than theoretically.
- 54. In discussions I get impatient with irrelevancies and digressions.
- 55. If I have a report to write I tend to produce lots of drafts before settling on the final version.
- 56. I am keen to try things out to see if they work in practice.
- 57. I am keen to reach answers via a logical approach.
- 58. I enjoy being the one that talks a lot.
- 59. In discussions I often find I am the realist, keeping people to the point and avoiding wild speculations.
- 60. I like to ponder many alternatives before making up my mind.
- 61. In discussions with people I often find I am the most dispassionate and objective.
- 62. In discussions I'm more likely to adopt a 'low profile' than to take the lead and do most of the talking.
- 63. I like to be able to relate current actions to a longer term bigger picture.
- 64. When things go wrong I am happy to shrug it off and 'put it down to experience'.
- 65. I tend to reject wild, spontaneous ideas as being impractical.
- 66. It's best to think carefully before taking action.
- 67. On balance I do the listening rather than the talking.
- 68. I tend to be tough on people who find it difficult to adopt a logical approach.
- 69. Most times I believe the end justifies the means.
- 70. I don't mind hurting people's feelings so long as the job gets done.
- 71. I find the formality of having specific objectives and plans stifling.
- 72. I'm usually one of the people who puts life into a party.
- 73. I do whatever is expedient to get the job done.
- 74. I quickly get bored with methodical, detailed work.
- 75. I am keen on exploring the basic assumptions, principles and theories underpinning things and events.
- 76. I'm always interested to find out what people think.
- 77. I like meetings to be run on methodical lines, sticking to laid down agenda, etc.
- 78. I steer clear of subjective or ambiguous topics.
- 79. I enjoy the drama and excitement of a crisis situation.
- 80. People often find me insensitive to their feelings.

LEARNING STYLES - GENERAL DESCRIPTIONS

Activists

Activists involve themselves fully and without bias in new experiences. They enjoy the here and now and are happy to be dominated by immediate experiences. They are open-minded, not sceptical, and this tends to make them enthusiastic about anything new. Their philosophy is: 'I'll try anything once'. They tend to act first and consider the consequences afterwards. Their days are filled with activity. They tackle problems by brainstorming. As soon as the excitement from one activity has died down they are busy looking for the next. They tend to thrive on the challenge of new experiences but are bored with implementation and longer term consolidation. They are gregarious people constantly involving themselves with others but, in doing so, they seek to centre all activities around themselves.

Reflectors

Reflectors like to stand back to ponder experiences and observe them from many different perspectives. They collect data, both first hand and from others, and prefer to think about it thoroughly before coming to any conclusion. The thorough collection and analysis of data about experiences and events is what counts so they tend to postpone reaching definitive conclusions for as long as possible. Their philosophy is to be cautious. They are thoughtful people who like to consider all possible angles and implications before making a move. They prefer to take a back seat in meetings and discussions. They enjoy observing other people in action. They listen to others and get the drift of the discussion before making their own points. They tend to adopt a low profile and have a slightly distant, tolerant unruffled air about them. When they act it is part of a wide picture which includes the past as well as the present and others' observations as well as their own.

Theorists

Theorists adapt and integrate observations into complex but logically sound theories. They think problems through in a vertical, step-by-step logical way. They assimilate disparate facts into coherent theories. They tend to be perfectionists who won't rest easy until things are tidy and fit into a rational scheme. They like to analyze and synthesize. They are keen on basic assumptions, principles, theories models and systems thinking. Their philosophy prizes rationality and logic. 'If it's logical it's good'. Questions they frequently ask are: 'Does it make sense?' 'How does this fit with that?' 'What are the basic assumptions?' They tend to be detached, analytical and dedicated to rational objectivity rather than anything subjective or ambiguous. Their approach to problems is consistently logical. This is their 'mental set' and they rigidly reject anything that doesn't fit with it. They prefer to maximize certainty and feel uncomfortable with subjective judgements, lateral thinking and anything flippant.

Pragmatists

Pragmatists are keen on trying out ideas, theories and techniques to see if they work in practice. They positively search out new ideas and take the first opportunity to experiment with applications. They are the sort of people who return from management courses brimming with new ideas that they want to try out in practice. They like to get on with things and act quickly and confidently on ideas that attract them. They tend to be impatient with ruminating and open-ended discussions. They are essentially practical, down to earth people who like making practical decisions and solving problems. They respond to problems and opportunities 'as a challenge'. Their philosophy is: 'There is always a better way' and 'If it works it's good'.

LEARNING STYLES QUESTIONNAIRE – SCORING

You score one point for each item you ticked (✓). There are no points for items you crossed (X).

Simply indicate on the lists below which items were ticked.

2 ✓	7	1 ✓	5 ✓
4	13	3 ✓	9 ✓
6	15	8	11
10	16 ✓	12	19
17	25	14	21
23 ✓	28	18	27
24	29	20	35
32 ✓	31 ✓	22 ✓	37
34	33 ✓	26 ✓	44
38 ✓	36 ✓	30	49
40 ✓	39	42	50
43	41	47	53 ✓
45 ✓	46 ✓	51	54 ✓
48 ✓	52 ✓	57	56
58 ✓	55	61 ✓	59
64 ✓	60	63	65
71	62	68	69
72 ✓	66 ✓	75	70 ✓
74 ✓	67	77	73
79 ✓	76 ✓	78	80

Totals

Activist Reflector Theorist Pragmatist

Ring your scores on this chart and join up.

Activist	Reflector	Theorist	Pragmatist	
20	20	20	20	Very strong preference
19		19	19	
18		18	18	
17	19	18	18	
16		17	17	
15		16	16	
14	18	15	15	
13		14	14	Strong preference
12	17	13	13	
11	16	12	12	
10	15	11	11	Moderate preference
9	14	10	10	
8	13	9	9	
7	12	8	8	
6	11	7	7	Low preference
5	10	6	6	
4	9	5	5	
3	8	4	4	Very low preference
2	7	3	3	
	6	2	2	
	5	1	1	
	4	0	0	
1	3			
0	2			

LEARNING STYLES QUESTIONNAIRE – SCORING

You score one point for each item you ticked (✓). There are no points for items you crossed (×).

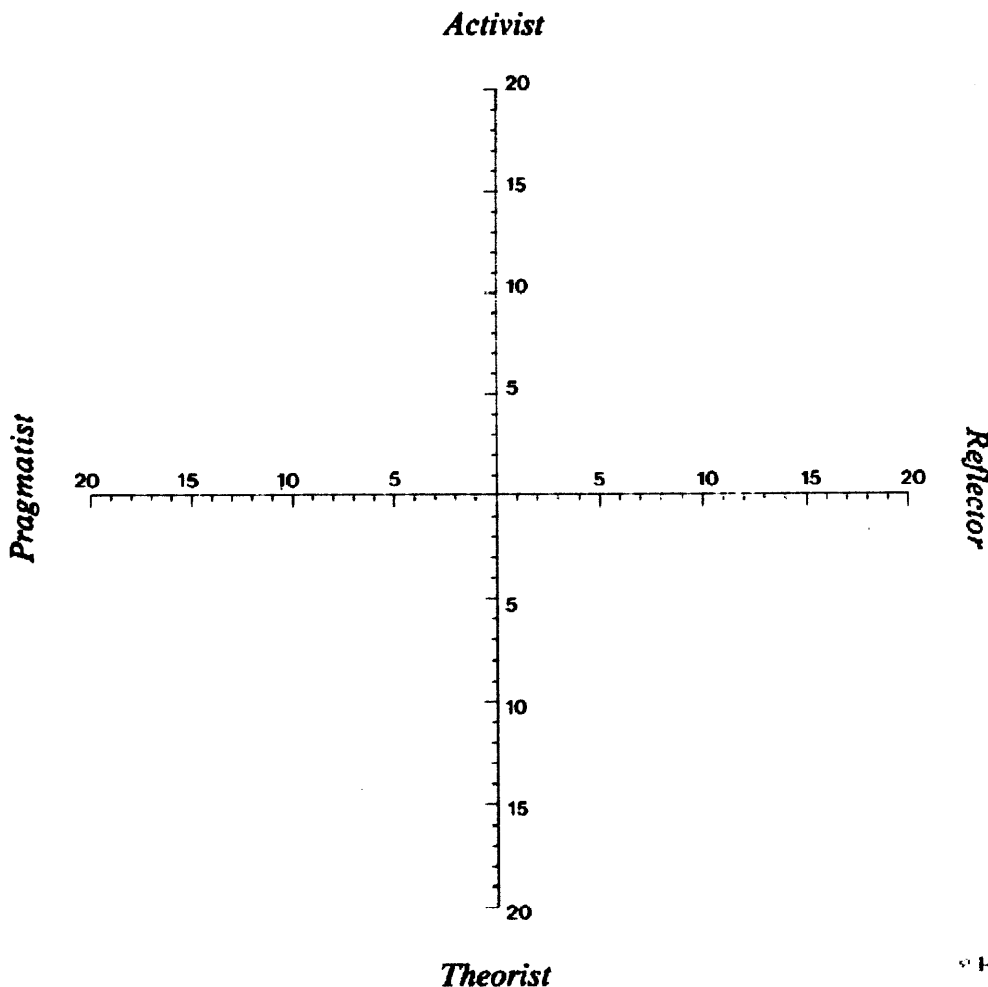
Simply indicate on the lists below which items were ticked.

2	7	1	5
4	13	3	9
6	15	8	11
10	16	12	19
17	25	14	21
23	28	18	27
24	29	20	35
32	31	22	37
34	33	26	44
38	36	30	49
40	39	42	50
43	41	47	53
45	46	51	54
48	52	57	56
58	55	61	59
64	60	63	65
71	62	68	69
72	66	75	70
74	67	77	73
79	76	78	80

Totals

Activist Reflector Theorist Pragmatist

Plot the scores on the arms of the cross below and apply the appropriate norms from Section 1 (pages 3-10) in the booklet "Using Your Learning Styles".



Appendix 4: Interview guide

Topic guides – participating students

1. **Introduction** and explanation of study (brief)
2. **Reassure** about confidentiality & lack of need to please the interviewer
3. **Confirm** consent to record the interview.

4. General learning and background

How they set about their learning? (*How had they set about their learning i.e. before the 3rd year or at the beginning of the third year before the study started? You are trying to get them to describe their approach to learning at some point before the study*)

Probe lectures, personal study, work with peer group.

The college culture

How do they think other students approach learning? If differently why? How helpful have they found other students to be ?

Had they themselves changed the way they learned since being in the college?

How helpful have they found the staff in advising how to learn rather than what to learn?

What motivates them to learn?

The workload in the 3rd year?

How do they find the workload in the 3rd year compared to yrs.1&2. What exactly is the problem , if any? Ask for examples.

Effect of exams on learning

How much of their learning is in response to exams? What is the effect of exams on their learning? What would happen to their learning if they didn't have exams?

Have they done really well in any exam/assessment? What was the effect of this on their learning?

The ward learning environment

Ask them to describe the good parts and the drawbacks.

Probe teaching by SHOs and PRHOs. Is what they learn on the wards easier to remember? Does the fact that it is in context help? How?

The informal peer group

Do they undertake any unofficial learning with groups of friends? If so what form does it take? Is it helpful? How?

5. The study

NB the experience consists of two parts, the diary keeping and the groups.. So you want to establish the facts in each case ie. What went on and also their evaluation of each part and possibly also which bit they liked best, found most valuable or not.

What are they getting out of the study? (*What would you say to a friend who asked you what you were getting out of this study . if anything?*)

The learning diary. *Their use of the diary... but do not assume that they are necessarily keeping it. Assume that they are not so as to give them permission to tell you. How have you got on with the diary? some people seem to find it helpful and others don't manage to fill it in often, what was your experience like?*

Any problems keeping it?

Probe how much time spent weekly?

The tutorial groups

What are the groups like? (*How they are run? Have they changed over time? How much contribution does the tutor make/ does he decide who is doing what; do the participants set the agenda; how much involvement do individuals have? What was the content of the discussions? Do the same things come up?*)

You could try asking them to give an account / describe the last group they attended to establish the current structure and levels of involvement and then probe for difference over time; changes in the role of the tutor. Have they presented material themselves? Did they find others' comments helpful? Were the others in the group known to them beforehand? Have they met together outside the groups? Have they discussed the groups with their friends or any one else? If so what was the reaction?

Does the tutor teach?

Did they learn from each others' presentations?.

6. Prolonged benefits

Will they continue to use reflection in their learning after the study ends? Probe why/why not? What (if anything) has “sold” this method to them?

Has taking part in the study helped them to learn? Probe changes in style of learning. *(Do they see any differences in the way they approach learning now compared to their description of earlier times?)*

7. Barriers to gaining more from reflective learning?

What might have made the study easier for them?

What stopped them gaining more from the study?

How might others be persuaded to take part?

8. Thank respondent, remind about confidentiality

Appendix 5: Extract from learning diary

*Retrospective case study.**PC Pain.*

- * Throughout abdomen
- * Sudden onset same day
- * With a 'bubbling sensation' within the abdomen
- * Worsened by coughing/straining
- * Very severe (not relieved by paracetamol)
- * Constant

*Nausea (vomiting)**HPC*

- * Change in bowel habit (blood in stool)

PDH

- * Long standing Hx iron def. Anaemia
- * Wt loss (2 stone in past 6 month)
- * MI (mild) March 2002 – full recovery + 3 other MI previous to that
- * Angina since 1970's – stable
- * Stroke 3 yrs ago – full recovery
- * Hypertension – controlled by medication
- * Falls of unknown cause – last one April 2002
- * Diverticulosis diagnosed 5 yrs ago

Surgery

- * Childhood adenoidectomy and tonsillectomy
- * 1969 thyroidectomy
- * 1970's cholecystectomy
- * Also a hernia repair (PX history vague)
- * Appendectomy

DH

- * Aspirin 150mg OD
- * Thyroxine 100mg OD
- * FeSO₄ 200mu tds
- * Atenolol 25mg od
- * Frusemide 20mg od
- * Allergy to penicillin
- * GA reactions

FH

Depicted by family tree sketch diagram showing previous illnesses in Family.

Soc Hx

- * Rtd. Shopkeeper
- * Lives alone but has good support network (churchgoer)
- * Non smoker
- * No EtOH

Sy Rev

- * Cough
- * SOB on mod. Exertion; can get up stairs without difficulty
- * Orthopnoea

* PND
 * Ankle swelling noted
 * Cataracts
 * Hearing aid @ ear – (L) ear poor
 * Mobile
 * Continent of urine
 * Vaginal/urethral discharges noted
 Risks
 * Old age (85)
 * Comp of diverticulosis
 * Fe deficiency anaemia – ‘cancer unless proven otherwise’
 U/O (performed by PRHO 13/11)
 * In pain at rest
 Diagram showing location of pain
 BP = 150/60
 Pulse =?
 Signs of anaemia
 Temp = 36.8 degrees C
 Diagram to show clear lungs
 Perforation of bowel leading to peritonitis

* Diverticulum
 * Appendix
 * Bowel
 Pancreatitis
 Colon tumour

Plan

History and examination

Blood tests: Hb, WBC, plts, Na⁺, K⁺, Urea creatinine, Grp and save
 (2units) Amylase Clotting factors (? Thrombosis)
 Erect CXR (after sitting up >10 mins)
 Pain relief
 NBM – IVI 0.9%NaCl
 Blood cultures

Results

* Blood tests
 * Hb 12.9 norm * Wbc 6.2 norm * Plates 168 norm * Na⁺ 139 norm K⁺
 4.1 norm, * Urea 10.6 (3.4 – 7.2) HIGH * Creat 76 * Amylase <30 norm
 * Clotting norm
 * Erect CXR; Pneumoperitoneum at @ cardiophrenic angle. This
 demonstrates that the bowel is perforated somewhere along its length
 and that gases have escaped into the peritoneal cavity.
 Pancreatitis excluded (normal amylase)

Identifying the source of the perforation becomes the next challenge. A CT/MRI scan could be used to do this but in practice it is as easy to identify the perforation in theatre.

IMJ was admitted to theatre as a laparoscopy emergency

Pathology confirmed that IMJ had suppurative appendicitis with localised peritonitis.

Discussion

The case highlights the fact that appendicitis and consequent rupture of the appendix can occur in all age groups.

Aetiology; Causes of an inflamed appendix include faecoliths, lymphoid hyperplasia, diverticulosis of the appendix and carcinoid tumours. Various bacteria including Yersinia pseudotuberculosis are also known to affect the appendix.

Pathogenesis

Flow chart included depicting the different stages beginning with 'breach in epithelium' and resulting in perforation.

D4

DIARY ENTRY 07.11.02

- Factual Account

o in a chest clinic today I was asked about and told about respiratory Tests.

o I felt I did not know enough about them and ought to look them up later.

- Reflections

o I did know about the difference in ratios of FEV1/FVC for restrictive and obstructive lung disease patterns.

o I did not feel I knew enough if I were to be questioned further on how the tests work and the reasons behind the patterns on the graph.

- Learning needs brought to light

o Learn about Peak expiratory flow rate

o Learn about spirometry

- What do I need to do now?

o Read about the in Kumar and Clark

- What did I learn?

o Peak expiratory flow rate

** Subjects are asked to take a full inspiration to total lung capacity and then blow out forcefully into the peak flow metre, which is held horizontally.*

** The best of three tests is recorded*

** This is not a good measure of airflow limitation as it measures the expiratory flow rate only in the first 2ms of expiration and overestimates lung function in patients with moderate airflow limitation.*

** It is best used to measure progression of disease and its treatment.*

o Spirometry

** This measures the FEV1 and FVC.*

** Both of these measurements are related to age, height and sex.*

** The technique involves a maximum inspiration followed by a forced expiration for as long as possible.*

** A moving record chart then measures volume against time.*

** Expiration should continue until all the air has been expelled from the lungs (even though the record chart moves for 5s) as patients with severe airflow limitation may have a very prolonged forced expiratory time.*

** The FEV1 is expressed as a percentage of FVC and is an excellent measure of airflow limitation.*

** In normal subjects the ration should be around 75%*

** With increasing airflow limitation (emphysema, asthma, chronic bronchitis) the FEV1 falls proportionately more than the FVC so that the ration is reduced (below 75%)*

** With restrictive lung disease (fibrosis, pneumonia) the FEV1 and FVC are reduced in the same proportion and so the ration remains normal or may even increase due to enhanced elastic recoil.*

D6

PARKINSONISM

- Tremor = Resting tremor. Coarse. Typically 'pill rolling' – thumb over fingers.

- Rigidity = Limbs resist passive extension throughout movement regardless of velocity (lead pipe rigidity)

- Combined rigidity and tremor = Cogwheel rigidity – juddering on passive extension of flexed forearm. Pronation/Supination and wrist rotation.

- Bradykineis (slowness) = Slow movement, monotonous speech, short Shuffling steps and flexed trunk as if feet always trying to catch up With centre of gravity. 'Festinant gait'. (Down arrow) Peristalsis (down

arrow) blink rate (down arrow) fidgeting. Micrographia.

- Difficulty starting and stopping walking

- 'Mask face' - expressionless

Parkinson's disease = 1 cause of Parkinsonism

Depletion of substantia nigra dopaminergic neurones – Lewy Bodies found in this area.

May be related to observed mutations in mit DNA and local inability to prod ATP.

Pesticides and toxins are possible causes

Onset usually ~50-70yrs.

Symptoms may be relieved by Dopamine agonists e.g. L-Dopa But effects wear off over time. SE's Nausea, unwanted movements Positive effects improved mobility.

Dementia and depression are often seen.

Antidepressants may worsen Parkinson's. Anticholinergics may help tremor.

Other causes of Parkinsonism

- Neurodegeneration, neuroleptics – metoclopramide, haloperidol;

Arteriosclerosis, copoisoning, mut system atrophy.

D3

Node Tree

- (1) /My Learning
- (1 1) /My Learning/How tutor's learning has changed
- (1 4) /My Learning/Deep learning
- (1 5) /My Learning/Motivation
- (1 5 1) /My Learning/Motivation/Intrinsic
- (1 5 2) /My Learning/Motivation/extrinsic
- (1 6) /My Learning/Clinical learning
- (1 6 1) /My Learning/Clinical learning/Seeing a patient with it makes you learn it.
- (1 6 2) /My Learning/Clinical learning/Interest stimulated by clinical environment
- (1 7) /My Learning/Self confidence/self-efficacy
- (1 8) /My Learning/Making notes of my notes
- (1 9) /My Learning/learning by rehearsal
- (1 11) /My Learning/Prefer small group teaching.
- (1 12) /My Learning/Reflect on my own learning
- (1 12 2) /My Learning/Reflect on my own learning/occasionally reflect on my own learning
- (1 13) /My Learning/Crammer/steady
- (1 13 1) /My Learning/Crammer/steady/Steady learner
- (1 13 2) /My Learning/Crammer/steady/Crammer
- (1 14) /My Learning/Lectures
- (1 14 1) /My Learning/Lectures/Scribble everything down, file, get out for exams
- (1 14 2) /My Learning/Lectures/write all lecture, don't know what's important
- (1 15) /My Learning/High volume
- (1 15 1) /My Learning/High volume/Adapted learning to high volume
- (1 15 2) /My Learning/High volume/Higher volume than A level.
- (1 16) /My Learning/Revision
- (1 16 1) /My Learning/Revision/Revises alone
- (1 16 2) /My Learning/Revision/Revises collaboratively
- (1 17) /My Learning/Organising incoming knowledge
- (1 18) /My Learning/Already learning reflectively
- (1 20) /My Learning/Happy with how I learn
- (2) /My view about others' learning
- (3) /tutors' views of reflective learning
- (3 1) /tutors' views of reflective learning/Not my own subject area
- (4) /Context/environment
- (4 1) /Context/environment/Freedom to ask/answer questions without feeling foolish
- (4 2) /Context/environment/Effect of context on learning approach
- (4 2 1) /Context/environment/Effect of context on learning approach/Driven more superficial

- (4 3) /Context/environment/If I could change 1 thing
- (4 3 1) /Context/environment/If I could change 1 thing/Training for lecturers
- (4 4) /Context/environment/GP teaching good
- (4 5) /Context/environment/Coursework
- (4 6) /Context/environment/Good placement
- (4 6 1) /Context/environment/Good placement/timetable
- (4 8) /Context/environment/Negative aspects of teaching
- (4 9) /Context/envrinment/1st year harder than 2nd.
- (4 10) /Context/environment/Ward teaching
- (4 10 1) /Context/environment/Ward teaching/Who does it?
- (4 10 1 1) /Context/environment/Ward teaching/Who does it?/PRHO/SHO
- (4 10 1 2) /Context/environment/Ward teaching/Who does it?/SPR
- (4 10 1 3) /Context/environment/Ward teaching/Who does it?/Consultant
- (4 10 1 4) /Context/environment/Ward teaching/Who does it?/They all do
- (4 11) /Context/environment/Emotionally challenging material
- (5) /College culture
- (5 1) /College culture/Talking about work taboo
- (5 2) /College culture/Stories about 3rd year workload
- (6) /The study
- (6 1) /The study/logistical and time problems
- (6 1 2) /The study/logistical and time problems/Study squeezed out by time.
- (6 1 2 1) /The study/logistical and time problems/Study squeezed out by time./I would have got more out of the study if there had been more time (4)
- (6 1 2 2) /The study/logistical and time problems/Study squeezed out by time./It was interesting but there wasn't enough time (5)
- (6 1 2 3) /The study/logistical and time problems/Study squeezed out by time./Dropped out because of time (3)
- (6 1 4) /The study/logistical and time problems/Had missed too much.
- (6 2) /The study/my motivation to take part
- (6 2 1) /The study/my motivation to take part/support research into how we learn.
- (6 2 2) /The study/my motivation to take part/looking for new/different way of learning
- (6 2 4) /The study/my motivation to take part/interested in what I heard in the lecture
- (6 3) /The study/Peers impressions of the study
- (6 3 1) /The study/Peers impressions of the study/I didn't join because I didn't want to seem to be a nerd
- (6 4) /The study/Learning diary
- (6 4 1) /The study/Learning diary/Reflection/logbook continuum
- (6 4 1 1) /The study/Learning diary/Reflection/logbook continuum/Reflective diary
- (6 4 1 2) /The study/Learning diary/Reflection/logbook continuum/reflective/logbook hybrid
- (6 4 1 3) /The study/Learning diary/Reflection/logbook continuum/logbook
- (6 5) /The study/how far I got involved

- (6 6) /The study/Impressions of the study
- (6 7) /The study/benefits from the study
- (6 7 1) /The study/benefits from the study/Overall impression quotes
- (6 7 2) /The study/benefits from the study/Help from the theory/ like the idea of it
- (6 7 5) /The study/benefits from the study/change in learning style
- (6 7 5 1) /The study/benefits from the study/change in learning style/Didn't change my learning style.
- (6 7 7) /The study/benefits from the study/deepened my learning combo
- (6 7 7 1) /The study/benefits from the study/deepened my learning combo/metacognition
- (6 7 7 1 1) /The study/benefits from the study/deepened my learning combo/metacognition/Focussed my learning
- (6 7 7 1 2) /The study/benefits from the study/deepened my learning combo/metacognition/made me think about how I learn
- (6 7 7 2) /The study/benefits from the study/deepened my learning combo/Up the ladder
- (6 7 7 2 1) /The study/benefits from the study/deepened my learning combo/Up the ladder/Integration
- (6 7 7 2 2) /The study/benefits from the study/deepened my learning combo/Up the ladder/critical thinking
- (6 7 7 2 3) /The study/benefits from the study/deepened my learning combo/Up the ladder/consolidate knowledge
- (6 7 7 2 4) /The study/benefits from the study/deepened my learning combo/Up the ladder/Learning for the future
- (6 7 7 2 5) /The study/benefits from the study/deepened my learning combo/Up the ladder/Improved my practice of medicine
- (6 7 7 3) /The study/benefits from the study/deepened my learning combo/Positive affect
- (6 7 7 4) /The study/benefits from the study/deepened my learning combo/Structured reflection
- (6 7 7 4 1) /The study/benefits from the study/deepened my learning combo/Structured reflection/Something I/you should be doing anyway
- (6 7 10) /The study/benefits from the study/Help now v. help later
- (6 8) /The study/cultural view of the study
- (6 10) /The study/Impressions of participants
- (6 12) /The study/Keep going after the study
- (6 12 1) /The study/Keep going after the study/Definitely would
- (6 12 2) /The study/Keep going after the study/I might....
- (6 14) /The study/Not for me
- (6 15) /The study/Tutorial groups
- (6 15 1) /The study/Tutorial groups/Groups size
- (6 15 2) /The study/Tutorial groups/format of tutorials
- (6 15 3) /The study/Tutorial groups/Role of the tutor
- (6 15 3 1) /The study/Tutorial groups/Role of the tutor/Should also be pastoral tutor too.

- (6 15 6) /The study/Tutorial groups/Learning from peers reflections
- (6 15 7) /The study/Tutorial groups/Topics for reflection
- (6 15 7 1) /The study/Tutorial groups/Topics for reflection/It was awful, I need to learn more
- (6 15 8) /The study/Tutorial groups/Norming
- (6 15 9) /The study/Tutorial groups/Emotional material
- (6 15 12) /The study/Tutorial groups/Looking stupid
- (6 15 13) /The study/Tutorial groups/role modelling
- (6 16) /The study/Suggestions for improvement
- (7) /Base data
- (7 1) /Base data/Gender
- (7 1 1) /Base data/Gender/female
- (7 1 2) /Base data/Gender/male
- (7 2) /Base data/Interviewer
- (7 2 1) /Base data/Interviewer/LM
- (7 2 2) /Base data/Interviewer/AG
- (7 2 3) /Base data/Interviewer/MR
- (7 3) /Base data/participant status
- (7 3 1) /Base data/participant status/Participant
- (7 3 2) /Base data/participant status/non-participant
- (7 3 3) /Base data/participant status/dropper out
- (7 4) /Base data/Manchester
- (7 4 1) /Base data/Manchester/manchester/manchester
- (7 4 2) /Base data/Manchester/Manchester/St. Andrews
- (7 5) /Base data/mature student
- (7 6) /Base data/Tutor

Appendix 7: Phase II questionnaire pack

Final Year Learning styles study.

Dear Student.

We would be very grateful if you could complete this questionnaire.

A number of studies have supported reflective learning as a strategy that is helpful to both undergraduate and postgraduate learners. All doctors in the United Kingdom now have to take part in appraisal and revalidation processes both of which included learning by reflection. We are examining the effect different curricula have on students' ability to learn using reflection. The results of this study will be used to help design curricula for doctors and medical students in the future.

This is an amalgam of three questionnaires which examine students'; reflection in learning, approach to learning and motivation for self-directed learning respectively.

For our results to be useful we need all the questionnaires to be completed and returned. YOUR completed questionnaire is vital to our study.

Your questionnaire is anonymous and your responses cannot be traced back to you.

Thank you

Some information about you.

Gender *please circle*.....Male / Female

Age

Age at entry to medical school.....

Did you enter medical school *Please mark correct response with a cross*

Straight from school.....

After a gap year.....

Turn over

After doing another degree *Please mark with a cross if applicable*.....

If so, to what level (please circle) Bachelor / Masters/ Doctorate

And in (Please circle)

Science / Arts

After working (excluding student part/time and holiday jobs).....

Please mark with a cross if applicable

A. Active reflection

Please answer the items below in relation to your learning experiences in the medical course. [1 = Never, 7 = Always] please circle the most appropriate number

To what extent have I;

1. Carefully planned my learning tasks in the courses and training activities of the medical course?	1	2	3	4	5	6	7
2. Talked with my colleagues about learning and methods of study?	1	2	3	4	5	6	7
3. Reviewed previously studied subjects during each term?	1	2	3	4	5	6	7
4. Integrated all topics in a course among themselves and with those of other courses and training activities?	1	2	3	4	5	6	7
5. Mentally processed what I already knew and what I needed to know about the topics of procedures?	1	2	3	4	5	6	7
6. Been aware of what I was learning and for what purposes?	1	2	3	4	5	6	7
7. Sought out interrelations between topics in order to construct more comprehensive notions about some theme?	1	2	3	4	5	6	7
8. Pondered over the meaning of the things I was studying and learning in relation to my personal experience?	1	2	3	4	5	6	7
9. Conscientiously sought to adapt myself to the varied demands of the different courses and training activities?	1	2	3	4	5	6	7
10. Systematically reflected about how I was studying and learning in different contexts and circumstances?	1	2	3	4	5	6	7
11.- Mindfully summarised what I was learning day in, day out in my studies?	1	2	3	4	5	6	7

Turn over

12. Exerted my capacity to reflect <i>during</i> a learning experience?	1	2	3	4	5	6	7
13. Diligently removed negative feelings in relation to aims, objects, behaviours, topics or problems pertaining to my studies?	1	2	3	4	5	6	7
14. Constructively self-assessed my work as a learner?	1	2	3	4	5	6	7

Taking into account the perceptions referred to above, I consider that my personal skill to practise the reflective process is:

- () Null. I do not value that process and I am unfit to exert it.
- () Minimal. I am not suitably prepared although I am aware of its worth.
- () Restricted. I actually require additional preparation (orientation, support development, practice and feedback).
- () Partial. I just need incentives and opportunities
- () Ample. I have autonomy under favourable conditions
- () Maximal. I have full autonomy even under negative pressure (adverse context, no time)

B. What do you expect to get from the experience of higher education						
Put a cross in the appropriate box to indicate how strongly you agree with each of the following statements		Very strongly	Fairly strongly	Somewhat /not sure	Rather weakly	Very weakly/ not at all
15	I want to develop knowledge and skills for my career.					
16	I hope things I learn will help me to develop as a person and broaden my horizons					
17	I'm focussed on the opportunities here for an active social life and /or sport.					
18	I hope the whole experience at medical school will make me more independent and self-confident					
19	I'm mainly here because it seemed the natural thing: I'd done well academically in the past					
20	I want to learn things which might let me help people, and/or make a difference in the world					
21	I mainly need the qualification					

Turn over

22	I want an opportunity to prove to myself or to other people what I can do					
23	When I look back, I sometimes wonder why I ever decided to come here.					

C. Approaches to learning and studying

The next part of the questionnaire has been designed to allow you to describe, in a systematic way, how you go about learning and studying. The technique involves asking you a substantial number of questions which overlap to some extent to provide good overall coverage of different ways of studying. Most of the items are based on comments made previously by other students. Please give your **immediate** reaction to every comments, indicating how you **really do** study.

We want to know about your **typical** ways of studying. If you have not encountered a particular situation , try to imagine how you would react.

Put a cross in the appropriate box to indicate how strongly you agree with each of the following statements.

5 = agree 4 = agree somewhat 2 = disagree somewhat 1 = disagree

Try not to use 3 = unsure unless you really have to or unless the item cannot apply to you

		1	2	3	4	5
24	I usually set out to understand for myself what we have to learn					
25	When I'm communicating ideas, I think over how well I've got my points across.					
26	I'm pretty good at getting down to work whenever I need to.					
27	Topics are often presented in such complicated ways I often can't see what's meant					
28	When I've finished a piece of work, I check to see if it really meets the requirements					
29	I try to make sense of things by linking them to what I already know.					
30	I really try hard to do just as well as I possible can.					
31	In the whole, I'm quite systematic and organised in my studying.					
32	Often I have to learn over and over things that don't really make much sense to me					
33	I'm pretty good at preparing for classes in advance.					
34	I tend to take what we are taught at face value without questioning it much					

Turn over

Put a cross in the appropriate box to indicate how strongly you agree with each of the following statements.		1	2	3	4	5
5 = agree 4 = agree somewhat 2 = disagree somewhat 1 = disagree Try not to use 3 = unsure unless you really have to or unless the item cannot apply to you						
35	For an essay or report, I don't just focus on the topic, I try to improve my writing skill					
36	Ideas I come across in my academic reading often set me off on long chains of thought.					
37	If I'm not understanding things well enough when I'm studying, I try a different approach.					
38	I try to relate ideas I come across to other topics or other courses whenever possible					
39	I carefully prioritise my time to make sure I can fit everything in.					
40	I often have trouble in making sense of the things I have to remember.					
41	I generally keep working hard even when things aren't going all that well.					
42	I'm just going through the motions of studying without seeing where I'm going					
43	Concentration is not usually a problem for me except when I am really tired					
44	Much of what I've learned seems no more than lost of unrelated bits and pieces in my mind					
45	I generally put a lot of effort into studying.					
46	I think about what I want to get out of my studies so as to keep my work well focused					
47	It's important for me to follow the argument or to see the reason behind things.					
48	I organise my study time carefully to make sure I get the best out of it.					
49	I go over the work I've done to check my reasoning and see that it makes sense					
50	In making sense of new ideas, I often relate them to practical or real-life contexts					
51	Whatever I'm working on, generally I push myself to make a good job of it.					
52	I don't think through topics for myself, I just rely on what we're taught.					
53	When I find something boring, I can usually force myself to keep focussed.					

Turn over

<p>Put a cross in the appropriate box to indicate how strongly you agree with each of the following statements.</p> <p>5 = agree 4 = agree somewhat 2 = disagree somewhat 1 = disagree</p> <p>Try not to use 3 = unsure unless you really have to or unless the item cannot apply to you</p>											
54	I tend just to learn things without thinking about the best way to work										
55	I work steadily during the course, rather than just leaving things to the last minute										
56	When I'm reading, I try to find out for myself exactly what the author means.										
57	I try to find out better ways of tracking down relevant information.										
58	I look at evidence carefully to reach my own conclusion about what I'm studying.										
59	I pay careful attention to any advice or feedback I'm given, and try to improve my understanding										
<p>How well do you think you are doing in your studies based on your performance and comments you have received on your work? Please try to rate yourself objectively, based on the grades you have been obtaining. Please put a cross in one box</p>											
Very well		Well		quite well		about average		not so well		rather badly	
9	8	7	6	5	4	3	2	1			

Turn over

D. Self-efficacy								
How well can you;								
		1 not well at all	2	3 not too well	4	5 pretty well	6	7 very well
60	Finish assignments by deadlines?							
61	Study when there are other interesting things to do?							
62	Concentrate on your studies?							
63	Take lecture notes?							
64	Use the library to get information for assignments?							
65	Plan your studies?							
66	Organise your studies?							
67	Remember information presented in lectures and textbooks?							
68	Arrange a place to study without distractions?							
69	Motivate yourself to study?							
70	Participate in class discussions?							

Thank you very much. We appreciate you taking the time to complete this questionnaire.

Please hand it to a member of staff or place it in one of the boxes provided.

**Appendix 8: Subscales of the learning and studying
questionnaire**

1. Learning orientations

Intrinsic orientation (4 item scale)

a. I want to develop knowledge and skills I can use in a career.

g. I want to study the subject in depth by taking interesting and stimulating courses.

b. I hope the things I learn will help me to develop as a person and broaden my horizons.

f. I want to learn things, which might let me help people, and/or make a difference in the world.

Single orientation items

h. I mainly need the qualification to enable me to get a good job when I finish.

e. I'm mainly here because it seemed the natural thing: I'd done well academically in the past.

i. I want an opportunity to prove to myself or to other people what I can do.

c. I'm focused on the opportunities here for an active social life and/or sport.

d. I hope the whole experience here will make me more independent and self-confident.

j. When I look back, I sometimes wonder why I ever decided to come here.

2. Approaches to learning and studying inventory (ALSI)

Deep approach (8 item scale)

Intention to understand for oneself (2 items)

1. I usually set out to understand for myself the meaning of what we have to learn.

33. When I'm reading for a course, I try to find out for myself exactly what the author means.

Relating ideas (including constructivist learning) (4 items)

6. I try to make sense of things by linking them to what I know already.

13. Ideas I come across in my academic reading often set me off on long chains of thought.

15. I try to relate ideas I come across to other topics or other courses whenever possible.

27. In making sense of new ideas, I often relate them to practical or real-life contexts.

Use of evidence (2 items)

24. It's important for me to follow the argument, or to see the reason behind things.

35. I look at evidence carefully to reach my own conclusion about what I'm studying.

Surface approach (8 item scale)

Memorising without understanding (2 items)

9. Often I have to learn over and over things that don't really make much sense to me.

17. I often have trouble in making sense of the things I have to remember.

Unreflective studying (2 items)

19. I'm just going through the motions of studying without seeing where I'm going.

31. I tend to just learn things without thinking about the best way to work.

Fragmented knowledge (2 items)

4. Topics are presented in such complicated ways I often can't see what is meant.

21. Much of what I've learned seems no more than lots of unrelated bits and pieces in my mind.

Unthinking acceptance (2 items)

11. I tend to take what we are taught at face value without questioning it much.

29. I don't think through topics for myself, I just rely on what we're taught.

Monitoring studying (8 item scale)

Monitoring study effectiveness (2 items)

5. When I've finished a piece of work, I check to see it really meets the requirements.

23. I think about what I want to get out of my studies so as to keep my work well focused.

Monitoring understanding (3 items)

14. If I'm not understanding things well enough when I'm studying, I try a different approach.

26. I go over the work I've done to check my reasoning and see that it makes sense.

36. I pay careful attention to any advice or feedback I'm given, and try to improve my understanding.

Monitoring generic skills (3 items)

2. When I'm communicating ideas, I think over how well I've got my points across.

12. For an essay or report, I don't just focus on the topic, I try to improve my writing skill.

34. I try to find better ways of tracking down relevant information in my subject.

Organised studying (6 item scale)

Study organisation (2 items)

8. On the whole, I'm quite systematic and organised in my studying.

10. I'm quite good at preparing for classes in advance.

Time management (4 items)

3. I'm pretty good at getting down to work whenever I need to.

16. I carefully prioritise my time to make sure I can fit everything in.

25. I organise my study time carefully to make the best use of it.

32. I work steadily during the course, rather than just leaving things until the last minute.

Effort management (6 item scale)

Effort (4 items)

7. I try really hard to do just as well as I possibly can.

18. I generally keep working hard even when things aren't going all that well.

22. I generally put a lot of effort into my studying.

28. Whatever I'm working on, I generally push myself to make a good job of it.

Concentration (2 items)

20. Concentration is not usually a problem for me, unless I'm really tired.

30. When I find something boring, I can usually force myself to keep focused.

Appendix 9: Participant validation: Summary

Reflective Learning Study: summary

Objective: to observe the effects of a voluntary intervention in reflective learning.

Participants: 65 students attended an introductory lecture in response to information circulated about reflective learning. After the lecture 35 agreed to take part of which 15 subsequently dropped out (some during the introductory process, some after taking part for many weeks).

Interventions: for two terms participants kept learning diaries and attended fortnightly, facilitated tutorial groups where they discussed their reflective diary entries.

Results: students from all groups said that they were under pressure in the third year due to a combination of time taken to get to clinical placements, written assignments and, as the year progressed, revising for the intermediate MB exams. They were told by students in the years above that the third year was the hardest. In lectures students wrote as much as they could and learned from their lecture notes in time for exams.

The culture among the students was one of playing down how much study you did and not appearing keen in front of your peers.

Interviews were carried out with 19 participants, (five students who dropped out and seven non-participants). All four tutors were also interviewed. Participants perceived a greater ability to identify learning objectives and to integrate learning. Some participants described positive feedback from reflective learning, and felt more confident in their knowledge and their learning ability. Increased awareness of individual learning styles was also a consequence of taking part in the study. Some students who said that they already used reflection in their learning gained most by the structure of the study prompting them to reflect regularly.

As well as encouraging participants to keep going with the learning diary tutorial groups enabled students to compare progress with their peers. Material presented by one student at tutorial groups was often of use to all. Regular contact with a senior member of staff was welcome. Some tutors kept diaries, which they presented, to the students.

Some students were dissuaded from taking part because they thought that the large factual content of the curriculum would make reflective learning less useful.

Over half the participants said that they would use the reflective learning techniques after the study ended.

Conclusions: reflective learning techniques help medical students become more self-directed and deeper learners. Students are unlikely to take up reflective learning if they do not think it relates to their curriculum and assessments. Student culture exerts a potent effect on students' decisions whether to adopt new learning strategies such as reflective learning.

**Appendix 10: Paper accepted for publication by
Medical Education**

Students' views of reflective learning techniques: an efficacy study at a UK medical school

Short title: Students' views of reflective learning techniques

Word count; 3,315 (illustrative quotes; 593)

Abstract

Objective: to describe the effects of a voluntary intervention using reflective learning techniques on students' learning.

Design: interventional study with reflective learning techniques offered to medical students.

Setting: the third year of undergraduate medicine at Cardiff University where the curriculum is integrated with early clinical contact.

Participants: all 232 third-year students were invited to participate. Sixty-five attended an introductory lecture. After the lecture 35 students agreed to attend regular tutorial groups. Fifteen of these subsequently dropped out (some before attending the reflective learning groups, others after taking part for some weeks).

Interventions: for two terms participants kept learning journals and attended fortnightly, facilitated tutorial groups where they discussed their reflective journal entries.

Main outcome measures: qualitative interviews and exam results.

Results: interviews were carried out with 19 full participants, four initial participants and seven non-participants. Participants perceived that they gained a greater ability to identify learning objectives and to integrate learning. The tutorial groups encouraged students to compare progress with their peers.

Some students did not take part because they thought that the large factual content of the curriculum would make reflective learning less useful.

There were no differences between the groups in exam results

Conclusions: among this small, self-selected group participants were better able to identify what they needed to learn although there was no improvement in exam results. Students appear unlikely to take up voluntary reflective learning if they do not think it relates to curriculum and assessments. Student culture exerts a potent effect on willingness to attend extra tutorial groups.

1. Introduction

Reflective learning is currently enjoying popularity in medical education¹ and in other health-related professions, particularly nursing,^{2,3} although there is confusion about what is meant by reflection.⁴ There is also an extensive literature describing reflective learning in teacher training.⁵ Few studies, however, have been published describing the use of reflective learning in undergraduate medical education.^{6,7}

John Dewey⁸ described reflection as a purposeful form of thought provoked by unease in learners when they recognise that their understanding is incomplete. Thinking back over encounters in their learning (e.g. clinical encounters) students can examine their understanding for any gaps or inconsistencies.^{8,9} This stimulates them to address any identified gaps - a process driven by intrinsic motivation and thereby associated with better recall and satisfaction.¹⁰

Reflective learning helps students develop a deeper and more integrated style of learning.¹¹ Students who have better insight into what they know and how they learn are better placed to direct their own learning.¹² Studies have shown that greater reflective activity in learning is correlated with better performance in examinations^{1,13}.

Reflective learning is a valuable lifelong learning tool for any doctor and is now a requirement for all doctors in the United Kingdom for the processes of appraisal and revalidation¹⁴.

Most published studies describe situations where students had no choice about participation and involve assessment.⁶ Any evaluation based on such interventions must consider the possibility of bias due to students responding in a way which they perceive enhances their assessment.¹⁵

We report here the results of a study where reflective learning techniques were offered to medical students without compulsion or assessment. With this design we chose to contrast the reports of those who participated with those who attended a lecture but chose not to go further. In carrying out an efficacy study, we were able to evaluate the effect of reflective learning without any extrinsic effects from assessment or course requirements.

2. Method

Study development

A study proposal was shown to three groups of third-year students in the year prior to the study. They reported that this was a very busy year with many assignments to be completed and the intermediate MB exams at the end of the year. The groups thought that reflective learning would be helpful to third year students and that many would sign up but that some may drop out as the workload increased.

The intervention

Students attended two introductory seminars where they took part in reflective learning exercises¹⁶ aimed at helping them understand and experience reflective learning. taking part also involved keeping a learning journal using a format based on the critical incident technique.¹⁷ This involves the use of templates which prompt the learner to record an event, their understanding of that event and the learning needs thus revealed.¹⁸ Because learning is enhanced more by discussion of learning experiences than by writing alone,¹⁹ we organised fortnightly tutorial groups. The intervention ran from October to March.

The sample

We chose third-year students because they were beginning the intensive component of their clinical training and should be integrating learning from patients with prior biomedical learning. We were interested in both students' positive and negative views about reflective learning

Recruitment was a two-stage procedure. All 232 third-year students were invited by email to attend an introductory lecture where it was explained how reflective learning might help students' learning and what participation would involve. All attendees were asked if they would be willing to be interviewed whether or not they decided to take part. Formal recruitment to complete journals and attend tutorial groups took place at the end of the lecture. We later categorised the 65 students who attended the lecture into three groups, those who declined to participate in subsequent reflective learning activities (non-participants); those who participated for the duration of the study (full-participants) and those who participated initially but stopped attending the tutorial groups (initial participants). We did not include students who had not attended the introductory lecture in our analysis because they were not in a position to make an informed decision about reflective learning.

Tutors and tutorial groups

Ten tutors were recruited by writing to experienced small group tutors from the medical school. A two-hour seminar was held to explain the nature of the study and the learning journal. They were then given instruction on running tutorial groups, facilitating group function and helping students keep learning diaries.

The fortnightly tutorial groups lasted an hour. Participants shared their diary entries, using them as a basis for discussion. Tutors encouraged students to continue with the

learning diary and gave students advice how to use the tutorial groups and the journal. Some students dropped out after attending several sessions.

After two months the tutorial groups were reduced to four ensuring that each group was large enough for purposeful discussion.

Data collection and analysis

Qualitative methods were used to explore students' perceptions of the utility and acceptability of the intervention and the effect on their learning styles. Semi-structured interviews were carried out with full participants, initial participants and non-participants. A two-part interview guide was developed (see appendix 3). The first part of the interview guide asked about students' prior learning and context. The second part was tailored to each group. For full participants, the questions related to the effects of participation in the study. The guide for initial participants aimed to explore perceived effects of taking part and reasons for dropping out. For non-participants we concentrated on why students had chosen not to take part. They were asked their views on the potential of reflective learning now or in the future.

We approached ten students to be interviewed from each group, selecting them with a random numbers table. After interviewing nine full participants, four initial participants and seven non-participants we reached saturation with regard to prior learning and context and to reasons for non-participation and dropping out. However, we had not reached saturation on the effects of participation in the study on students' learning. The remaining 11 full participants were approached and ten were interviewed.

Interviews were carried out by two members of the study team (AG & EM), and one other researcher (MR). They were audio-recorded and transcribed.

When analysing the data about prior learning and context we were looking for the themes that emerged and we used a grounded theory approach.²⁰ When we examined the data relating to reflective learning we were evaluating an intervention which we had designed and about which we held ideas and expectations. In this case we carried out a thematic analysis, with some set themes but with openness to new themes emerging from the data.²¹

After the initial few interviews had been transcribed and analysed a coding frame was developed by two members of the research team (EM and AG). Data was imported into QSR N6, software²². Transcripts were coded according to the framework by two researchers working independently. The study team met to discuss and refine the emerging frameworks. Negative cases were used to refine the categories. A third researcher (FW) examined a sample of transcripts and derived a list of categories all of which were in the original frameworks. RP provided expert supervision for all aspects of qualitative methodology.

The emergent theories derived from this process were triangulated with data from interviews with tutors. Deviant cases were examined to test validity.²³

Exam results

Data were available for the performance in the intermediate MB examinations (held at the end of the year) for the full and initial participants, non-participants and the 167 students who did not attend the introductory lecture (lecture non-attenders). The exam results were examined for differences in mean scores between the groups. The means for the four groups were compared using analysis of variance (ANOVA).

3. Results

Recruitment and participation

Sixty-five students attended the introductory lecture. Of these, 35 said they would like to take part, however, 15 subsequently dropped out.

Table 1 Division of students who attended initial lecture into participant status and sex

	Whole year	Lecture attendees		
		Full participant	Initial participant	Non-participant
Male	88	6	2	14
Female	144	14	13	16
Total	232	20	15	30

Gender of participants

There was no significant difference (chi-square, Fishers exact test - see table 1) in sex distribution in the whole year ($p = 0.295$), the lecture attendees ($p = 0.111$) and the participants ($p = 0.419$).

Interview data

The emergent themes (box 1) are arranged in two sections. The data relating to learning context are from all interviewees. The data related to the intervention is presented in three parts: from the participants' experience of reflective learning; the non-participants perceptions of the study and reasons for not taking part; and initial participants' reasons for dropping out.

Box 1 Themes from analysis of interview data**Learning Context**

- Volume of work
- “Tales about the third year”
- Not discussing work

Participation

- Knowing what to learn
- Raised awareness of learning styles
- Connecting new and prior learning
- Topics for reflection
- Confidence and affect
- Norming

Views from initial participants

- Logistical and time problems

Non-participants views of the study

- “Wouldn’t help me now”
- “Not for me”
- Logistical and time problems

Learning context**Volume of work**

The interviewees described attending lectures whose content made up the exam syllabus. In lectures, they wrote as much as possible of what was said, taking little in, and then attempted to learn the contents of these notes in time for the exams.

I can't do a thing if all you're doing is hurting your hand to write as much as you can from the slides... there's just too much of an information overload.

RLS 1

Students said that they either had not signed up or had dropped out due to competing pressures on their time.

If I had the time, yes indeed. Reflective learning is a very good way of learning I think, the best way of learning but you need the time to do it.

RLS 12

Tales about the third year

The perception passed down from previous students was that the third year was the hardest. There was increasing pressure in the spring term with assignments to be handed in and revision for the forthcoming exams.

Everyone knows that the third year is going to be a nightmare and after Christmas...

RLS 19

Not discussing work

Students reported a reluctance to discuss their studies.

The course involves so much kind of actual doing of work, people don't like to talk about what they're doing as a general rule, and certainly it's a fairly taboo subject over lunch or in the evenings

RLS 13

Students' reflection on participation

Knowing what to learn

Participants commented that they were more aware of what they were learning and of its importance. They had more control over what they learned and thought about learning priorities, rather than trying to learn everything in their lecture notes. Some

were also aware of building knowledge that would be of value to them when they were practising doctors.

When I'm looking at that vital bit of information I should have known I know that's what I'm doing, and I'm recognising it more now than maybe at the beginning, and I can put a name to it.

RLS13

You just learn the more relevant things to life after med school

RLS 20

Raised awareness of learning styles

Participating in the study made students more aware of their learning styles.

It did just make me a bit more aware of different ways to like, to try to learn.

RLS 28

I think that it really made me think about how I did things. It was quite affirmative in that you know it's fine to do things differently.

RLS29

Connecting new and prior learning

Participants were better at integrating learning from different sources. For many this took the form of integrating theoretical and clinical learning.

If you're revising you think "oh yes, I looked this up earlier and it's related to this patient" and you've got it all there already.

RLS 17

I revised for my intermediates by going, not straight through a whole [subject] panel and doing them all separately, but actually trying to

incorporate everything that's the same for each panel. ... I think that helped a lot.

RLS23

Topics for reflection

Clinical learning formed the basis of reflection for all the participants and in the tutorial groups students often valued hearing their peers' reflections.

Generally when there's something that you're missing, it's something the others should know as well.

RLS 20

Confidence and affect

A small number of students gained confidence in their own knowledge as a result of reflection and said that they learned better as a result. They stated that this encouraged them to continue to use reflective learning.

When you just pick up on the one or two things and then you go away and you learn about those, you know, you feel a sense of achievement and it's an encouragement to do the same again next week because you know you got somewhere.

RLS 20

Emotional support

Some students described getting emotional support from the reflective process.

There was a cardiac arrest, it was one of my reflective learning experiences. It was the first death I'd seen ... the conclusion we all came to it was that the reflecting actually became the learning for things like, death.

RLS 14

Norming

One frequently mentioned benefit of the tutorial groups was the opportunity for participants to find out if they were keeping up with their peers and to discuss their workload.

We did talk about things and had a big old moan about “oh this is really hard” and have you done this coursework yet and so yes, it was good. It was useful.

RLS27

Contribution from tutors

For some students regular contact with their tutor was the best aspect of the study. The role that the tutors played over and above chairing the tutorial groups was to help students to recognise when they were reflecting.

I'd sort of say ‘Oh, I don't know whether that's reflecting’ and she would go back and say well yes it is because of this and this and this.

RLS 23

Reflections from initial participants

Initial participants consistently said they had dropped out because of the workload and other demands on their time.

I really enjoyed the tutorial groups. There were three students in my group we met at 8am. I went for quite a few weeks then dropped out because I found it difficult to get up in the mornings. We talked about specific topics and how we were getting on.

RLS 26

Non participants view of the study

Five non-participants said that they thought that reflective learning was a good idea but it would not help with current methods of teaching and assessment. Others thought that it did not match their learning style and some felt that there was not room for it in their busy schedule.

I don't think it would improve my mark at intermediate MB, but it might improve the way you self-reflect, and you learn from yourself. It might improve how you learn actual information and develop interests throughout your career, but, unfortunately, the number one focus here is getting into the 4th year. ... It doesn't help you jump through any of the hoops.

RLS 1

I think I'd just be happy just to read things up on my own sort of thing. I don't think I need to do it with other people.

RLS 8

Learning journal

We examined five student journals. The format varied widely from some highly reflective accounts of the writers' feelings to factual records of students' clinical experiences and studies.

Examination results

Table 2. Comparison of mean percentage marks at intermediate MB exams for full participants, initial participants, non-participants and introductory lecture non-attenders, analysis of variance (ANOVA).

Participant status	Mean mark	Standard deviation	F	Sig.
Full participants	66.75	49.36	.30	.826
Initial participants	65.118	42.79		
Non-participants	66.50	51.65		
Lecture non attenders	66.26	45.81		

There was no notable or statistically significant difference in examination results between full participants, initial participants, non-participants or students from the rest of the year (see table 2).

Discussion

In this study we describe the effects of a voluntary intervention in reflective learning on third year medical students as they began the task of integrating their clinical and biomedical learning. We achieved our aim of examining the efficacy of reflective learning and we found the participants perceived that reflective learning helped them select what they needed to learn and raised their awareness of their individual learning styles. They were better able to integrate what they had learned from different sources which proved helpful for revision. Reflective learning gave students confidence in what they knew and was associated with a sense of achievement which encouraged them to continue using it.

As well as this efficacy data we discovered how reflective learning related to the workload, the curriculum and to students' learning styles. Participants developed their ability to formulate their own learning objectives. Integration of new and prior learning fits with the constructivist model and is a feature of deeper learning.²⁴ A student being spurred on by previous episodes of reflective learning is evidence of intrinsic motivation.²⁵

Some of the benefits the participants cited may be due to the supportive effects of the small group rather than from reflective learning itself. The participants were made aware of gaps in their knowledge by the other students' reflective diary entries as well as their own.

Other students despite being able to see the benefits of reflective learning, did not think it would help them get through the current curriculum. The students who chose not to take part gave two reasons. Lack of time and incompatibility with the curriculum which, they perceived, demanded reproduction of facts not conceptual learning. Initial participants dropped out because of clashes with other activities.

Limitations of this study

Our voluntary study involved a trade-off. The reflective learning activities were not a curricular requirement. The only reason to take part was because students thought that it would benefit their learning. This enabled us to eliminate bias due to assessment pressures or coercion. As a result, however, we studied a small, self-selected group. We assume that students were more reluctant to attend the initial lecture for the same reason that non-participants chose not to take part in the study. Our inability to show any difference in performance at the Intermediate MB exams may be a reflection of the small number of participants or the lack of effect of the intervention on this outcome.

This was an efficacy study in which the population was 65 students who came to find out more about reflective learning. We needed to find out why some of them decided not to take part in reflective learning and to evaluate the experiences of those who did. We chose to include only students who had attended the introductory lecture in our non-participant group because they had chosen not to take part *after finding out what reflective learning was about*.

We prepared material that would put the benefits of reflective learning to the students without giving them false expectations (see appendices 1 and 2). Similarly in developing the interview guides we began the questions about the effects of participation with an open unbiased question.

Despite our efforts during the interviews we cannot be certain that the changes the participants reported were due to the intervention rather than the clinical learning they were experiencing for the first time.

We do not know whether the students who came to the introductory lecture have different styles of learning from their peers. If they do we do not know how stable such learning styles are.

Relationship to other research

The improved ability by participants to determine their own learning objectives correlates with the findings of Driessen et al.⁶ Our finding of better integrated learning, a characteristic of deeper learning,¹² correlates with the connection between deeper learning and reflection discovered by Sobral.²⁶ In this study students' perception of the task of learning in this context affected the approach they took (memorisation as opposed to reflective learning).²¹

Further research

Further research should assess whether the perceived benefits from reflective learning seen in this study could be extended across the whole student group. To be taken up by a greater proportion of students reflective learning would need to be more aligned with the curriculum and the way it is assessed. If reflective learning is to be made a course requirement it is important that assessment is formative and does not distort the demonstrated benefits.

A longitudinal study would determine whether students who have used reflection in learning continue to use it and whether this has any effect on their performance in exams or career choice.

Further studies should be designed to separate the effects of being part of a small group from benefits to reflective learning.

Conclusion

We believe that this study provides evidence to extend the use of reflective learning in undergraduate medical education. Reflective learning is likely to be taken up by students with greater enthusiasm if they perceive it will help them achieve the goals of their curriculum.

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Appendix 1

Third year reflective learning study***Definition***

There are many definitions for reflection but “making meaning” is a good one for the way it is going to be used in this study. Reflection has a function of connecting new and prior learning which will be particularly helpful at this stage in your studies.

Reflective learning

There are four essential elements to reflective learning

1. A learning experience (usually a clinical encounter)
2. Reflection on that experience. What happened? What knowledge/skills did I already have? What knowledge/skills were needed?
3. What gaps in my knowledge have been revealed? How can I fill these gaps?
4. Applying new knowledge in similar situations.

Using a learning journal

A learning journal serves as a set of prompts to take you through those four steps. So each entry in your journal should have four headings

1. A factual account of the event.
2. Your reflections
3. What you now need to know and how you plan to address those learning needs.
4. How you have subsequently used that new knowledge

It is useful to set out your entries in the journal in a way that makes these four parts of each entry distinct.

There is no prescribed number of entries you should make in your journal. Aim to make about two entries a week at the start. You can, subsequently, make the number of entries that suits you.

Remember that keeping the learning journal is solely to help you with your learning.

By reflecting on your clinical encounters you are

1. Connecting what you are learning now with what you have learned about the subject in the past. This is well recognised as a way of enhancing learning
2. Developing a sense of what you know and what you still need to learn.
3. Getting better insight into your learning styles.

Points two and three will help you develop independent learning skills.

How do you choose what to write about?

The cases that are most rewarding are those that have exercised you in mind in some way. This can be ones that were particularly difficult or where you thought there were gaps in your knowledge. Equally these can be situations that you enjoyed or found satisfying. There is no substitute to keeping a learning journal for developing a sense of what is useful to write about. It will probably take a while to really feel the benefit of keeping a reflective learning diary.

Tutorial groups

Tutorial groups have two functions.

1. To help you get going and to encourage you to keep going with your learning diary. Particularly at the beginning your tutor and your peers will be able to help you with any problems you may have
2. To discuss some of your diary entries with the group. You won't be forced to read out anything you don't want to. Having to read out an entry in itself forces you to think about it in a different way and having the reflections of the other group members can be very helpful.

Tutorial groups will be held on Monday and Wednesday between 1 and 2. One tutor has offered to lead a group between 8 and 9 on Wednesday mornings.

Appendix 2

Third year reflective learning study

You have the opportunity to take part in a study of reflective learning which will be an ideal support to your learning as you put together your factual knowledge with your clinical experience in the wards and clinics.

What is reflective learning?

Reflective learning involves reviewing some of your learning encounters, this study we are going to be using learning journals for this purpose. After reflecting the learner asks him/herself “What do I already know about this subject? What do I need to go and learn?” The last part of the cycle is bringing new knowledge into use in similar situations to the one that provoked the original analysis.

Why a research trial?

We believe that reflective learning has a great deal to offer medical students but that some support to learners as they start using reflective learning improves the outcome. This belief is based on education theory and on experimental work. We hope that, with your participation, we can prove through rigorous research that reflective learning is beneficial to third-year medical students’ learning, in order to do this we are going to run a trial.

Participation in the study is entirely voluntary and the learning journals will not be marked.

What next?

On 30th September a presentation of reflective learning and the trial will be made to all students in the third year. A handout will be also given out with basic information on reflective learning and keeping a learning diary. After the presentation you will be asked if you wish to take part. You will have two seminars on how to get the most from reflective learning. You will also join a tutorial group once every two weeks where you will be given advice and support on reflective learning and will discuss your diary entries with the other group members. A member of staff will facilitate these groups but there will be no active teaching. I will try to deal with any questions you may have at the presentation.

I hope that you will join the study.

Please feel free to contact me by email after 23rd September grantaj@cardiff.ac.uk.

Appendix 3

Interview guide headings**1) General learning**

- i) How they set about their learning
- ii) The college culture
- iii) How do they think other students approach learning
- iv) Have they changed the way they learn?
- v) How helpful have they found the staff in advising how to learn rather than what to learn?
- vi) The workload in the 3rd year?

2) The tutorial groups

- i) What are the groups like? ...
- ii) how they are run
- iii) how much contribution does the tutor make
- iv) Did they learn from each others' presentations?

3) The learning diary.

- i) Any problems keeping it?
- ii) Probe how much time spent weekly?

4) The study

- i) What are they getting out of the study?
- ii) How has taking part in the study helped them to learn?
- iii) Will they continue to use reflection in their learning after the study ends?

5) Barriers to gaining more from reflective learning

- i) What might have made the study easier?
- ii) What stopped them gaining more from the study?
- iii) How might others be persuaded to take part?

**Appendix 11 Abstracts accepted for presentation at
scientific meetings**

Abstract presented at Ottawa conference on medical education, Barcelona, July, 2004.

Background

Reflection can help learners to take a deeper approach to their learning and can raise their awareness of what they do and don't know. When adopting deeper approach learners integrate what they are learning into their existing cognitive structure. Learning in response to needs recognized by the learner is associated with greater satisfaction and recall. We aimed to discover whether reflective learning techniques could help bring about these changes.

Method

All 230 medical students in the third year were invited to participate by keeping a learning diary with a structure based on the critical incident technique and attending fortnightly tutorial groups where students discussed their reflections with small groups of their peers.

Evaluation was by semi-structured interviews with individual students and by correlating participant status with scores on the Learning Styles Questionnaire¹ (LSQ) and intermediate MB examinations. The transcripts of interviews and excerpts from students' diaries were coded then examined for emergent themes. Transcripts of negative cases were examined carefully. Findings were validated by independent analysis.

Results

Of 19 participants interviewed 16 described qualitative changes in their learning. The most common changes were metacognitive, students becoming more aware of their knowledge base. Also described were stronger affective elements of learning and greater integration. There was no difference in LSQ, scores or exam results between students who took part and those who did not. The demands of the curriculum and the mode of

¹Honey, P. and A. Mumford (1982). *The Manual of Learning Styles*. Maidenhead, Berkshire, Peter Honey.

assessment resulted in many students saying that reflective learning would not be of immediate benefit to them.

Conclusions

This study shows the potential efficacy of reflective learning techniques. It shows desirable changes in the learning of volunteers. Further work is needed to find out if the same changes would be seen if reflective learning techniques were introduced for all students.

The study also showed the effects of context on students' willingness to take part in reflective learning. A further study will examine reflective learning skills at three medical schools with differing curricula.

**Abstract presented at Ottawa conference on medical education,
Barcelona, July, 2004.**

Hierarchical Scales of Learning: A review of the literature

A number of authors including King & Kitchener¹, Marton and the Gothenburg group², & Biggs³ have developed hierarchies whereby learning at different levels is described. The parameters which they use to define different levels of depth or sophistication of learning vary, Marton, and others have investigated the learner's approach to study. The SOLO Taxonomy makes inferences about quality and complexity of learning by observation of students' work. Perry and King & Kitchener examine students' ability to deal with uncertainty in their thinking. They use scales where the first level is a dualistic view of the world with increasing levels of ability to view the world as pluralistic. All these authors have researched their work rigorously.

Van Rossum & Schenk take this a step further by correlating the approach to learning and the observed outcome of learning.

This work challenges teachers to adopt teaching strategies that nurture a deep approach to learning and to encourage students to constantly perform at their highest level.

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Abstract presented at the Association for the Study of Medical Education ASM, Liverpool, September 2004

Introducing Reflective Learning Techniques into Undergraduate Medical Education: The effects of context

Background

Reflection is a way of improving the quality of learning. The changes that might be brought about include; accommodation between new and prior learning, understanding of principles, making abstractions from learning. Reflection can help students identify what they know and what they still need to learn.

The University of Wales College of Medicine (UWCM) has an integrated undergraduate medical course. In the third year the students begin clinical placements.

Method

Students in the third year at UWCM were offered a chance to take part in this study. The study lasted from October to March and participating involved keeping a learning diary and attending a fortnightly tutorial group. Evaluation was by one-to-one interviews. Data was analysed and emergent themes identified. The database was interrogated for developing theory with attention to negative cases.

Findings

Out of 230, students 45 signed up for the study and 30 attended.

Most students had established patterns of learning some of whom did not want to change. Students separated their learning into learning from lectures and learning on the wards. The content of the lectures was seen as the syllabus and students tried to write down all that was said. Many said that they wrote at a cost of not thinking about content. Students kept their notes until the exams approached then memorised as much as possible using summarising and rehearsal techniques. A small number of students described naturally reflective ways of learning some of which were not helpful in the current course.

Students said that MCQ and EMQ exams did not reward their understanding only their ability to reproduce lists. Some said that the method of assessment would have to change before many students would take up reflective learning. Despite being interested in

reflective learning some students had not signed up for the study because they thought it would not help with the current course.

Clinical learning was quite different and varied a great deal from placement to placement. Many students commented that a condition was easier to remember if they had seen a patient with it.

Discussion

Reflective learning appeared irrelevant to many students. Their teaching and examination methods encouraged them to learn their lecture notes by rote and reproduce what they had learned in the exam.

For reflective learning to be taken up by students their teaching and assessment must encourage deeper and more integrated learning.

Abstract presented at the Association for the Study of Medical Education in Europe ASM, Edinburgh, September 2004

To present a review of the literature examining definitions of different levels of learning derived by rigorous research.

Summary of work

A number of authors (King & Kitchener, Marton and the Gothenburg group, Biggs, Perry) have developed hierarchies describing learning at different levels.

Summary of Findings

Marton, Säljö and others have extensively investigated the learner's (deep or surface) approach to study.

Collis & Biggs' SOLO Taxonomy makes inferences about complexity of learning by observation of students' work.

Van Rossum & Schenk demonstrated a correlation between the approach to learning and the SOLO taxonomy.

Perry and King & Kitchener both examine students' ability to deal with uncertainty. The first level is a dualistic view of the world going through levels of increasing complexity where multiple explanations for phenomena exist.

The work of these authors has been rigorously researched.

Conclusions.

Evidence based scales of depth or sophistication of learning are available.

The parameters of level of sophistication of learning vary from author to author.

Abstract accepted for presentation at the Association for the Study of Medical Education in Europe ASM. Amsterdam, September 2005

Comparison of reflection in learning, approach to learning and self-efficacy in self-directed learning at medical schools with different curricula,

Background

In previous work, we found that students at different schools had different approaches to learning. At a school with a problem-based curriculum students described a deeper approach and higher self-direction of learning.

Method

Participants –All final-year students at two medical schools: one with an integrated curriculum and one with a problem-based curriculum.

The students will be asked to complete:

The Reflective Learning Scale(1) measures metacognitive activity and ability to integrate learning.

The Learning and Studying Questionnaire(2) measures surface and deep approaches to learning and learning orientations.

The Self-Efficacy in Learning Scale(3) measures learners' perception of their competence to direct their own learning.

Generalisability of results

The combination of instruments being used in this study means that there is the potential to detect differences in characteristics of learning which are widely recognised as indicators of good quality learning.

A difference in approach to learning or in self-efficacy between students at different schools this will be significant. It will signal the need for further research to determine the reasons for the differences both in the intake and the curricula of the respective schools.