Peer Mentoring:
A Model of Professional Development for Experienced Teacher Pairs

A thesis submitted for the degree of Doctor of Philosophy

By

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Abstract

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A model using peer support in mentoring as a way of professional development was produced from an extensive literature search. It set out to suggest strategies to optimise the peer mentoring process between two experienced primary teachers in science teaching. The two year study subsequently collected data from 24 teachers, 12 of whom were participating in an in-service science programme. After one term five mentor pairs were selected as a research cohort for more detailed monitoring. Biographical and demographic information, views and beliefs about teaching and learning in science, and data about the research cohort teachers' understandings of mentoring, was collected. The data from the research cohort teachers' understandings of mentoring was compared with questionnaires from a sample of over 100 different primary and secondary teachers. The strategies and activities carried out by the research cohort teacher pairs was monitored through questionnaires, interviews, regular individual researcher / tutor – teacher mentoring meetings, periodic collective group meetings, teacher's logs and completed proformas and tape and video recordings.

Following the data collection and analysis the Framework used in the Project was reviewed and moderated. It was also found that access to a mentor increased the research cohort teachers' sense of well being and confidence to teach science. The implications of the study are that mentoring can be a manageable activity for some, self-selected teachers.

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Chapter One - Overview of the Research Project

Orientation

This chapter furnishes an overview of my research. An outline and plan of how the thesis is constructed is included at the end of the chapter.

Introduction

The study set out to explore a way in which experienced primary school teachers could help one another improve the effectiveness of their teaching and learning in science; their pedagogical practices. It was designed so that it was not hierarchical, with teacher pairs working together each bringing something of value to the partnership.

The two-year project focused on use of a Framework to support pairs of teachers as they acted as a mentor to their colleague. The use of this Framework was designed to support teachers within school situations and during training opportunities (INSET).[1] Underpinning this process of peer-mentoring is the concept that professional learning results in professional expertise. Or as Eraut (1994) expresses it:

> *Whether it is self-directed or enforced; innovation focussed or more general, the prime purpose of facilitated professional learning is the development of professional expertise.* (p. 11)

Therefore the core of the thesis concentrates on participants' experiences with pair peer-mentoring to develop professional learning. The study acts as a narrative of the journey the researcher and the teachers took over the two years, 1999 and 2000.

The Original Project

The initial concept was that teachers would use a self-developed Framework to help themselves and colleagues improve their science subject pedagogical knowledge by supporting one another as they learnt and changed. It was hoped that as pairs of teachers became proficient in use of the Framework, and as a corollary more effective in their science teaching, they would each take on a new partner. In this way good practice in science teaching would spread throughout the school.

[1] INSET is the favoured acronym for facilitated professional development activities. The term inservice is also used as an acronym for professional development activities.

Outcomes of the First Project

Six primary teachers and their headteachers agreed to participate and the project was set to commence at the beginning of the new 1998/99 school year. It was proposed that the six teachers would work with a colleague, with self-determined foci, with little direct in-put from the researcher. However, by the end of October 1998 there were no longer any participants in the project. This appeared to be due primarily to the demands of the Literacy Hour and to a lesser extent insecurity with how to mentor a colleague.

A two-staged approach was taken to this teacher insecurity and / or reluctance to design a way of working with a colleague. A survey was to be carried out to investigate Leicestershire teachers' general understandings of mentoring. These understandings would then form the underlying basis for my development of a central Framework to guide teachers' interactions in a mentoring relationship. The hypotheses taken by myself, (based on extensive experience in educational professional development as detailed in chapter 2), was that in having a practical Framework to direct and support them as they undertook a mentoring relationship, teachers might establish a partnership that could lead to effective professional growth.

In October 1998 a questionnaire was constructed that explored teachers' general knowledge of mentoring and their perceived training needs in the area. Five hundred questionnaires, (Questionnaire 1) were sent out, one to every school in Leicester City and Leicestershire County. Data from the questionnaire provided some information toward the development of the proposed Framework for teachers. The questionnaire was also used to inform the design of INSET that would facilitate teachers' use of such a Framework.

At the end of the 1998 winter term the pilot Framework was drafted taking into account the questionnaire results and an in-depth literature review in the field of mentoring or peer tutoring. Gottesman and Jennings' (1994) work "Peer Coaching for Educators" was chosen as the Framework's structural model. The intention of the second project was to implement and as necessary modify this draft Framework.

The Second Project

In January 1999, as part of an industry, University of Leicester and LEA initiative, 16 inner-city primary schools agreed to participate in a two-year project for professional development for their teachers of science. These schools had been identified as having serious weaknesses or some problems with their science teaching and were prepared to send two of their staff on INSET courses provided by the University. There was a core course for all teachers and a number of optional courses, one of which was for science co-ordinators. The co-ordinators' course seemed a suitable vehicle for trialing of the peer-mentoring scheme. Twelve teachers from 11 schools chose to participate in the co-ordinators' course.

The proposed Pair Peer-Mentoring Project was designed with differing types of support. On-site University INSET support was followed by researcher/tutor support at the school. As teachers implemented and became familiar with the process of peer-mentoring the emphases of researcher/tutor support shifted, intensified and became concentrated at the school level. In addition, from the 1999/2000 Spring Term onwards the teachers and researcher/tutor held a University based group meeting at least once a term.

University-based Support

The INSET was used to introduce the co-ordinators to the draft Framework and to provide the theoretical background, practice and support for the teachers' during their implementation and adoption of pair peer-mentoring.

Tutor Support

One of the parameters of the research project was school-based support for the teacher participants because it is considered by many researchers to be an essential component for successful change (Joyce and Showers 1980, 1982, 1995; Showers, Joyce & Bennett 1987). This support was to take the form of a University tutor (myself) facilitating teachers through the change process as they 'took on board' pair peer-mentoring.

Teacher Adoption and Implementation

Initially, the science co-ordinators had problems in understanding the steps in the Framework and were unsure of how to write Action Plans. Consequently, time was spent at INSET sessions providing exemplars. There were also researcher/tutor - teacher meetings to guide teachers through the process of selecting a focus, a timeline, and criteria for

success when writing an Action Plan. As the need for this guidance developed the researcher/tutor found it useful to generate additional strategies and support materials for teacher use. These strategies and resources became part of the final Framework.

Tutor Monitoring

At the beginning of the Autumn Term 1999/2000, a subset of five teacher pairs was chosen to enable the researcher/tutor to track, in a more in-depth way, what was happening during the process. Data was collected via a questionnaire, semi-structured interviews, observation of teachers teaching science, researcher/tutor field notes, teacher documentation on use of pair peer-mentoring, as well as teacher and headteacher written and oral evaluation of the process. Monitoring and evaluation of change was through analysis of change models.

Collective Meetings

End of term collective meetings were also arranged and carried out so that teachers had an opportunity to meet up and share their problems and successes with their colleagues and the researcher/tutor.

Outcomes of the Second Project

Gradually, over two to three terms, the sub-set of teachers appeared to become more confident in writing Action Plans and using the Framework to peer-mentor their colleagues. However, over time, as their independence from researcher/tutor support developed, their Action Plans showed less and less detail and feedback became more general in nature. Some teacher pairs did not carry out their Action Plans.

During the Spring Term (2000) two co-ordinators lost their peer partners as a result of a school transfer and a pregnancy. The remaining teacher pairs and individual teachers continued in the Project. By the conclusion of the Project these teachers showed some growth in the use of the Framework for pair peer-mentoring; they could produce a form of action planning, had become more confident in their science teaching and had trust in one another. There is perhaps still some way to go before the teachers develop the necessary skills, knowledge and understandings to enable them to effectively develop one another's pedagogical practices and so improve their professional expertise.

The Final Framework

To overcome some of the difficulties experienced by both teachers and the researcher/ tutor in undertaking pair peer-mentoring the suggested final Framework incorporates a very structured programme of implementation. Support materials to guide teachers including such things as criterion checklists for self-needs analysis and protocols for examining actual teaching practice, are suggested as basic components in the process.

The research indicated that the final Framework could be used to help teachers develop one another's pedagogical practices and, by implication, their professional expertise.

Thesis Outline and Plan

The second chapter positions the study with respect to developments in education in the past decade, such as the development of the leadership roles of Subject Leader and Advanced Skills Teacher (AST) and some of their associated problems. It considers how the proposed strategy of pair peer-mentoring together with the researcher's personal expertise was thought to be of value to this process.

Chapter three reviews the professional literature on factors that influence teachers' professional learning and change.

Whilst mentoring *per se* was not the focus of the research, its context clearly had ramifications for the way experience and learning were construed by those involved in the mentoring project. An examination of the literature on mentoring and how mentoring relates to the aims of this study is made in chapters four and five.

The theoretical basis of the methodology, outlined in chapter six, is an ethnographic / phenomenological / action research approach employing some aspects of grounded theory research methodology to analyse the data (Glasser and Strauss 1967; Strauss and Corbin 1998). This approach was taken because mentoring is a complex activity taking place in a highly individual social setting (McIntyre and Hagger 1996) and as such it was felt that a qualitative research method would be the most appropriate, as it allows for in-depth investigation of the interactions between individuals within their school settings.

Chapters seven and eight describe the research design strategy and methods used to collect and analyse evidence from the eight case-study teachers' experience in using the Framework for Pair Peer-Mentoring.

A review of the achievements and the processes of this research and the conclusions drawn are presented in chapter nine.

Conclusion

The study of the experiences of eight teachers provided insight into the process of pair peer-mentoring. It resulted in the production of a Framework, with a different training and an implementation structure than was originally envisioned, and an understanding that teachers have to be at a stage when they are capable / motivated to take it on. Despite the difficulties encountered, the journey was worthwhile to the teachers, their schools and to the researcher. It is hoped that it will also prove to be relevant and worthwhile to other practitioners, and to the wider research community.

Chapter Two – Rationale For the Study

Orientation

This chapter gives a synopsis of the educational climate at the time of the study; the development of teacher leadership roles; how the pair peer-mentoring strategy might contribute as a way of improving teacher expertise; and why the researcher was well placed to carry out this study.

Introduction

Education is a practical activity, and as such its improvement requires teachers and other educationalists to formulate and address practical problems. In the context of educational research, the task of solving practical problems is often neglected.

> *Those researchers who are concerned with the improvement of practice need to bear in mind, that if practice is to be improved, someone somewhere - or, more often, a group of people working in collaboration - has to do something; writing and talking about doing things are not enough.* (Swann 2000, p. 4)

The research set out to focus on an important practical issue, namely to provide a school based structure for continuous professional learning. The structure or framework was intended to support and / or help experienced primary teachers begin to develop the expertise needed to take on the leadership roles demanded by government initiatives.

The Educational Climate

In England, primary teaching was undergoing an extensive period of government prescribed change, the National Curriculum in 1988, the Literacy Hour in 1998 and the Numeracy Hour in 1999. When the process of change takes place without the agreement of participants, there are additional stresses and this may have left many primary teachers feeling a loss of control over their own professional lives as the initiatives lessened primary teachers' traditional autonomy in their own classrooms. Another effect resulting from these mandated programmes was increased measures from the Department for Education and Employment (DfEE) for audit and accountability of student learning. By the late 1990's this became focused in a demand for teachers to demonstrate that they are 'lifelong learners'(achieving threshold status and beyond), ever required to show evidence of maintaining their professional development. These changes, new programmes and

increased accountability together with the introduction of standards for subject co-ordinators, left many teachers feeling demoralised and deprofessionalised.

Detrimental Effects of Imposed Change

The detrimental effects of externally imposed rather than self-initiated change are well documented (for example, Fullan 1991, 1993, 1995; Fullan and Hargreaves 1992; Smith and Coldron 1999). Other educational theorists such as Tickle (1989), Pring (1996), and Ovens (1999) were also concerned about the value of central control of educational provision with Pring arguing that the government imposed innovations relegated teachers to becoming technicians carrying out the State's job according to State specifications and that teachers increasingly feel that they are the objects rather than the subjects of change. He puts forward four reasons why the relationship between teachers and the State have changed - accountability, cost, economic relevance, and social control (pp. 11-14).

> *Thus, there is central control, a standard model, and limited choice within a regulated market. What suffers is the recognition of teachers as professionals.* (Pring p.15)

Feeling demoralised and deprofessionalised is not a satisfactory status for teachers. Giving teachers a voice, that is asking the teachers themselves to make contributions to the quality of teaching and learning occurring in schools may, however, be a way of addressing the problem.

Giving Teachers a Voice

Pring's viewpoint seems to be shared by Tickle (1989) when he reasons that if we accept that teachers should await and respond to imposed changes in curriculum, appraisal, administration, and governance, then teachers would be technicians to 'work the system'. Tickle proposed that rather than accepting the idea of 'teacher-as-technician' we think of teaching as a profession in which teachers act on the basis of understanding the complexities of the educational processes involved in teaching, and in which teachers take on more personal responsibility for the quality of the service.

To enable teachers to contribute to the development of a quality service a method of continuous teacher education based on experience and practical action is needed. Opportunities for teachers to engage in professional growth, or utilise their professional knowledge should be provided, so that the potential of teachers' professional judgements can be realised in practice.

Government Initiatives to give Teachers a Voice

Recent government actions about, and expectations for, teachers holding 'leadership' positions in the school system provide ways, at least from a government point of view, in which teachers' professional judgements might make contributions to developing the quality of the service - "Subjects and Standards" (OFSTED 1996); "Excellence in Schools" (DfEE 1997); "Teachers Meeting the Challenge of Change" (DfEE) 1998; "National Standards for Subject Leaders" (TTA 1998). These documents promote the leadership role of a Subject Leader and / or an Advanced Skills Teacher (AST).

Development of the Subject Leader

The role of a subject leader proposed by the Teacher Training Agency (TTA) in 1998 arose from concerns outlined in OFSTED publications from two years previously which said, amongst other things:

> *In KS1 quality of management of subjects is weak overall in over a quarter of schools: for individual subjects this figure ranges from one fifth to well over one third. In KS2 the situation is worse: it is weak overall in almost one third of schools and in individual subjects from a quarter to well over two fifths.* (Subjects and Standards 1996, p. 34)

The serious concern about subject leadership in the primary school, expressed by inspectors in 1994-95, probably arose from the introduction of the National Curriculum. For the first time primary teachers were expected to cover the range of academic disciplines recognised in secondary schools. Prior to the National Curriculum it had been possible for teachers to leave out some subjects (eg. science or technology) because they were not confident in the discipline. Nationally, only a minority of schools were staffed by teachers who, between them, had subject expertise in all subjects of the National Curriculum. An additional Report "Target setting to raise standards: A survey of good practice" went on to make concluding recommendations that many schools might usefully take action to address their weak subject knowledge by carrying out a variety of strategies (OFSTED 1996).[2]

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[2] These recommendations were to:

- carry out an audit of the subject expertise of their staff in respect of the major components of the National Curriculum programmes of study and of the school's curriculum for RE;
- develop existing subject expertise using INSET appropriately;
- encourage staff with subject expertise to support other colleagues through advice or joint work in classrooms; and
- deploy the subject expertise available through some use of specialist class teaching and collaborate with other schools.

The Subjects and Standards Report (p. 35) also provided primary schools with an approach to the 'unsatisfactory situation' with regard to subject co-ordination. It outlined five areas, which were to be addressed, in order to strengthen the co-ordination and leadership of subjects, within the primary school. Schools were asked to consider how co-ordinators might:

(1) develop their roles as managers for their subject;

(2) have opportunities to influence policy and planning, to monitor and guide teaching, and to oversee resource provision;

(3) have, maintain, or acquire adequate specialist knowledge to make them effective in their role;

(4) have sufficient time to carry out these responsibilities; and

(5) have access to the necessary in-service training and contacts, and opportunities to lead subject training for colleagues.

Unfortunately, for many headteachers it was not possible to ensure that all subjects were adequately co-ordinated (Flecknoe 2000 p. 2). Consequently, it was not surprising that dissatisfaction with the level of subject expertise continued to be raised in subsequent OFSTED reports. For instance the 1997 OFSTED report says:

> *Typically, however, the organisation of primary schools restricts the possibility of teachers with subject expertise using their specialist knowledge outside their own classroom for the benefit of the school as a whole.* (p. 3)

Despite this expressed dissatisfaction with the status quo, there still appeared to be an expectation, by the government, that full time primary class teachers could also be effective subject leaders. In 1998 The Teacher Training Agency (TTA) issued National Standards for Subject Leaders which were to be applied to subject leaders in both primary and secondary schools. It seemed to be accepted that there was no difference between the role of a subject leader in a primary school or a secondary school.

The National Standards for Subject Leadership (TTA 1998) declare that Subject Leadership has as its core purpose: 'To provide professional leadership and management for a subject to secure high quality teaching, effective use of resources and improved standards of learning and achievement for all pupils'.

Thus, an effective subject leader will have pupils who:

> *Show sustained improvement in their subject knowledge, understanding and skills in relation to prior attainment, understand the key ideas in the subject at a level appropriate to their age and stage of development...show improvement in their literacy, numeracy and information technology skills...know the purpose and sequence of activities...are well prepared for any tests or examinations in the subject...are enthusiastic about the subject and highly motivated to continue with their studies...through their attitudes and behaviour, contribute to the maintenance of a purposeful working environment.* (TTA 1998, p. 5)

In order to help primary science subject leaders in particular to understand and achieve the standards set by the TTA, Bell and Ritchie (1999, pp. 3-5) identified four key areas of concern and then described the responsibilities, roles and tasks associated with each of them. These key areas are:

* Strategic direction and development of the subject - to develop and implement subject policies, plans, targets and practices.
* Teaching and learning - to secure and sustain effective teaching of the subject, evaluate the quality of teaching and standards of pupils' achievements and set targets for improvement.
* Leading and managing staff - to provide all those with involvement in the teaching or support of the subject, the support, challenge, information and development necessary to sustain motivation and secure improvement in teaching.
* Efficient and effective deployment of staff and resources - to identify appropriate resources for the subject and ensure they are used efficiently, effectively and safely.

To fulfil these key responsibilities, roles and tasks subject leaders need management and administrative skills, attributes and professional competencies to lead and manage people to work as individuals and as a team towards a common goal (Bell 1993; Cudworth 1993; Ritchie 1998).

Development of the Advanced Skills Teacher (AST) Role

Concurrent with the developments for subject leadership, the Department of Education and Employment (DfEE) also proposed initiatives to acknowledge and harness teacher expertise to raise standards of attainment. The Advanced Skills Teacher (AST) was one such enterprise. The DfEE Standards and Effectiveness Unit (1998) articulated a number of principles for school improvement, which drew on the school improvement and school effectiveness literature and provided a context for the AST initiative. These principles recognised that further improvement in standards was dependent on improving the quality

of teaching and learning in the classroom. AST's are directly concerned with this as dissemination of good practice is seen as crucial. The DfEE clearly stated this criterion when it said:

> *Teachers meeting the AST standards are recognised and respected as the very best practitioners as well as role-models and leaders within their subject (s)/specialism. Their excellence enables them to perform effectively in any classroom in their own and others' schools, securing progress for all pupils.*
>
> *They contribute to regional/national debate in their specialist area(s) and are able to inspire others. They help others to analyse their teaching and evaluate its impact on pupil progress and achievement. They provide feedback, advice and coaching to others to help them secure improvements.* (DfEE 1999a, p. 39)

The need to acknowledge and harness teacher classroom expertise may have arisen not only from issues in the English educational system but also as a result of international moves in this direction. Little (1985) in writing on the notion of a teacher leader, in a USA context, talked of pressure to expand career leadership opportunities and rewards, saying the idea of leadership roles was attractive to teachers. She comments that:

> *There are new efforts to invest the teaching career with richer professional opportunities, rewards and obligations. Central to any improvement-oriented initiative that rests heavily on joint work on teaching are the principles and skills of advising. At stake are substantial gains in professional support for teacher development, and for the steady improvement of schools.* (p. 36)

The late 1990's also saw the introduction of an advanced skill classification into Australian schools. This heralded an official, career-based recognition of the experienced classroom teacher as an important 'pedagogical site' in schools (Shacklock, Smyth & Hatton 1996, p. 1).

In England, the original concept of the AST was based on the key principle that excellence in teaching should be recognised and rewarded: excellent teachers were to be able to gain promotion whilst staying in the classroom rather than having to assume a management role. The concept was also linked to the assumption that excellent teachers can help others to improve their teaching. It was intended to support other moves designed to raise standards, for example Subject Leaders, but was distinctive in its focus on the classroom level.

The AST's advisory role was later extended (DfEE 1999a) to include helping colleagues to improve their teaching in subjects other than their own, working in either their own or other schools. This enlarged role was a significant departure from the view that the designation of 'expert teacher' was recognition of competence in a particular subject. Other changes expanded the role further with ASTs being given a place in the strategic planning of improvement in the quality of teaching and learning at the whole school level by being expected to contribute at the Local Education Authority level (Harrison, Sutton, Wise & Wortley 2000, p. 14).

Problems associated with the introduction of Primary Subject Leader and AST Teacher

Subjects and Standards (OFSTED 1996) recommendations were vague and made no reference to resources. Primary schools have limited in-service resources and with some of the five training days mandated for specific purposes (eg. Literacy or Numeracy) it was not surprising that schools were not performing adequately (Flecknoe 2000, p. 2). The 1996 report also makes several assumptions about practice in primary schools based on case studies drawn from good practice in Key Stage 2 (OFSTED 1997). It assumes that a teacher is only a co-ordinator of one subject, and as a co-ordinator would have either post-A-level qualifications in the subject or have attended a 20 day INSET course combined with personal interest. Many primary teachers are co-ordinators in more than one subject area and may have no special expertise or interest in the area(s).

Another critical assumption of the 1996 and 1997 OFSTED Reports is that a primary co-ordinator has some non-contact time for role responsibilities, though less time than that of a secondary colleague. In actual day-to-day practice a primary subject co-ordinator may have no non-contact time. Additionally, whilst secondary subject leaders have line management status and receive some pay and time to carry out subject responsibilities, many primary subject leaders have neither line management status nor receive time or money for their co-ordinator responsibilities.

It may be that in the structure and culture of primary schools such responsibilities, as outlined above, would not be acceptable to primary headteachers. In a survey of primary headteachers (Moore 1992) it was noted that, while most wished their science co-ordinators to help colleagues, only a few wished the co-ordinator to have authoritative influence on colleagues' teaching. This made the suggestion that a primary subject leader with no authority over colleagues and no opportunity to visit other classes could somehow

take responsibility for the teaching and learning of all pupils within a specific subject somewhat problematic. Webb and Vulliamy (1995, p. 32) had earlier indicated these problems in their survey of subject leaders in 50 representative primary schools throughout the United Kingdom pointing out that 'most recent studies show the relatively limited impact that primary school subject co-ordinators can make'.

All the above elements make the standards suggested in "Subjects and Standards" (1996), difficult to achieve with Flecknoe (2000) complaining: 'They have produced standards which primary teachers in most schools cannot reach' (p. 7). The Report itself recognises some difficulties of the job:

> *The endeavours of the specialists to influence the work of other teachers rarely bring the quality of the teaching by non-specialists up to that of the specialist.*
> (Subjects and Standards 1996, p. 6)

The Primary Science Subject Leader

The Subject Leader and AST initiatives demand that the teacher has 'expert' knowledge of, and skills in, the subject concerned and transfers this knowledge and / or skills to colleagues. As related earlier, this is difficult for primary school teachers in that many may not have the confidence, expertise or the time to do this. Co-ordinators are frequently allocated or 'volunteer' for subjects in which they have little expertise. This is especially true of science. Primary teachers often lack understanding in concept knowledge and pedagogical knowledge in science. These limits in teachers' conceptual and pedagogical knowledge hamper changes in primary science. Even if a primary AST teacher has this knowledge he/she may not have all the pre-requisite skills necessary to effectively transfer his/her knowledge because their expertise is so embedded in their day-to-day work and is rarely de-contextualised, examined or articulated. As Bey (1997) suggests:

> *Highly accomplished teachers performing support functions may have to serve a broad range of colleagues at various stages of professional growth and development. They may find themselves facing difficulties and perplexities in deciding how to transfer skills that are germane to their effectiveness in the classroom to other teachers.* (p. 127)

It would seem that the belief that excellent teachers (such as AST teachers) can help others to improve their teaching, either colleagues within their own or in other schools, or to improve colleagues' teaching in subjects other than their own without new strategies for support is highly speculative.

Peer Mentoring as an Alternative to Traditional INSET

In the past in-service education provided by external agencies outside the schools, designed to address problems relating to professional competencies, people skills, management and administrative skills, etc. has proved to be inadequate. A number of nationally funded programs, a variety of INSET provisions and numerous schemes of work have been developed, implemented and/or published to try to effect change. In the education literature there is a significant body of work that outlines the limited impact of these reform efforts (Eraut 1982; Haberman 1989; Grossman 1991; Aubusson and Webb 1992; Ross and Reagan 1993; Smith, Blakeslee & Anderson 1993; Jakicic 1994; Tresman and Fox 1994).

For many teachers experiences and ideas obtained from INSET courses outside of their classrooms and schools do not appear to be powerful enough in themselves to be implemented and sustained back in their classrooms (Holly 1989), an explanation of this phenomenon being that teaching is a complex process and teachers change slowly as they are unwilling to let go of their set patterns of teaching.

Consequently change may be achieved more effectively by providing a greater emphasis on the teachers' own experience and knowledge in the context of their own classroom. Consideration of Ferry and Ross-Gordon's (1998) work in which they say: 'The key to [professional] expertise does not seem to reside in merely gaining experience, but in how the individual uses experience as a learning mechanism' (p. 99) led me to conjecture on how use of a mentoring framework might influence learners' on-going experience and hence contribute to the growth of teachers' professional expertise and their subject leader abilities.

Personal Contribution

As facilitating professional development has been a significant part of my career for a number of years I was well placed to research supporting primary teachers in developing professional expertise. This began with my appointment, in 1994 in Western Australia, as a School Development Officer for a large Educational District. This is similar to a subject advisory position in a Local Education Authority (LEA) in England. Being responsible for improving the teaching and learning in science and design and technology from reception to 6th Form, I had begun to look into ways of developing effective, career-long teacher professional growth. I continued this interest during a Government awarded Public

Endowment Fellowship, undertaken in England 1994/95. Research of the literature on professional development was followed up by practical experience in evaluating and researching in-service through working on the provision of two, year-long GEST INSET courses for experienced primary teachers in science and design and technology. To facilitate the professional development of the teachers concerned I collaborated with the Courses' director to plan and provide workshops. I then monitored and evaluated the transfer and dissemination of the coursework into classroom practice and school adoption (Buzzard and Jarvis, 1999).

In July 1997 an overarching Curriculum Framework and an Outcomes & Standards Framework were introduced to Western Australian schools. As a consultant and advisor to this government educational enterprise I was included in the development, planning and implementation of this large and far-reaching State educational innovation. At the same time I was also involved with Performance Management initiatives. These two new dimensions of my professional knowledge expanded my interest in teachers' acquisition of professional expertise and gave me the practical experience to suggest strategies for pursuing effective professional growth that could be developed through a research programme. Therefore my research, as developed in this thesis, explores a model of professional development in which a science co-ordinator can work with a colleague in a subject mentoring or peer coaching relationship to improve both teachers' teaching and learning in science. The model provides a Framework that allows experienced teachers to exchange knowledge and expertise, as at different stages and times each will act as the mentor and the mentee.

The Framework was designed to:

* optimise development of content and/or pedagogical knowledge;
* provide a structure for the development of subject leadership skills; and
* ensure teachers effectively used their time together.

Before being able to develop such a Framework it was important to explore the complexities of teachers' professional learning and growth. This is developed in detail in the next chapter where a synthesis of the literature relating to the underlying concepts about teachers' professional learning is presented.

Chapter Three -The underlying concepts about teachers' professional learning as discussed in the literature

Orientation

Teachers' professional learning and growth is a life-long, complex developmental process. The educational literature relating to individual aspects of this process such as teacher beliefs, school cultures, the process of change and environmental factors that promote or inhibit professional growth are synthesised and explored in detail in this chapter. Any peer-mentoring structure must take account of these factors.

Introduction

In the study a number of experienced primary teachers, some of whom were science co-ordinators, examined in a contextualised environment the kinds of knowledge they needed to effectively teach science. This examination was managed through a collaborative relationship between the researcher and the teachers. If experienced primary teachers are to contribute more effectively to quality educational provision then teachers and those government bodies responsible for education need to understand something of the factors that influence and / or develop professional expertise.

Conditions for Learning and Professional Growth

Part of understanding the conditions for teachers' professional learning and growth, in Vonk's (1996) view, is understanding that the process of becoming a teacher is developmental in nature. He advises looking on teachers' careers as a coherent whole, from initial education and training to retirement. Vonk suggests that throughout teachers' careers, based on their personal life experiences, a continuous and coherent set of changes takes place in their ideas about the profession and in their professional way of thinking and acting. These changes are both qualitative and quantitative in nature. He goes on to explain that this professional development is an interaction between person-related and environmental factors and defines these factors in the following way:

- Person-related factors are those factors in personal life that influence ones professional functioning; such as individual disposition, life stage, crisis, family, leisure activities and participation in non-professional organisations.
- The professional environment consists of several groups of persons with whom one is confronted while practising the profession. These are colleagues, students, school administration, school board, local authorities, and parents. Each group has its own expectations concerning the teacher's professional behaviour and each will try to influence development (Ibid p. 114).

Vonk, (pp.114-115) building on work by Fullan (1991) and McIntyre (1993), says professional learning, cannot be envisaged separately from its environmental context as it:

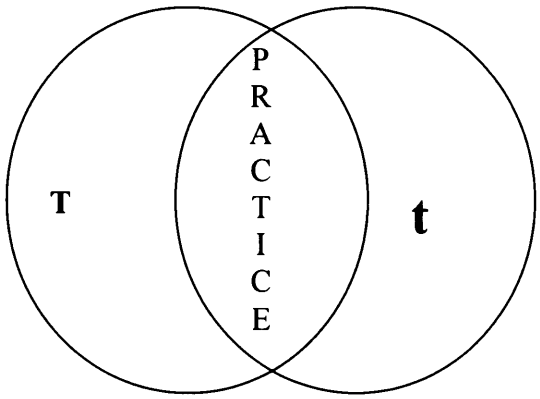
* is based on the teacher's continuous reflection (their practical and theoretical knowledge) of everyday experiences in a certain context;
* is a lifelong process because teachers are continually confronted with new situations and challenges that give them opportunities to learn; and
* must be in the context of a particular school not in isolation.

> *Professional development and school development are inextricably linked. This means that the teacher does not only depend on individuals, but also on teachers and administrators with whom they work.* (Ibid p. 114)

Maldarez and Bodoczky (1999) appear to have developed Vonk's ideas indicating that professional expertise can be constructed in various ways. They propose using an iceberg as a metaphor for the elements that influence teacher expertise. Part of Maldarez and Bodoczky's use of an iceberg metaphor relies on their interpretation of teacher expertise being conceptualised as having Theory, theory and practice as integral parts of the same skill in a continuous dynamic inter-relationship.[3] They suggest that classroom events will inform personal theories, and theories and Theory will inform classroom practice. The central link in the process is the teacher's reflection of actual classroom experience, and the consequent future planning for future action in the classroom. This relationship can be expressed as a Venn diagram as seen in Figure 3.1.

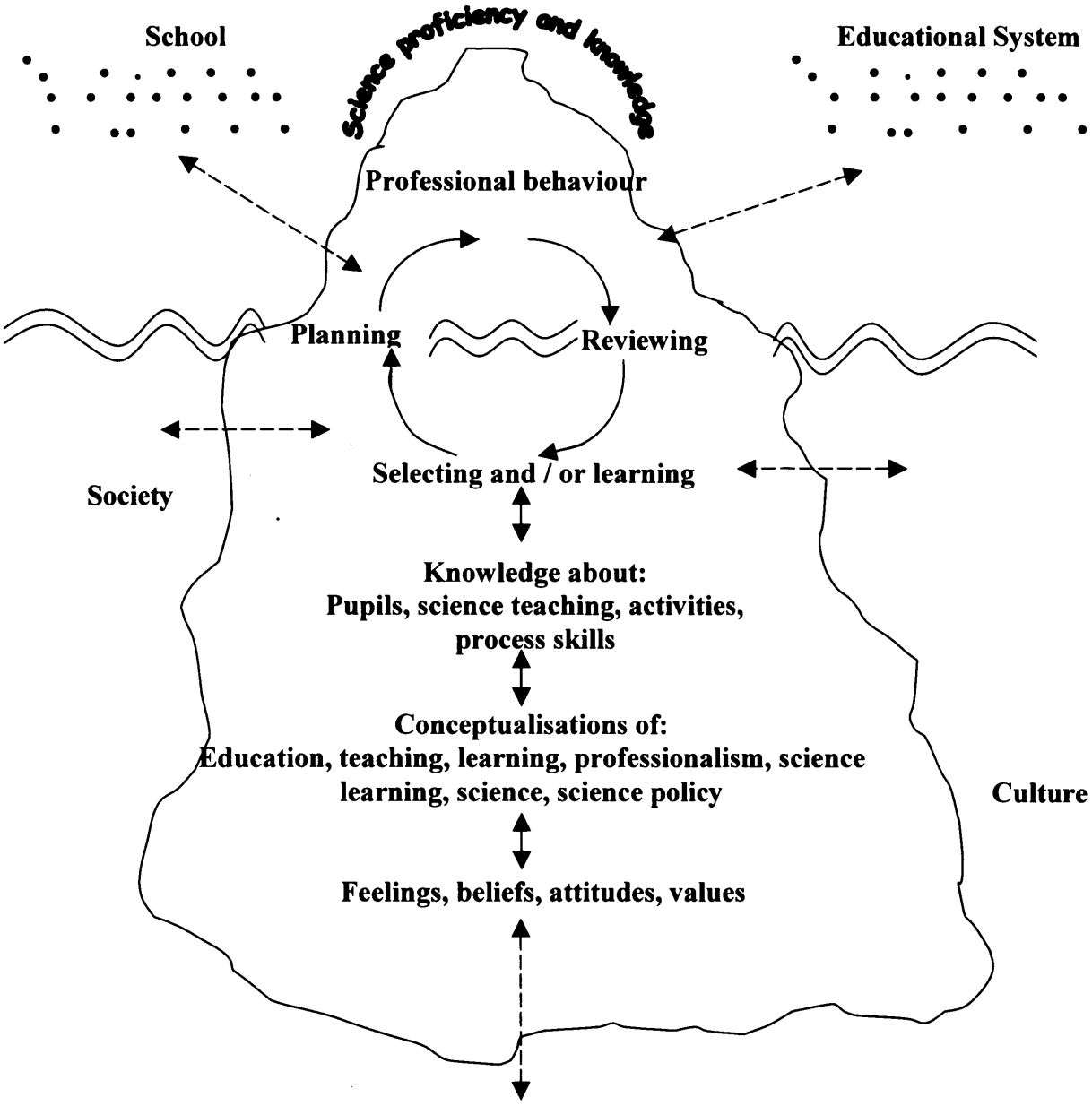
[3] Maldarez and Bodoczky interpret 'theory' with a small t and 'practice' as fundamental parts of the same skill. Capital T 'Theory' is seen as public theory, for example, theories about best practice in science teaching. In Maldarez and Bodoczky's view teachers' private theories (small t theories) incorporate those aspects of public theories (Capital T theories) that teachers find useful and it is these small t theories that are (reflected in) their practice.

Figure 3.1: Venn diagram of Maldarez and Bodoczky's description of the relationship between capital T (public) theory, small t (private) theory and a teacher's practice



In the Maldarez and Bodoczky's iceberg metaphor, illustrated in Figure 3.2 the visible tip of the iceberg is the teacher's subject knowledge and professional behaviour. These aspects of practice will be influenced by the 'air', the culture of the whole school and specifically the classroom in which the teacher works. Similarly, the mass below the surface will be influenced by the surrounding 'sea' of the culture and society in which the teacher lives. Immediately below the surface are the processes the teacher goes through before going into the classroom, those involved with decision-making, lesson planning and so on. In turn, these decisions draw on constructs of the subject, the pupils themselves and a body of knowledge that covers a range of possible courses for action for the classroom and the wider professional world. These knowledge constructs are embedded in deeper understandings about people, learning and teaching, which themselves have been influenced by even more fundamental beliefs, attitudes, feelings, and experiences. It is not a one-way process, the influences flow in both directions (Ibid pp. 14-15).

Figure 3.2: The Teacher Iceberg ***(Maldarez 1996)*** with the researcher/tutor's adaptation for teachers of science.



Interpreting teacher responses through use of the iceberg metaphor suggests that teacher responses may be set in motion by something that happens in the visible part of the iceberg. As teachers reflect on what happened in their classroom and/or school they will begin drawing from the layers below, considering possible interpretations, other choices that could have been made, and the influences from the deeper levels on what happened. This process may reveal a need to discover more: more evidence, more perspectives from others' knowledge bases, that is to learn from others' icebergs (Ibid pp. 13-14).

Maldarez and Bodoczky used their metaphor in relation to the development of language teacher trainees and language teachers but it can be applied to science teachers as seen in Figure 3.2. The iceberg metaphor is particularly helpful in this study as it illustrates a number of themes that make up the theoretical framework that underpin the perspective taken in this research.

These themes are:

- teacher belief systems;
- culture;
- change;
- professional growth and professional development; and
- leadership.

Teacher Belief Systems

In their paper Elliott and Calderhead (1995) talk of the difficulties earlier empirical writers encountered in cultivating the professional knowledge and thinking of the teacher and the complexities of teachers' work that took it beyond seeing teaching as a catalogue of competencies. In an attempt to gain a better and fuller understanding of teacher development more recent research has drawn on teachers' beliefs and mental processes (Cronin-Jones 1991; Louden 1991; Wallace and Louden 1992; Elliott and Calderhead 1995).

Past learning theories for improved teaching often focused on improved pedagogy, more expertise in subject matter, and personal growth. Louden (1991) believes that the problem in many of these theories for improvement in teaching is a misunderstanding about teachers and their work. It is an assumption that the key to improvement is some better method of teaching. He considers that it is more important to pay close attention to how the change relates to these teachers' understanding of their work.

Louden contends that a teacher participates in professional learning from the standpoint of his or her own background. As seen in the previous section this background includes the tradition in the particular school and subject within which they work, as well as personal beliefs and understandings.

> *From a practioner's perspective, teaching is a struggle to discover and maintain a settled practice, a set of routines and patterns of action which resolve the problems posed by particular subjects and groups of children. These patterns, content and resolutions to familiar classroom problems are shaped by a teacher's biography and professional experience.*

> *The meaning of these patterns of action only becomes clear when they are set in the context of a teacher's personal and professional history, a teacher's hopes and dreams for teaching, and the school in which the teacher works. A teacher's response to new problems is shaped by these historically sedimented patterns of action. Such horizons of understanding are not static, but are constantly in the process of formation. Confronted by new problems and challenges, a teacher struggles to resolve them in ways that are consistent with the understanding he/she brings to the problem and this process leads, in turn, to new horizons of understanding about teaching.* (Louden 1991, pp. x-xvii)

Several other researchers also consider that learning to teach involves changes in knowledge and beliefs and not simply changes in skill. Shulman's (1987) research with teachers in the early stages of their careers led him to conclude that teachers engage in progressive cycles of thought involving comprehension, transforming, instructing, evaluating, reflecting and forming new comprehensions of teaching. This conclusion suggests a constructivist perspective on teachers' work that intimately relates thought and action, that is growth in teaching requires interrelated changes in cognition, beliefs, attitudes and behaviours. A conclusion that also seems to be supported in Malderez and Bodoczky's (1999) iceberg metaphor.

Building on from Shulman's work Elliott and Calderhead (1995) outline a number of factors about teacher development that emerged from their study of beginning teachers. Three of these factors are briefly outlined below. First, growth in teaching is a process that occurs across a considerable period of time and needs to be fostered in ways that are unique to the profession. Such fostering needs to attend to both the affective and cognitive aspects of teaching. Second, because growth is complex and multi-dimensional in nature, learning to teach will probably occur at different rates for different people. Third, growth can be fostered or hindered by the knowledge, values and ideas that the teacher brings to teaching as well as the context in which such growth is developed. What is important to note, in relation to the present study's research of experienced teachers, is that Elliott and Calderhead consider these factors are as pertinent to experienced teachers as they are to beginning or novice teachers, as they state 'such differentiation probably continues throughout their career where teachers move to expertise in different areas at different rates ... it is personal and idiosyncratic' (Ibid p. 41).

Schecter and Parkhurst (1993, p. 772) also saw value in studies that sought to represent and elucidate the belief systems of educators 'because such beliefs and such systems have serious implications for the classroom experience and developed dispositions of students'. Schecter and Parkhursts' view is reiterated by Hashweh (1996), whose work indicated that teachers' epistemological beliefs have a great influence on the classroom curriculum. Hashweh further suggests that it is important for both the teacher and the tutor in a professional development programme to understand and acknowledge these beliefs.

Therefore it seems the challenge of facilitating change in experienced teachers' beliefs and knowledge needs to take into account their existing expectations and self belief about their ability to bring about student learning (Ross 1994). Failure to do so may lead to less than expected outcomes. This idea was suggested in Aubusson and Webb's (1992) study, in which they theorised that by ignoring the conceptions, beliefs, views and attitudes of teachers, innovations in education, new curricula and their associated teaching practices, although well founded on learning theory, pedagogy and empirical research, failed.

However, in their work with student teachers Malderez and Bodoczky (1999, pp.15-16) initially found that many were not able to draw on those sub-surface levels of their 'icebergs' in order to construct a personal understanding of teaching. This may be because of the strength of peoples' existing internalised models of 'what being a teacher is'. These models come from what Lortie (1975) called the 'apprenticeship of observation' built up from the many years of being pupils in a classroom. Because these internalised models are based only on the visible tip of the teacher's iceberg, it is often difficult for student-teachers (and I believe, experienced teachers) to understand that there is a 'mass below the surface'. Experienced teachers as well as novice teachers may therefore only focus on knowledge of their subject and classroom activities because these are the most salient elements of their practice.

Smith and Coldron (1999) offer another explanation for teachers' reluctance to 'look below the surface'. In writing about the conditions for teachers learning they talk about how learning may be impeded when conditions for participation are not met. In their view much of the pressure on teachers comes from the expectation that teachers are competent, coping and effective in their own classrooms. The need to present this image of a capable self to colleagues and pupils has been threatened or extended considerably in recent years by new demands, from changing curricula, new subject matter or teaching methods, to extended

roles such as indicated in the National Standards for Subject Leaders (TTA 1998). This greater public visibility created such anxiety that some teachers left the profession. An example of this kind of anxiety was the early retirement taken by many teachers with the introduction of the National Curriculum. Teachers spoke of the pressures they felt when their competency was lowered by having to teach new material in new ways; teachers felt like "a new novice" or they talked of having their personal image of teaching and associated beliefs called into question (Ibid p. 257). In such an educational climate, where conditions inhibit rather than enhance participation, teachers will be reluctant to take risks, to take on new learning that may bring into further question their competency and effectiveness in the classroom. They will not risk exploring the surface beneath their iceberg.

Smith and Coldron go on to propose that the quality of conditions for learning during a teacher's career relate to two crucial general features – an environment that encourages participation in professional learning and a choice of ways in which to undertake this learning (p. 258). This position supports a view of teaching as being dependent upon individual and collective professional judgement that is, it is dependent on the culture of the school.

School Cultures

Most teacher learning takes place on the basis of reflection on personal experiences in teachers' own classrooms. As growth occurs the need to learn in a whole school context is important. Calderhead and Gates (1994) talk of an appropriately supportive school environment being necessary to foster cognitive and affective orientations to teaching when they say:

> *Just as a supportive environment is an important pre-requisite for reflection among teachers so is a total school environment, including leadership from the head, an acceptance of professional debate and challenge as well as encouragement among the staff. These may be essential characteristics of a school if a teacher is to develop those essential orientations to practice.* (p. 40)

Grimmett and Crehan (1992, p. 60) favour the idea of culture being important because it represents the values which bind people together commenting that 'the culture of the school is an important and influential determinant of how teaching and learning take place'. Jennifer Nias (1989) also promotes the importance of school culture, contending that strong cultures are rooted in shared 'vision' or 'mission' which is itself the manifestation of jointly held and deeply internalised beliefs and values (pp. 143-146).

Teachers derive influence from their colleagues and respect from administrators, parents and pupils from work conditions, a culture, which fosters collegiality. Little's (1987) studies illustrate the benefits teachers draw from colleagues when they work closely in professional relationships. Teachers develop instructional range, depth, and flexibility. The three collaborative group-work structures enable and encourage teachers to attempt curricula innovations that they may not have tried as individuals. In her view it is not merely the teamwork that creates the willingness to try new things, it is the joint action that flows from the group's purposes and obligations as they shape the shared task and its outcomes. In promoting collegial action she states 'that the more public an enterprise teaching becomes, the more it both requires and supports collective scrutiny' (p. 496).

A collective scrutiny breeds influence and respect among teachers. Grimmett and Crehan, (1992, p. 56) refer to Meyer, Cohen, Brunetti, Molnar & Lueders-Salmon's (1971) work as an illustration of this point. In the Meyer et al study schools where teachers who were both routinely visible to one another and routinely and intensively involved in teams showed high levels of reciprocal influence. Grimmett and Crehan themselves feel that school cultures that give professional recognition, promote or reward professional involvement and professional influence keep teachers career-oriented and help them establish a high sense of efficacy. A similar idea on the benefit of collective scrutiny is expressed by Elliot and Calderhead (1995) where they press for schools to be 'learning communities' in which learning occurs at various levels:

> *In such a community open debate amongst all professionals would have to characterize the school environment [culture]. Teachers will need to interact with each another, challenging each other and supporting each other in order to sustain that challenge.* (p. 53)

Sergiovanni (1984) conveyed the same notion when he said 'the more understood, accepted, and cohesive the culture of the school, the better able it [the school] is to move in concert toward ideals it holds and objectives it wishes to pursue' (p. 9).

In spite of this advocacy for the effectiveness of a collaborative and co-operative school culture, much of the promise of collegial practices has not been achieved in many of today's schools due to the strength of the traditional school culture. Little (1982) talks of this phenomenon in the following way:

> *The conditions of individualism, presentism, and conservatism persist. Patterns of interaction that support mutual assistance or routine sharing seem less likely to force teachers' collective confrontation with the school's fundamental purposes or with the implications of the pattern of practices that have accumulated over time.* (p. 326)

Studies undertaken by Fullan and Hargreaves (1992) substantiate Little's line of reasoning as they comment 'that school cultures, with only a few exceptions, continue to allow individualism at the expense of teacher growth. Collaborative work cultures that actively promote continual teacher development are in a minority' (p. 6).

Why might this be so? Fullan and Connelly (1987) and Grimmett and Crehan (1992) argue that the last decade has witnessed a significant trend in most western societies towards a centralization of bureaucratic control with a tightening of administrative surveillance over both curriculum content and pedagogical process in the school systems. Hargreaves (1989a) suggests that these developments are driven by powerful social forces amounting to fundamental crises of legitimation, belief, motivation, and purpose. Hargreaves and Dawe (1990) put forward the idea that in these circumstances:

> *Teachers may therefore engage in a contrived form of collegiality which may be little more than a quick, slick administrative surrogate for a more genuinely collaborative teacher cultures.* (p. 235)

In other words, attempts at initiating collaboration have produced the artefacts without nurturing the underlying beliefs, values and norms that make up the sustaining culture. Grafting collegial practices on to existing school cultures results in the processes of collaboration appearing to be contrived and their effects subverted. An illustration of this may be found in a study carried out by Nias, Southworth and Yeomans (1989) of five primary schools where there was a disparity between the professed culture of the staff (one of collaboration and co-operation), and educational practice in the schools.

Nias et al's conclusion was that the 'culture of collaboration' alleged by the teachers in the five study schools was educational in outcome rather than intent and so had an indirect rather than a direct effect upon the individual teacher's curricula aims and teaching methods. In this sense it was a culture of the staff room rather than the classroom. In a later article, Nias (1989) draws on these findings suggesting that it is necessary to examine the cultures of many schools before we can talk of 'the culture of the school', asking in respect of the participants in each:

> *What beliefs do they hold, about what? and What is the logical and empirical connection between these beliefs and individuals' practice in classrooms and schools?*
> (Ibid p. 144)

Another possible element to consider in an examination of the apparent 'failure' to establish collaborative school cultures may be the cellular organisation of schools themselves. Grimmett and Crehan (1992) feel that school structures tend to make teachers value the importance of proving themselves without help from others:

> *Teachers' success in standing on their own two feet is essential to class-room teaching effectiveness but it is the belief that this must be achieved alone and the value placed thereon that fosters norms of self-sufficiency and individualism.* (p. 62)

When teachers act in self-sufficient and individualistic ways, they are less likely to engage in the powerful collegial discourse that accompanies educational change. The cellular organisation of schools also shapes the ways in which teachers relate to one another professionally. Teachers generally believe that they should not intrude into one another's classrooms. Grimmett and Crehan believe the word 'intrude' is important as it suggests a lack of willingness or readiness on the part of the teacher being observed to have another professional in the classroom.

> *Control over one's workplace is essential to any professional endeavour but the value accompanying this belief frequently confounds teachers' needs for professional autonomy with their idiosyncratic wish for privacy This preference for privacy over responsible autonomy breeds norms of reticence and isolationism. When teachers are reticent to provide feedback to one another and prefer to act as 'gatekeepers' to their isolated 'kingdoms' rather than as professional colleagues, the prospects for positive educational change are reduced.* (Ibid p. 62)

Consequently, teacher autonomy is not regarded as 'something to be exercised in a context of rich professional dialogue with a plethora of challenging educational alternatives' (Goodlad 1984, p. 186). Rather, it is seen as a surrogate for teacher seclusion and secrecy.

Indeed it was found that a lack of ease, or some reticence, when teachers were asked to work together was a feature of the Pair Peer-Mentoring Project. The schools in this study's project were not characterized by a collaborative, cooperative school culture. The teacher pairs did not find it easy to change the way/s they interacted with one another and with other colleagues in the school. Each of the teachers had to expose their practice to a colleague and then perhaps change the way they thought or approached their teaching. This was a difficult barrier to overcome for the teachers, a change that they had perhaps not thought that they would have to undertake.

Change

Societies throughout the world are constantly changing and developing. Therefore education can also be expected to change. As *The Organization for Economic Co-operation and Development* (1989, p. 110 cited in Sikes 1992, p. 36) states, 'the contemporary educational and political language is one of change, reform, and improvement. Scarcely has one set of reforms been formulated, let alone properly implemented, and another is in genesis'.

Such being the case, experienced teachers should expect to operate in an ever-changing environment. Sikes (1992) suggests that the problem for teachers therefore, is not change per se but the number of imposed changes and the frequency of such demands. In talking of this dilemma she says:

> *There is nothing new about educational change. What is new is the rate and frequency with which changes are being introduced and imposed through governmental legislation; the way in which these changes reflect a worldwide trend towards centralized control of education; the extent to which they challenge the prevailing ethos and assumptions about how education should be delivered; and the degree to which they directly affect, or at least have implications for, the careers of all teachers and head.* (p. 36)

The extent and rate of change in education is not a fresh dilemma. Hopkins and Bollington (1989) had previously written on the number of change innovations that were simultaneously occurring in schools pointing out that these innovations were of two kinds – one being new areas of learning within the curriculum, such as information and communication technology (ICT), the other changes to existing practices, an example being The National Curriculum.

Whatever the 'changes', the 'reforms' or the 'improvements', they primarily impact on the classroom teacher. Teachers have to implement them, even though in recent educational times they are unlikely to have had significant involvement in their formulation. Teachers have been required to change themselves and what they do to meet specifications laid down by policy makers who neither know them or the contexts in which they work (Sikes pp. 37-40). Anecdotal evidence seems to indicate they may even have been required to make changes that they believe, on the basis of their professional experience, to be inappropriate or impossible. Examples for some teachers would be the National Literacy and Numeracy Hours, (B.J. Buzzard, personal communication, 1999, 2000). The implementation of these imposed changes has meant that teachers' professional freedom and autonomy is further curtailed (Sikes, p. 37).

There is an assumption in all these changes (Louden 1991; Sikes 1992; Smith and Coldron 1999) that all is not well in education and that teachers are lacking in knowledge, skills and competencies with students not getting the best possible education. The changes are to remedy the 'deficiencies' and the changes are compensatory to help teachers 'develop' and 'improve'. Teachers are therefore continually required variously to alter their administrative and organizational systems, their pedagogy, the curriculum content, the resources and technology they use, and their assessment procedures. In so doing, they are in effect acknowledging their 'inadequacies'. While teachers may see these innovations as criticism of their practices, Sikes (pp. 38-40) feels that imposed change fails to take into account that teachers are people and that schools are social institutions and have therefore failed. Hopkins and Bollington (1989), further this premise with their view that innovations in the past have not done well because planners and practioners gave inadequate attention to integrating them into existing educational practice.

The actual processes of effective implementation, adoption and institutionalisation of new programmes or products was ignored. This failure on the part of planners and practioners to effectively put into practice an innovation was because of a lack of coherent, practical information about the process of educational change (Ibid p. 163).

Fullan (1982, pp. 24-26), though writing earlier, provides a possible way forward by suggesting that the crux of change is how individuals come to terms with the reality of the change in the context of their familiar framework of reality. In other words, their interpretation of what the change means for them influences what they subsequently do and how they do it. In discussing the process of change he stressed the need to remember that any change or development at an individual level involves learning and that learning is often difficult and uncomfortable.

In Fullan's (1985) opinion the learning an individual involved in innovation and change needs to undertake and understand is:

* that change takes place over time;
* that the initial stages of any significant change always involve anxiety and uncertainty;
* that on-going technical and psychological support/assistance is crucial if the anxiety is to be coped with;
* that change involves learning new skills through practice and feedback - it is incremental and developmental;
* that the most fundamental breakthrough occurs when people can cognitively understand the underlying conception and rationale with respect to 'why this new way works better';
* that organizational conditions within the school (peer norms, administrative leadership), and in relation to the school (eg. external administrative support and technical help) make it more or less likely that the process will succeed; and
* successful change involves pressure, but it is pressure through interaction with peers and other technical and administrative leaders (Ibid pp. 391-421).

Hord (1987) seemingly reinforces Fullan's ideas in her proposal that successful implementation of an innovation takes time and that failure to allow sufficient time for implementation and institutionalisation of innovations has been a major contributor to problems and mistakes of the past. In her words there has been 'a lack of an adequate long-term perspective' (p. 164). She reasons that change is a process, that change happens over time, and usually a considerable period of time with different individuals responding to change in different ways needing to adjust at their own pace.

Consequently there seems to be need for recognition of the fact that change is a gradual, on-growing process requiring considerable amounts of both time and appropriately focused energy for its successful and lasting implementation.

Cavendish (1994) and Buzzard and Jarvis' (1999) work supports that of Hord and Fullan as their findings indicated that change in the extent of teachers' knowledge, skills and attitudes was often a long process and the effects of such changes might not be evident for some time. As Hord writes 'Time is an enabling factor that creates the possibility of effecting change. To say that change takes time is to say that it takes support and a great deal of energy' (p. 164).

Hord (1987) and Hord, Rutherford, Huling-Austin & Hall (1987) promote the importance of understanding these concepts of change when implementing a new innovation and recommend use of the Concerns-Based Adoption Model (CBAM). The CBAM Model (Hall, Wallace & Dossett 1973) is a set of interlocking, complementary techniques or procedures for evaluating change. A fuller description of the CBAM model of change is given in Chapter 7 as this model was used to describe changes in practice of teachers in the Pair Peer-Mentoring Project. The choice of this model for monitoring the teachers' change was in part to try to ensure what Hord (1987) calls 'the respectful, balanced and sensitive interaction of all interested persons' (p.173). Hord comments that lacking this key determinant for effective action, almost any approach will be bound to encounter major problems; having it, almost any approach will have a reasonable chance for success. She also cautions that no theoretical programme for change or identified succession of stages can by itself represent accurately and thoroughly the actual appearances of all real change efforts in practice (Ibid p. 83).

Following these arguments it seems that if effective change and development is to occur, as was hoped for in this study of the pair peer-mentoring process, the implications for individual change needed to have been understood and incorporated into the planning process at the University, the school, and the individual teacher level. The necessity for this level of understanding was possibly not understood by the teachers, headteachers or myself, the researcher/tutor, in the initial development of the Pair Peer-Mentoring Project.

The nature of the change process

In looking at the change process such factors as the commitment of those in positions of leadership, the availability of resources, the climate in the school and the Local Education Authority (LEA), and the opportunity for those involved to develop an understanding of the innovation and a sense of ownership are important. It is also important in whatever way it is decided to implement change that there is maximum clarity. Teachers and others involved in the change effort need to know, as precisely as possible, what is expected of them (Fullan 1993; Hord 1987; Buzzard and Jarvis 1999).

In 1985, Fullan suggested that there was not a lot in the literature about actual strategies for preparation and climate setting for change though change literature is unanimous on the importance of these factors. Louden's (1991) study presents an approach to this limited repertoire of preparation for change strategies. Louden recommends developing a number of different tactics. The first is a new approach to the problem of understanding teaching, the second is an analysis of the role of reflection in changes in teacher's knowledge and action, and the third is an appreciation of the place of continuity and tradition in understanding teachers' work.

A closer examination of Louden's third point, the concept of continuity and tradition, seems to indicate Louden is coming from a similar place to that of Fullan (1993) and Hord (1987) in that he advocates educational reform being best approached by exploring change from the teacher's perspective. In his view, as individual teachers respond and adjust to change in different ways and at their own pace an apparent unwillingness to change should not just be seen as resistance. Teachers' common-sense understanding/insight is often deeper than many theorists'. Therefore, instead of seeing teacher resistance as a factor in the failure of education reform more attention should be paid to the forces of continuity in teachers' work. Teachers' common-sense understanding, their repertoire of safe and familiar practices, is what allows them to overcome the most common problems they face. More than this, their practice is deeply connected to their biography and their hopes and dreams for teaching. When expanding what he means by the concept of continuity and tradition Louden looks at the relationships between teachers' horizons of understanding and their reflection, saying 'teachers can and do want to change, but the possibilities for change are shaped by their horizons of understanding and by the traditions of teaching within which they work' (Ibid pp. 120-127).

In the case study put forward in his book, to further explain his ideas Louden talks of a teacher who is asked to introduce two new syllabi and manages successfully with the English syllabus but is less successful with the Science syllabus. Louden theorizes that in order for the teacher to effectively teach the Science program it required more than mastering new content, as did the English program; the Science program required a significant change in the teacher's current horizons of understanding about teaching. To teach the Science syllabus as intended, the teacher had to put aside familiar patterns of teaching built up over years, disturb her careful balance between educational goals and problems of classroom management, and add new lessons and strategies to her repertoire. The horizons of understanding that inhibited the teacher's ability to teach Science according to the syllabus were not just personal and idiosyncratic because the teacher's understanding of teaching was constructed within larger frames of reference.

Louden's theorising seems to be validated by empirical evidence (see chapter 2, p. 15) as it appears that while teachers are comfortable in what they know and do they are unlikely to change. Lange and Burroughs-Lange (1994) found in their case studies that teachers are only motivated, affectively and cognitively, to refine their professional knowledge and practice when they are in a state of professional uncertainty. Therefore, it would seem important to identify a strategy or strategies that promote teachers' desire to change.

Hoyle (1975) and Evans (1998) suggest that more is required than just a desire to change. In their writings, the level and extent to which teachers might be prepared to change is related to their professionality. Professionality as described by Hoyle refers to the knowledge, skills and procedures which teachers use in their work, whereas professionalism refers to status-related elements of an occupation. 'Professionality' is a term introduced by Hoyle who illustrates the range of professionality typically manifested by teachers by describing two extremes: 'restricted' and 'extended' professionality. 'Restricted' professionality is described as essentially reliant upon experience and intuition and guided by a narrow, classroom based perspective which values that which is related to the day-to-day practicalities of teaching. 'Extended' professionality, at the other end of the continuum, carries a much wider vision of what education involves, values the theory underpinning pedagogy and generally adopts a much more reasoned and analytical approach to the job (Hoyle, pp. 314-320).

Linda Evans (1998) in developing her work from that of Hoyle defines professionality as:

> *An ideologically, attitudinally, intellectually and epistemologically-based stance, on the part of an individual, in relation to the practice of the profession to which s/he belongs, and which influences her / his professional practice.* (p. 39)

Evans points out the importance of emphasising that professionality is represented by graduations with 'extended' and 'restricted' professionalities representing the two extremes. The two extremes are defined by exceptional atypicality. Professionality orientation reflects teachers' values, beliefs, ideologies and sometimes their intellectuality, it determines what is their 'ideal' in relation to their work, which in turn influences their work-related goals, expectations and their willingness to change. In her assessment where there is congruence between a teacher's professionality orientation and the professionality orientation of those of his / her colleagues who influence the school's professional climate and ways of working, he / she is more likely to change, to experience job satisfaction and to have high morale (p. 40). What then is needed to encourage the professionality of teachers toward the upper end of the continuum? How can teachers be encouraged to have an 'extended professionality' orientation?

Professional growth and professional development

In 1987 Shulman was saying:

> *Richly developed portrayals of expertise in teaching are rare. Though many characterizations of teaching exist, most of these dwell on the teacher's management of the classroom. There are few descriptions or analyses of teachers that give careful attention not only to the management of students in classrooms, but also to the management of ideas within classroom discourse. Both kinds of emphasis are needed for a portrayal of good practice.* (p.1)

Hopkins and Bollington (1989) intimate that this is because early stage, teacher effectiveness research was concerned with a definition of competence based only on observable workplace skills - identifying the characteristics of successful teachers and finding a 'perfect-method' of teaching. Hopkins and Bollington describe this as 'a form of process-product, where relationships between the teaching process and certain outcomes or products (often gains in student test scores) were looked for' (p. 170).

Whitty and Willmott (1995, pp. 212-216) question the value of this kind of definition and ask whether it is worthwhile 'to judge the value of a learning experience largely in terms of the ability to demonstrate competence or whether competence should have a broader definition?' They indicate that there are differing views about whether a competence is something that is either a specific achievement or, alternatively, a dimension of performance in terms of which one can perform at different levels. In their view a definition of competence should go beyond skills and include knowledge, values and attitudes. Assessment of the attainment of competences would then require inferences to be made on the basis of a range of evidence: with under-pinning knowledge and under-standing assessed separately from performance.

An alternate way to look at effectiveness, in Hopkins and Bollington's judgment, is that teachers themselves devise a list of teaching skills, that is, 'a practioner's view of effective teaching' (p. 171). Such a list would be based on the views and experiences of veteran teachers and could provide a useful framework for other teachers involved in developing and / or improving their practice. Hopkins and Bollington (p. 172) also talk of the open-ended approaches to self-review proposed by Stenhouse (1975) with his concept of the 'teacher researcher' and by Schon (1983) with his notion of the 'reflective practioner' but comment 'these ideas although potentially very powerful, espouse not so much the use of a specific technique but more a way of life'.

Though this type of research is a useful source of ideas it provides a limited understanding of teacher effectiveness. Shulman (1987) in reviewing the public reform movement in the USA, which urged the professionalism of teaching, refuted the claim that teaching deserves professional status because it was based on the premise/belief that a 'knowledge base for teaching' exists - a codifiable aggregation of knowledge, skill, understanding and technology, of ethics and disposition, of collective responsibility - as well as a means for representing and communicating it. Shulman disputed the premise of 'a knowledge base' maintaining that 'the rhetoric regarding the knowledge base does not specify the character of such knowledge. It does not say exactly what it is that teachers should know, do, or understand' (p. 4). Even the concept that teaching requires basic skills, content knowledge, and general pedagogical skills was, in Shulman's interpretation, a trivialization of teaching as its complexities were ignored and its demands diminished (pp. 5-6).

Shulman's own ideas of the sources and outlines of a required knowledge base for teaching ask for a framework for a knowledge base for teaching, sources of that knowledge base, and the domains of scholarship and experience from which teachers may draw their understanding; plus an exploration of the processes of pedagogical reasoning and action within such teacher knowledge is used. His core conception of teaching is that teaching necessarily begins with a teacher's understanding of what is to be learned and how it is to be taught. In addition, there are categories of that knowledge that underlie the teacher insight needed to promote comprehension among students. Shulman's categories of a knowledge base are:

* content knowledge;
* general pedagogical knowledge - broad principles and strategies of classroom management and organisation that transcends subject matter;
* curriculum knowledge - grasp of the materials and programmes that serve as 'tools of the trade' for teachers;
* pedagogical content knowledge -amalgam of content and pedagogy, their own special form of professional understanding;
* knowledge of learners and their characteristics;
* knowledge of educational contexts - ranging from the classroom, the financing and governance of school districts, to the character of the community and its culture; and
* knowledge of educational ends, purposes and values, and their philosophical and historical grounds (p. 6).

In looking at Shulman's writings in relation to this study, his explanations of the categories of 'pedagogical content knowledge' and 'content knowledge' are particularly pertinent. He classifies pedagogical knowledge as the distinctive bodies of knowledge for teaching. Pedagogical content knowledge represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organised, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction. His second category, knowledge of content, is also important because the teacher must have the knowledge, understanding and skills, to be learnt by the students, and be able to comprehend what the important ideas and skills are in the domain and how new ideas are added and deficient ones dropped by those who produce knowledge in this area (Ibid p. 8).

Shulman's ideas on pedagogical content knowledge added a new and critical dimension to teacher professional development - to what the expert teacher 'should know, do, or understand'. The value of his thinking was acknowledged in Venville, Wallace & Louden's (1998) work as they felt Shulman's ideas were of particular importance in the area of primary science. Their study underscored the importance of teachers knowing how to teach particular content knowledge, the conceptions students are likely to hold about science concepts, what students of a certain age are developmentally able to learn, and what examples and representations help them learn it.

This partial outline of Shulman's explanations of content knowledge and pedagogical knowledge and Venville et al's findings implies that the teacher should not only have depth of understanding with respect to the particular subject being taught but the manner in which that understanding is communicated to students is equally important. However, some teachers still have difficulty in articulating what they know, how they act, and how they might translate this knowledge to their students as was seen in the project described in this thesis. Many of the teachers in the pair peer-mentoring study had some weaknesses in their content knowledge and this had an impact on their pedagogical content knowledge and their teaching practices. Being involved in the Project was a way forward in their professional learning.

It was hoped that the Pair Peer-Mentoring Project would offer the teachers opportunities for self-assessment with reference to personal standards of performance. Peer review also had the potential for developing a climate of professional development within a school. Collaborative appraisal can encourage teachers to establish and work together in a supportive and critical community. Louckes-Horsley, Hewson, Love & Styles (1987) suggest there are a number of ways to achieve this, for example teacher as researcher, clinical supervision, and peer mentoring.

Need for support in change of practices

Lortie, (1975) in his *"School Teacher: A Sociological Study"* comments that novice teachers who want to achieve professional autonomy and status equality with their colleagues don't seek help from their colleagues except indirectly by swapping stories about personal experiences. For newly qualified teachers this strategy hides weaknesses but it doesn't enable them to gain help with factors such as lack of expertise or ambiguity about goal attainment that produces much of the teacher stress related to performing professional tasks. It may be that experienced teachers wanting to maintain their status quo also do not seek help from their colleagues for the same reasons (see Goodlad; Little; Fullan and Hargreaves and Grimmett & Crehan discussed earlier in this chapter). Working with colleagues does help teachers to shape their perspectives on their daily work (Little 1987; Elliot and Calderhead 1995). It also enables them to reduce what Lortie (1975) referred to as 'the endemic uncertainties of teaching', which typically deny teachers a sense of success (p. 134).

In 1980, Joyce and Showers' seminal work proposed that effective professional development had four hierarchically linked components: theory, demonstration, practice and feedback. Further work by Showers, Joyce and Bennett (1987, pp. 85-86) went on to suggest that nearly all teachers need social support and 'follow-up' provided by expert or a peer coach during the transfer process to enable them to sustain their new practice. Buzzard and Jarvis (1999) also found in their study with experienced primary teachers of science and design and technology that sustained practice in the classroom was necessary for transfer.

Joyce and Showers' studies in the '80's showed the way in which teachers' learning is managed provides a potent model in the school for the way in which teachers manage student learning. Their work in analysing the effectiveness of staff development in education established a clear correlation between access to the full portfolio of learning activities and the extent to which principle is actually translated into habitual practice.

However, Kinder and Harland (1991) and Bradley, Conner & Southworth (1994) while acknowledging the model advanced by Joyce and Showers, suggest that it omits factors that can be highly influential on teachers' subsequent classroom practices. They advocated a training design which is learner-centred, focused on a relevant school need and embedded in a widely embracing strategy for development, which should also include researching and learning from the teacher's everyday experience, together with shared planning and teaching which challenges perceptions Baird, Fensham, Gunstone & White (1991 p. 165) expand on this further, suggesting that there is a need to study processes and outcomes of teaching and learning together. This follows from their viewpoint that teacher change precedes student change and that metacognition is linked with the construction of meaning and with conceptual change.

In the *"Project for Enhancing Effective Learning"* (Baird and Mitchell, 1986) teachers and students considered ways by which students could assume more responsibility for and control over their learning. The study showed that changes in the metacognition of students could occur only after changes in teachers' attitudes, perceptions, conceptions, and abilities; that is, development of teachers' metacognition must precede that of their students (p. 165). Another insight from this project, supporting Showers and Joyce's, Kinder and Harland's and Bradley, Conner & Southworth findings, was that a method of collaborative action research is effective in promoting teachers' intellectual development (Baird, Mitchell & Northfield 1987).

These studies are reinforced by Smyth's (1989) belief that training which is externally managed and has agendas which do not grow out of the individual's job and is not supported in the workplace, will not work (p. 226). While Margerison's (1991) definition is that development occurs in doing the actual job supported by reflection, feedback and coaching. Pink (1990) however, provides an alternate perspective. Pink states that though large-scale studies for example, Joyce and Showers (1995) and Showers and Joyce (1996) show that teacher development is closely related to successful change it is important to remember that these were large-scale studies that required great sophistication, effort, skill and persistence to achieve success.

The reality, in Pink's opinion, is that in most smaller scale projects there are a number of barriers to innovation-effectiveness (p. 45). In writing about some of these barriers Hargreaves (1991, p. 4) suggests that educational studies need to know more about an innovation's effect on teachers themselves:

> *Nor do we know enough about the relationship of these innovation experiences to the teacher's sense of purpose, the teacher as a person, or the contexts and conditions under which they work.*

Fullan and Hargreaves (1992) in a later work intimate that some types of Pink's 'typical barriers' will eventually always have a negative impact on even apparently successful innovations. This is because the innovation-focused approach is too narrow and too weak an intervention to alter basic institutional conditions that need to be altered for teacher development to flourish. They go on to conclude that the innovation focused paradigm is useful but fundamentally limited for understanding teacher development (pp. 1-9).

In their writings Fullan and Hargreaves (1992) advocate a more comprehensive framework which takes into account four main elements: the teacher's *purpose*, the teacher as a *person,* the real world *context* in which teachers work, and the *culture* of teaching, that is the working relationship that teachers have with their colleagues inside and outside the school. This means enabling teachers to develop, voice, and act on their sense of purpose.

> *Teacher development must actively listen to and sponsor the teachers' voice; establish opportunities for teachers to confront assumptions and beliefs underlying their practices;... and create a community of teachers who discuss and develop their purposes together, over time.* (p. 5)

In explaining their ideas, Fullan and Hargreaves draw attention to the fact that in many approaches to staff development the teacher as a person is ignored. Teachers are treated as if they are all the same (or should be the same), or teachers are stereotyped as innovators, resisters and so on. They advise that the teacher as a person should not be ignored as all the factors that make up a total person, affect that person's interest in and response to innovation and their motivation to seek improvement. For instance, research by Krupp (1989) and Huberman (1992) as well as the ideas of Louden (1991) and Vonk (1996) detailed earlier in this chapter, have shown that stage of career, age and gender all have implications for teacher development. A further area of neglect, in Fullan and Hargreaves judgment, is that most teacher development programmes fail to value and / or involve the experienced teacher, and they fail to appreciate the nature of the varying life circumstances of different teachers as these relate to the teacher as a person.

Expanding on what they mean by 'the real world *context* in which teachers work, and the *culture* of teaching', Fullan and Hargreaves talk about the necessity to take into account the context in which a person works - primary compared with secondary schools, inner city as opposed to suburban and rural communities. They comment that many attempts to improve instruction take little account of the social contexts in which teaching and learning take place. The price of ignoring the context of teaching is failed idealism, guilt and frustration at not being able to meet the standards and criticism of teachers who fail to make the changes (pp.5-6).

Fullan and Hargreaves' conclusion is that teacher development must be conceptualised much more thoroughly than it has been. Its relationship to educational change is not just a matter of better implementation of selected innovations (although it includes this) but more basically a change in the profession of teaching, and in the institutions in which teachers are trained and in which they work. This message of the need to understand teacher development more thoroughly has begun to be tackled in more recent research. The Hay and McBer Report (2000) for the DfEE was instigated as a way of taking forward proposals put forward in "Teachers Meeting the Challenges of Change" (DfEE 1998). The Hay/McBer Report describes the characteristics of an effective teacher in the different phases of her / his career and in so doing takes into consideration the developmental changes that teachers experience.

Reflective Practice

Changes in teachers' knowledge bases take place through reflection. That reflection has to deal with their knowledge (subject knowledge and pedagogical content knowledge), methodology (knowledge and skills), as well as their beliefs about 'good practice' (Vonk 1996: Malderez and Bodoczky 1999). Individuals refine their intellectual alertness through discovery, experimentation and innovation. To develop a flexible repertoire of actions for 'effective' teaching a teacher has to reflect on both the experiences of success and of failure. This will lead to a process of problematizing - translating "why" into a problem to be solved and problem solving. That is Schon's (1983, 1987) reflection-in and reflection-on practice. Processing experiences in this way enables teachers to develop flexible repertoires of actions that result in a rich professional knowledge base and pupils' meaningful learning.

In 1984 Kolb had put forward an alternate explanation to that of Schon for articulating or understanding teachers' reflective practices with his concept of a Learning Cycle. In Kolb's model the adult learner moves around stages in a cycle, from concrete experience, to reflection and analysis of the experience, onto identifying conceptual frameworks which inform the experience, and then through application of these learning experiences by active experimentation. From this active experimentation new learning is integrated from which knowledge, skills and attitudes consolidate, develop and are refined over time. Kolb warned that failure to complete the cycle lead to partial, or total loss, of learning opportunities.

Later researchers do not appear to have explored the idea of a Learning Cycle further. Rather the debate seems to have moved forward through extension of Schon's ideas on teachers' reflective practices. One such suggestion is that of Zeichner (1983, 1987) who promoted the concept of three levels of reflection. At the first level teachers begin by reflecting on the effectiveness of their teaching on a technical level; they then move on to the second level where they consider how the contexts in which they are teaching (institutional, social, cultural etc.) influence their teaching and learning; and finally they move onto a third level of reflection that introduces moral and ethical issues. This last (third) level encourages teachers to critically enquire, question and consider pedagogic alternatives within an ethical framework (1987, pp. 565-575).

Whitty (1995, p. 203) uses the work of Hextall, Lawn, Menter, Sidgewick & Walker (1991) to clarify reflective practices further by contributing the following two examples as definitions of the quality of reflectivity and to talk of these qualities as a series of competencies that can be monitored.

- A reflective practioner can articulate and defend his/her own purpose as a teacher and relate this to other professional opinion.
- A reflective teacher treats teaching as an experimental process, recognizing the necessity of turning reflection into action, choosing between alternatives, and critically evaluating the process.

While Hyatt and Beigy (1999) suggest that such reflection can give teachers the opportunity to discuss and learn from their similarity and difference in practice, context and philosophical approach (p. 32).

Whitty, in further discussion of the sorts of competencies described by Hextall et al (1991), talks of them as examples of learning to be capable, or the 'core' skills of professional education (p. 204). Establishing reflection as a habit means learning the skills of reviewing which include noticing, interpreting and evaluating, as well as developing the subsequent skills of planning and selecting. All these skills depend on consciously linking interpretations of classroom events with personally constructed theories (see Eraut 1982, Shulman 1987; Louden, 1991; Malderez and Bodoczky 1999).

Eraut (1982) had written earlier of teachers' private and personally constructed theories - their own personal explanations and conceptual systems for making sense of experience. Eraut makes a distinction between teachers' private theories and public theories. Public theories are systematically developed and publicly known conceptual schemes for interpreting phenomena (p. 9). In Eraut's view (also proposed by Malderez and Bodoczky) teachers' private theories incorporate those aspects of public theories that they find useful to their lives and teaching.

> *As teachers act on their world, and are reciprocally acted upon by it, their perceptions change and with these changes comes a restructuring of their assumptions, explanations, and theories. These are the mental images that influence teachers' behaviour.* (p. 7)

Other writers such as Calderhead (1988) and Louden (1991) also talk about teachers functioning from their own evolving personal, professional, theoretical bases. Calderhead and Louden both contend that teachers act on constantly changing schemata - structures of thought that are modified by and through their actions, and reflections about those actions.

It would seem then, from the empirical research briefly outlined above, that the aim of a reflective approach to teaching is for the teacher to foster a notion of critical reflection, reflection which includes analysing one's own professional knowledge and repertoire, putting it in a wider context and relating it to existing knowledge and research.

Need for support in Reflective Practice

Studies on teacher professional development have shown that teachers who have been left to fend for themselves in their first years of teaching tend to develop a strongly 'survival-oriented' repertoire of actions, sometimes called a 'survival-kit'. This results from a trial-and-error approach, influenced by immediate circumstantial pressure and is most often inflexible in nature. Vonk's (1996) explanation for this phenomena is that within the time constraints in which teachers work they are hardly able to reflect, and if they do, they do not know what to reflect on: they lack a solid orientation base. In Vonk's terms an orientation base is defined as a conceptual framework related to a repertoire of actions and which is based on an integrated whole of theoretical knowledge and practical experiences. As a consequence, a 'survival-oriented' repertoire offers very few points of contact for expansion and further development (p. 115). Vonk goes on to say that changes in this kind of repertoire demand great effort on the part of those teachers because it could again lead to class-control problems which is something they wish to avoid.

Elliott (1991, p.313) agrees that 'routinised behaviour and unquestioned assumptions can be prohibitive in curtailing initiative and limiting change', but promotes the use of reflective practice so the individual can engage in 'strategic action for improvement and reform'. In speaking about reflection and change Louden (1991) also suggests that patterns of teaching developed in an attempt to reduce the uncertainty of life in classrooms may tend to solidify into an unchanging routine, but classrooms continue to provide surprising situations. In Louden's view, in these situations reflective action may replace routine action.

In addition Louden points out that though the value of reflection is well documented, (Schon, 1983, 1987; Zeichner, 1987; Calderhead 1988) much of this literature is concerned with prescription rather than description. He feels there is less empirical exploration of the kinds of reflection teachers are able to do in their day-to-day work.

Smyth (1989) and others may perhaps have provided some of this empirical exploration with Smyth, adapting from McDonald (1986), saying:

> *Teachers... come therefore to regard their own knowledge as inherently provisional - useful perhaps for getting through the day, but not particularly worth sharing with others, nor even worth articulating to oneself.* (p. 223)

In particular, Smyth feels that teachers need ways of beginning a dialogue with one another so as to penetrate the habitual taken-for-grantedness of their classroom practice and to develop robust theories about their teaching (p. 222). He suggests that the level of consciousness needed for teachers to begin to alter the nature of their practice may occur by starting with a consideration of the practical. Holly and Whalley (1989) also talk of teachers' need to 'render in tangible forms more of what we know' (p. 289). They consider it is essential for teachers to explicitly and tangibly express their knowledge and understandings about the profession of teaching, for both personal and professional growth and for the development of teaching as a profession, 'Teaching and learning, and theory and practice, are dialectical - each reciprocally influences the other' (Ibid p. 289). While, Carr and Kemmis (1983) say:

> *Empowerment of teachers comes through the development of critical awareness, through the development of networks of critical, learning communities...Learning communities able to act - empowered to act – and able to reflect openly on the consequences of their actions need to be created.* (p. 25)

Getting teachers to acknowledge that they have theories about what works for them in teaching is sometimes very difficult, as was found in this study of pair peer-mentoring. This is because historically teachers have been concerned with implementing agendas formulated outside their classrooms. To be truly empowered teachers need to be assisted to stand back from the habitualness of their teaching and to ask pointed questions about what they do and why (Smyth, p. 226).

Holly and McLoughlin (1989) agree that teachers find it difficult to articulate their practice saying that professional teaching is not easy, it takes support and continuing professional development to explore, evaluate and learn from experience.

> *The fleeting nature of classroom life requires conscious effort to cultivate awareness of it if it is to be captured for later consideration. Reflection on practice brings to awareness, hidden dimensions of teaching and learning and though teachers can act purposefully on what is known and understood, much of this cannot readily be put into words.* (p. 259)

Sanders and McCutcheon's (1986) work does not support that of Smyth or Holly and McLoughlin as they believe that teachers practical theories of teaching are consciously held, and teachers are able to explicate them. They argue that though teachers may sometimes not be fully conscious of their reasoning, and perhaps rely on accustomed routines without really thinking about them, 'it is in the nature of their work that teachers are always trying to accomplish something when they act professionally' (p. 55). Elbaz (1987) also believes that teachers theories of teaching are consciously held saying that while teachers may remain largely silent about the pedagogical knowledge they possess, they do, nevertheless, have a broad range of knowledge that helps them make sense of the realities and dilemmas of teaching (p. 46).

If Sanders and McCutcheon and Elbaz are right and teachers have this broad range of knowledge, how then do they become empowered to help themselves? To move from a situation of dependence and non- reflectivity to one of becoming active inquirers into their own and others' practices? Unfortunately, it sometimes appears that teachers lives are dominated by what others think they should know and how others think they should teach. Therefore, to be connoisseurs (appreciating the significance of their work) and critics (making public the importance of educational processes) of teaching and learning, teachers must be given support to focus on their work. 'They need time and conditions conducive to reflection in order to consider practice and the meanings of teaching. These are necessary for bringing implicit assumptions and beliefs which influence teaching and learning to a conscious level' (Holly and McLoughlin, 1989, p. 261). For educators, reflective self-evaluation involves clarifying, thinking, and identifying underlying assumptions and beliefs, and recognizing motives and behaviour. Most importantly, it helps to translate implicit theories into a format which can be pondered alone and with others (Holly and Whalley, 1989, p. 293).

How might educational environments be designed to promote questions, reflection, and collegial discussion of matters of consequence? Smyth (1987) advocates a focus on deliberative and reflective processes used to create understandings that change practice. He suggests that teachers use concrete and practical experiences as a basis for the creation of their own structures of knowledge ('theories') about subject matter, curricula content, classroom organisation, the strengths and weaknesses of their teaching, the needs of their students, as well as the social and political circumstances of their work (p. 158).

Smyth sees this as a gradual process as teachers do not instantly become critically conscious agents saying:

> *Gradually as they become comfortable with describing and analysing their unquestioned practices and how they came to be, teachers move towards the demystification of the wider social and cultural contexts in which their teaching is embedded. They do this through discussion, disclosure, and dialogue.* (p.163)

Holly and Whalley (1989) describe this process in similar terms:

> *Whereas successful teachers have always exercised specialized knowledge and understanding, they are rarely called upon to make public accounts of their knowledge and skill. With time and support to focus on teaching and schooling, teachers can gain deeper appreciation of significant aspects of practice. It means bringing to a conscious level much of what already is known.* (p. 297)

Holly and McLoughlin (1989, p. 261) go on to state that teachers celebrating their successes, posing their own dilemmas, and conducting their own action research within supportive and intellectually robust environments are engaged and empowered teachers. 'It enables them to know what they know, know how they know it, and know how to extend it'.

Professional judgement develops through experience, by identifying challenges, by turning problems around and around, and by exploring alternative solutions and trying them out. Serious observation and professional deliberation are relevant and effective methods for school improvement. Thoughtful, reflective practice takes time and courage. Little (1982, p. 325) reinforces this idea saying that successful teachers and environments are where collegial discussion centres on professional matters. Professional teachers are those who discover and act on their judgements and who develop ways of working collaboratively to make schools better learning places for children.

In a cautionary note, Holly and Whalley (p. 287) counsel that it is important to first discover to what extent teachers rely on, or seek out each other for professional dialogue, warning that teachers are frequently isolated from an adult educational life with few opportunities to talk about their teaching. This isolation may lead to a lack of intellectual stimulation. As Nias (1984) puts it 'when too much time is spent with children teachers may become so preoccupied with current concerns that larger issues and professional affairs are either not addressed or passed over with little depth of consideration' (p. 269).

How school administrators help teachers to work collaboratively, through the way they construe the work of teachers will have a significant impact on teachers' ability to participate at a professional level. Smyth (1989) believes that school administrators can actively assist teachers in uncovering meaning in what they do, while investing in them the capacity to change those practices by transcending them (p. 222). 'The rewards that accrue from providing teachers with the time and resources to work with others are the rewards of professionalism' (Holly and Whalley p. 305).

Leadership

Headteacher and Teacher Relationships

The role and style of school administrators or the school's leadership is a critical factor in the success of a school. 'Leadership in schools is not something that is exercised in a vacuum. Educational leaders need to adopt a view of teachers as active creators and users of knowledge about their own teaching' (Smyth, 1989, p. 227). The DfEE (1998) also promote the importance of the relationship between headteachers and teachers. In their Green Paper "Teachers Meeting the Challenge of Change" they comment that 'good heads are crucial to the success of schools - we need to develop strong leaders' (p. 21).

They go on to write:

> *All the evidence shows that heads are the key to a school's success. All schools need a leader who creates a sense of purpose and direction, sets high expectations of staff and pupils, focuses on improving teaching and learning, monitors performance and motivates the staff to give of their best.* (Ibid p. 22)

OFSTED inspections (OFSTED 1994) have shown a similar pattern between aspects of successful headship and successful schools. The inspections showed a strong link between the quality of teaching and the leadership and management of a school. West-Burnham's (1993) work reinforces this connection with his argument that a school management that does not recognise, reinforce, celebrate and integrate effective classroom practice is denying a powerful set of common experiences and reinforcing the artificial divide between being a 'teacher' and being a 'manager' (p. 126). Kirkham (1993) expresses similar ideas stating that a head who assumes an active role in initiating an innovation needs to take account of the professional prerogatives and needs of teachers. In Kirkham's opinion headteachers, having brought in new practices and ideas, have a fundamental obligation to be supportive and humane as they collaborate with teachers in implementing those innovations and making them work (pp. 107-123). While Fullan (1992), states that headteachers interested in effecting innovations must concentrate on developing within their school cultures norms of collegiality that respect individuality, norms of continuous improvement, and norms of lifelong teacher development that involve inquiry, reflective practice, collaboration, and technical skills.

Hord (1987) is another advocate of the 'support seeking' head. In discussing effective change she writes about the relationship between headteachers and teachers. She stresses the importance of the school leader as a vital element in the change process stating 'there is no question that a strong, active leader can be invaluable both as a major catalyst for change and as the primary change facilitator and manager' (p. 171).

Nias et al's (1989) study of primary school staff provides further evidence of the importance of the relationship between school administrators and teachers. Their study showed positive benefits where a consultative relationship existed between the leadership and staff of a school; a shared decision-making process they describe as 'cultures of collaboration' within schools.

> *The free exchange of work-related information and ideas contributed both to the professional development of the whole staff and to its social cohesion, that is it simultaneously built up the team and developed the group.* (p.70)

Elements that may Impact on Headteacher – Teacher Relationships

Element 1 Change in Conditions

Despite the documentation on the value of a cooperative and collegial approach to the management of a school this is not an approach that is always taken. Why then might some headteachers choose to ignore or not value the input of their teaching staff? One explanation is the introduction of the Education Reform Act of 1988. This Act effected changes that significantly altered the role of primary school headteachers in England. Considerable administrative demands were made with the introduction of the National Curriculum as well as the demands of local management in schools (LMS). Incorporating these and other changes, such as the increased power and responsibilities of school governors, teacher appraisal and school based in-service training provision, and the general, increasingly prevalent, pressure to keep abreast of current educational issues, meant that primary school headship changed considerably (Evans 1999).

Like all leaders, headteachers need to have a secure environment where they can explore ideas for maintenance and change with people who understand the role and the environment. However, as an unintended consequent of the 1988 Act there was a considerable reduction in Local Education Authority (LEA) advisory services. Many of these advisors or inspectors, as representatives of the employing body (but also as fellow professionals) would have regularly spent time in schools to maintain current knowledge of developments and also to be a listening ear for the head (Kirkham 1993). The absence of this 'listening ear' may have led to a sense of isolation for headteachers and this feeling of isolation may have also prevented a headteacher from seeking support and guidance from others within their own organization in the belief that such an action would show weakness. In fact seeking support and guidance is an action that ultimately promotes strength, not weakness (Ibid pp. 118-120).

Another component of recent Education Reform Acts that has had a considerable impact on headteachers has been that of giving more people a say in what goes on in schools. Widening the constituency of schools' governing bodies and increasing their power has been a mechanism for extending participation in policy-and decision-making to the general public and to parents. The latter have also effectively been given more opportunities to make their views heard through schools' increased accountability to them, reflected by statutory reporting, the Parents Charter and open enrolment (Evans 1999, p. 57). Though more people outside schools have been given opportunities for involvement in decision-making, there have been few such changes for the teachers who work in the school.

However, many teachers do communicate to school managers and leaders their ideas and suggestions on the running of the school. There are also many schools where an open and candid expression of views is cultivated. The key issue in Evans' view is that these opinions may be taken into account, or they may be ignored. Representations of teachers' ideas and concerns are accepted or rejected at the discretion of the headteacher and, ultimately, the school governors.

Element 2 Headteacher Styles

Evan's (1998) five year composite study of teachers morale, job satisfaction and motivation resulted in a greater understanding of primary school teachers' attitudes to their work and the identification of the factors that influence these attitudes. She found the most common factor to emerge as influential on teachers' morale, job satisfaction and motivation is school leadership. 'The leadership effected by their headteachers was clearly a key determinant of how teachers felt about their job' (p. 118). Evans' research, in general, showed the most compelling leadership-related influence on teachers' attitudes to their work was school management. The ways in which teachers were managed, as members of the staff of an institution, greatly influenced their levels of job satisfaction, morale and motivation. So influential was headteachers' management 'that it could make the difference between teachers being fired with enthusiasm and their commitment and their dreading to go to work on Monday mornings' (Ibid p. 131).

Heads whose management tended to be consultative were more generally successful in securing high levels of job satisfaction, morale and motivation amongst those who valued opportunities to be heard. Heads who were aware of what was going on in their schools and what teachers were doing, who showed a genuine interest in everything that was happening around them and who carefully monitored the activities that went on were the best motivators. Recognition in the form of feedback on their work from respected colleagues and in particular, from their headteachers, was also widely identified as a motivator. This recognition served to reinforce, confirm or even introduce to teachers a sense of their work's being of sufficiently high standard to warrant their feeling a sense of achievement (Ibid pp. 133-143). The headteacher is, therefore, the key influence on his/her school since his/her leadership, whether it be autocratic, democratic or *laissez-faire* sets the tone of the school's culture and establishes the parameters within which other sources of influence may operate.

One implication from Evans' work is that leadership quality is not necessarily reflective of personal qualities; that likeable people do not always make good heads. Her later work (1999) essentially revealed three interrelated factors, all of which stem from biographical factors that underpin teachers' leadership preferences. These are teachers' professionality orientations, relative perspectives, and realistic expectations. Such expectations reflect values and ideologies, and will partly be influenced by professionality and comparative experiences and insights (p. 33). Individuals differ in relation to what they expect of those who lead them. The extent to which these realistic expectations of leaders are fulfilled is an important influence on teacher' job-related attitudes.

Nias et al (1989) identify some of the specific aspects of interpersonal behaviour manifested by heads of schools ' which offered a positive model of adult relationships' and which fostered collaborative cultures. They refer to heads' awareness of the importance of 'how they behaved as people' to teachers' comments about their heads' personal qualities and to heads' membership of staff peer groups (pp. 105-107). However, headteachers sometimes chose hierarchical-based decision making placing seniority and status, over alternative, sometimes competing, claims of suitability for participation in decision-making. As such they over-look recognition of the value and potential of those who are placed at the base of the hierarchy and neglect consideration and utilization of individuality and fitness for purpose. 'Hierarchical-based decision making is myopically selective, it wastes talent and, in so doing, is susceptible to the engenderment of feelings of unfulfilment and resentment' (Evans 1999, p. 68).

Day, Hall & Whitaker (1998) suggest that hierarchical management can result in those located at the lower levels of the hierarchy experiencing feelings such as 'a sense of inadequacy; inability to express oneself; inability to influence anyone; feelings of being shut out; increase in cynicism...feeling that new ideas can only come from the top; and feeling that there is no way to communicate with those at the top' (p. 14). Although a hierarchically-based decision-making management may be fairly efficient in terms of getting through an enormous managerial workload, it is not the best way to manage if a head wishes to motivate as many members of staff as possible. As there does not seem to be one single style of leadership that provides a model for effective motivation it is important therefore, to offer a leadership that takes into account the diverse needs of all staff (Evans 1999, pp. 34-36).

A skilful staff development program results in a self-perpetuating process for change as well as new knowledge and skills for teachers and increased learning for students (Nolan and Hillkirk 1991). When staff development becomes the major vehicle for school improvement, schools should think about the structures and content of training, changes needed in the workplace to allow collaborative planning, decision making and data collection; all essential to organisational change efforts. A form of staff development that some schools have adopted is the introduction of a mentoring scheme - a process that accommodates individuals' needs, and values investment in people (human resource management). Use of a mentoring process can help school managers to actively change the culture of the school to one of support for personal and career development that will help the school achieve success. As Rae (1997, p. 34) describes it 'organisational learning depends on individual learning and connectivity. Individuals must both be able to learn effectively and to share what they know with others'. If school leaders want to meet the 'Challenge of Change' to be successful as described in the Green Paper (DfEE 1998, p.22):

> *All the evidence shows that heads are the key to a school's success. All schools need a leader who creates a sense of purpose and direction, sets high expectations of staff and pupils, focuses on improving teaching and learning, monitors performance and motivates the staff to give of their best.* (p. 22)

Then use of a mentoring strategy could be a viable option. An exploration of the process of mentoring is offered in the next chapter.

Chapter Four – Mentoring

Orientation

This chapter provides an examination of the literature on mentoring, its theory and, more widely, its ramifications on practitioners.

Introduction

Most teachers still spend the major part of their time isolated from their peers and as a consequence teachers often do not receive, as is natural in other professions, ongoing direction and assistance from more or other experienced colleagues. Shulman (1987), an early advocate of the value of teachers working together, proposed that some of the potentially most useful yet most demanding interactions among teachers were those that focused on actual classroom performance. 'Such interactions enable teachers to learn from and with one another, and to reflect on crucial aspects of curriculum and instruction' (p.20).

Learning Theories

An influential theorist in educational literature, Vygotsky (1962, 1978) advances a learning theory that may provide an understanding of what is happening in teacher interactions. Vygotsky proposed that learning is essentially a social activity - learners become more knowledgeable as they engage in mutual activities with expert others. Central to Vygotsky's view of learning is the zone of proximal development (ZPD) - the distance between the learner's actual development and his or her potential level of development with assistance from a more expert other. Through assistance the learner accomplishes something that would not have been achievable alone and therefore is intellectually accelerated (Vygotsky 1978, Wood 1998). The guidance of an 'expert' is vital as the learner moves from a position of needing support to being able to operate independently.

Bruner and his colleagues who propounded the concept of 'scaffolding' (Wood, Bruner & Ross 1976) developed Vygotsky's ideas. The term 'scaffolding' refers to the range of activities an expert might use when supporting a learner in achieving goals that would otherwise be beyond the individual, that is, when assisting the learner to reach a potential level of development. As the learner becomes more proficient the expert is able to gradually remove the scaffolding. Eventually the learner will no longer need that support and will be able to operate autonomously until the next new learning situation.

Social Environments Conducive to Learning

Topping (1988 p. 8), using as a basis the work of Glyn (1985), advances Vygotsky's theories in another way when, in talking of student learning, he specifies four major characteristics of environments conducive to independent learning. The first is that the learner must be able to initiate rather than merely react to stimuli controlled by another. The second characteristic is the sharing of activity between less skilled and more skilled performers, between whom there is a positive social relationship. This implies that the particular learning task be functional for both performers. The third characteristic is that of reciprocity of mutual influence, with each participant in the interaction modifying the behaviour of the other. The fourth characteristic of the responsive learning context relates to the amount and type of feedback provided for the initiation of the learners. These four characteristics could equally apply to adult learners, especially in the context of teachers learning from one another as in this study of pair peer-mentoring.

Historical Perspectives of Mentoring

Mentoring has a long history of success, beginning with Odysseus' decision to entrust the education and development of his son to a wise and learned man named Mentor, 3,500 years ago. In the myth, Odysseus, who has to be away fighting the Trojan War, hands over his son, Telemachus, to his friend and advisor, Mentor. Mentor is charged with advising and serving as a guardian to the entire royal household.

In Anderson and Shannon's (1995) view the account of Mentor in "The Odyssey" allows several conclusions to be made about mentoring. First, mentoring is an intentional process. Second, mentoring is a nurturing process that fosters the growth and development of the protégé towards full maturity. Third, mentoring is an insightful process in which the wisdom of the mentor is acquired and applied by the protégé. Fourth mentoring is a supportive, protective process. Anderson and Shannon go on to say that in interpreting the poem it is reasonable to conclude that role modelling is also a central quality of mentoring (pp. 25 -26).

Professional literature has been making use of this imagery in a variety of functions and in a variety of vocational fields yet no commonly accepted meaning of the term mentor has been developed (Gray and Gray 1985, p. 37). A number of these studies have centred on career development in the business field with business mentoring definitions tending to portray the traditional or original hierarchical relationship.

Allerman's (1986) description of a mentor 'as a person of greater rank or expertise who teaches, counsels, guides and develops a novice in an organisation or a profession' is given by Anderson and Shannon (1995 p. 27) as an example of this kind of hierarchical business definition.

Mentoring in Education

Educational definitions of mentors also often have a hierarchical basis. This can be seen by Fagen and Walter's (1982, p. 115) definition; ' a mentor is an experienced adult who befriends and guides a less experienced adult', or Klopf and Harrison (1981, p. 42) who conceptualise mentoring as an enabling process; 'mentors are competent people who serve as teachers, advisors, councillors and sponsors for an associate who may be younger'.

Despite the abundance of material on mentoring in teacher journals in the '90's Anderson and Shannon (1995) felt that few provided the field of education with a clear conceptualisation of the act of mentoring. The literature did not give mentors enough specific direction of what to do or how they were to do it and, in their opinion, much of this professional literature still saw mentoring as only taking place between a skilled and novice practitioner (p. 25). Yet Anderson and Shannon's own work has this perspective as can be seen in their definition:

> *Mentoring can best be defined as: a nurturing process in which a more skilled or more experienced person, serving as a role model, teaches, sponsors, encourages, counsels, and befriends a less skilled or less experienced person for the purpose of promoting the latter's professional and/or personal development. Mentoring functions are carried out within the context of an on going, caring relationship between the mentor and the protégé.* (p. 29)

Wilkin (1997) however, takes a longer view of mentoring and sees it as a tool of social and work place growth - suggesting that political and social policy changes have promoted and sustained the developments in education and training that have led to the advocacy of mentoring across the board (pp. 6-7).

Joan Stephenson (1997) in her editorial in "Mentoring- the new panacea?" seems to support this understanding when she says:

> *The rise of mentoring, as a means of developing individuals within their place of work, has coincided with perhaps the most sustained attack on education and latterly teacher education since the Education Act of 1944. Continuing and ever more far reaching investigation into standards of achievement is now the norm.*
>
> *Through discussion, pressure-group activity and legislation content, methods, and practice of teachers and trainees have been challenged and increasingly proscribed. In a situation where very little attention to the complexities of the issues facing education as we move into the 21st century has been apparent, that the mentor has for some assumed the proportions of a magical potion capable of being applied to every ailment with a certainty of success.* (p. 1)

Little (1985, p. 34) also has some reservations about the concept of mentoring as the solution to effective teacher professional learning. She warns that mentoring interactions place teachers' self-esteem and professional respect on the line, because they expose how teachers teach, how they think about teaching, and how they plan for teaching to the scrutiny of their peers. Little goes on to say there are no established traditions in the teaching profession by which teachers receive advice on their teaching, or offer advice to others. 'However skilfully and enthusiastically conducted, conferences, between teachers and teachers, place teachers on unfamiliar ground with one another' (p. 36).

Showers, Joyce & Bennett's (1987) studies, though talking of peer coaching, seemingly draw a different conclusion to that of Little. Joyce and Showers' (1980, 1983) and Showers' (1985) work showed that successful professional development occurred when teachers supported one another as they (the teachers) tried to increase their repertoire of teaching practices. The form of the professional development promoted by Joyce and Showers was peer coaching, a planned process that allows experienced teachers to try new teaching strategies, take risks, be reflective about their craft, and share pedagogy with other teachers.

There are some differences between mentoring and coaching. Wilkin (1997, p. 12) draws attention to these differences when she says that modes of occupational preparation, training, and mentoring can be opposed. Conway (1997) while acknowledging that mentors could act as a coach as part of their mentoring role sees mentoring as more than being a coach. 'The advantage of mentoring is that the mentor can take on a variety of roles as none is fixed and can continually move through them' (p. 54). An examination of the differences between the two processes indicates that coaching is often directly related to performance issues, for example the acquisition of a particular skill. Mentoring on the other hand is a non-directive relationship that is more broadly focused than coaching. This can be simplistically represented as in the diagram below:

Figure 4.1: Differences between training or coaching and mentoring

	Training or Coaching		Mentoring
Learner's contribution to knowledge	*Low*	----------	*High*
Focus of development	*Shared skills and knowledge*	----------	*Individual ideas and practices*
Institutional risk	*Low*	----------	*High*
Direction of learning	*Unidirectional*	----------	*Reciprocal*
Nature of knowledge	*Codified Unquestioned*	----------	*Uncodified questioned*

Wilkin, 1997 p.12.

Advocacy for Mentoring

In spite of the debate on an adequate educational definition of mentoring and some questioning of its importance as an educational way forward, Edge 1992; Cohen 1995; Vonk 1996; Bey 1997; Conway 1997 and Maldarez and Bodoczky 1999 (amongst others) promote its use. Vonk states that adequate mentoring can aid teacher colleagues to effectively tackle the problems they meet, and in so doing this might eventually lead to a more flexible repertoire of actions and a more open-minded attitude to change. He comments that:

> *Mentoring is a dynamic, reciprocal relationship in a work environment between two experienced teachers aimed at promoting the career development of both. In order to be able to help other teachers teach effectively, the teachers in the relationship have to reflect continuously on their own professional knowledge and repertoire of actions. This nearly always results in improvement of that repertoire. The mentoring relationship contributes to the professional development of both participants that is, it boosts the quality of the professional practice of both participants.* (p. 116)

While Vonk focuses on gains to individual teachers, Conway (1997) advocates the use of mentoring relationships to stimulate organizational learning, commenting that mentoring is a cost-effective and powerful strategy for organizational development. 'Mentoring in the organization means benefiting the mentor, the mentee and others in the wider organization' He considers that the three aspects to this benefit are: the learning of mentors and how this effects their impact on the organization, the learning of mentees and the impact of this on the organization, and how the organization proactively promotes the process of shared learning (Ibid pp. 53-54).

Nolan and Hillkirk (1991) also promote mentoring as being beneficial to the organisation (the school) when they say that a skilful staff development program results in a self-perpetuating process for change as well as new knowledge and skills for teachers and increased learning for students. Thus, use of a mentoring process can help school managers to actively change the culture of the school to one of support for personal and career development that will help the school achieve success.

When staff development becomes the major vehicle for school improvement, schools need to think about the structures and content of training, changes needed in the workplace to allow collaborative planning, decision making, and data collection which are all essential to organisational change efforts. As Rae (1997, p. 34) describes it 'organisational learning depends on individual learning and connectivity. Individuals must both be able to learn effectively and to share what they know with others'. This is because mentoring as a basis for educational staff development is founded on the notion of learning and learning styles. To put it another way, whole staff development is about individual teachers learning, that is, changing their behaviour.

Problems related to the use of mentoring to facilitate professional growth

Although there are advantages to mentoring it is important to remember that there can also be problems when trying to implement mentoring programmes in schools. Elliott and Calderhead (1995) found in research, carried out at the end of the first year of a two-year articled teacher-training scheme for primary teachers, that mentors concentrated on the nurturing or supporting of novices so that they could learn 'by whatever works' in their school or their classroom. The teacher mentors were, in fact, confusing the articulation of their personal knowledge with the process of critically appraising their teaching practices. It was a conforming rather than a critical orientation to the role.

Another significant point in regard to the approaches taken by these mentors was that few challenged their novice's ideas and images of teaching. When asked why not, mentors did not see the need to do so or thought it was an inappropriate approach for novice teachers. Though research (Vygotsky 1978; Yeomans and Sampson 1994; Conway 1997; Moyles, Suschitsky & Chapman 1998; Chapman 1999) indicates that challenge is essential for professional growth to occur, the mentors in the Elliot and Calderhead study did not adopt such approaches. Elliott and Calderhead comment that for some mentors in the study growth in teaching was embedded in experience, that is students were able to take the class for large periods of time. The teachers were 'equating competence with sustainability in teaching' (p. 45).

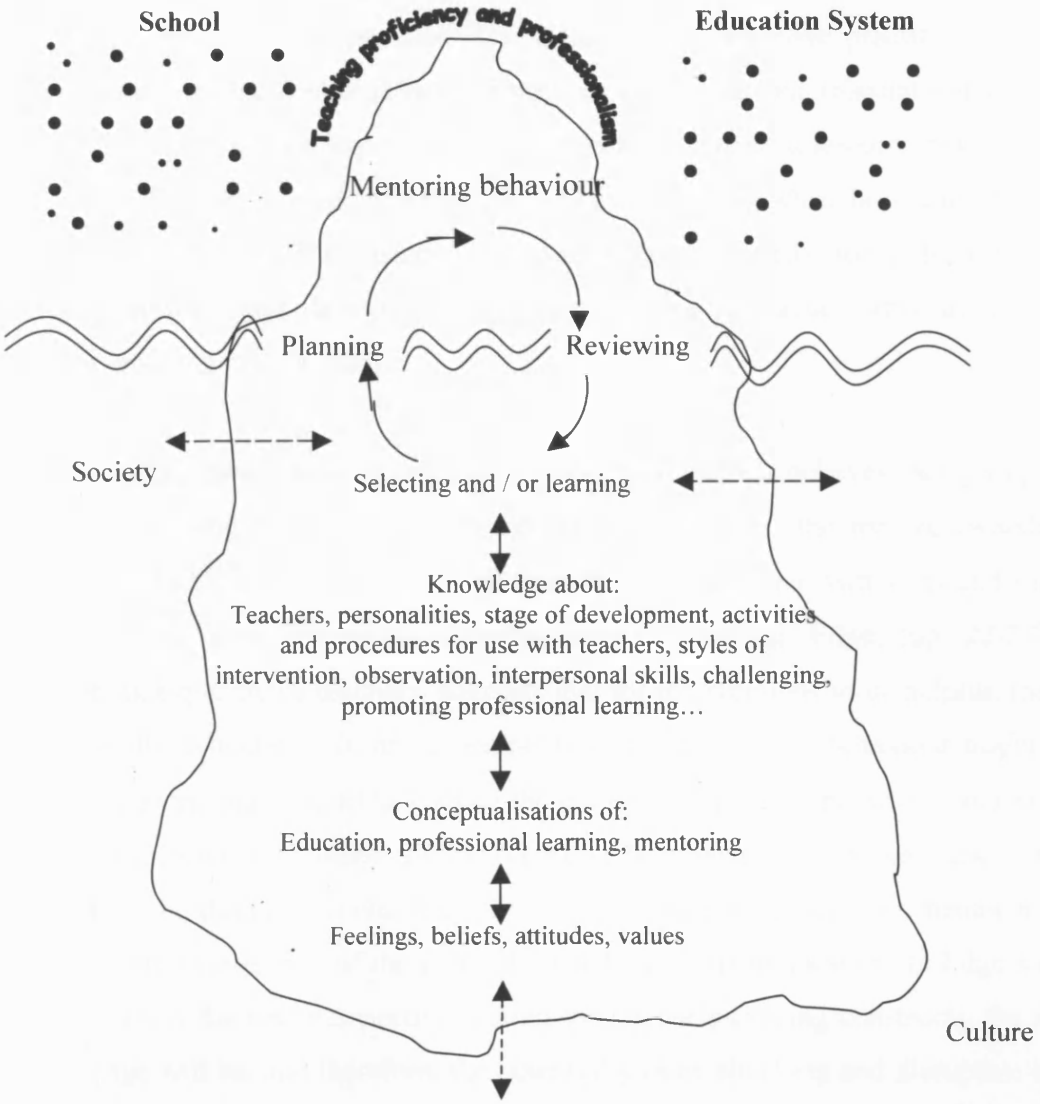
One conclusion Elliot and Calderhead draw from their analysis is that mentors had views about learning to teach which were more simplistic than those implied in the literature. They go on to say that the conceptions that mentors hold and the values and beliefs that they bring to a mentoring context appear to be important factors in determining whether or not these skills are actually exercised. In their view mentors who had broad views of their own learning were more likely to encourage growth, in all its dimensions, in their novices (pp. 46-53).

Elliot and Calderhead's research on teachers' learning also illustrated the powerful images that students bring with them to their training (see Chapter 3 – teacher belief systems). They posit that this is generalizable to all professional development and advocate programmes for growth that establish conceptions of mentoring in such a way that the unique combinations of challenge and support necessary to foster growth are realised in mentoring contexts (Ibid p. 54). The balance between change and support will need to vary because mentors and mentees will differ in their levels of interpersonal skill, as well as in their stages of professional development, in their styles and paces of learning, and their personal biographies and belief systems (see Louden 1991; Malderez and Bodoczky 1999). It is therefore essential that mentors consider how strong the challenge is likely to be and to be aware of where to put in support structures. Knowledge of the challenges teachers will face as mentors and knowledge of support structures to help meet these challenges are vital skills not only from the point of view of learning but also for mentor / mentee relationships.

Need for Skills Training in Mentorship

Maldarez and Bodoczky (1999) use their iceberg metaphor to explore Vonk and other writers' ideas about mentor-expertise in the teacher-mentor. They comment (p. 18) that if the goal of the teacher is to be a skilled professional teacher, then the goal of mentoring is one of creating skilled professional mentors. Just as having a good subject knowledge is not enough to be a good teacher, so being a good teacher is not enough to be a good mentor. It requires additional skills and knowledge.

Figure 4.2: The Mentor Iceberg *(Maldarez and Bodoczky 1999)*



Many things in the Mentor Iceberg above and below the surface will have to be learnt, as they are not necessarily part of the make-up of a competent classroom teacher. Turner (1995) reiterates this idea saying:

> *Training for a teacher mentor is necessary because few teachers have had the experience of observing other teachers at work and commenting on their technique and achievements. Skills in planning and evaluating are important, as is the ability to assess the other person's work and give them advice that will enable them to improve.* (p. 153)

Time is needed to acquire this additional knowledge and skills, as well as for the process of challenging existing models of professional development.

As teachers develop these skills Turner believes teacher mentors need to be pro-active trainers demonstrating their qualities as reflective practitioners as well as encouraging reflective practices in their mentees. The theme of the reflective practitioner mentor is continued in work by Tickle (1989), though in a different but relevant context. Tickle expounds the need for reflective teacher mentors to be part of a research-based induction programme. He sees a clear role for the reflective mentor when he claims that newly qualified teachers' (NQT's) success is linked with a 'capacity for reflection-in-action [being] recognised and developed with support from colleagues who are themselves reflective practitioners' (p. 284).

While endorsing these characteristics and needs, Edge (1992) believes that giving advice or doing something for someone will not necessarily assist the mentee (whether that mentee is an NQT or an experienced teacher) to construct their own view and link their practice to their own theoretical understandings of teaching. Edge, (pp. 22-27) when talking about experienced teachers, suggests that for interventions to be helpful, they need to be carefully considered. In an 'educator' role, helpful mentor behaviour might be, for example, encouraging explicit talk about the mentee's beliefs (hypotheses), and providing selected data either from observations, theory or the mentor's own experience. In doing this the mentor's design is to challenge those beliefs and perhaps lead the mentee to a more complete conceptualisation of the particular teaching focus in question. In Edge's opinion the further away the new perspective is from the learner's existing constructs, the stronger the challenge will be, and therefore, the potentially more shocking and disruptive in terms of the mentor relationship. But challenge is always necessary for learning to occur (Vygotsky, 1978).

> *If ideas are offered as one professional sharing their constructs with another, inviting challenge and welcoming opportunities such challenge offers for their professional growth, then the experience can model how to use challenge constructively. This input is offered as another viewpoint to add a further dimension to the person's knowledge base.* (Edge 1992, p. 20)

Mentoring for Experienced Practitioners

Reflective practices are very difficult for the inexperienced teacher; even experienced teachers have difficulty in effectively critically appraising their pedagogy. In addition, to help experienced practiòners cultivate a critical awareness of their own practice Edge (1992) recommends, as do Carr and Kemmis (1983) and Smyth (1989), assisting teachers to articulate their practice. Experienced teachers have a wealth of experience. They need to bring this to a conscious awareness, acknowledging the skills and knowledge they already have and then move on to new areas of discovery through consulting other sources of knowledge. It is a self-development process of self-review, target setting and individual action planning.

Smith and West-Burnham (1993) further the theme of promoting experienced teachers' need to be able to identify the skills, knowledge and competencies demonstrated within their present jobs when they write that task analysis allows a clearer picture of what teachers actually do in practice. In their [Smith and West-Burnham's] understanding, task analysis serves as an aid to self-reflection, it is also a recognition of what is done. They go on to suggest that experienced teachers engaging in such a process will have their learning greatly enhanced through the guidance and support of a skilled professional mentor in the school (Ibid pp. 85-88).

Edge (1992) also draws attention to the need for teachers engaged in interactions that foster this kind of self-development (such as mentors and mentees) to learn some new rules for speaking, for listening, and for responding in order to co-operate in a disciplined way. Smith and West-Burnham describe this learning as being made up of three parts. The first part of the process is the questions that teachers ask of themselves, the second is the process they use to find answers, and the third part identifies when the mentor can best support. Figure 4.3 illustrates this process.

Figure 4.3: Personal and Career Development

Need to Know		Process	Support
Where am I now?	-	Self-Review	
Where do I want to be?	-	Self-Review	
How do I get there from here?	-	Target-Setting	Mentor Support
What are my targets for development?	-	Action-Planning	Mentor Support
Who can help me?	-		Mentor Support

adapted from Smith and West-Burnham (1993)

Another writer in the field of mentoring, Bey (1997), perceives the process of mentoring in terms of two co-existent forces of teacher education - intellectual power and professional development. In Bey's view the practice of mentoring entails exercising the tools of intellectual power while use of these tools symbolises mentorial support, a determination to cultivate adult growth and learning. She talks about these support systems in the following way:

> *Such support may facilitate the need for higher integration, a mode of self-determination urging educators to lead, so that all teachers learn to improve themselves by learning from colleagues and mentors. To this end, mentorships offer a worthy basis for an expansion of collaborative relationships in educating both pre-service and in-service teachers.* (p. 134)

When mentors work with experienced colleagues Bey describes their role as positive change agents saying 'as positive change agents, proficient mentors may want to empower mid-career and career committed teachers to improve instructional practices' (p. 129). She goes on to indicate that this empowerment could motivate experienced practioners to rethink routines or assume responsibility for professional improvement. Fullan (1993) concurs with Bey on the value of proficient mentors saying 'optimistically if experienced teachers had the support of highly skilled colleagues this might be enough impetus for the teachers to think about changing teaching techniques, curriculum materials and the classroom environment' (p. 53).

Bey puts forward the following factors to be considered when thinking of using mentorships to encourage on-going teacher learning:

1. mentors trained for their role and well prepared to support teachers in all stages of professional growth;

2. opportunities for mentors to reduce teaching responsibilities, allowing ample time for them to assist other teachers; and

3. mentors involved in the planning, organisation, and implementation of a support system for the professional development of teachers.

Impediments to Successful Experienced Teacher Mentoring

The researcher's review of the literature on mentoring indicated that there would be problems to be overcome when setting up a mentoring scheme between experienced teachers, such as was hoped for in this study's project. One problem is that in order to facilitate growth; mentors need to have well formulated ideas on how teachers develop professionally. Elliott & Calderhead (1995, p. 44) intimate that teachers may not have these 'well formulated ideas' nor have the skills to help other teachers extend their thinking about their educational practices as is recommended by Shulman (1986b).

> *The most substantial contribution that a mentor can make to help other teachers develop professionally is to extend their thinking about their educational practices.* (p. 11)

Little (1985) offers three options or components as to why this might be so:

- *Knowledge;* An advisor, (meaning here a peer), although secure in their own general grasp of curriculum and pedagogy, might believe they know too little to construct useful advice about a teacher's specific intentions and practices, the observed year level or subject, or a particular classroom situation.
- *Strategies;* Such 'advisors' might be reluctant to introduce their own ideas in ways that might undermine the teacher's own analysis or ignore his/her aspirations.
- *Etiquette;* In their reluctance to give advice, the advisors (peers) may be responding to a prevailing professional etiquette among teachers in which advice is not highly prized. Offering advice, especially unsolicited advice, runs counter to the valued, accepted, collegial behaviour of teachers.

The etiquette surrounding advice-giving appears to be one instance of a larger phenomenon, in which the reluctance to assert oneself on matters of curriculum and instruction is seen as proper restraint in the exercise of professional good manners (Ibid p. 36). Little goes on to say one way to overcome this etiquette and at the same time provide leadership opportunities for career teachers is for more experienced teachers to serve as mentors to their colleagues. Enabling each experienced teacher in the mentoring relationship to take on both the role of mentor and mentee at different times appeared to be the way forward.

Possible Ways Forward

Showers and Joyce's work in the eighties showed that regular (weekly) seminars which focused on classroom implementation and the analysis of teaching, especially students' responses would enable teachers to practice and implement the content they were learning. They went on to recommend that teachers who were studying teaching and curriculum form small coaching groups that would share the learning process. Their recommendations (Showers, Joyce & Bennett 1987) were based on a review of more than 200 studies on training and the ability of teachers to acquire teaching skills and strategies. They found that teachers "are wonderful learners" but also that the conditions needed for effective teacher learning were not common in most in-service settings. From their analysis, they were able to identify a number of training components that have been studied intensively, alone and in combination. Each of these training components contributes to the impact of a training sequence of activity. When used together, each has a greater power than when they are used alone.

The conditions necessary for effective training in Showers and Joyce's view are:

* presentation of theory or description of skill or strategy;
* modelling or demonstration of skills of teaching;
* practice in simulated and classroom settings;
* structured and open-ended feedback;
* coaching for application (hands-on, in classroom assistance with the transfer of skills and strategies to the classroom).

In the 90's, in rethinking (influenced by the work of organisational and change theorists) how teachers can create better learning environments for themselves, Joyce and Showers (1995), began to promote peer coaching in a slightly different way than previously. Instead of offering advice to colleagues after observing them teach, they advocated that teachers learn from one another while planning instruction, developing support materials, watching one another work with students, and thinking together about the impact of their behaviour on their students' learning (Showers and Joyce 1996 pp. 112-116).

Kelly, Beck & ap Thomas (1995) make the claim that schools using a mentoring system for teacher professional learning have had great success when all staff were designated both as a mentor to someone else, and as a mentee, (had someone as their mentor). This may be because as research has shown (Vygotsky 1962, 1978; Wood et al 1976; Smyth 1991; Showers and Joyce 1996) self-development is more likely to be successful with the support of other people. The process of mentoring offers that support by providing individuals with someone who can share, discuss, question, challenge, give feedback and guide one through the learning cycle (Ibid).

It was decided to adopt a similar approach to the latter work of Showers and Joyce (1996) whilst taking into account the ideas of Smyth (1991), Cohen (1995), and Kelly et al (1995) for the Pair Peer-Mentoring Project described in this thesis.

Conclusion

In summarising the mentoring process the following components became evident. They are the value of peer mentoring, factors necessary for effective mentoring, why mentoring is more advantageous than INSET, and why teachers might choose to peer mentor. All these generic factors need to be taken into account when looking at subject specific mentoring. The key points of these categories are outlined below.

Peer mentoring would:

1. Help establish a line of communication between school colleagues.
2. Provide teachers with a chance to think and talk about their lessons.
3. Help bring techniques teachers use instinctively to the conscious level, thus improving the chance they will be repeated.
4. Increase the amount of time teachers spend on discussing instructional matters.
5. Provide technical feedback from respected peers.
6. Improve teaching skills of mentors since they often learn as much or more by observing than by being observed.
7. Improve the skills of analysis, challenge and articulation of pedagogy which extends and enhances professionalism.
8. Help professionalise teaching since it offers teachers a chance to be involved in decisions that impact on them and their students.

Mentoring is effective because:

* it is based on the premise that change is a process;
* it is in context;
* it is concerned with and values the input of the individual teacher;
* it builds on the skills and knowledge the teacher already has;
* teachers have ownership of the process, in that it allows the individual teacher to develop at their own rate and in the direction they choose;
* it is cost effective;
* it has a direct impact on the teaching and learning of the students; and
* it has the potential to impact on whole school development.

The Mentoring Process is more effective than INSET because:

* it acknowledges the importance of the teacher in the education process;
* it acknowledges the complexity of the classroom, the school, and the community;
* it is sensitive to the way teachers think, feel and make meaning from their experiences;
* it is based on a conception of the teacher, an adult learner, being involved in continuous professional growth and development;
* skills learnt in using a mentoring framework, such as reflection, observation and feedback are critical for growth; and
* it is idiosyncratic to the teacher, the class, the school, and the community.

Peer Mentoring satisfies different teacher needs such as:

Professional Needs (Growth)

* makes a teacher examine his / her lessons in detail;
* gives a teacher a chance to discuss concerns with fellow professionals;
* provides a learning experience by visits to other classes;
* increases the amount of time teachers spend on discussing instructional matters; and
* makes teachers assume new roles and gain a sense of empowerment.

Personal Needs

* gaining adult companionship;
* developing a support system;
* improving personal relationships (communication, respect for fellow teachers, team concept); and
* improving energy level - by renewing.

School Needs

* improves quality of instruction for students;
* allows the teacher to try out new ideas in a non-threatening environment;
* helps identify areas of concern - staff development; and
* transfers learning.

These components and my earlier research on teachers, teaching, and the mentoring process as an effective professional development tool are encapsulated in the following quote from Wilkin (1997) which illustrates why I chose to investigate this form of professional learning in my research.

> *Practice of mentoring promotes mentors' own professional development as teachers. Mentoring results in a heightened awareness of personal teaching style/s and habits, which in turn leads to their assessment and the recognition of the possibility of improvement. A further important outcome of mentoring has been an increase in morale at a time when teachers have been subject to numerous demands for change in their working practices.* (p. 15)

The next chapter examines how I began to use this research to offer a Framework whereby primary science co-ordinators and primary teachers could begin to consider how to instate peer support for professional development, lessen their sense of isolation and allow them to have some control over the growth and direction of their professional lives.

Chapter Five - The Mentoring Framework

Orientation

This chapter begins with a brief discussion of an auxiliary literature review of subject specific mentoring which led to the development of the first Framework of the Project. On the failure of the first Framework, an additional literature search of the specific skills and activities of a mentor led to the development of an alternate approach to implementing a paired mentoring programme and the creation of the Framework for the Second Project.

Introduction

This research was to go beyond mentoring for generic skills. It is concerned with experienced primary teachers assisting one another to improve their teaching and learning in science. To effect this professional development a Framework for a pair peer-mentoring scheme was to be developed with input from both teachers and the researcher. It was hoped that by implementing the mentoring process a two fold effect would result, in that the actual skills of observation, feedback, data collecting and analyses in themselves would help develop the professionalism of teachers in addition to their further learning of skills, knowledge and understandings in science and / or increasing their science pedagogical knowledge.

Subject Mentoring

While much of the empirical research in this field deals with generic mentoring this study concerned mentoring in a subject. Badely (1989) talks of the subject mentor in terms of a collegial model of mentoring where development results from the collaboration of peers; allowing the subject mentor and the mentee to share knowledge and experience. Wallace (1997) describes this approach as teachers learning to engage in 'critical and realistic reflection on what and how they are doing, while working and using the language of the subject' (p. 81).

In subject mentoring it is important to acknowledge a difference between technical expertise and process skills, since the mentor's repertoire of knowledge, attitudes and skills encompasses both subject-matter content and teaching and learning methods. That is, taking the step from mentoring a colleague's general teaching skills to that of looking more closely at science teaching skills requires a conscious decision and a clear focus (Maynard 1996). For example, the subject mentor needs to help colleagues to establish a sound understanding of how students learn science; develop skilled intervention strategies to lead students towards accepted science ideas; and learn to present simple models and analogies to illustrate and explain concepts (Maynard, Sanders & Furlong 1997).

Success of Subject Mentoring

A mentoring project that endeavoured to utilize and report on the effectiveness of the subject mentor was a reflective coaching project[4] for experienced teachers described by Nolan and Hillkirk (1991). The goal of the project, between a university and a semi-rural school district was to equip a cadre of 'veteran' classroom teachers with the skills and knowledge to be peer mentors for their colleagues for one year. Through the provision of an ongoing, sustaining professional relationship, change occurred in both intellectual development and in specific subject task competencies. Nolan and Hillkirk (p. 74) note that for both types of improvement, the opportunity for intensive, regular reflection was crucial. This opportunity for discussion and reflection of actual teaching experience with mentors (in their capacity as fellow subject teachers) was seen as being essential in helping mentees reflect on their own teaching. Findings from the Rothera, Howkins & Hendry (1995) study also showed that being in touch with the classroom and in possession of specialist knowledge was deemed vital in the legitimacy of the subject mentor to advise on subject matter and teaching methods (p. 100). 'Mentees' were positive about receiving constructive criticism from their 'mentors', seeing skills in objectivity and balanced appraisal of supreme value for a mentor as it demonstrated their professional competence' (Ibid p. 108).

It seemed, in view of this evidence in its favour, that there was a role for subject mentoring as an instigator in a self-perpetuating process for change as well as a vehicle for developing new knowledge and skills for teachers and increased learning for students.

[4] In many USA studies the word coaching is used to describe a process that is very similar to a mentoring process. The Nolan and Hillkirk project described in this chapter is one such study.

Implementation of Subject Pair Peer-Mentoring

The First Project

The remit of the Project was to investigate the ability of experienced primary teachers to work together in a pair peer- mentoring partnership to improve the quality of their teaching of primary science. By introducing a pair peer-mentoring process that incorporated access to an individual supportive relationship with an experienced peer it was hoped to:

* help establish a line of communication between primary school colleagues;
* provide teachers with a chance to think and talk about their lessons;
* help bring techniques teachers use instinctively to the conscious level, thus improving the chance they will be repeated;
* increase the amount of time teachers spend on discussing instructional matters;
* provide technical feedback from respected peers;
* improve teaching skills of teachers when acting as mentors since mentors often learn as much or more by observing than by being observed;
* improve the skills of analysis, challenge and articulation of pedagogy which extends and enhances professionalism;
* help professionalise teaching since it offers teachers a chance to be involved in decisions that impact on them and their students.

Case studies of these partnerships would allow a detailed picture to be built up of the complex interactions – the mentoring between the individuals - and have the added bonus of the process being viewed within individual school settings.

The Model for the First Framework

As a first step the researcher needed to determine how to 'sell' the project to teachers and head teachers. It was essential, if teachers were going to be able to effectively participate, to condense or make accessible to teachers and administrative staff those critical elements of mentoring (both the theory and the practical steps of the process) gleaned from the literature and to translate them into some kind of beginning structure teachers could understand. The review (detailed in chapters 3 and 4) led to an initial selection of Sampson and Yeomans' (1994) theoretical model of mentoring as a starting point. This choice was made because in the Sampson and Yeomans' model the multiplicity of roles a mentor might undertake are clearly set out in specified domains with examples of the kind of behaviours mentors may be engaged in or activities mentors may carry out, given. Sampson and Yeomans' model describes three domains of support a mentor needs to provide: Personal Support, Structural Support and Professional Support. As the Pair Peer-Mentoring Project was concerned with experienced teachers, Professional Support was the domain explored in detail.

In the Sampson and Yeomans' model, when operating within the Professional Support domain, teachers need to take on a variety of roles to scaffold colleagues' learning, essentially moving from the position of a trainer, that is where the teacher-as-mentor offers intensive support through coaching, instructing, telling, guiding and encouraging reflection in order for the teacher-as-mentee to gain in competence and confidence, and then to the position of educator. As an educator, the teacher-as-mentor continues to assist professional development through challenging the teacher-as-mentee's thinking, guiding him/her towards a deeper reflection on practice and towards a wider understanding of the theoretical, ethical and political issues of teaching.

Later work by Chapman (1999) suggested the inclusion, within the Professional Support domain, of a Professional Supporter element. In her view there was a need to make distinct professional support from personal support (pp. 49-50). To better understand this distinction Chapman sub-categorised professional support into three role elements: Professional Supporter; Trainer; Educator. These roles are illustrated in Table 5.1.

Table 5.1 Elements and Associated Roles of the Professional Support Domain

Role Domain	Role Element	Associated Roles
Professional	Professional Supporter	to encourage to listen to support in classroom to reassure
	Trainer	to role model to discuss to help identify needs to help focus to help clarify to be a critic to help reflect to sometimes advise
	Educator	to help set targets to challenge to relate theory to practice

Chapman (1999) adapted from Sampson and Yeomans (1994)

Chapman goes on to say (p. 49) that the above categorisation is not meant to suggest that there is a simple linear progression from supporter to trainer to educator. Rather it is expected that the dominance of each of these elements will continually change and shift depending on the context of the learning. It is important that teachers have this opportunity to operate flexibly, continually selecting the roles that will best meet their own and their colleagues' varying needs. As Tharp and Gallimore (1998) advise, within a Vygotskian framework learning does not occur uniformly or in discrete stages:

> *The life-long learning by an individual is made up of regulated ZPD sequences - from other assistance to self-assistance - recurring over and over again for the development of new capacities. For every individual, at any point in time, there will be a mix of other regulation, self-regulation and automised processes. (p. 103)*

Teacher Sample

In May 1998 letters were sent to participants, and their head teachers, of the Primary Science GEST Courses for 1997/98. The thinking behind this approach was that teachers who had attended an INSET course might be predisposed toward continuing to work on their science teaching. The letter introduced the researcher, outlined the proposed Project, (a model or framework for pair peer-mentoring), and asked for interested parties to contact the School of Education. Letters were also sent to targeted (thought likely to have an interest or at least a receptive attitude) secondary teachers and their respective head teachers.

There was little positive response to the letters from the primary cohort and no response from the secondary schools. As a second attempt, documents, completed by participants at the end of their GEST Courses, were perused for teachers who had suggested that they wished to work with colleagues. Personal telephone calls were made to these primary teachers to expand the information they had on the Project and to see if they were interested in being part of the research. A further approach to secondary teachers was deferred. In all, six primary teachers and their head teachers agreed to participate.

Visits were arranged and carried out to these primary schools in June 1998 where an outline of what teachers might be expected to do along with some theoretical background on the benefits of mentoring for the professional learning of teachers was provided. The key aspects of the Sampson and Yeomans' model of mentoring (moving from the position of a trainer to the position of an educator) and Chapman's chart (Table 5.1) were used to explain and clarify the practical processes of mentoring.

It was proposed to begin the six teachers' action research (using some form of mentoring process) during the Autumn Term of the 1998/99 school year. The six teachers would work with a colleague in ways which they determined for themselves with little direct input from the researcher. Participants were asked if they would keep some kind of record of: (a) what they were aiming to do; (b) a timeline and description of these actions; and (c) details of what actually occurred. Training or coaching for the necessary skills and attributes for effective mentoring would be offered, in November, for Project participants as a three hour session on three evenings at the School of Education. Future training needs were hoped to be met, as their need became clear, by a series of exercises or short tasks which would be contained within the developing model or Framework. Alternatively, the teachers might choose to attend a Continuing Professional Development (CPD) Course offered by a local external agency.

Participant visits were scheduled for the last week of August and were to continue weekly from September. Base-line data of a short questionnaire / open-ended interview and a short subject diagnostic test would be collected from the teachers at the beginning of the Project. The researcher would also observe all participants teaching, to gain some idea of them as teachers, and keep a journal from on-going surveys of their (the teachers') interest and attitudinal changes.

Outcomes of the First Project

From the commencement of visits, pairs of teachers began to withdraw from the Project. The reasons given for retraction were primarily concerned with the imminent introduction of the Literacy Hour but the researcher perceived an underlying feeling of insecurity with teachers not really understanding how to go about working with one another. The researcher had taken the stance that ownership in the change that the Pair Peer- Mentoring Framework represented would be a vital factor in its successful development. The teachers would commit and participate more enthusiastically if they had actively generated the actual Framework to be used. This was not so. These teachers wanted to be told what to do; they wanted an identifiable structure of mentoring provision. One teacher's response typifies their attitude:

"Yes, but what do we really do".

In the face of this uncertainty and the demands of the Literacy Hour it seemed wisest, from their (the teachers') point of view, to withdraw. By the end of October'98 there were no longer any participants in the original Project.

Response to the Failure of the First Project

A bilateral approach was taken to this teacher insecurity and / or reluctance to design a way of working with a colleague. A survey was carried out to investigate Leicestershire teachers' general understandings of mentoring. These understandings would then form the underlying basis for the development of a new draft Framework to guide teachers' interactions in a mentoring relationship. The expectation was that in having a practical structure to direct and support them as they undertook a mentoring relationship, teachers might establish a partnership that could lead to effective professional growth.

Construction of Questionnaire

To help understand something of teachers' thinking on mentoring a "Knowledge-of-Mentoring" questionnaire was constructed. The questionnaire was concerned with what prior knowledge and ideas teachers might bring to the mentoring process by providing an opportunity to explore what skills, activities and knowledge teachers thought important in mentoring a colleague in science, and what kind of training or INSET they might require if asked to undertake such a role.

The comprehensive examination of the research in the field of mentoring, summarised in earlier chapters, had suggested that, though the model of mentoring used is shaped and continually amended by the organisational context in which it is practised, core ingredients exist which distinguish mentoring from other forms of intervention. These include the consistent, developmental nature of the mentor/mentee relationship (Sampson and Yeomans 1994; Allsop and Benson 1997; Moyles, Suschitzky & Chapman 1998; and Reiman and Thies-Sprinthall 1998), a supportive, non-judgmental climate in which to explore ideas and attend to the mentee's own agenda (Joyce and Showers 1995; McIntyre and Hagger 1996) and help in defining manageable strategies for change and for development (Desrochers and Klein 1990; Acton, Smith & Kirkham 1993; Rothwell, Nardi & McIntyre 1994; Stephens 1996; Freeman 1997). The core ingredients – that is the skills and activities mentors and mentees are engaged in, formed the basis of the questions in the survey.

Metholodgical Considerations

The main purpose of surveys is to get reliable information from answers. A high degree of involvement may contribute to respondents' accuracy in answering survey questions. Securing involvement needs to take into account some technical considerations, such as question formulation, wording, question form, question structure, and time for administration. Another technical consideration, put forward by Johnson and Briggs (1994), is that good questionnaire items should be built on theory and previous research. In Johnson and Briggs' opinion, this not only helps improve the quality of instruments but allows researchers to relate the findings of similar studies to one another. Sudman and Bradburn (1982) recommended that prior to being sent to potential respondents questionnaires should be subject to the following critical steps:

* criticism from experienced peers;
* revision and testing on friends, relatives, co-workers;
* revision and testing on approximately 50 people resembling the eventual respondents in the survey;
* revision and testing again; and
* revision.

Such steps are designed to detect any serious problems leading to reformulation and retesting of the trial questions before going on to ask them in the survey itself. The questionnaire was submitted to 15 people in total, colleagues, practicing teachers and friends. Given the fact that the questionnaire was not a major part of the study and due to the constraints of time and money it was therefore not trialed in the suggested larger numbers.

Questionnaire Design

The questionnaire was designed to see what or if any patterns of knowledge about peer mentoring or peer tutoring was held by experienced science and / or design technology teachers working at levels from nursery to post-sixteen schooling. As the questionnaire was trying to determine the extent and breadth of teachers' knowledge from two subject learning areas and from a diverse range of teaching levels, it was felt essential to collect teachers' demographical and biographical information. Consequently the first page of the questionnaire asked for details on: type of school; year level/s teaching; subjects teaching; gender; approximate age of teacher; number of years teaching; extent of teaching experience; and teaching qualifications.

The skills and processes concerned with mentoring were presented, within an ordered scaffold, in the three subsequent pages as a series of statements arranged together so that different parameters of mentoring were grouped together. The parameters chosen were based most directly on the work of Sampson and Yeomans 1994; Stephens 1996; Freeman 1997; and Moyles, Suschitzky & Chapman 1998; though extensive reading of studies in the field of mentoring or peer tutoring, mentioned earlier in this thesis, were also influential. These parameters were: prior to mentoring, mentoring skills, mentoring activities, out-of-class mentoring activities or duties, an overview of elements in mentoring, and training needs for specific skills.

Questionnaire Design Problems

Much of the difficulty in developing the questionnaire was in condensing the many theories/ideas on mentoring into a viable document (a) in terms of its length; (b) to ensure the text was 'reader-friendly'; (c) in ease of answering; and (d) in assessment of the completed document. Other considerations were the sorts of sections to be included and their arrangement on the questionnaire. The components of mentoring were set out in the questionnaire in the order that they would logically occur.

Thus sections were and appear as: *Prior to Mentoring; Suggested Mentor Skills; Mentoring Activities; Mentoring Activities in Non-teaching Time*; *Overview of Mentoring*; and *Training Needs.* Initially statements were grouped and presented under a general heading paragraph that asked teachers to answer the questionnaire in terms of what they thought or believed were the important skills and processes of mentoring or peer coaching. The text *Rediguide 12: Designing and Analysing Questionnaires*, by M.B. Youngman (1987), advice from experienced colleagues, and personal experience were used to guide the original design format of:

(a)	Length	4 pages maximum;
(b)	Text	short series of statements relating to a specific heading;
(c)	Completion	either ticking a box (personal/demographic information) or a circling of the number of the statement the teacher reader felt was an important or necessary element in mentoring;
(d)	Evaluation	analysing the patterns, if any, of the statements circled.

This format was chosen as teachers, being busy, would be unlikely to read or complete a long or complicated questionnaire. Two weeks was allowed for the return of the questionnaire on the premise that a longer timeframe increases the risk of 'putting off' completion or lost documents.

Questionnaire Re-structure

Through the trialing the following anomalies were hi-lighted from the draft questionnaire:

1. The introductory paragraph asked only for ideas and beliefs about mentoring whereas some of the specific statements required teachers to answer about their actual skills or ability to perform certain mentoring tasks. Thus the survey was purporting to be about one thing but asking questions about something else.
2. It was difficult to understand some of the statements. In trying to condense an idea or concepts into simple sentences meaning became obscure or was sometimes lost.
3. Being required to circle the number of the statement/s a teacher thought important allowed for every statement number to be circled. No pattern/s could then be seen nor would such answers give an indication of the perceived relative importance of individual statements in the teacher's belief system.
4. The section on *Essential Mentoring Skills* offered summary statements on seven skills designated as essential by Paul Stephens (1996). The question asked for answers to these seven statements. However, as there were two types of observation and two types of assessment given it would not have been possible to order, in importance, all skills in the allocated seven spaces.
5. The order of statements within a category was often randomly arranged which meant that sometimes readers were required to answer about themselves and then about a colleague or colleagues. This may have caused confusion.
6. Instructions on how to complete each section were different. This may have also caused confusion.

Second Draft of Questionnaire

The second draft saw a resolution of these problems.

1. Statements were re-written so:
   * the idea or concept was clear;
   * that they were concerned with what the teacher thought or believed;
   * they were ordered within each parameter so that statements concerning self were first and statements concerning self and colleagues followed.
2. The *Essential Mentoring Skills* section was re-written and re-numbered so it would be easy to rank, in importance, all the described components.
3. Instructions on how to answer the questionnaire were made consistent for each question.
4. Teachers were asked, in each section, to rank the statements in order of importance to themselves, starting with the most important. In this way some idea of their beliefs / values might become apparent. The risk that the teacher readers might fail to complete the questionnaire because of the extra time and concentration required to complete a ranking scale rather than just circle numbers was considered.

The revised questionnaire still evoked concerns about:

1. As written, there was no opportunity for teachers to leave out a statement or statements if they thought it/they were irrelevant or not important.
2. Uncertainty about the section of the questionnaire labelled *Essential Mentoring Skills*. What was its purpose? It appeared to be asking for the same kind of answer as had an earlier section; *Suggested Mentor Skills* . The section was included as an overview or a summary of all the previous sections and was placed in the questionnaire as a check or a second asking for the same information. This is a technique recommended for use in designing questionnaires as it gives some reliance to the accuracy of the answers provided (Youngman 1987).

Revised Form of Questionnaire

(an example of the questionnaire can be found in the appendices as Appendix 1)

A final draft added an instruction, as part of the detail on how to complete each section, to ignore those statements the reader saw as irrelevant or not important when completing their ranking order and a re-written introduction and heading to the section *Essential Mentoring Skills.* It was now called *Overview of Mentoring* to try to convey to the reader a sense of the purpose of the section - that is, to see it as something more than a repetition of an earlier section.

Possible Further Design Problems

Later consideration of the questionnaire design (after distribution) suggested the following possible difficulties in answering the survey's questions:

1. The final format of the questionnaire made it easy and apparently sensible to rank the statements for each question section in the order they appear on the questionnaire. It looked logical. This meant that the design might have had an influence on how ideas were ranked. The design would have been improved with a random order of statements for each question section.
2. The large numbers of statements for many of the questions may have caused problems. Questions 2, 4, & 5 had respectively, six, seven and nine statements for respondents to rank in order of importance to themselves. It is possible that when faced with such a large choice some respondents would either not carefully consider each statement or would stop making choices after perhaps a third or fourth choice. However, fewer statements would generate the problem of a narrow picture of the mentoring process.
3. A lack of a clear structure in which to show the ranking of importance may also have created difficulties. The format provided, [respondents to give ranking choices by writing statement numbers along a line at the bottom of the question (see Appendix 1)], may have lead to some confusion between ranking choice and statement number. The provision of a box alongside each question, in which the respondent wrote his/her ranking order for that statement, would have provided a clear picture and would perhaps have given a less confusing layout to the questionnaire.

Distribution and Initial Analyses of the Questionnaire

(The results of the final analyses of the questionnaire can be seen in Chapter 8)

Five hundred copies consisting of, a covering letter, the questionnaire and a stamped, self-addressed envelope for return, were sent to all schools in Leicester City and Leicestershire at the end of October 1998.

A brief, initial analysis of the survey showed that though overall there did not appear to be any particular pattern/s of response to the questions there were three areas that showed discrepancies that would have implications for the kind of training or INSET teachers might require if asked to mentor a colleague in science. These areas relate (1) to an inconsistent ranking of importance given to specific skills and activities in the main body of the questionnaire and the number of teachers asking for training in the same skill when completing the training needs section of the questionnaire and (2) to the descriptive language used to describe particular skills or activities. These areas are discussed below:

Challenging Colleagues

An example of these inconsistencies can be seen in the skill of 'ways of challenging colleagues' which was chosen by 63% of respondents as a skill they would like training in. Yet in questions where the actual skills and / or techniques were given that could be used to challenge colleagues few respondents gave them a high ranking.

Subject Knowledge

Only a small number of teachers asked for training to increase subject content knowledge or questioning skills. This is knowledge that is important to have if acting as a subject peer mentor. The smaller number choosing this option is however, consistent with the questionnaire results where statements related to subject knowledge or specific subject skills were not ranked as particularly important.

Use of Language

There were differences in the ranking given to similar skills dependent on the language used. For example if a question used terminology that appeared 'informal' as in question 3 '*observing a colleague's teaching and providing feedback*' it was given a higher ranking of importance than a statement such as in question (4) *have post-lesson de-briefings with colleagues* which was ranked as having a low level of importance.

In terms of developing INSET to meet the above training needs it was also necessary to note the large number of respondents (more than half) who asked for training in *Models of teaching related to best practice.*

This questionnaire (Questionnaire1) was also given to all participants in the Second Project where a similar pattern of responses was found (see Chapter 8).

Construction of the Framework for the Second Project

Framework Design

Initial analysis of the questionnaire seemed to indicate that teachers may not have clear ideas on the knowledge, skills and activities that might be thought necessary for successful subject mentoring. Therefore it looked as if something more concrete and specific than the Sampson and Yeomans' model should be provided to help teachers' mentor a colleague. A model that would allow teachers to operate flexibly yet at the same time provide a safe but detailed structure in ways to work together. That is, what was needed for the Project was a simple framework that could cope with primary science co-ordinators' lack of non-contact time, possible lack of subject expertise, and probable lack of experience in working in this way with an experienced colleague or colleagues. As Freeman (1997) puts it,

> *Overall, a model needs to encourage and sustain mentors/mentees to explore uncharted seas, rather than sail past them, believing that they could yield insights useful in moving forward the process of professional development.* (p. 61)

The Draft Framework

The draft Framework was therefore developed from Gottesman and Jennings' (1994) work "Peer Coaching for Educators". Gottesman and Jennings present a five-step model of the mentoring process which has equity in the partnership between teachers and is founded on the premise that teachers have limited time to actively support one another.

The Model Used as a Framework for Pair Peer-Mentoring

The Model's Steps

(The time in brackets is the suggested length for each interaction)

1. Teacher's request for a visit/meeting (5 minutes)
2. The actual visit/meeting (10 minutes)
3. The mentor's review of notes and development of possible suggestions (5 minutes)
4. The talk after the visit (10 minutes)
5. Review of the process (5 minutes).

Skills to be developed to use this Framework

(adapted from Gottesman and Jennings, 1994 p. 16)

The Skills Training was adapted from Gottesman and Jennings' original model to take into consideration findings from Questionnaire1 and to accommodate the kind of processes the teachers as mentors and mentees may be undertaking, such as learning from one another while planning instruction, developing support materials, watching one another work with students, and thinking together about the impact of their behaviour on their students' learning (Showers and Joyce 1996, pp. 12-16). Therefore the skills and processes to be developed in the INSET sessions were:

1. Creating a personal growth plan - Pre- Model Step 1
   * selection of a focus or foci
   * an action plan
   * listing of criteria for success
2. Observation skills - Model Step 2
   * peer watching or
3. Programme planning Model Step 2
   * medium term planning meeting
   * lesson planning meeting
4. Post-observation/ skills - Model Step 3
   * review of observation notes; or
   * review of meeting
5. Peer feedback - Model Steps 4 and 5
   * eliciting ideas/suggestions from mentee on where they could go or how to achieve their goal

Another consideration that needed to be taken into account in the development of the draft Framework was the ethical issues that would arise during the developmental process.

Ethical Considerations

As the research project had the potential to raise sensitive issues of various kinds the research design was agreed collaboratively with the research supervisor and the researcher. Issues taken into account were confidentiality of the process, respect for the teacher and a recognition that teachers might have other commitments and not always be able to complete agreed to tasks. A brief summary of actions taken in regard to these concerns is outlined in the following paragraphs.

Confidentiality

Confidentiality was guaranteed at the start of participants' involvement. The teacher-pairs were invited to participate in the research and briefed on the nature and purposes of the project. Research documentation was to be kept in a secure place and if used would have altered names, and non-specific school descriptors.

Respect

Teachers were to be treated with respect. Individual's teaching practices were to remain private. Comment or advice given in feedback or any other form of critical appraisal of a teacher's practice would not be made available to administrative or other staff of the school nor shared with teacher pairs at other schools without the permission of the teacher or teachers concerned.

Recognition of Other Commitments

Any reluctance to document ideas, thoughts, actions or even simple facts was not pursued vigorously by the researcher. Many of the teacher participants felt that as their current workload was so heavy they could not afford the time to adequately complete the paperwork. The position to not pursue lack of 'responses' documentation was based on the view that research can be exploitative of those who have agreed to be the focus of the research. It would be unethical to apply undue pressure to the teacher participants.

Conclusion

The following chapter, six, provides the theoretical basis of the methodology used for the research design of the mentoring project. The rationale for this approach being that a qualitative research method would be appropriate as mentoring is a complex activity taking place in highly individual social settings (McIntyre and Hagger, 1996).

Chapter Six - Research Design

Orientation

This chapter gives details of the methodology and research design of this study. The section opens with an examination of some of the principles of why research might be undertaken and goes on to describe the choice of methodology and its application to the study. A discussion of the theoretical frameworks used for data analysis is included in the relevant section.

Introduction

There is a problem in trying to give a definitive answer to the question on what is educational research in that it means different things to different people in the field of education – 'there is a huge range of often disparate activities that form the education process' (Verma and Mallick 1999, p. 55). In this study, the research is an attempt to understand the meaning or nature of experience of a number of primary teachers, finding out what they were doing and thinking as they taught science, and as such may be best fitted to Stenhouse's (1984) definition of educational research given as:

> *a systematic activity that is directed toward providing knowledge, or adding to the understanding of existing knowledge which is of relevance for improving the effectiveness of education.* (p. 44)

Reasons for the Research

There are many valid reasons for research to be undertaken. One reason lies in the value of using research as a critical tool in the introduction of small-scale change. Another reason is the nature of the research problem itself. In both elements, research as a critical tool in the introduction of small-scale change and the nature of the research question, were pertinent to the Pair Peer-Mentoring Project.

Research designs are about organizing research activity, including the collection of data, in ways that are most likely to achieve the research aims (Easterby-Smith, Thorpe & Lowe 1994, p.84). Therefore, research that attempts to understand the meaning or nature of experience of individuals, such as in this study, lends itself to getting out in the field and finding out what people are doing and thinking. What was of importance in the research was what teachers actually experienced in their classrooms, what meaning they gave to those experiences, what kinds of problems evolved over time, and how to help teachers to tackle these problems effectively. Such an approach includes description and interpretation, the latter to help teachers to a more in-depth insight into problems and into associated knowledge/ strategies / skills to address these problems.

The Study Research Design

As the purpose of the study was to gain insight into one perspective of a number of teachers' professional lives a form of qualitative research seemed indicated. This was the kind of methodology that would be best suited to address the questions or solve the problems that arose during the course of the Project. A down side to this type of approach is that qualitative methods are slow and can cause anxiety to the researcher because of the lack of structure or even an end goal, in the research design. Moreover since the research question/s are to be developed and refined during, rather than prior to the research, it is more difficult to plan the research programme as a whole. Establishing a scaffold for analysis was a particular, continuing cause of concern in the Pair Peer-Mentoring Project.

Research Methodologies Examined

Bearing the restraints of uncertainty and difficulty of planning in mind, within the range of qualitative research methodologies possible, ethnography was initially selected as the chosen line of approach. Ethnographers have a research-based belief that behaviour is significantly influenced by the environment in which it occurs, that is, the variables being investigated are studied where they occur, as they naturally occur. As the study was interested in insight, discovery and interpretation of a select group of teachers' practice in their own classrooms rather than hypothesis testing, ethnography seemed an appropriate, initial starting point.

The purpose of an ethnographic approach is the observation and description of the social behaviour of a group within a setting, organisation, or community. The roots of ethnography lie within social anthropology and underpin its core method: observation while participating in the life of the group (Pole and Lampard 2002, pp. 288-289). The ethnographer's immersion in the group and his/her desire to understand it from the perspective(s) of group members provide links to phenomenology as phenomenologists identify phenomena through how they are perceived by participants in the research.

Gay (1992, p. 239) maintains that ethnographic and phenomenological studies typically represent 'multi-instrument' research with data collected over an extended period of time, using a variety of data collection strategies in conjunction with observation. He uses Pelto and Pelto's (1978) classification of verbal and nonverbal techniques to describe these collection strategies. Verbal techniques involve interactions between the researcher and persons in the research environment and include tools such as questionnaires, interviews and attitude scales. Nonverbal techniques are less obtrusive, that is, less likely to affect the behaviours being studied and include such strategies as the use of recording devices and examination of written records (Gay, pp. 240-241).

A major difference between ethnographic and phenomenological approaches and traditional approaches is that the review of related literature, the study of previous research and theory, does not result in testable hypotheses, to be supported or not supported by the results of the study. Instead the study of previous work results in tentative, working hypotheses and strategies only:

> *Epistemologically, phenomenological approaches start from a perspective free from hypotheses or preconceptions and emphasise the importance of personal perspective and interpretation.*
> (Lester 1999, p. 2)

However, Stanley and Wise (1993) state as it is not possible to be totally bias free it is important in these kinds of studies to make clear how interpretations and meanings have been placed on findings, as well as make the researcher visible in the research as an interested and subjective player rather than a detached and impartial observer.

While ethnography and to a lesser extent phenomenological methodologies provided an overview or context (the bigger picture) for the researcher to work in, for the teachers an action research methodology was the tool for their actual day-to-day research and collection of data. This choice was made because a principle of this study was that during the act of teaching, teachers were investigating and improving their own practice. That is, teaching is not considered as an objectively measurable unit, but as a function of personal interaction and perception (Vonk 1996, p. 117).

Action Research

There are a number of differing proponents of education action research with Stenhouse (1975) being a key figure in its development. In Stenhouse's representation action research is a cyclical occurrence rather than a single intervention, with each intervention evaluated in order to inform the next stage of planning, so technical change and understanding come about together. Other academics, for example Kemmis (1985), Elliott (1991, 1993) and Crookes (1993), inspired by Stenhouse's support for action research, promoted the use of this methodology for improving educational practice with Kemmis offering this definition:

> *Action research is a form of self-reflective enquiry undertaken by participants in social (including educational) situations in order to improve the rationality and justice of (a) their social or educational practices, (b) their understanding of these practices, and (c) the situations in which the practices are carried out.* (p. 152)

Action research can also be based, as do Easterby-Smith et al (1994), on the assumption that social phenomena are continually changing rather than static and that the researcher is seen as part of the change process itself. As a consequence, in their opinion, two features of action research are:

1. The belief that the best way of learning about an organisation or social system is through attempting to change it, and this therefore should to some extent be the objective of the action researcher.
2. The belief that those people most likely to be affected by, or involved in implementing these changes should as far as possible become involved in the research process itself (p. 84).

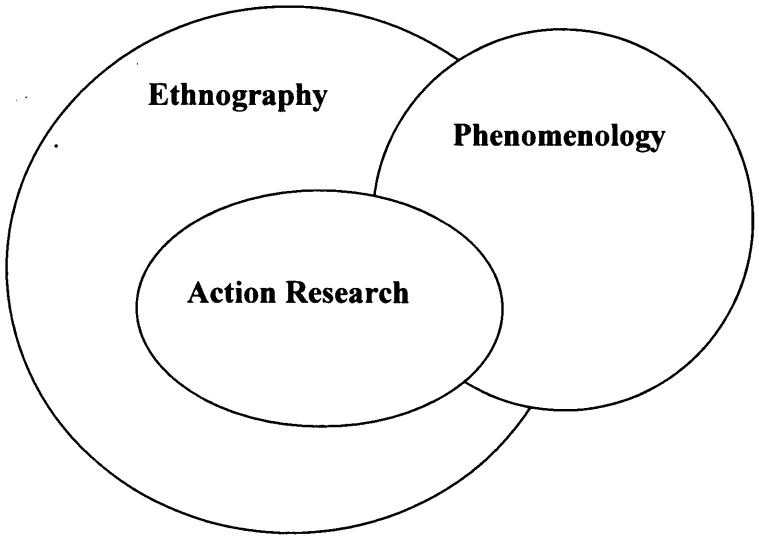
While endorsing the features put forward by Easterby-Smith et al, Lomax (1994) asserts that another characteristic of action research, that stresses its importance for managing change, is that action research is an intervention in practice to bring about improvement. Lomax points out that such action research can be small scale and focused on small technical improvements in individual practice. In her view (p. 157) the improvement that professionals seek to make involves recognizing professional goals and making a commitment to achieving them. Swann (2000) also draws attention to this need to bring about improved practices when she puts forward a caveat to use of critical tool research stating that for 'critical tool' small-scale research to be consequential to educational practice, it must stimulate teachers, education policy-makers and / or students to reflect on practice.

> *Critical tool research's potential to lead to improvement lies in the extent to which it challenges assumptions, by making apparent various errors and limitations which underpin existing or planned educational practice, and / or it provides answers to questions about such practice.* (Ibid p. 9)

Stenhouse's work of 1984 reinforces this idea where he emphasised that action research is necessarily a substantive act, and has to be undertaken with an obligation to benefit others than the research community. In this study, this would indicate that the research should benefit the teachers and the schools in the Project. This was the intention of the Pair Peer-Mentoring Project, to establish innovative, collegial pairs of teachers, self-monitoring their practice as real co-researchers in the study.

The following diagram (Figure 6.1) is presented as a graphic representation of the three methodologies discussed, illustrating how each was interlinked in the pair peer-mentoring study.

Figure 6.1: Graphic Representation of Methodologies Used in the Pair Peer-Mentoring Study



Issues for the Researcher in Using an Action Research Methodology

Though the researcher, in this study, was interested in grounding the research in the teachers' own experience and meaning frames, there was some element of the researcher's own concerns and problems. This was relevant as definitions of action research often have, as integral to the whole concept, that it is undertaken by the actual practioner investigating their own field of work (Stenhouse 1975; Crookes 1993). By contrast, this research project had the teachers 'researching' their practice with the researcher acting as 'a form of continuous validation by an 'educated' witness from within the context' (Lomax p. 159). Having 'an educated witness from within the context' raised questions about the concept of 'self' in this particular model of research that need to be addressed.

The Concept of 'Self'

Altrichter and Posch (1989) suggest, as do Stanley and Wise (1993), that in teacher research, rather than the researcher ignoring his/her own theoretical preconceptions it is essential to reflect on them. 'It facilitates the definition and clarification of a starting point for research and enables the researcher to select carefully the data needed' (Ibid p. 24). While Elliott (1993) talks of 'situational understanding' being a necessary prerequisite for anyone engaged in action research. Elliott (p. 69) describes this 'situational understanding' in terms of three strands of reflective practice, namely 'personal', 'problematic', and 'critical'. The 'personal' element is the individual as an integral part of his or her own research. The 'problematic' refers to the interactive role of the self within the parameters of this research. The 'critical' strand is what the self brings to the investigation in terms of taken-for-granted beliefs and assumptions. Other writers, such as Whitehead (1993) and Lomax (1994) also identify the importance of self in that the effects of the values and beliefs held about practice, including the researcher's own assumptions about good practice have impact and recommend that they be critically examined.

> *Action researchers put the values guiding their choice of actions 'up front' because the question, "How can I improve...?" fundamentally affects the relationship between the researcher and the data, and the choice of levels of data appropriate for analysis.* (Lomax 1994, p. 156)

Altrichter and Posch (p. 24) continue to add to the debate when they claim that the 'perspective' of a researcher always contains theoretical elements, some of which he/she is not aware of. These originate from theoretical and prior experience and they contribute in the course of the research process to the building of a full 'theory' in the sense of Glasser and Strauss's (1967) ideas of grounded theory, (the way the researcher first looks at the field when it is entered and the way first encounters in the field contain a 'theoretical nucleus' will contribute to the more elaborate 'theory' in some way or another)[5]. In Altrichter and Posch's view the research concept of the professional researcher can be conceptualised as a kind of 'reflection-in-action' (Schön 1983, pp. 64-68)[6].

[5] Grounded Theory is discussed in more detail in the data analysis section of this chapter.

[6] Pollard and Tann (1993, p.4) define Schön's conceptualisation of reflective teaching as a process through which the capacity to act on professional judgements is developed and maintained.

Awareness of Schön's (1983, 1987) theory of reflection-in-action had enabled the researcher to develop insight into her own practice. In her own teaching, the researcher identified instances or phenomena, made judgements on why this might be happening and then attempted to solve the problem. If the solution was not effective then the process was repeated until something was found that did work so that each new situation was dealt with through a 'constant activity of appreciation, action, re-appreciation and further action', engaging in a cycle that extended and enriched her repertoire of practice.

This understanding of the reflective process and insight into her own practice was to be used by the researcher to support and / or facilitate the teacher mentor pairs through recognising elements in the teacher pairs' teaching practices or by helping them identify specific elements of their own practices. In attempting to do this it was imperative for the researcher to acknowledge that her own experiences may effect her judgements and advice about 'good' science teaching, that is to be aware of the influence of 'self' when encouraging the teacher mentor pairs to develop and / or understand their own reflections-in-action. To help them become what Schön describes as a researcher in a specific and particular practical situation and to make the links that Altrichter and Posch suggest between the professional researcher and the reflective teacher engaged in action research.

> *Quality in both professional research and professional teaching is achieved by tightly interlinking theoretical and empirical, inductive and deductive aspects in the way Schön characterized as 'reflection-in-action'. Though there will be differences with regard to the concrete forms of reflection between professional researchers and teachers these differences are gradual rather than dichotomous ones. What is good for practice is good for research.* (Ibid p. 29)

Subjectivity versus Objectivity

In addition to the researcher's own theoretical preconceptions another dilemma in the role of the researcher/tutor in the Pair Peer-Mentoring Project was the key issue of subjectivity versus objectivity. As a participant within the research situation, it would be difficult to be totally detached and objective. A number of arguments can be used to counter this difficulty. One is that the researcher's role as a tutor/ facilitator, working in a number of schools, provided the opportunity for a wider perspective beyond that of working within a single class or school - it allowed the study to be more objective than if it had been contained within one educational setting, and also gave it a broader scope. Another positive factor was that there are benefits from being part of the educational field under review. A key one being insight, giving the researcher a knowledge of what is being researched. A further benefit is familiarity with the context. These two factors facilitated a smoother operation of the research process within the schools involved with teachers asked to incorporate the research into their existing teaching routines to minimise tension.

A further point is that because the researcher was known by the teachers and had head teacher support for the research programme, access was facilitated. However, though the teachers saw the research had the potential to be useful and beneficial there was some perception of the research being an extra burden. The statutory requirements for daily literacy and numeracy teaching, plus science and the foundation subjects results in a crowded curriculum and some reluctance from primary teachers and schools to participate in research projects. Despite these constraints the researcher ensured that the research continued to be related to what was actually happening with science teaching in the schools.

Lastly, it can also be argued that all research is subjective to some degree. This is particularly true of research interested in human interactions. If the researcher is also a player in the research field then it can be posited that the results obtained may be a truer reflection of the actual reality than that obtained from an outside agent (Altrichter and Posch 1989).

Having considered approaches to the collection of the data, thought needed to be given to the methodology for analysis.

Theoretical Frameworks used for Data Analysis

Strauss and Corbin (1998, p. 11) in speaking about qualitative analysis describe it as a non-mathematical process of interpretation, carried out for the purposes of discovering concepts and relationships in raw data and then organising these into a theoretical explanatory scheme. Or as Evans (1998) expresses it:

> *Qualitative analysis reflects the cyclical, elucidatory process of conceptualisation, data analysis, reconceptualisation and reanalysis and which in turn, illustrates the difficulties involved in wanting to study a concept which may be unclearly defined, but whose definition is dependent upon elucidation of its properties and constituents through study.* (p. 138)

The approach taken to data analysis in this study was to make some use of grounded theory to provide the scaffold for taking observations, interpretations, and understandings to a conceptual level and provide guidelines for the discovery and formulation of theory but also to allow for a 'reflective conversation with the situation' which has the same characteristics as practioners' reflection-in-action as described by Schön (1983, 1987). Other reasons for the use of a grounded theory approach to data analysis were:

1. theory derived from data is more likely to resemble the "reality" than is theory derived from putting together a series of concepts based on experience or solely through speculation (Altrichter and Posch 1989); and
2. grounded theories because they are drawn from data, are likely to offer insight, enhance understanding, and provide a meaningful guide to action (Strauss and Corbin 1998 p. 12).

For the purposes of this research, grounded theory is seen as theory generated from multiple stages of data collection within conceptual categories, systematically built within the process of social research (Glaser and Strauss 1967; Creswell 1994). Strauss and Corbin (1998) define grounded theory as a general methodology for developing theories during a continual process of coding, analysis, reflection and recoding. These processes, sometimes referred to as the constant comparison method, generate thick, saturated descriptions, a state reached when further analysis will no longer contribute additional evidence (Grove 1988; King 1994; Strauss and Corbin 1998; Searle 1999).

In this study the multiple stages of data collection formed a scaffold for the research methods while the continual process of coding and analysing the data informed the emerging changes in the research design. This was because a simple, tidy paradigm did not reflect or support the complex realities of the teacher pairs in the Peer-Mentoring Project. Consequently, many of the procedures were frequently modified and refined in order to support and sustain the unexpected and changing responses of the participants; a similar experience to that described in the work of Abbey, Bailey, Dubrick, Moore, Nyhof-Young, Pedretti & Saranchuk (1997) and Middlewood, Coleman & Lumby (1999).

In addition, the researcher, as a result of the ways in which events changed uncontrollably, felt a degree of discomfort. There was anxiety because of structures that were thought to be of help not being as effective as hoped with the resulting difficulty in making plans for the on-going research programme as a whole. Details of these difficulties are included in the descriptions of data collection and data analysis indicating the important lessons learnt from the changing processes and the impact that this had on those involved. Tom (1996) expresses concern that many published accounts of qualitative research do not record the way in which methodologies change within a research project. A concern that the 'messiest' accounts are interpreted as failures inhibits an open reporting of grounded methodologies (p. 347).

Consideration was also given to the fact that though grounded theory can be understood as a significant approach to research as it offers many practical ideas for the researcher in the field it does not always provide a useful general orientation to teacher research. This is because the grounded theory approach proceeds from the assumption that there is, and should be, a strong institutional separation between professional research and professional practice, which contrast sharply with the collaborative aims of action research (Altrichter and Posch pp. 26-27). Therefore, in this study's context 'grounded' has at least two meanings. First, in the notion of 'grounding' emergent theory in the experiences and environments of the teachers as the research attempted to systematically seek out multiple perspectives and make sense of these perspectives and interpretations (Strauss and Corbin 1998, p. 280). Secondly grounded theory is used to describe specific strategies formulated for handling and making sense of, 'initially ill-structured qualitative data' (Coffey and Atkinson 1996). In this way, grounded theory facilitates the development of conceptually dense representations and adds to the credibility of the research by providing a record of the pathways taken.

These pathways are outlined in depth in the next chapter, Chapter 7, which describes the data collection process throughout the implementation of the Pair Peer-Mentoring Project.

Chapter Seven – Implementation of the Pair Peer-Mentoring Project Including Data Collection

Orientation

There are two parts to this chapter. The first part delineates methods of data collection in the light of a literature review of possible methodologies (Chapter 6). The second part provides an overview of the process of instigating the Pair Peer-Mentoring Project describing the instruments used, the on-going compilation and analysis of data together with a discussion of the successes and difficulties of implementing each stage of the research.

Introduction

The way in which teachers' learning is managed provides a powerful model in the school for the way in which teachers manage student learning. Joyce and Showers' (1980) seminal work which analyses the effectiveness of staff development in education established a clear correlation between access to the full portfolio of learning activities and the extent to which principle is actually translated into habitual practice (Evans, Packwood, St. J. Neill and Campbell, 1994). As discussed in Chapter Four, Showers, Joyce & Bennett (1987) defined four potential levels of impact of training which may be summarised as (1) awareness, (2) understanding, (3) application, (4) integration and transfer. They also identified five of the most commonly used training methods, (1) presentation, (2) modelling, (3) practising, (4) feedback, and (5) coaching. The crucial conclusion of their research was that full integration of new knowledge or skills was only achieved when all five training methods were used. They advised that if any of the components were left out, the impact of training would be weakened in the sense that fewer numbers of people would progress to the transfer level, which is the only level that has significant meaning for school improvement.

Fullan (1982) in talking of change outlines the view that an innovation process consists of three overlapping phases: initiation, implementation and institutionalisation. These stages have different characteristics and require different strategies for success to be achieved. For example, during the initiation phase the innovation, to be successful, needs to be clearly articulated, have an active advocate, a forceful mandate, and be complemented by extensive training. During the implementation phase, the innovation needs to be well coordinated, have adequate and sustained external support, and provide rewards (eg. supply cover, positive feedback) for those involved. During the institutionalised phase, the innovation will need to be embedded in the school organisation, tied into classroom practice, have widespread use in the school, and be supported by local trainers.

The Pair Peer-Mentoring Project

The Project for Pair Peer-Mentoring in its proposed, training, adoption and implementation strategies appeared to fulfil all Joyce and Shower's criteria for success. Fullan's phases of change, within the resources allowed, were also incorporated into the research design. That is, by introducing, facilitating and supporting the Project through a collaborative relationship between the researcher and the teachers, change in teaching practice could occur. So by the end of the Project it was hoped that teachers would be:

- communicating with colleagues;
- making provision to think and talk about their science lessons;
- bringing instinctive techniques to the conscious level, thereby increasing the amount of time they spent on discussing instructional matters;
- giving and getting technical feedback from respected peers;
- continually improving their science teaching skills through observations, as well as
- improving their skills of analysis, challenge and articulation of science content pedagogy.

Data Collection for Monitoring of the Project

Data was needed to monitor the initiation, implementation, and optimistically the institutionalised phases of the participants' interactions within the Framework for Pair Peer-Mentoring. All the strands of the research, ethnography, phenomenology and action research, required a wide variety of qualitative data collection strategies. These collection strategies used verbal and nonverbal techniques and included tools such as questionnaires and interviews, regular individual researcher/tutor – teacher mentor meetings, periodic small-group meetings, teachers' logs and completed proformas and tape and video recordings.

Methods of Data Collection

Baseline Data Collection

Once the mentor/mentee partnerships were set up and had begun to work, the researcher/tutor chose five mentor pairs and asked them to complete Questionnaire 1 and an open-ended one-to-one semi-structured interview, identified as questionnaire 2. As a way of gathering additional baseline data the researcher/tutor observed the pairs teaching, to gain some idea of them as teachers, using a model put forward by Glatthorn and Fox (1996). Use was made of another model, the Concerns-Based Adoption Model (Hall, Wallace & Dossett 1973; Hord 1987) to oversee the stages the teachers were expected to go through when confronting or managing change.

On-going Data Collection

Initially, to allow time for the Project to become established, the researcher/ tutor visited each mentor pair at the beginning and end of a term. The researcher/tutor kept field notes on the teachers' adoption and implementation of the Framework through these bi-termly tutor visits. At the teacher level, each teacher in the mentor pair was expected to complete a personal Action Plan outlining their focus of interest, the time-line and their criteria for success. They were also asked to keep records of 'mentoring' meetings as they implemented their Action Plans.

After the first year, teachers' opinions of peer-mentoring were collected from a written evaluation form. At the same time, teachers' re-visited one area of questionnaire 2, (hoped for gains from participating in a pair peer-mentoring scheme). This question was again re-visited at the end of the Project in July 2000. In the second year of the Project the researcher/tutor attended a feedback meeting at least once a term to ensure that the teacher pairs carried out some mentoring of one another. Field notes were kept of these meetings. During the second year the researcher/tutor made a video of each of the teachers teaching a science lesson. Teachers answered an individual reflective skills proforma prior to and after viewing their video.

End of Project Data Collection

In July 2000 data was again collected via a teacher review of beliefs and ideas about teaching and learning in science, (questionnaire 2); teachers' views of the peer-mentoring partnership; and the teachers' perceptions of changes to themselves and their teaching as a result of the Project. An outside perspective was provided by gaining the headteachers' views on the impact of the Project on their teachers, their pupils, and the school.

Research Instruments

A detailed outline of the instruments used in the Project, including the basis for their selection (where relevant), is described in the following section.

Baseline Data Instruments

Questionnaire 1

The questionnaire (Appendix 1) teachers completed was the original questionnaire, Questionnaire 1, sent to all schools in Leicester City and Leicester County in October, 1998 (details of which are outlined earlier in Chapter 5). The purpose of this survey had been to discover something of teachers' knowledge of the mentoring process. The teacher participants in the research study were asked to complete Questionnaire 1 as an indicator of the prior-knowledge and ideas they might bring to the Project.

The Open-ended Interview - Questionnaire 2

The protocol for questionnaire 2, the one-to-one open-ended interview/ survey (Appendix 2) was developed and trialed in an earlier study (Buzzard and Jarvis, 1999). With some modification, after consultation with expert colleagues, this semi-structured questionnaire/ survey was used to gain an insight into the teachers' biographies, their beliefs about teaching and learning in science, their career hopes, and their expectations of the Pair Peer-Mentoring Project. Whilst most of these interviews were tape recorded, (with the consent of the teacher), some participants preferred to make written responses to the questions. Extracts used in this thesis are verbatim transcripts.

Observing Classroom Practice

Two models were used to try to see changes in teachers' practice throughout the course of the project. The first being the Glatthorn and Fox (1996) Model allocating Level of Teaching Skills and the second the Concerns-Based Adoption Model (CBAM) developed by Hall, et al (1973) and adapted by Hord (1987). In the interest of research rigor teachers were 'placed' on each of these models both at the beginning and at the end of the Project.

1. The Glatthorn and Fox Model

The model put forward by Glatthorn and Fox (1996) portrays teaching skills as embracing three levels: basic, intermediate, and advanced with the teaching skills conceptualised as including eight categories of behaviour. In each of these categories it is hypothesised that teachers move through three levels, each one more complex and more comprehensive than the preceding one with expert teachers functioning at the advanced level. Such a model provides a basis for distinguishing the level that experienced teachers are working at as well as indicating the kind of strategies that may be needed to bring about change.

The Glatthorn and Fox model was synthesised from Kenneth Leithwood's (1992) earlier work on the interrelated dimensions of teacher development. Leithwood (pp. 87-95) suggests a framework of three interrelated dimensions: psychological development, development of professional expertise, and career-cycle development. An examination of Leithwood's explanation of development of professional expertise provides an insight into, and a deeper understanding of the categories used in the Glatthorn and Fox model. Figure 7.1 presents Leithwood's (1992) model of the development of professional expertise. Having this broader perspective helped place the teacher participants in the study on an 'appropriate' level of the Glatthorn and Fox model.

Figure 7.1: Development of Competence in the 'Technology' of Educational Practice

1.	Developing survival skills	* Partially developed classroom-management skills * Knowledge about and limited skill in use of several teaching models * No conscious reflection on choice of model * Student assessment is primarily summative and carried out, using limited techniques, in response to external demands, (eg. Reporting to parents); there maybe poor link/links between the focus of assessment and instructional goal
2.	Becoming competent in the basic skills of instruction	* Well developed classroom-management skills * Well developed skill in the use of several teaching models * Habitual application through trial and error, of certain teaching models for particular parts of curriculum * Student assessment begins to reflect formative purposes, although techniques are not well suited to such purposes; focus of assessment linked to instructional goals easiest to measure
3.	Expanding one's instructional flexibilithy	* Automatized classroom-management skills * Growing awareness of need for and existence of other teaching models and initial efforts to expand repertoire influenced most by interest in providing variety to maintain student interest * Student assessment carried out for both formative and summative purposes; repertoire of techniques is beginning to match purposes; focus of assessment covers significant range of instructional goals
4.	Acquiring instructional expertise	* Classroom management integrated with programme; little attention required to classroom management as an independent issue * Skill in application of a broad repertoire of teaching models
5.	Contributing to the growth of colleague's instructional expertise	* Has high levels of expertise in classroom instructional performance * Reflective about own competence and choices and the fundamental beliefs and values on which they are based * Able to assist other teachers in acquiring instructional expertise through either planned learning experiences such as mentoring, or more formal experiences, such as in-service education and coaching programmes
6.	Participating in a broad array of educational decision at all levels of the education system	* Is committed to the goal of school improvement * Accepts responsibility for fostering that goal through any legitimate opportunity * Able to exercise leadership, both formal and informal, with groups of adults inside and outside the school * Has a broad framework from which to understand the relationship among decisions at many different levels in the education system * Is well informed about policies at many different levels in the education system

Leithwood 1992

Leithwood's categories and behaviours have been synthesised into the Glatthorn and Fox (1996) model which is shown in Figure 7.2.

Figure 7.2: Glatthorn and Fox Levels of Teaching Skills

	Level of Skill		
Behaviour Categories	**Basic**	**Intermediate**	**Advanced**
Model of Teaching	Uses direct instruction	Uses model recommended by experts in the field	Users several models, especially constructivism
Curriculum	Implements school scheme of work	Integrates within subject	Integrates 2 or more subjects, providing for enrichment and remediation
Content Knowledge	Avoids content errors	Demonstrates sound and current content knowledge	Enables students to understand deep structure of subject
Classroom Climate	Maintains orderly environment, uses most of the class time for learning	Maintains learning-focused environment, maximizes time on task	Varies environment to suit learning goal, providing for co-operative interaction, relates time use to learning priorities
Lesson Structure	Provides overview, states objectives	Also makes transitions effectively and summarizes lesson	Varies lesson structure when necessary to encourage discovery
Learning Activities	Provides activities that relate to objectives	Varies activities	Emphasizes active learning assessment
Assessment	Checks for understanding	Also uses assessment data to modify instruction	Uses authentic assessment measures, giving feedback to students
Communication	Explains clearly, questions effectively	Also uses student answers to advance discussion	Also structures discussion to foster student – student interaction

Glatthorn and Fox, 1996

As Figure 7.2 indicates, teaching skills are conceptualized as including eight categories of behaviour. The first is the model of teaching that the teacher uses most of the time, either as a result of decision making or training. The second is how the teacher uses the school scheme of work in planning and teaching. Next is the teacher's mastery of content knowledge. The fourth category involves the classroom climate and environment for learning. Fifth is the type and extent of lesson structure, the way the teacher organizes instruction. The sixth category embraces the teaching-learning activities provided. How the teacher assesses learning is the seventh category. The final category involves the communication processes, focusing on the teacher's use of explaining, questioning, and responding.

Glatthorn and Fox (1996, p. 4) provide a further explanation of their first category saying that most models of teaching subsume many of the other categories identified in their model. The term direct instruction (basic level) is further clarified as it set out to represent Hunter's (1984) ideas of the "six-step lesson plan" which includes the following components: anticipatory set, presentation, checking for understanding, guided practice, independent practice, and closure. Glatthorn and Fox consider teachers working at the intermediate level have moved towards using a model recommended by experts in a particular subject field. For example in science, some teachers might use the 'scientific inquiry model'. Teachers at the advanced level vary the model of teaching depending on the learners and the learning objectives. Many 'advanced level teachers' may use a constructivist model of teaching.

2. The Concerns-Based Adoption Model (CBAM)

The second model used to oversee changes in teachers' practice was The Concerns-Based Adoption Model (CBAM). The CBAM model Hord (1987), was formulated as a way to explain the stages teachers go through when confronting or managing educational change. It takes a different perspective to the Glatthorn and Fox approach in that the four main categories within the model examine the relationship between attitude and behaviour in any kind of change, not only classroom practice. In each of these elements, (attitude and behaviour), are seven stages through which teachers may pass as they undergo the change process.

The attitude element looks at the stage of concern the teacher is at and the related nature of that concern. The behavioural element looks at the level of use the teacher is making of the innovation and the nature of that use. These elements are briefly outlined in Table 7.1 and Table 7.2.

Table 7.1: CBAM Model Stages of Concern and Nature of Concern

Affective / Attitudinal						
Stage of Concern/Nature of Concern						
Awareness	**Informational** lack of information / skill	**Personal** personal impact	**Management** effect on time & resources	**Consequence** impact on students' learning	**Collaboration** ability to work with / relate to others	**Refocusing** re-evaluation of aims and objectives
Typical Expressions of Concern						
I am not concerned about it (the innovation)	I would like to know more about it.	How will using it affect me?	I seem to spend all my time getting material ready.	How is my use affecting students?	I am concerned about relating what I am doing with what other teachers are doing.	I have some ideas about something that would work even better.

Hord, 1987, p. 101

Table 7.2: CBAM Model Levels of Use and Nature of Use

Behavioural / Practical						
Level of Use/Nature of Use						
Orientation	**Preparation** preparing to use the innovation	**Mechanical** developing basic skills & knowledge	**Routine** practice, established pattern of use	**Refinement** exploring educational potential	**Integration** developing collaborative activities	**Renewal** developing innovative strategies
Behavioural Indices Of Level						
The individual is seeking information about the innovation.	The individual is preparing to use the innovation.	The user is making changes to organise better use of the innovation.	The user is making few or no changes and has an established pattern of use.	The user is making changes to increase outcomes.	The user is making deliberate efforts to co-ordinate with others in using the innovation.	The user is seeking more effective alternatives to the established use of the innovation.

Hord, 1987 p. 111

These elaborated sets of categories denote an individual's theoretical or actual progression with respect to an innovation. The seven named stages provide a detailed picture of the individual's concerns about an innovation, and the level and nature of use a teacher is making of the innovation, at a given point in time.

These two models, the Glatthorn and Fox Model and the CBAM Model, provided a structure for analysing the stages of the teachers' practice at the beginning of the Project. They also helped to monitor the stages and changes of teachers' classroom practice, understandings and attitudes throughout and at the end of the Project. Further insight into the teachers on-going attitudes and changes to their practice was obtained via field notes, teacher and researcher/tutor documentation, evaluations and video.

On-going Data Collection Instruments

It was important that the processes (the two models used to monitor the teachers' practices) and the outcomes of teaching (changes in the teachers' practice) were studied together with a strong emphasis on personal and professional reflection and collaborative action research. In order to achieve this several data collection methods were used.

a. Researcher Field Notes

The researcher/tutor kept records of all researcher/tutor - teacher meetings. These records tabled the concerns and problems the teachers were experiencing in implementing the Pair Peer-Mentoring Framework.

b. Teacher Action Plans

The teacher mentors/mentees were expected to create a personal Action Plan developed from a needs analysis that had highlighted a focus of interest. A time-line for implementation plus criteria used to determine success was to be part of the Action Plan. The documentation used by teachers to write their Action Plans was that from the University of Leicester's Continuing Professional Development Courses (CPD) see Appendix 3.

In order to complete the CPD form teachers needed to undertake some form of needs survey. There were three different sets of documents that the teachers could choose to use. The first format, Format A (Appendix 4) simply asked teachers to examine what they taught, how they taught, and the instructional materials they used, a design proposed by Joyce and Showers (1995, p. 98). The second format, Format B had three components. The first (Appendix 5) was a researcher/tutor adapted lesson observation checklist from the SCIcentre's Mentoring Manual (1998 pp. 48-49). The other two components were: (i) a confidence scale developed by (Jarvis 1993) - confidence in teaching science in own class, confidence in teaching science in a familiar / unfamiliar phase level, confidence in teaching science across the whole school (Appendix 6); and (ii) a checklist of duties of a subject co-ordinator for the teachers to rank in importance; to indicate which roles they actually did, and to indicate which roles they thought they should do (Appendix 7). The latter two components were to prompt teachers to think about their needs outside their own classrooms. Format C, the third format to be offered was the science section of the Required Standards for Initial Teacher Training (DfEE, 1998 pp. 68-86). The science section of the document was being offered as an example of an extremely thorough outline of the knowledge and skills required to teach primary science.

All sets of documents ask teachers to prioritise the areas they identify as areas of need. Smith and West-Burnham (1992, pp. 86-88) vigorously advocate an obligation for self task analysis saying there is a need to be able to identify the skills, knowledge and competences demonstrated within teaching (see chapter 4). This process of task analysis was to encourage teacher self-reflection, to help the teachers build broad goals for personal development while at the same time provide some understanding for the researcher/tutor of their current stage of development. The extent or degree of this personal self-development would however, depend on each teacher's self-esteem and motivation at the beginning of the Pair Peer-Mentoring Project. As Smith and West-Burnham say 'the aims or ambitions of teachers are inevitably influenced by their level of motivation and their self-esteem at the time' (p. 88).

c. Teacher Records of Mentoring Episodes

One of the steps of the Pair Peer-Mentoring Framework, and a key component of Action Research, is that details of meetings are recorded. Therefore, as the teachers implemented their Action Plans they were required to keep records of 'mentoring' meetings. Originally teachers were free to document their meetings in whatever format most suited them. After the first term, to promote a uniform and convenient way to catalogue mentoring sessions, each of the teachers was given a mentoring log in the form of an A5 file. The inside cover sheet of the file contained a guide or outline of the steps in the Pair Peer-Mentoring Framework the teachers should follow in their interactions with one another.

d. Project Evaluation Form

On-going monitoring was also carried out as part of the University and LEA initiative, under the AstraZeneca Science Teaching Trust. Consequently, written evaluation forms were completed by participants towards the end of the first year. For the evaluation of the Science Coordinator Course, of which the Pair Peer-Mentor Project was a part, participants answered questions relating to the training (INSET) provided, and their needs and expectations.

A summary of their evaluations was compiled by the Director of the AstraZeneca Science Teaching Trust Project, and was presented to the researcher/tutor and the teacher participants. As a result of this information the researcher/tutor decided that it was important to introduce the idea of a termly collective meeting for the five mentor pairs.

e. Tutor Field Notes of Feedback Meetings

After two terms, due to other school commitments, there had been a tendency from most of the mentor pairs not to follow through with their Action Plans so that proposed mentoring sessions often did not occur. Subsequently, the researcher/tutor attended feedback meetings to ensure that at least some part of a pair's plan was carried out. Field notes of these sessions were kept by the researcher/tutor.

f. Video Proforma

In the fourth term of the Pair Peer-Mentoring Project, to facilitate development of the teacher's reflective skills, a video was made of each of the teachers teaching a science lesson. The video also provided an additional means of monitoring the teachers' development.

It was hoped that the video would help teachers reflect on their own teaching as they would have the 'in-head' knowledge of where they were coming from and what they were trying to do when reflecting on the lesson. This 'in-head' knowledge may make it easier for them to identify and articulate strategies used, successes, problems, and future steps. Once they were able to reflect on their own practice it was thought, by the researcher/tutor, it would be simpler for the teachers to look at a colleague's teaching and identify and talk about similar understandings and skills. That is, the researcher/ tutor was trialing the hypothesis that 'viewing a video of own practice will enable teachers to effectively reflect on their own practice and by learning these skills when looking at themselves it may then be easy to transfer these skills to help a colleague critically appraise his/her lessons'.

Support for this hypothesis can be gained from looking at the use of video as an effective training tool for developing the skills of teacher mentors when working with students in Initial Teacher Training (ITT) or as part of the induction process for a Newly Qualified Teacher (NQT). An example of this kind of application is the widespread use of the video, 'Mentoring in Primary Science' (SCIcentre, 1998). Further corroboration for the use of video as an effective training tool is provided by the initial findings of a number of Higher Education Institutions (HEI), Local Education Authorities (LEA) and school partnerships studies which investigated 'How teachers use video evidence of their own classroom to develop and improve their classroom practice'. Preliminary conclusions from these projects were generally positive about the effectiveness of video in helping teachers reflect on, and develop their teaching (TTA, 1998). Other exemplars of the employment of video to support teachers' understanding of their practice, or to help them review and alter their practice in line with government policy, was seen from the prominent part videos played in the training programmes for the implementation of the Literacy and Numeracy Hours.

Prior to the videoing sessions, teachers were given a reflective proforma (Appendix 8) with sections to complete before and after the recording. The reflective sheet (proforma) was designed to help teachers articulate their planning and pedagogy by presenting questions about the purpose of the lesson and proposed learning outcomes, the lesson's structure and on its completion an evaluation on what had happened and what had been learnt. Using the proforma in this way was to assist teachers to identify what was happening in their lesson as well as give the researcher/tutor insight into their level of progress.

End of Project Data Collection

The end of project data collection incorporated the re-administration of much of the baseline data. Teachers completed the one-to-one open-ended interview/survey, questionnaire 2, in written format, and were placed by the researcher/tutor on the two models, the Glatthorn and Fox Model (1996) allocating Level of Teaching Skills and the CBAM Model for Change (Hord 1987). In addition, a more complex survey was made of the teacher pairs beliefs about teaching and learning in science together with their perceptions of the impact of the Pair Peer-Mentoring Project. The headteachers from the five schools were also interviewed regarding their awareness of the effect of the Project.

a. Teacher Beliefs about Teaching and Learning in Science

The original open-ended question asking for teacher beliefs about teaching and learning in science used in the base-line data collection, (and again in the end-of-project data collection), had not resulted in the anticipated depth of detail. Consequently during the course of the Project a literature search was carried out for a more suitable mechanism for eliciting teacher beliefs about teaching and learning in science. The Teacher Interview Protocol developed by Cronin-Jones (1991 p. 249) in her study of middle-level teachers' implementation of a science curriculum package was adapted for use in this Project. The resulting protocol (Appendix 9) gave specific data about teaching and learning in science not only from a teacher's perspective but from a student's perspective as well. The more detailed information gained from this protocol was to be used as an extension of the teachers' views expressed in questionnaire 2, the open-ended question format.

b. Teacher and Headteacher Perceptions of Impact of Project

Teacher mentors completed an interview/survey questionnaire of the impact of the Pair Peer-Mentoring Project on themselves, on their students and on other teachers. Their responses were in written format. To ascertain if there was consensus between teacher and headteacher perceptions of impact the headteachers of the five teacher pairs were interviewed.

Evidence of the headteachers' monitoring and evaluation of the of the Pair Peer-Mentoring Project on the teachers involved, on their students, other teachers, and the school was obtained, as a form of triangulation of data, through use of an interview questionnaire. The Headteacher interviews were tape-recorded and a full transcript made of the text.

The way in which the data collection was modified and actually unfolded is shown in Figure 7.3, a diagrammatic representation of the Pair Peer-Mentoring Project showing the two tiers of support and training put in place to introduce the Mentoring Framework and monitor its use.

Figure 7.3 Diagrammatic Representation of Implementation of the Pair Peer-Mentoring Project – including Data Collection

Tier One Support and Training: Initiation - the Induction Phase

Initiation/Induction Phase	Location of Implementation	Summary of Review	Method of Data Collection
A. The First INSET The Framework was introduced Plus each teacher gave a lesson to a small group of others and practised observation & feedback .	Implemented by the University researcher/tutor in the School of Education .	Reviewed and identified the problem. Teachers didn't understand what mentoring was or what they needed to do because the presentation was too formal and complex. Praise & its use was also an issue.	*** Collection of baseline data begun** with Questionnaire 1.
B. The Second INSET Simplified terms for the steps in the Framework were practised. Further practice in Mentoring was provided through the use of written lesson scenarios.	Implemented by the University researcher/tutor in the School of Education.	Review of the repeated induction indicated some success.	

Tier Two Support and Training: Implementation and Institutionalisation Phases

Initiation/Induction Phase	Location of Implementation	Summary of Review	Method of Data Collection
The Model in Practice **On-going research / tutor support** Needs Analysis to be conducted by teachers & an Action Plan (AP) drawn up with partner. Three proformas were given for the needs analysis. The teachers also had to choose a focus and write an Action Plan.	The teacher pairs were to carry these activities out in their own classrooms.	Review of Action Plans indicated teachers' plans were inadequate. They were not able to implement them as they were too brief or too general, lacking foci and criteria for success.	*** Baseline data collection contd.** with questionnaire 2, a semi-structured interview on how the teachers saw themselves as teacher & what they hoped to gain from the mentor project.
Researcher/tutor facilitation of teacher pairs to generate a new Action Plan & timeline.	Implemented by researcher/tutor and the teacher pairs in their school.	Review indicated some success. The teachers had written action plans that were achieveable and that they could monitor.	*** Baseline data collection contd.** Teachers were observed teaching & placed on the Glatthorn Fox Model & the CBAM Model. ***On-going data collection commenced** with field notes kept by the researcher / tutor & less effectively by the teachers.

Tier 2 Support and Training: Implementation and Institutionalisation Phases continued

Initiation/Induction Phase	Location of Implementation	Summary of Review	Method of Data Collection
The Model in Practice **New Action Plan** The teacher pairs to re-try following their plan.	Teachers to independently implement their Action Plan in their classroom.	Review indicated that teachers had not followed their plans. They also either hadn't kept records (an element of action research) or had lost records or had made extremely brief notes. There was no record of implementation.	* **On-going data collection contd.** Field notes were kept by researcher / tutor. Teachers records of observations, feedback or meetings were either not kept, or were very limited or not found.
Support at mentor pair meetings With the researcher / tutor supporting the teachers by acting as the scribe.	Implemented in schools with researcher / tutor in schools taking notes at mentor meetings.	Review indicated feedback between pairs was not particularly effective because (i) the mentor did not review on the AP focus, (ii) when the mentor gave feedback, the mentee took a justification position (iii) therefore, the mentee didn't come up with their own possible ways forward.	* **On-going data collection contd.** Field notes were kept by researcher / tutor. Teachers notes of mentoring meetings. Teacher re-interviewed re: what they hoped to gain from pair peer-mentoring project. Teachers-pairs completed a written evaluation of the programme.
Researcher / tutor modelling of in-depth one to one feedback & reflective practice. A term collective meeting was introduced.	Implemented by the researcher / tutor in schools over 2 to 3 visits. Ways to give feedback was also discussed at the collective meeting at the School of Education.	Review indicated minimal improvement in the teachers' reflective practices and their skills in giving feedback.	***On-going data collected contd.** Field notes by the researcher / tutor.
The researcher / tutor Video of individual teachers' teaching. Prior to the video teachers had to have a lesson plan & a focus. Teachers given a proforma to complete prior to and after watching their video to encourage them to observe & reflect on their own practice.	Videos made by researcher / tutor in each teacher's class. Discussion and sharing of videos at the collaborative meeting at the School of Education.	Review indicated that some of the teachers were beginning (i) to identify components of their practice (ii) to critically appraise their practice & were (iii) able to share reflections with their colleagues.	* **End of project data collection** Teacher & headteachers interviewed re: (i) the teachers' views of the peer mentoring partnership & their perceptions of its impact (ii) the headteachers' views of the mentoring project & its impact on the school. Teachers re-completed questionnaire 2 from the baseline data. Teachers completed written proformas on their beliefs & ideas about teaching & learning in science. After teachers were observed teaching via the video, teachers' re-placed on the Glatthorn & Fox Model & the CBAM model. The teachers' reflective proformas from the video session was also collected.

Introducing the Pair Peer-Mentoring Project

Two tiers of training and support structures were set up for the Pair Peer-Mentoring Project. As a first tier, (Initiation), an induction phase - a series of introductory workshops (INSET) introduced the Mentoring Framework and offered the intending mentor/mentee science co-ordinator a definition of task, a knowledge base, and understanding of the developmental cycle of the five step model from Gottesman and Jennings' (1994) work, on which the Framework was based. Identification and initial rehearsal of the basic skills and processes of the Framework were also included in this initiation or induction phase of training.

The second tier (Implementation and Institutionalisation) provided the pairs of teachers with consistent, on-going support for their work in their classrooms, as they addressed their own learning agendas as mentors and mentees. The second tier of support and training also sought to extend and develop the teachers' skills, knowledge and understanding of the Mentoring Framework, and its relationship to approaches to teaching and learning.

Tier 1 Support and Training: Initiation – the Induction Phase

A: The First INSET

The first INSET[7] session furnished the primary teacher science co-ordinators with a theoretical background of mentoring, reasons why they might choose to mentor a peer and introduced the model of mentoring, the Framework shown in Figure 7.4. The workshop also gave details of the skills needed to make effective use of this mentoring Framework (Figure 7.5) and the arrangements for practice and support for their adoption, and implementation of such a structure.

[7] This INSET was only provided for the teachers on the Science Coordinators' Course. Their school-based partners did not attend the University Induction INSET.

Figure 7.4: The Pair Peer-Mentoring Framework

A Five Step Model		
Step1.	Request A Visit or Meeting	(5 minutes)
Step2.	Visit Or Meeting	(10 minutes)
Step3.	Review Notes And List Some Possibilities	(5 minutes)
Step 4.	Talk After Visit or Meeting	(10 minutes)
Step 5.	Process Review	(5 minutes)

Adapted from the work of Gottesman and Jennings, 1994

Figure 7.5: The Skills of the Pair Peer Mentoring Framework

The Skills are:

1. **Observation Skills**
   - (a) Peer Watching
   - (b) Peer Feedback

2. **Post-Observation Mentoring Skills**
   - (a) Review of Observation Notes
   - (b) Talk, eliciting ideas/suggestions from the mentee on what they could do/how they could achieve their goal.

3. **Planning Skills**
   - (a) Medium Term Planning
   - (b) Lesson Planning

4. **Creating an Action Plan**

The Framework was presented to the teachers in an initial three-hour workshop. This introductory workshop provided an opportunity for the potential mentors/mentees to rehearse the peer-mentoring model and allowed the researcher/tutor to assess the suitability of the Framework and the teachers' individual responses to using it.

Review of A: The First INSET

Three areas of difficulty became apparent from the INSET.

(1) Step Descriptors

The step descriptors of the proposed Framework were confusing to the teachers. The step descriptors are given here with their meanings within the Framework shown in the brackets: Peer Feedback (data collection); Review (summarising the data and determining 2 or 3 focus areas); and Talk (feedback meeting). The initial notes given to teachers detailing these step descriptors can be seen in Appendix 10.

The step descriptor which caused the most difficulty for the teachers was 'Peer Feedback' and to a lesser extent the descriptor, 'Review'. The teachers' uncertainty arose as the common usage meaning of these words is slightly different to their meaning/use as step descriptors within the Framework.

(2) Focused Critical Appraisal

Prior to the INSET, the teachers had been asked to prepare a short science lesson to teach to two or three colleagues. At the workshop the teachers were placed in groups of three, taking turns to 'teach' with their colleagues also taking turns practising their skills of Peer Watching, Peer Feedback, Review and Talk. The data collected by the teachers from their Peer Watching and Peer Feedback activities was limited and very general in tone as was their data from the subsequent Review and Talk sessions. The teachers could not describe in detail what they had seen. Their partial skills and understandings of focused observation and summary also made it very difficult for the teacher 'mentors' to formulate focus questions for the teacher 'mentees' or provide effective 'Talk'.

(3) Praise

During the practise 'teaching' activities the issue of praise arose. Teachers wanted to begin their 'Talk' with general praise for those elements of the lesson that were good. However, the need for a non-judgmental approach when giving feedback was an inherent component of the Gottesman and Jennings' model, that distinguishes it from other models, forms and styles of mentoring.

The Resulting Necessary Adaptations and/or Actions from the Review of A: The First INSET

In their introduction to the Peer Pair- Mentoring Framework the teachers experienced uncertainty about how the Framework worked and how exactly they were to practise the skills utilised in this model of mentoring. New step descriptor names and a checklist incorporating their use within the Framework, together with an agreement on the modest use of praise, and some examples of data collection were draw up by the teachers and the researcher/tutor in an effort to clarify these problems in understanding.

(1) Step Descriptors and a Mentor Skills Checklist

By the end of the first workshop the teachers had devised new names for the step descriptors of Peer Watching, Data Collection, Private Review, and Feedback Meeting and had begun to incorporate them into a Mentor Skills Checklist (Figure7.6) that they could use when practising the Mentoring Framework in school. The checklist was subsequently refined by the researcher/tutor with points under each step descriptor clearly defining a way teachers could set about the task and reminding the teachers of the 'dos' and 'don'ts' within each step, especially when observing.

The completed checklist was sent to the teachers as a general guide to follow as they undertook the Framework's mentoring process.

Figure 7.6: Mentor Skills Checklist

Peer Watching

When I am observing I need:

1. To think about where I sit – try not to be in line-of-sight.
2. To stay focused.
3. To watch first, write second.
4. To develop a personal form of quick writing.
5. To watch body language.
6. To try not to become part of the lesson.
7. To avoid interacting with the children.

Data Collection

When I am practising Data Collection I need:

1. To have a focus for the observation; to help with this it might be useful to have
   (a) a list - either
      * a checklist developed by myself, or
      * part of an existing checklist, eg. the checklist in the Mentoring book
   (b) a class seating plan

2. To be factual – to write about what actually happened in the lesson.

Private Review

If I am the Mentor, when I am practising my Private Review I need to sit down by myself and:

1. Look at what I have written and try to summarise or analyse it.
2. Think of some leading questions to ask the Teacher/Mentee.

If I am the Teacher/Mentee, when I am practising my Private Review I need to sit down by myself and:

1. Think about what happened in my lesson and try to summarise it.
2. Think about what I could do to improve it.

Feedback Meeting

If I am the Mentor, when I am part of a Feedback Meeting I need to:

1. Allow the Teacher/Mentee to talk first
2. Give the Teacher/Mentee my factual summary of the lesson.
3. Encourage the Teacher/Mentee to talk about the area of focus/concern, giving her/his own ideas.
4. Only comment or make suggestions about the focus area.
5. Concentrate my praise on the focus area, (on the bits that were successful), rather than give unfocussed, general praise.

(2) Focused Critical Appraisal

At the conclusion of the first workshop the teachers agreed to practise the Pair Peer-Mentoring Framework, making use of the new checklist which would be sent to them, and to bring a written record of these observation and / or meetings to the next Induction INSET. Further support for the school-based mentoring practise was provided with the inclusion of three examples of data collection (see Appendix 11) in the documentation sent to the schools. The researcher/tutor developed the examples for the teachers, as illustrations of ways to record data. Data Collection (accurately describing what they saw) appeared to be one of the most complicated tasks for the teachers. The rational in sending the exemplars was that having an example often helps clarify problem areas for teachers and others.

(3) Praise

Due to the teachers' wish to use praise and their lack of ease when using only objective comment for 'Feedback' the researcher/tutor decided to undertake a short literature review to see what other studies or research had to say about the use or non-use of praise. This investigation of the literature showed mixed results on the effects of offering a reward (praise) for performance. Studies have indicated that rewards facilitate performance, have a detrimental effect or show no effect (Schunk, 1983; Claxton, 1989; Hastings and Wheldall, 1996; Evans, 1998).

Hastings and Wheldall (1996) found teachers generally believe that it is important to praise children, and by inference adults, for progress and achievement in learning. They offer four suggestions for effective use of praise. The first being that praise should be contingent, frequent and immediate. Praise must relate to particular behaviours and be delivered when they happen as indiscriminate praise is useless. In the early stages of establishing a behaviour pattern praise should be frequent. Once behaviour is routine, the frequency can be reduced. The second is that praise must carry information about the accomplishment - what is being applauded. The focus should be on praise for improvement. Thirdly praise for improved behaviour should sometimes include internal attributions, whereby the improvement is attributed to effort or increasing ability. The fourth suggestion is that praise should be given with sensitivity to the individuals concerned (pp. 83-84).

Evans (1998) found in her study that recognition of teachers' efforts and achievements through praise was the best motivator. Teachers who were given positive feedback on their work by their head reported higher levels of job satisfaction, morale and motivation than those who were not similarly serviced (p. 134). This is because individuals in our society strive to maintain a self-image of high ability as their self- worth depends on the ability to achieve (Schunk 1983).

However, Schunk (pp. 511-517) goes on to suggest that there is a need to look more closely at reward/praise to determine how well its use is enhancing skills and promoting a sense of personal efficacy. While Claxton (1989), in talking about good learning and being a mentor says:

> *It does not mean always praising: far from it, because praise trains learners to need someone else's validation and feedback. It creates an emotional and intellectual dependency.* (p. 89)

Therefore, taking into account, the needs of the teachers, the ambiguous results of the literature review, and the integrity of the model it was decided to ask the teachers to use praise in the first of the four ways suggested by Hastings and Wheldall. That is, it was decided to ask teachers to limit praise to the 'focus' of the lesson when first working together and then gradually withdraw this element when the mentoring relationship was more established.

Tier 2 Support and Training: Initiation – the Induction Phase

B: The Second INSET

The second INSET presented the teachers with an overview, in face of moves by the government to introduce standards for teachers and teacher leaders, of the need for primary teacher co-ordinators to develop strategies to help individual colleagues and the school improve the quality of teaching and learning in science (DfEE 1997, 1998; TTA 1998). The researcher/tutor thought that if the teachers were introduced to some of the thinking behind the development of the Pair Peer-Mentoring Framework, it may put the planned activities for the workshop in perspective or motivate or encourage the teachers to enthusiastically undertake the mentoring process.

Within this bigger picture the practical aspects of the workshop were arranged in three sections; the first part gave time for the teachers to become more familiar with the Framework and the skills inherent in it and to further clarify the issue of praise, the second section was devoted to planning skills, and the final section developed action planning skills as the teachers were not familiar with writing Action Plans.

(1) Step Descriptors and Data Collection

Therefore, the first section of the INSET was a revisit of the Framework on Pair Peer-Mentoring and the steps within it, Peer Watching, Data Collection, Private Review, and Feedback Meeting. This part of the workshop took the form of a researcher/tutor facilitated general discussion of the school-based tasks followed by the working through of some scenarios of classroom observations (Appendix 12). This allowed the teachers to:

* briefly report back on school-based tasks;
* work through three 'classroom observations' and the way the data was collected, to enhance the idea that data collection could vary to suit the style of the mentor collecting the data or to suit the task or focus point of the observation session;
* practise summarising or seeing patterns in data which could help them develop questions or prompts for their peer partner;
* practise in facilitating discussions which encourage 'the mentee' to find answers/suggest solutions for themselves; and
* practise limiting the use of praise to the 'focus' area of observations.

(2) Planning and Focused Critical Appraisal

The second section of the INSET was used to review the teachers' use of medium term planning or lesson plans from the mentoring manual "Mentoring in Primary Science" (SCIcentre, 1998) and to look at the lesson observation portion of the mentoring video "Mentoring in the Primary Classroom: A Case Study" (SCIcentre, 1998). This was to demonstrate the importance of looking for the science being planned for, or taught and learnt, in lessons and to allow teachers, through watching a mentor facilitating a discussion with a student teacher, to see (a) ways to encourage a mentee to emphasise the science learning in a lesson and (b) identify useful and non-useful ways of talking with a mentee who is an experienced colleague.

(3) Action Plans and Need Analysis

The third section of the INSET was concerned with a way to get started in the peer mentoring process through a personal review or needs analysis and an action plan. Teachers were given documentation to complete for their Action Plan. Two of the formats, to use as starting points in a needs analysis for an action plan, were introduced and gone through with the teachers. It was decided, due to the length and complexity of Format C, not to offer this form to the teachers. Format A (Appendix 4) would provide the teacher with a fairly general picture of their individual classroom performance. Format B (Appendices 5, 6 & 7) would provide a wider picture in that it required the teacher to look closely at their own specific classroom practices in teaching science and then to examine their responsibilities and roles beyond their class, to the school.

Review of B: The Second INSET

Though it was possible to draw some positive conclusions from the second INSET, three areas of difficulty had also become apparent. The positive aspects were firstly that the teachers had found the checklist with the new step descriptors of Peer Watching, Data Collection, Private Review, and Feedback Meeting beneficial in understanding the Framework for Pair Peer-Mentoring. As a group they seemed more confident about the concept of peer mentoring with some of the teachers having made tentative attempts to observe a colleague and provide feedback on their teaching. Another positive aspect was that the teachers were pleased with the opportunity to work together on further examples of data collection. All the teachers participated enthusiastically in the discussions of the exemplars and had lots of ideas and advice they would give 'the teacher' in the scenarios.

The difficulties encountered in the second INSET concerned challenging colleagues in the Feedback Meeting, collecting only relevant data during observations and writing Action Plans.

(1) Challenging Colleagues

The problems the teachers talked about in carrying out practice observation exercises were that Feedback Meetings were complicated. How to phrase key questions or give prompts which facilitate or help the 'mentee' come up with solutions for themselves was a major dilemma. The following quote exemplifies the teachers' comments.

> *"It is complicated, as is keeping the discussion focused on the area of concern, especially when there are lots of things that could be discussed"* Teacher E.

(2) Data Collection

In looking at, and talking with teachers, about their school observation and data collection practises it was noticeable that teachers were collecting too much data. The ability to concentrate or really focus on the area of concern, both as an observer and as a data collector, was more complex than teachers either anticipated or understood. Malderez and Bodoczky (1999) also encountered this problem when training their teacher-mentors saying:

> *The practical mentoring sub-skills of non-evaluative observation, and the recording and giving of data are, we find, among the hardest to acquire.* (p. 19)

(3) Action Plans and Need Analysis

During the second INSET teachers had been introduced to further aspects of pair peer-mentoring and their roles as science co-ordinators - a lot of new information had to be assimilated. Therefore, though teachers expressed interest in exploring the different formats of a needs analysis preparatory to creating an Action Plan none was prepared to either complete a needs analysis or an Action Plan during the workshop.

The Resulting Adaptations and/or Actions from the Review of B: The Second INSET

(1) Challenging Colleagues

It was apparent that having teachers work through the scenarios, as a group, helped them to become more skilful in, and confident with identifying the kinds of key questions or the sorts of prompts to use in a Feedback Meeting, the questions or phrases that could facilitate 'mentees' to devise their own solutions. Having this group practice was expected to give the teachers more experience to draw on when working with their peer partners back in school.

(2) Data collection

The group experience of working through practice observations and their subsequent data collections, was also expected to help teachers more clearly understand the type of data to collect, the amount of data to collect and some of the different ways that this might be achieved. As with **(1) Challenging Colleagues** the group practice was likely to facilitate individual's work in the schools.

(3) Action Plans and Need Analysis

Teachers were allowed the term vacation to read and complete a needs analysis, subsequent to developing an Action Plan. This documentation was to be ready for discussion by the researcher/tutor and teacher at the first researcher/tutor - teacher school-based meeting at the beginning of the following school term.

There did not appear to be any short-term solution for the three problems of challenging colleagues in the Feedback Meeting, collecting only relevant data during observations and writing Action Plans. It was anticipated that long-term use of the Framework, practise, and researcher/tutor support with the skills within the Framework would ultimately overcome these difficulties.

Tier 2 Support and Training: Implementation and Institutionalisation Phases

The Model in Practice

On-going researcher/tutor support – School and University Based

The Project had as one of its parameters support for the teacher participants. One form was four days supply cover to give teachers school time to work together. Another form was having a university researcher/tutor facilitate teachers through the change process. The researcher/tutor would attempt to provide, within practical boundaries, the level of support the teachers needed to implement new knowledge or skills required for pair peer-mentoring. This form of support was put in place to try to ensure effective transfer of INSET to practice. Research into the effectiveness of INSET has shown that support during the implementation stage of new knowledge or skills is essential for transfer to take place (Joyce and Showers 1995).

At researcher/tutor - teacher meetings the researcher/tutor was to guide teachers through the process of writing an Action Plan by helping with the selection of a focus, a timeline, and the criteria for success. Later sessions were to have the researcher/tutor working with the teachers to improve their reflective practice through effective use of the Mentoring Framework.

End of term collective meetings were also arranged and carried out so that the teachers had an opportunity to meet up and share their experiences with their colleagues - their problems and successes. The purpose of the end of term mentors/mentees' collective meetings was to both offer support and to develop the teachers' skills as mentor/ mentees. Through the meetings it was hoped that each pairs' own learning agendas would be identified and discussed within the larger group, thus maximising the opportunities for professional development.

Problems revealed from the researcher/tutor experience

1st Researcher/Tutor - Teacher Meeting

The tutor was met each time with pairs of teachers who were waiting to be shown what to do - to have the 'expert' come and (a) either lead them through the steps of writing an Action Plan or (b) validate what they 'thought' before their Action Plans were completed under her 'expert' supervision. The latter part of the statement applies to the few teachers who had used the term vacation to agree on some areas of interest, preparatory for their needs analysis and the subsequent writing of an Action Plan.

The apparent failure of the teachers to take on board action planning may be as a result of the change process. In the early stages of the CBAM Model (where the teachers in the study had been placed by the researcher/tutor) teachers are concerned with information about the innovation, followed by concerns on how it will impact on themselves (Hord, 1987 and Hord et al, 1987). The teacher-pairs' level of use of the Framework, at this time, might have been at this stage of cognitive development as they were finding out more about the innovation. Alternatively, their use of the Framework was limited and mechanical as they were only developing basic skills and knowledge about the Framework. The research cohort teachers were concerned in finding out about peer mentoring and cautious in undertaking its use. Their concerns were personal: "How will it impact on our time?" "Will we be able to do it?" "How useful will it be if I use it?" typify their comments.

An alternate view is that as the teachers were not yet fully prepared to commit themselves to peer mentoring they perhaps, had not spent much time in reflecting on their practice and therefore had done little in preparation for writing Action Plans. This problem could be summarised as avoidance of action. Though the teachers were in favour of the idea they appeared to lack the confidence to trial 'mentoring' of one another. Most teacher pairs had neither written nor attempted to carry out an Action Plan. The demands of the Literacy hour, and other school commitments had been prioritised above mentoring a colleague.

2nd Researcher/Tutor - Teacher Meeting

In the second term of the Project teachers began to mentor each other. At the researcher/ tutor-teacher mentor meetings certain trends became apparent for the foci of the teachers' action planning. Action Plans showed that the teachers and their mentor partners were often concerned with more effective assessment of children's' science understandings. Many teacher pairs had as a core issue or interest exploring ways to better understand the level of knowledge and/or skills of their pupils. Some teachers wanted to explore ways in which they could encourage their class or groups of children to ask questions with child generated questions being seen as a way of understanding where the child 'was at'. Other teachers were interested in learning about new or different assessment strategies including a much broader range of ways children might record their learning in science lessons.

Another common focus area was planning. The teachers interested in planning either felt that their medium term plans did not translate well to their lesson plans - their lesson objectives were not clear, or the way in which science was planned for the year at the class or school level was not specific enough. Action Plans on how to achieve the above mentioned foci were discussed and drawn up at the researcher/tutor-teacher visit however, not all teachers completed the form at the time and there were long delays before some documentation was forwarded to the University.

At these meetings the teachers continued to state their willingness to use the peer mentoring process. They were keen to find and / or try out new ideas whilst having the support of a colleague to bounce ideas off and to check whether they were succeeding or not and were prepared to write and carry out Action Plans. Nevertheless, due to past experience the researcher/tutor felt that many of the teachers would possibly not carry through their Action Plan and therefore decided to concentrate the monitoring of the Project in a more practical and effective way by collecting in-depth data from a subset of five pairs. The premise for selection to this subset was that (a) there appeared to be a reasonable chance that the pair would carry through their Action Plans, based on researcher/tutor-teachers' discussion at visits and (b) the pairs of teachers selected represented a variety of teachers and teaching levels, including a female/ male pair, a young subordinate and an older superior, a pair of young teachers and a pair of teachers working in reception classes.

3rd Researcher/Tutor -Teacher Meeting

The third researcher/tutor – teacher meeting was scheduled for the beginning of the third term of the project. However, there was some variation in the research cohort teachers' enthusiasm / interest in this meeting. Interest ranged from a desire for a meeting early in the term *"to get organised,"* a wish expressed by three of the teacher pairs, to the other two pairs arranging a meeting time well into the term.

It was apparent at the meeting that despite having positively accepted membership to the research cohort there was some lack of enthusiasm from the teacher pairs for the Pair-Mentoring Project. Only one teacher had initiated any structured strategy for moving herself and colleagues forward in the Autumn term. Two teacher pairs had thought about what they might do but had not committed or converted their ideas into an Action Plan. The other two teacher pairs had waited for the visit /meeting to think about what they might do and how they might go about it.

At first glance it was especially surprising to encounter such widespread 'apparent' lack of enthusiasm from the research-cohort group when all had made a commitment to continue with the Pair-Peer Mentoring Project in the new school year. All the cohort teachers had signified their willingness and interest in continuing with the Project. A mental review of what was happening in schools provided a likely explanation - the introduction of the Numeracy Hour with its accompanying changes to work practices and classroom organisation.

Another possible way to understand the situation was to assess to what extent each teacher had used the Framework to critically appraise his/her teaching. Had the teacher pairs used the notes taken or the feedback sessions to think about their area of focus? Did they look at their Action Plans to see if they had achieved their own stated criteria for success? How detailed or general were the notes taken at each of the peer mentoring sessions? Did any of the above factors inform their new Action Plan? If not, what did inform their new Action Plan?

The ability to look objectively at their own teaching and to be able to identify successes and weaknesses is seen, by the researcher/tutor, to be a critical step in allowing a teacher to move forward professionally.

With the exception of the one teacher who had, without prompting or support, moved forward with her role of improving the quality of science teaching within her school, (not wholly in a mentoring partnership), no teacher had used notes or specific information to develop a new Action Plan. Most teachers had not looked at their notes, did not know where they were, and none had checked back against the criteria for success to judge their performance.

Summary of the Researcher/Tutor – Teacher Meetings

(1) Limited documentation

Initially many teachers failed to keep written records of any of their mentoring sessions subsequently the freedom to self-choose a method of documentation for mentoring sessions resulted in many records being kept on scraps of paper that were afterwards lost or the accounts were so general in nature and so time consuming to produce that the teacher pairs discontinued keeping records. Of those pairs who did begin to keep records, the material was found to be unfocused and very general in nature. That is, the teachers wrote pages on everything they saw in the class or had discussed in the planning meeting. It was difficult to identify what the focus for the lesson was and what points, ideas were shared with the mentor partner (See Appendix 13). Consequently, intense questioning and discussion was necessary at the researcher/tutor-teacher meetings. Time was concentrated on what the mentoring pair intended to do, and what their focus was to be, in the coming term. The teacher pairs from the research cohort who had thought about an Action Plan were vague and general in their ideas and seemed to require the support of the researcher/ tutor to crystallise their ideas. Much discussion was necessary to develop an Action Plan that had an achievable, clearly understood focus with a defined timeline. The other pairs in the research cohort required even more time spent in trying to establish what they felt they had achieved, possible areas of interest and ways forward.

(2) Lack of focus

In these talks it became clear that what seemed to be most influential for the teachers' sense of their own success was not written documentation but rather their own perceptions of the lesson and remembered ideas or thoughts orally exchanged at the feedback meeting. This may not have been reliable information. Interestingly the teachers felt that in their feedback sessions, whether as mentor or mentee, they could have 'talked for ages' and enjoyed doing so without feeling guilty. It was as though the mentoring session justified professional dialogue - without it they would not have made the opportunity to talk to one another.

Another area where teachers were vague was that of the use of Supply Days. All but one of the teachers did not know exactly how much time they had used nor quite how much time had been allocated to support them in their peer mentoring role. This information had been given to the teachers at Course sessions, in written documentation and discussed in depth at Summer Term meetings with support tutors. The teacher who was aware of her use of Supply was the teacher who had independently moved ahead in creating an Action Plan for herself and colleagues.

Focus areas for teachers in their peer mentoring programme for the Autumn Term 1999 showed some movement away from assessment and recording methods to effective differentiation and setting or pitching lessons at an appropriate level (this was of concern for the teachers who changed year or phase of teaching). For the other teacher pairs in the cohort a variety of effective assessment strategies and different ways of recording science continued to be of importance. As these foci incline toward 'big picture' this may explain why the teachers tended to write or talk about their peer mentoring sessions in general and fairly vague terms. A more specific focus may have helped teachers to critically appraise their own and colleagues' teaching.

(3) Criteria for Success missing

As Action Plans had too wide a scope in their objectives it was difficult for teachers to know when or why, or even if they had succeeded with their aims other than in general subjective terms. Consequently, writing and use of success criteria was weak. The end of term collective meeting showed that teachers had not used their mentoring notes or specific information to develop a new Action Plan for the following term. None had judged their performance by checking back against their stated criteria for success.

Resulting Adaptations and/or Actions to Overcome Problems Encountered in Implementing the Framework

Apart from the help in facilitating ideas for ways forward including the use of Supply, the researcher/tutor provided the teacher pairs with a file for recording mentoring sessions. This organizer was introduced in order to give more structure and support to the teachers when working as peer mentors. Additionally, the file would provide a record of meetings and a way, for the researcher, to more effectively monitor progress or the developing skills of the research cohort group. The researcher/tutor also arranged times for the writing of Action Plans.

(1) Log Books

To facilitate the keeping of a more accurate record of the mentoring process, and to encourage practise of the skills of the Framework the researcher/tutor provided a Log Book file for documentation of mentoring sessions. On the inside cover of the Log Book was a proforma which was to act both as a reminder of the key steps in the Framework and as a scaffold for their recording.

(2) Increased Tutor Visits

For the next two terms fixed-time researcher/tutor visits to schools were made so that the researcher/ tutor could provide support in the writing of Action Plans including selection of success criteria.

(3) Collective Meeting

A collective meeting was used to revisit the Framework. Teachers were reminded of the steps in the process and encouraged to discuss problems they had in its use and ways these might be overcome.

Further Problems Revealed from the On-Going Researcher/Tutor Support Experience

In the ensuing two terms the researcher/tutor - teacher meetings exposed the following problems.

(1) Log Books

Few teachers used their logs books as prescribed, ie. to record key points from their observations or planning meetings, or as a prompt for feedback sessions. Teachers either jotted notes to themselves or made no use of the log book.

(2) Lack of Focus

Over time, Action Plans showed less and less detail and feedback between teacher-mentors to teacher-mentees became more general in nature. This may be because it was easier, if acting as a mentor, to provide only general feedback to the mentee rather than challenging him/her to problem solve.

(3) Reflective Practice

There continued to be little demonstration at feedback meetings of in-depth reflective thinking from either the teacher-mentor or the teacher-mentee.

Additional Adaptations and/or Actions

(1) Further Increase of Researcher/Tutor Visits

In later terms the tutor attended at least one mentoring feedback session to facilitate teachers' self-appraisal of practice. At these times it was common for the teacher pairs, after carrying out their feedback, to ask for researcher/tutor approval of their mentoring. *"What do you think? "Did we do it properly?" "Tell us what we should do".* The researcher/tutor suggested ideas on ways to critically reflect on lessons or planning, or an effective feedback session was modelled. That is, demonstrations on how to use the Framework's skills as a structure for effective communication was given by the researcher/ tutor.

(2) Reflective Practice - Use of Video

To try to help overcome the problems of keeping lesson observations specific, being able to identify key elements, and to summarise what had happened in the lesson in order to promote their colleague's reflective skills, the teachers agreed to have the researcher/tutor make a video of each of them teaching science to their own class. Their feelings and ideas, after viewing themselves teaching, were to be shared with the group at a collective meeting.

(3) End of Term Collective Meetings

Collective meetings were again used to revisit the Framework. Teachers were reminded of the steps in the process and encouraged to discuss problems they had in its use and ways these might be overcome. At the penultimate meeting teachers were invited to share their reflections of their teaching as seen on video. Few teachers chose to do so.

Conclusion

Elliott and Calderhead's (1995) work may offer a possible explanation for the somewhat varied responses and actions and attitudes that emerged in the implementation of the Pair Peer-Mentoring Project when they speculate that,

> *"it is possible that the only model for learning and development to which the mentors have access is one which is grounded in classroom teaching. The only adult relationships in the school to which the mentor can relate (such as those among other teachers) are based on friendship and not related to learning".* (p. 51)

They go on to say that as such, they are inappropriate models for fostering growth in beginning teachers. This study seems to suggest that this may also be true for some experienced teachers. For some centuries, teaching, particularly in primary schools has been identified with teaching young children. Teachers' notions of learning are built on the fact that they teach young pupils. From this perspective, since the teachers did not have extensive experience in self or peer professional development they had not formulated an appropriate language to talk to one another about alternative ways of viewing classroom contexts. Thus they may have been hampered in bringing about changes in teaching practices because of a lack of an appropriate language in which to do so (Ibid p. 52). This concept together with other findings from the Pair Peer-Mentoring Project is explored in Chapter 8.

Chapter Eight - Findings and Analysis

Orientation

This chapter presents and analyses the data generated from assessing how far participants' expectations were addressed by the INSET, the effect of researcher/tutor support and the success or otherwise of the adoption of the pair peer-mentoring Framework. The extent to which these factors had an impact on teachers' practice is also examined firstly through the base-line data followed by the on-going data and concludes with the end of project data.

Introduction

The chapter begins with an outline of the analytical approach used to interpret the oral communication, interview, observation and documentation data generated from the Pair Peer-Mentoring Research Project. This material was analysed in order to determine practioners' initial and changing beliefs, values and understandings as they developed an in-depth and reflective approach to their science teaching practices. Techniques of qualitative analysis recommended by Miles and Huberman (1994), and Glaser and Strauss's (1967) grounded theory were used to analyse the transcripts of interviews and other documentation.

The analytical approach used to interpret the data

Grounded Theorists such as Glasser and Strauss, (1967); Glasser, (1978); and Strauss and Corbin, (1997, 1998) advocate an approach to theoretical coding that is characterised by a continual link between coding and conceptualisation whereby initial categories are synthesised and studied for potential patterns and relationships. The process is cyclical rather than linear and often unpredictable but this procedure of coding and recoding allows raw findings to eventually mature into more secure interpretations. Thus, through conceptualising the changes it would be possible to identify some developmental changes in the teachers' practice.

The analyses of data in this project were carried out by hand in order to develop some comprehension of the frames of understanding employed by the research-cohort teachers to describe their work, their discussions, their practice. Early themes or interesting bits of data derived from questionnaires, open-ended interviews, meetings and observations were later triangulated through examining additional documentation, observations, videos and headteacher interviews. That is, themes emerging from one source of data that conflicted with findings from alternate sources were further checked against subsequent observations, meetings, school visits, documentation and videos. Coding in this way provided the researcher/tutor with in-depth familiarity with the data, and was an opportunity for reflection within the process.

In listening to and dealing with the mentoring pairs ideas and problems and repeating information to those who had forgotten and or mislaid relevant documentation forced the researcher/ tutor to take the time to deliberate, consider and reflect on her own perceptions of the strengths and weaknesses of the Project. These various strengths and weaknesses are examined with respect to the baseline, on-going and end of project data collection.

Base-line Data

The research cohorts' baseline data was derived from Questionnaire 1(Appendix 1), open-ended one-to-one semi-structured interviews (questionnaire 2, Appendix 2) and placement of the teachers on the Glatthorn and Fox Model (1996) Level of Teaching Skill and the CBAM Model (Hord, 1987) for changes in teachers' practice.

Research Cohort's Biographical Details

The research cohort was made up of five pairs of teachers selected to represent a variety of teachers and teaching levels. The group included a male/female pair, a more experienced and less experienced female pair, an older superior and a young subordinate, a pair of young teachers and a pair of teachers working in reception classes. Attrition over the study's timeline meant that two teachers, one from the young teacher pair and one from the reception teaching pair left late in the project. Biographical details of the remaining teacher pairs or teachers are given below.

Teachers A and B (the male / female pair)

Location: a large urban school

Teacher A was a male in the 30 – 40 year age group, had 13 years experience and was, at the start of the project, teaching a Year 5 class. In the second year of the Project he took on a Year 3 class. He was educationally well qualified with a BA (Hons), a MA and held a secondary PGCE. Teacher A had commenced his teaching career teaching History at the secondary level but after one year had changed to primary teaching. At the Project's commencement he was the schools' science co-ordinator, a position he had held for a number of years. Teacher A often worked very closely with the headteacher acting as a kind of informal Deputy. He was interested in school management issues but felt that schools' autonomy was becoming so restricted through government regulations it was not worth striving to improve teaching practices. *'Teaching is increasingly viewed in the terms of League Tables – quantifiable assessments. What is personally important to the teacher and children is becoming increasingly irrelevant'.*

Teacher B, the female was in the same age group, though towards its upper end, and had been teaching for seven years. She had taken up teaching after having children and had the qualifications of a BSc (Hons) and a Primary PGCE. Teacher B was teaching a year 1 class in the first year of the Project and a year 2 class in its second year. Throughout her career Teacher B had only taught in year 1 or 2 classes and had never held any kind of 'management' position within a school. For Teacher B there was no attraction to move beyond her classroom, she also had no interest in using her classroom expertise in something like an AST position. *'Go for an AST, no I couldn't be bothered with that sort of thing'.*

Teachers C and D (the more experienced and less experienced female pair)

Location: small city infants' school

Teacher C's details showed her in the upper end of the 40-50 age group. She had been teaching for eight years. She had trained to be a teacher after having children and had the educational qualifications of a BA and a Primary PGCE. Teacher C had only taught Early Years in Infants' schools and had a year 1 and a year 2 class in the two years of the Project. Teacher C was very committed to remaining as a classroom teacher and was not interested in moving on or up. *'I have other things in my life other than teaching'.* Teacher C was the science coordinator for the school though she did not have any background in the science area.

Teacher D was in the 20 – 30 age group and had been teaching for four years. Her educational qualifications were a B. Ed (Hons). Her current school was the only school she had taught in, with her experience to this point confined to a year 1 or a year 2 class. Teacher D had a background in science and was keen to become a science co-ordinator sometime in the future. Teacher D was very interested in having a school working on a scheme to improve the science teaching. *'I'd like to do something like that. I am doing a bit now with other year 2 teachers but I would like to develop it more'.*

Teachers E and F (the older superior and young subordinate female pair)
Location: large urban school

Teacher E was the Deputy Headmistress of the school. She was in the 40-50 year age group, her educational qualifications included a Certificate in Education and a B. Ed. She had been teaching for 20 years. This experience was gained in a wide variety of schools across many year levels. During the Project Teacher E taught Year 5 classes. In addition to her role as Deputy, Teacher E was the science co-ordinator for the school, a position she had held for a number of years. Teacher E's career hopes were concerned with improving: (a) 'My *students' attitudes to science'* and (b) *'Developing my role as Deputy and the science co-ordinator to the best of my ability'.*

Teacher F was in the 30-40 age group and had been teaching for seven years. She was educationally well qualified with a BA (Hons), a M.Sc and a Primary PGCE. Teacher F had seven years teaching experience and was in her second year at the school when the study commenced. She taught a Year 4 class for both years of the Project. Teacher F had as a primary concern for her career that she was successful in OfSTED inspections. As part of this success she was interested in promotion via other schools. *'If I am successful I would like first to be Key Stage co-ordinator and then a Deputy but I expect I will do this in other schools'.*

Teacher G (originally part of the young female teacher pair)[8]

Location: large inner city school

Teacher G was in the 20-30 year age group, had the educational qualifications of a B.Sc (Hons) and a Primary PGCE. She had five years teaching experience and for the two years of the Project taught a Year 4 class. Teacher G stated she was ambitious and was keen to gain experience in both phase levels and in educational positions outside a school. *'I would like to be a Deputy Head one day, not a Head, as I want to stay in touch with the children'.* Teacher G, together with her peer partner, were the joint science co-ordinators of the school.

Teacher H (originally part of the reception teacher pair)[9]

Location: the infants' school within a large urban school

Teacher H was in the 50-60 age range and was the most experienced teacher in the research cohort. Her 24 years teaching of experience were confined to early years schooling with much of that time spent in Reception classes. Teacher H had a Certificate of Education and a Diploma of Education. Over the years Teacher H had taken on a variety of 'management' roles and at the time of the Project she was the science co-ordinator for the whole school, (Infants and Junior). Teacher H felt she was coming to the end of her teaching career and had no other career aspirations. *'I have done enough, if I can share some of my experience good, if I can learn something from a younger teacher good, but that is it'.*

Table 8.1 presents a summary of these teacher biographies.

Table 8.1: Teacher Biographies

Teacher	Age Group	No of Years Teaching	Year Level Teaching 1998/1999	Year Level Teaching 1999/2000	Educational Qualifications
A	30-40	13	Yr. 5	Yr. 3	BA (Hons) MA PGCE secondary
B	30-40	7	Yr. 1	Yr. 2	B.Sc (Hons) PGCE
C	40-50	8	Yr. 1	Yr. 2	BA PGCE
D	20-30	4	Yr. 2	Yr. 1	B.Ed (Hons)
E	40-50	20	Yr. 5	Yr. 5	Cert. Ed & B.Ed
F	30-40	7	Yr. 4	Yr. 4	BA (Hons) M.Sc PGCE
G	20-30	5	Yr. 4	Yr. 4	B.Sc (Hons) PGCE
H	50-60	24	Reception	Reception	Cert. Ed & Dip. Ed

[8] The second teacher in the pair left the school on maternity leave in the Spring Term 2000.

[9] The second teacher in the pair left the school in the Spring Term 2000 to take up a post in another school.

Analysis of Results of Questionnaire 1

Questionnaire 1 sought to give insight into the research cohorts' pre-course understandings of mentoring. It was to be used to ascertain if the research cohort teachers had similar or different knowledge and understandings of mentoring to that of the original respondents to the survey (refer to Appendix 1 for details on original group composition).

Questionnaire 1's structure (see Chapter 5 and Appendix 1) was a series of statements arranged so that different parameters of mentoring were grouped together. The number of statements for any one question varied between three and nine. In line with the literature on this subject, the parameters of mentoring chosen were: needs prior to mentoring, mentoring skills, type of mentoring activities, out-of-class mentoring activities or duties, the 'essential' elements in mentoring, and training needs for specific skills. In the first five questions the respondents were asked to rank, in order of importance to themselves, a series of statements. In effect, the questionnaire was asking each respondent *'In looking at the statements in each question which one of the statements is of most importance to you in respect of the aspects, skills or activities of mentoring the question is concerned with? When this choice is made then of the remaining statements which statement is of second most importance to you in respect of the aspects, skills or activities of mentoring the question is concerned with, which is third and so on until all statements are ranked?'* For the sixth question, relating to training needs, the respondents were asked to circle those elements they would like training in. No preference was needed.

The research cohort teachers found it difficult to rank the importance of particular statements when faced with the large numbers of statements in some questions and many stopped making choices after the fourth ranking. Therefore, to accommodate missing cases and hence consistency of number of ranking choices, only the first four preferences of the eight teachers were used for further examination.

There were 103 respondents to the original Questionnaire 1, hereafter referred to as the original cohort. The initial intention was to make a detailed analysis of the data generated by the original cohort. However, inspection of the data revealed constraints caused by the design of some of the questionnaire's elements; the multiple statements and a lack of a clear structure in which to show ranking of importance (these design problems are outlined in chapter 5, pp. 84-86). As the data generated from the original cohort's responses was going to be compared to the small-numbered, research cohort's responses to Questionnaire 1 the most appropriate method for examination of all data generated from Questionnaire 1 appeared to be by ranking choice count.

The ranking counts for the original cohort and the research cohort are given in the following tables. Percentages are given for each count as an aid in understanding the discussion of the ranking order that follows each table.

Tables of Results from the Original Cohort & the Research Cohort

Table 8.2a presents the original cohort's rankings of question 1, which asked for views about needs prior to mentoring.

Table 8.2a: Question 1 Needs Prior to Mentoring

Statement Ranking (Number of teachers N=103)*	**Ranking Choices**			
	1st	**2nd**	**3rd**	**Rank Order – ie. chosen by most people as 1st & 2nd preference**
I think it is important to: (1) Shadow an experienced mentor for a period of time.	**20** 19.4%	**33** 32%	**42** 40.8%	**3**
(2) Have time allocated to be briefed on how the mentoring role fits into the wider picture of the school.	**52** 50.4%	**30** 29.1%	**15** 14.5%	**1**
(3) Arrange a timetable for mentoring activities/duties.	**29** 28.7%	**36** 34.9%	**36** 34.9%	**2**

*** Total choices may not add to 100%, as there are missing cases**

Table 8.2a shows that in question 1 half the original cohort ranked Statement 2 as the most important aspect of mentoring with Statement 3 as being the second most important.

Table 8.2b presents the research cohort's rankings of question 1, which asked for views about needs prior to mentoring.

Table 8.2b: Question 1 Needs Prior to Mentoring

Statement Ranking (Number of teachers N=8)	Ranking Choices			
	1st	2nd	3rd	Rank Order – ie. chosen by most people as 1st & 2nd preference
I think it is important to: (1) Shadow an experienced mentor for a period of time.	1 12.5%	3 37.5%	4 50%	=2
(2) Have time allocated to be briefed on how the mentoring role fits into the wider picture of the school.	6 75%	2 25%	0	1
(3) Arrange a timetable for mentoring activities/duties.	1 12.5%	3 37.5%	4 50%	=2

Table 8.2b shows that Statement 2 was ranked as being of more importance than either of the remaining two statements which is the same as that of the original cohort. Ranking order of Statements 1 and 3 show an equal preference which is a slightly different ranking choice than that of the original cohort.

Table 8.3a presents the original cohort's rankings of question 2, on suggested mentoring skills.

Table 8.3a: Question 2 Suggested Mentoring Skills

Statement Ranking (Number of teachers N=103)*	Ranking Choices						
	1st	2nd	3rd	4th	5th	6th	Rank Order – chosen by most people as 1st & 2nd preference
Rank the skills in importance to you: (1) Able to demonstrate well-organized, purposeful teaching, appropriately paced and which employs effective questioning to elicit students interest / attention.	66 64%	16 15.5%	5 4.8%	4 3.8%	6 5.8%	3 2.9%	1
(2) Ability to assist teachers to forge strong & relevant theory-practice connections	7 6.8%	16 15.5%	12 11.6%	13 12.6%	16 15.5%	29 28.1%	3
(3) Ability to assist teachers to rethink their subject knowledge in a manner that meets school schemes of work and makes it accessible to students of differing abilities.	17 16.5%	34 33%	8 7.8%	13 12.6%	17 16.5%	10 9.7%	2
(4) High Expectations	3 2.9%	17 16.5%	21 20.3%	20 19.4%	17 16.5%	17 16.5%	4
(5) Positive Re-inforcement	4 3.8%	12 11.6%	38 36.9%	20 19.4%	15 14.6%	9 8.7%	5
(6) Explicit Feedback	4 3.8%	5 4.8%	16 15.5%	28 27.1%	23 22.3%	19 18.4%	6

** Total choices may not add to 100%, as there are missing cases*

Table 8.3a shows a ranking of Statement 1 as being the most important mentoring skill to 66 of the respondents. The second ranking choice is Statement 3 with 49.5% of responses choosing this item as their first or second choice. There is little difference between the remaining choices when considering the overall pattern of choices.

Table 8.3b presents the research cohort's rankings of question 2, on suggested mentoring skills.

Table 8.3b: Question 2 Suggested Mentoring Skills

Statement Ranking (Number of teachers N=8) Rank the skills in importance to you:	**Ranking Choices**				
	1st	**2nd**	**3rd**	**4th**	**Rank Order – chosen by most people as 1st & 2nd preference**
(1) Able to demonstrate well-organized, purposeful teaching, appropriately paced and which employs effective questioning to elicit students interest / attention.	**5** 62.5%	**1** 25%	**1** 12.5%	**1** 12.5%	**1**
(2) Ability to assist teachers to forge strong & relevant theory-practice connections	**1** 12.5%	**1** 12.5%	**1** 12.5%	**0**	**=3**
(3) Ability to assist teachers to rethink their subject knowledge in a manner that meets school schemes of work and makes it accessible to students of differing abilities.	**1** 12.5%	**3** 37.5%	**1** 12.5%	**2** 25%	**2**
(4) High Expectations	**0**	**0**	**2** 25%	**0**	**6**
(5) Positive Re-inforcement	**0**	**2** 25%	**0**	**4** 50%	**=3**
(6) Explicit Feedback	**1** 12.5%	**1** 12.5%	**3** 37.5%	**1** 12.5%	**=3**

Table 8.3b shows that the research cohort also ranked Statement 1 as being the most important mentoring skill and Statement 3 as second most important. As with the larger original cohort there is little difference between the other statements.

Table 8.4a presents the original cohort's rankings of question 3, which asked about their views of different mentoring activities.

Table 8.4a: Question 3 Mentoring Activities

Statement Ranking (Number of teachers N=103)*	Ranking Choices					
	1st	2nd	3rd	4th	5th	Rank Order – chosen by most people as 1st & 2nd preference
Rank the activities in importance to you: 1) Planning an individual program for teaching and learning and discussing progress.	**30** 29.1%	**12** 11.6%	**9** 8.7%	**29** 28.1%	**12** 11.6%	**3**
(2) Discussing with teachers teaching methods for a particular subject.	**29** 28.1%	**19** 18.4%	**23** 22.3%	**18** 17.5%	**11** 10.7%	**2**
(3) Observing teachers' teaching and providing feedback.	**26** 25.2%	**44** 42.7%	**18** 17.5%	**9** 8.7%	**1** 0. 97%	**1**
(4) Discussing with teacher the lesson/s observed.	**6** 5.8%	**24** 23.3%	**42** 40.8%	**17** 16.5%	**5** 4.8%	**4**
(5) Organizing a mentor timetable.	**11** 10.7%	**2** 1.9%	**7** 6.8%	**16** 15.5%	**49** 47.6%	**5**

** Total choices may not add to 100%, as there are missing cases*

Table 8.4a shows that the teachers considered that the three mentoring activities presented in Statements1, 2, and 3 were most important with some indication that observing teachers' teaching and providing feedback was most valued. Of interest is that almost half (49) respondents ranked Statement 5 as having least importance to themselves.

Table 8.4b presents the research cohort's rankings of question 3, which asked about their views of different mentoring activities.

Table 8.4b: Question 3 Mentoring Activities

Statement Ranking (Number of teachers N= 8)	Ranking Choices				
	1st	2nd	3rd	4th	Rank Order –chosen by most people as 1st & 2nd preference
Rank the activities in importance to you: (1) Planning an individual program for teaching and learning and discussing progress.	1 12.5%	1 12.5%	0	4 50%	=3
(2) Discussing with teachers teaching methods for a particular subject.	0	2 25%	2 25%	2 25%	=3
(3) Observing teachers' teaching and providing feedback.	5 62.5%	2 25%	1 12.5%	0	1
(4) Discussing with teacher the lesson/s observed.	0	3 37.5%	2 25%	2 25%	2
(5) Organizing a mentor timetable.	2 25%	0	3 37.5%	0	=3

Table 8.4b shows that, for the research cohort, Statement 3 had a high level of importance with five teachers selecting it as their first preference and two teachers ranking it as a second choice. There is some similarity in this ranking order with that of the original cohort where 44 respondents ranked Statement 3 as the second most important mentoring activity. The research cohort's second and third ranking choices were less clear with three teachers ranking Statement 4 as second most important and three teachers ranking Statement 5 as third most important. This relatively high ordering of Statement 5 shows a disparity with the original cohort's ranking of Statement 5 where almost half (49) of the respondents ranked it as having least importance to themselves. This disparity between the groups is also seen with Statement 1 where almost a third of the original cohort ranked this statement of being of most importance and half the research cohort ranked Statement 1 as their fourth choice.

Table 8.5a presents the original cohort's rankings of question 4, on which mentoring activities would they most value in non-teaching time .

Table 8.5a: Question 4 Mentoring Activities in Non-teaching Time

Statement Ranking (Number of teachers N=103)*	Ranking Choices							
	1st	2nd	3rd	4th	5th	6th	7th	Rank Order – chosen by most people as 1st & 2nd preference
Rank the processes in importance to you: (1) A Needs Survey of your self – what you are currently doing, the materials you use, and how you teach.	**26** 25.2%	**11** 10.7%	**13** 12.6%	**8** 7.8%	**8** 7.8%	**5** 4.8%	**7** 6.8%	**3**
(2) Have considered alternate content, teaching skills & strategies and/or materials to improve the quality of own instruction.	**15** 14.6%	**27** 26.2%	**22** 21.3%	**10** 9.7%	**7** 6.8%	**6** 5.8%	**4** 3.8%	**2**
(3) Reflected on own actual classroom outcomes and subsequent actions.	**27** 26.2%	**25** 24.2%	**9** 8.7%	**16** 15.5%	**10** 9.7%	**6** 5.8%	**3** 2.9%	**1**
(4) Have collaboratively planned and developed curriculum and instruction in an attempt to attain shared goals with other colleagues.	**24** 23.3%	**9** 8.7%	**25** 24.2%	**17** 16.5%	**5** 4.8%	**8** 7.8%	**8** 7.8%	**4**
(5) Have pre-lesson discussions with colleagues.	**6** 5.8%	**12** 11.6%	**6** 5.8%	**12** 11.6%	**19** 18.4%	**15** 14.6%	**8** 7.8%	**5**
(6) Have post-lesson de-briefings with colleagues.	**0** 0%	**5** 4.8%	**14** 13.6%	**7** 6.8%	**20** 19.4%	**22** 21.3%	**12** 11.6%	**7**
(7) Have chance/s to observe other experienced teachers.	**2** 1.9%	**11** 10.7%	**11** 10.7%	**26** 25.2%	**14** 13.6%	**11** 10.7%	**15** 14.6%	**6**

** Total choices may not add to 100%, as there are missing cases*

Table 8.5a shows a wide spread of ranking in importance choice across all statements. Statements 3 and 2 offer the greater number of responses from the 103 potential respondents with 26 respondents choosing Statement 1 and 27 respondents choosing Statement 3 as their choice of having most importance to themselves when thinking of mentoring activities to be carried out in non-teaching time. However, there is little real difference between these choices and for the other options.

Table 8.5b presents the research cohort's rankings of question 4, on which mentoring activities would they most value in non-teaching time.

Table 8.5b: Question 4 Mentoring Activities in Non-Teaching Time

Statement Ranking (Number of teachers N=8)	**Ranking Choices**				
	1st	**2nd**	**3rd**	**4th**	**Rank Order - chosen by most people as 1st & 2nd preference**
Rank the processes in importance to you: (1) A Needs Survey of your self – what you are currently doing, the materials you use, and how you teach.	**4** 50%	**0**	**0**	**0**	**2**
(2) Have considered alternate content, teaching skills & strategies and/or materials to improve the quality of own instruction.	**1** 12.5%	**2** 25%	**1** 12.5%	**2** 25%	**3**
(3) Reflected on own actual classroom outcomes and subsequent actions.	**1** 12.5%	**4** 50%	**2** 25%	**0**	**1**
(4) Have collaboratively planned and developed curriculum and instruction in an attempt to attain shared goals with other colleagues.	**1** 12.5%	**0**	**3** 37.5%	**2** 25%	**=5**
(5) Have pre-lesson discussions with colleagues.	**1** 12.5%	**1** 12.5%	**0**	**3** 37.5%	**4**
(6) Have post-lesson de-briefings with colleagues.	**0**	**1** 12.5%	**1** 12.5%	**0**	**=5**
(7) Have chance/s to observe other experienced teachers.	**0**	**0**	**1** 12.5%	**1** 12.5%	**6**

Table 8.5b indicates that Statement 1 was felt to be of importance with half the research cohort ranking it as their first choice. However, Statement 3 also placed highly with half the teachers ranking it as a second choice and one teacher ranking it as a first choice. In a similar way to the original cohort there was a lack of difference between preferences across the remaining options. Therefore, it may be that in this question the lack of clarity of ranking choice relates to all respondents' understandings or lack of understandings about the suggested non-teaching time, mentoring activities.

Table 8.6a presents the original cohort's rankings of question 5, where they were asked to give their rankings of importance of Paul Stephens' (1996) suggested 'essential' elements of mentoring (see Chapter 5, p. 80) for details on Stephens' essential skills).

Table 8.6a: Question 5 Suggested Essential Elements of Mentoring

Statement Ranking Number of teachers N=103*	Ranking Choices									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	Rank Order - chosen by most people as 1st & 2nd pref.
Rank the elements in importance to you: (1) Planning - time to practice as a mentor, time to carry out the role, a timeline for mentoring activities / duties.	57 55.3%	13 12.6%	7 6.8%	2 1.9%	8 7.8%	0 0%	2 1.9%	4 3.8%	2 1.9%	1
(2) Liaising - collaborative planning between mentor and mentee.	19 18.4%	49 47.6%	9 8.7%	12 11.6%	4 3.8%	3 2.9%	0 0%	0 0%	1 0.97%	2
(3) Demonstrating - mentor articulating reasons for advice, ie. thinking 'out-loud' actions and rationale.	6 5.8%	8 7.8%	18 17.5%	12 11.6%	18 17.5%	14 13.6%	5 4.8%	5 4.8%	7 6.8%	4
(4) Facilitating – working alongside a colleague.	8 7.8%	11 10.7%	25 24.2%	12 11.6%	10 9.7%	5 4.8%	12 11.6%	7 6.8%	1 0.97%	3
(5) Participant observation during team teaching.	0 0%	4 3.8%	9 8.7%	13 12.6%	5 4.8%	20 19.4%	14 13.6%	12 11.6%	9 8.7%	7
(6) Non-participant observation where the mentor observes the whole lesson with the foci of the observation chosen by the mentee.	5 4.8%	5 4.8%	9 8.7%	17 16.5%	16 15.5%	16 15.5%	12 11.6%	7 6.8%	6 5.8%	5
(7) Spoken assessment as a diagnostic summary.	1 0.97%	2 1.9%	7 6.8%	10 9.7%	21 20.3%	9 8.7%	22 21.3%	15 14.6%	6 5.8%	=8
(8) Written assessment which could be in the form of a lesson observation schedule.	0 0%	3 2.9%	2 1.9%	4 3.8%	5 4.8%	12 11.6%	11 10.7%	26 25.2%	21 20.3%	=8
(9) Guiding – detailed skills guidance, ethical guidance, counselling guidance.	4 3.8%	5 4.8%	14 13.6%	16 15.5%	7 6.8%	10 9.7%	6 5.8%	6 5.8%	24 23.3%	6

** Total choices may not add to 100%, as there are missing cases*

Table 8.6a shows, despite having nine statements options, a clear ranking of first and second choices with 57 respondents ranking Statement 1 as being of most importance to themselves and 49 respondents ranking Statement 2 as second in importance. There is a lack of obvious preference across the remaining options, except that Statements 7 and 8 have very low ranking.

Table 8.6b presents the research cohort's rankings of question 5, where they were asked to give their rankings of importance of Paul Stephens' (1996) suggested 'essential' elements of mentoring (see Chapter 5, p. 80 for details on Stephens' essential skills).

Table 8.6b: Question 5 Suggested Essential Elements of Mentoring

Statement Ranking (Number of teachers N=8)	**Ranking Choices**				
	1st	**2nd**	**3rd**	**4th**	**Rank Order – ie. chosen by most people as 1st & 2nd pref.**
Rank the elements in importance to you: (1) Planning - time to practice as a mentor, time to carry out the role, a timeline for mentoring activities / duties.	**4** 50%	**1** 12.5%	**2** 25%	**1** 12.5%	**2**
(2) Liaising - collaborative planning between mentor and mentee.	**3** 37.5%	**3** 37.5%	**1** 12.5%	**0**	**1**
(3) Demonstrating - mentor articulating reasons for advice, ie. thinking 'out-loud' actions and rationale.	**0**	**1** 12.5%	**1** 12.5%	**2** 25%	**=4**
(4) Facilitating - working alongside a colleague.	**0**	**1** 12.5%	**2** 12.5%	**3** 37.5%	**=4**
(5) Participant observation during team teaching.	**0**	**1** 12.5%	**1** 12.5%	**0**	**=4**
(6) Non-participant observation where the mentor observes the whole lesson with the foci of the observation chosen by the mentee.	**1** 12.5%	**1** 12.5%	**1** 12.5%	**2** 25%	**3**
(7) Spoken assessment as a diagnostic summary.	**0**	**0**	**0**	**0**	
(8) Written assessment which could be in the form of a lesson observation schedule.	**0**	**0**	**0**	**0**	
(9) Guiding – detailed skills guidance, ethical guidance, counselling guidance.	**0**	**0**	**0**	**0**	

Table 8.6b shows that three quarters of the respondents ranked Statement 2 as being most important. Statement 1 was also placed highly with half the respondents ranking it as most important and one respondent ranking it as a second choice. This ranking importance for Statements 1 and 2 is very similar to the ranking choices made by the original cohort as is the lack of obvious preference across the remaining Statements 3, 4, 5 and 6. Of interest was that Statements 7, 8, and 9 were not selected by any teacher in the research cohort. This might be explained as another example of the research cohort's stated difficulties in ranking the importance of particular statements when faced with the large numbers of statements. However, this result may also have been simply that Statements 7, 8 and 9 held no ranking importance to any research cohort teacher.

Within Questionnaire1, question 6 had a different response format to that of the earlier five questions.

In question 6 respondents were presented with a list of nine mentoring skills and asked to indicate which skills they would like training in. Respondents were free to choose any and / or all of these training options.

Table 8.7a presents the original cohort's selections of the mentoring skills they would choose to receive training in.

Table 8.7a: Question 6 Original cohorts' choices for skill training

Specific Mentoring Skills Required (Number of teachers N=103)*								
Training option 1	**Training option 2**	**Training option 3**	**Training option 4**	**Training option 5**	**Training option 6**	**Training option 7**	**Training option 8**	**Training option 9**
Reflective Practice - critical analysis of own teaching	Theory and/or research findings on learning to learn	Subject Content knowledge	Models of teaching related to best practice in subject;	Questioning skills	Goal setting	How to accurately record observation of others	Interpreting what you have seen	Ways of challenging your colleague - to go beyond what they already know;
Total Numbers & Percentages for each element								
32 31%	**41** 39.8%	**17** 16.5%	**53** 51.4%	**22** 21.3%	**30** 29.12%	**55** 53.3%	**37** 35.9%	**65** 63%

*** As the teachers could choose one or more training options the numbers do not add up to 100%.**

Table 8.7a shows that 'Ways of challenging a colleague - to go beyond what they already know' is a mentoring skill that 65 respondents felt that they required training in. Other skill training asked for, by half or more of respondents, was training in 'How to accurately record observations of others' and 'Models of teaching related to best practice in subject'. Training in 'Subject content knowledge' was the least asked for option.

Table 8.7b presents the research cohort's selections of the mentoring skills they would choose to receive training in.

Table 8.7b: Question 6 Training Needs

Specific Mentoring Skills Required (Number of teachers N=7)*								
Training option 1	**Training option 2**	**Training option 3**	**Training option 4**	**Training option 5**	**Training option 6**	**Training option 7**	**Training option 8**	**Training option 9**
Reflective Practice - critical analysis of own teaching	Theory and/or research findings on learning to learn	Subject content knowledge	Models of teaching related to best practice in subject;	Questioning skills	Goal setting	How to accurately record observation of others	Interpreting what you have seen	Ways of challenging your colleague - to go beyond what they already know;
Total Numbers & Percentages for each element								
3 37.5%	**1** 12.5%	**3** 37.5%	**4** 50%	**3** 37.5%	**3** 37.5%	**5** 62.5%	**3** 37.5%	**7** 87.5%

*** As the teachers could choose one or more training options the numbers do not add up to 100%.**

Table 8.7b shows that research cohort respondents selected the mentoring skills they required training in, in the same order as the original cohort. Of note was that one teacher in the research cohort did not feel they needed training in any of the offered skills and one teacher wanted training in all skills. A variation was seen however, in the least favoured training options. For the research cohort, 'Theory and/or research findings on learning to learn' was selected by only one teacher. The original cohort's selections show this option as the fourth most popular training need. The least popular option for the original cohort was training in 'Subject content knowledge'. It was initially thought that this variation was due to the research cohort being primary teachers and that the original respondents of Questionnaire 1were mainly secondary teachers who were comfortable in their subject content knowledge. Closer examination of the biographical details of the respondents to Questionnaire 1 (Appendix 1) showed the majority of respondents were either primary science coordinators or primary design and technology coordinators. Therefore, the discrepancy between the choices for least favoured training need could not be ascribed to a difference in phase level teaching.

Discussion of Questionnaire 1 results

The examination of the results of Questionnaire 1 shows that for the five questions relating to knowledge and understandings of mentoring the research cohort had a very comparable pattern of ranking response as did the respondents to the original survey. The commonality of these patterns would seem to suggest that the research cohort's knowledge and understandings of mentoring were as 'typical' as those of the original respondents to Questionnaire 1.

To supplement or further investigate these connections between the research cohort teachers and the original cohort's knowledge and understandings of mentoring, comparisons between their choices were explored in three ways. The first way **(i)** presented in Figure 8.1 looks, in the main, at ranking choices for first and second choices. The second way **(ii)** is within each of the five questions, some exploration was made of options which ranked low in the cohorts' preferences. The third element **(iii)** looked at the disparity between ranking preference of some skills and / or activities and the high degree of interest from both groups for training in that same area.

(i) Ranking choices for first and second choices

Figure 8.1 presents some comparisons between the original cohort and the research cohort's ranking selections of statement options for the first five questions of Questionnaire 1.

Figure 8.1: Comparisons between the Original Cohort and the Research Cohort's Ranking Selections of Questions 1 - 5

Question Number & Statements Selected	Comments
Question 1 – pre-mentoring needs I think it is important to: **Statement 2**: Have time allocated to be briefed on how the mentoring role fits into the wider picture of the school.	The original cohort and the research cohort clearly indicated this statement as being the most important option in respect to pre-mentoring activities. Both groups showed a similar ranking preference across the 2 remaining options.
Question 2 – mentoring skills I think it is important to: **Statement 1**: Be able to demonstrate well-organized, purposeful teaching, appropriately paced and which employs effective questioning to elicit students' interest /attention. **Statement 3**: Ability to assist teachers to rethink their subject knowledge in a manner that meets school schemes of work and makes it accessible to students of differing abilities.	Both cohorts' selected Statement 1 as being of most importance to themselves. Statement 3 was also ranked second in importance by both groups.
Question 3 – mentoring activities I think it is important to: **Statement 1:** Plan an individual program for teaching and learning and discuss progress. **Statement 2:** Discuss with teachers teaching methods for a particular subject. **Statement 3:** Observe teachers' teaching & provide feedback.	In question 3 the original cohort's preferences were spread across statements 1, 2, &3 with a slight bias toward statement 3. The research cohort however, clearly chose statement 3 as their first preference. There was no clear preference by either cohort of the remaining 2 options.
Question 4 – mentoring activities in non-teaching time I think it is important to: **Statement 2:** Have considered alternate content, teaching skills & strategies and/or materials to improve the quality of own instruction. **Statement 3:** Reflect on own actual classroom outcomes and subsequent actions. **Statement 1:** A Needs Survey of your self – what you are currently doing, the materials you use, and how you teach.	There was a wide spread of preference from the original cohort across the 7 options offered in this question, with some bias toward statements 2 & 3. Consideration was given to the idea that these results exemplify one of the problems inherent in Questionnaire1's design that is, when there are large numbers of options to rank in importance it becomes difficult for respondents to make meaningful ranking choices. This did not seem to be the total case for the research cohort as they selected statement 1 as being of most importance and ranked statement 3 as their second choice. However they did show a similar lack of preference across the other options. The inconsistency shown between the two cohort's ranking choices for 1st & 2nd preference may have occurred because the research cohort completed Questionnaire 1 at the end of their first INSET session. The INSET session had time allocated to discussion of self needs analysis. This meant the research cohort had some idea of what a Needs Survey is, and its purpose. All original respondents of Questionnaire1 may not necessarily have had this depth of knowledge and this may have had some influence on their subsequent ranking choices.
Question 5 – essential mentoring elements Rank the elements in importance to you: **Statement 1** Planning - time to practice as a mentor, time to carry out the role, a timeline for mentoring activities / duties. **Statement 2** Liaising - collaborative planning between mentor and mentee.	Question 5 however, seems to indicate that the original cohort could make a ranking choice of most importance when given large numbers of statements to order. There were 9 options in question 5 but the group clearly selected statement 1 as being of most importance and statement 2 as their second choice. The research cohort also did not appear to have difficulty in ranking the 9 options from this question, selecting statements 2 & 1 as their first and second choices, a very similar ranking choice to that of the original cohort. Both groups did show a lack of clear preference across the remaining options.

(ii) Exploration of options which ranked low in the cohorts' preferences

Both cohorts tended to give a low rank to activities or skills that would mean extra time, effort and commitment, perhaps even out-of-hours time, in order for them to be carried out. An example of this can be seen in question 5 where the statement options 'Spoken assessment as a diagnostic summary' and 'Written assessment which could be in the form of a lesson observation schedule' were ranked as the least preferred options by the original cohort and were not selected by any teacher from the research cohort.

Other low ranked statement choices, especially with regard to the research cohort, were given to statements relating to having enough confidence in one's own knowledge and ability to share and / or work closely with a colleague. An example of this can be seen also in question 5 where the option of the importance of a mentor having the skill to 'facilitate - working alongside a colleague' is given a low ranking of importance. A general lack of confidence in their own ability, was a characteristic of the research cohort and was noted in the INSET sessions and in early researcher/tutor - teacher meetings. It is important to remember that the teachers in the research cohort worked in schools which had been designated as having serious difficulties and the teachers had become, to some extent, accustomed to being appraised critically and therefore, lacked confidence.

(iii) Disparity between ranking preference and interest for training in the same skills

The other interesting element exposed in both the original and the research cohorts' results from Questionnaire 1 is the incompatible ranking of importance given to specific skills and activities in the main body of the questionnaire and the number of teachers asking for training in that skill when completing the training needs section. An example of this can be seen in Question 3 where the least favoured statement was 'Planning an individual program for teaching and learning and discussing progress' yet the training need asked for by all respondents being 'Ways to challenge a colleague'. Planning a program together and discussing progress would seem to be an effective way of challenging a colleague. This inconsistency between skills given low rankings of importance and training wanted in these same skills by both cohorts could be explained as lack of 'thought' when completing the survey or a lack of depth of understanding of the processes, activities and skills of mentoring. That is, both groups of respondents may not have been really sure what a particular process, activity or skill described in a statement would mean to them but when shown a specific skill they could determine if they needed training in that skill.

As a preliminary analysis of the original cohort's responses to Questionnaire 1 underpinned much of the development of the INSET for the Pair Peer-Mentoring Project. It was therefore, reassuring for the researcher/tutor that on examination of the research cohort's responses to Questionnaire 1 to see similar results to those of the original cohort. As the INSET design emerged from the apparent needs of the respondents to Questionnaire 1, the subsequent INSET the research cohort undertook would appear to have been suitable for their needs.

The Open-Ended One-To-One Semi-Structured Interview

(i) Teachers' expectations of gain from participating in the Pair Peer-mentoring Project

In April/May 1999, the researcher/tutor conducted a semi-structured questionnaire/ survey (questionnaire 2, Appendix 2) to gain insight into the research cohort teachers, their biographies, their beliefs about teaching science, their participation in the project. As part of this insight each teacher was asked what he/she expected to gain from participating in the Pair Peer-mentoring Project. This question was also asked in December 1999 (approximately mid-project) and again in July 2000 at the end of project data-collecting phase. Synthesis of comments, from these three data collection times, resulted in six categories of expected gain. These categories were self-gain, sharing experience, confidence building, working collaboratively, building relationships and the mentoring process spreading beyond immediate partner. As the Project developed, a shift was made towards a more confidence building, collaborative focus. This movement is discussed in the mid and end of project data sections of this chapter.

Table 8.8 presents the baseline position of the research cohort teachers' expectations of gain from participating in the Pair Peer-Mentoring Project.

Table 8.8: Teacher's expectations of gain from participating in the Pair Peer-Mentoring Project

Teacher	CATEGORIES of GAIN					
	Self gain	**Sharing experience**	**Confidence building**	**Collaboration**	**Relationship building**	**Spreading beyond partner 'buddy'**
A	X					
B		X		X		
C	X					
D	X					
E		X			X	
F	X					
G	X					
H		X				

Examples of transcript statements for each category are given below in Figure 8.2

Figure 8.2: Examples of teachers' comments for each category of gain

self-gain	"Hope to gain a better idea of what I do in the classroom".	**[Teacher A]**
	"I'd also like to know what things I do are right or wrong".	**[Teacher D]**
	"Better understanding of how I teach and areas to improve"	**[Teacher F]**
sharing experience	"Useful to see someone else in action and think, Yes I could do that".	**[Teacher B]**
	"It is a two-way process. Each teacher learning and sharing with each other".	**[Teacher H]**
collaboration	"Nice to make time to talk about observations and science issues".	**[Teacher B]**
Relationships	"An opportunity to get to really know colleagues involved with me on this project".	**[Teacher E]**

As can be seen in Table 8.8, at the baseline data collection time, many of the teachers saw participation in the Pair Peer-Mentoring Project primarily in terms of gains for themselves. There was some consideration of the project as being useful in helping or learning from a colleague.

(ii) Teachers' Beliefs about Teaching and Learning Pre Mentoring Project

Another element of the open-ended one-to-one semi-structured interview was a question asking teachers what they believed was important when teaching science. In the base line data the responses to this question fell into three main groups. The first of these groups had a focus on children; their ideas and their knowledge and understandings. The second group of responses had a focus on the teacher; the way he/ she should 'teach' and the skills, knowledge and attributes he or she should possess. The third group of responses related to organisational or environmental aspects of teaching. Teacher's comments that signify these groups are presented in Figure 8.3.

Figure 8.3: Categories of teachers' beliefs on what is important when teaching science

Groupings and their Focus	Identity of Teacher Comments
Child focus – children's ideas	
encourage children to talk and share ideas	**B E**
value what children say	**B**
good relationship with children	**C D G**
children's self esteem	**C**
find out about children - what makes them tick	**B**
Child focus – children's knowledge and understandings	
children have a practical, visual memory so they can carry through school 'what they did'	**G**
Teacher focus – children's learning	
children enabled to achieve at own level	**E**
encourage children to devise their own investigations	**F**
encourage children to work cooperatively	**F**
teacher fosters children's confidence and ability to deal with new concepts	**F**
lessons relevant and interesting to children	**C D F G H**
teach to stimulate curiosity and 'awe and wonder' of the world	**H**
teach learning is fun	**E**
Teacher focus – self skills, knowledge, attributes	
teacher self-critical appraisal to ensure future successful lessons	**E**
teacher has background knowledge and a good level of understanding	**G**
teacher is enthusiastic - enthuses children	**E G**
Organisation and environment focus	
external influences denote what is taught	**A**
controlled or structured environment	**D F**
good organisation	**C E**

It would seem from Figure 8.3 that for seven of the eight teachers, what is important in teaching science is a child-centred approach. The majority of their comments concerned understanding and valuing children and/or ways children should be taught. For these teachers, the children and the teacher's 'practice' are the key factors. The only teacher who had a different point of view was Teacher A whose comments were directed at the disempowerment of teachers as a result of Government edicts such as SATS, OFSTED Inspections, and so on. In his view what he believed about teaching and learning was irrelevant.

With the exception of teacher A, who did not answer the question, the researcher/ tutor felt the responses of the teachers represented an 'idealised' version of what they really believed about 'what was important in teaching science'. There was a rhetoric – practice gap. Evidence of this rhetoric – practice gap could be seen when teachers were observed teaching, and placed on the Glatthorn and Fox Model of levels of teaching skill. It seemed that something other than an open-ended question was needed to explicate teachers' beliefs about science teaching. Therefore, a detailed, specific proforma on beliefs about teaching science was used, in conjunction with the open-ended question, in the post-project data collection phase the results of which are discussed in that section of this chapter.

Teacher Placement on Models

The Glatthorn and Fox Model allocating Level of Teaching Skills

To gain some idea of the individuals in the mentor pairs as 'teachers', the researcher/tutor conducted a set of observations of the teachers teaching, using the proforma of the Glatthorn and Fox (1996) model (Figure 8.4). The researcher/tutor indicated by ticks and brief notes teachers' levels and reasons for choice as well as a general comment on the lesson as a whole. Knowledge of Leithwood's (1992) more complete descriptors, detailed earlier in chapter seven, was especially helpful to the researcher/tutor during these observations.

The observations took place April/May 1999 and are presented in Figure 8.5. This figure has been set out so that if a teacher is performing at a particular level within a category then a letter representing the teacher is placed under that level heading. If a teacher is not fully meeting the level descriptor then a brief note outlining reason for exclusion is given. For example, in 'Model of Teaching' under basic level appear the letters A B D E F G. This means these six teachers were fulfilling the criteria of direct instruction.

Glatthorn and Fox's Model of Levels of Teaching Skills is provided in Figure 8.4 as a reference for the categories of behaviour and skill levels.

Figure 8.4: Glatthorn and Fox (1996) Levels of Teaching Skills

Behaviour Categories	Levels of Skill		
	Basic	**Intermediate**	**Advanced**
Model of Teaching	Uses direct instruction	Uses model recommended by experts in the field	Uses several models, especially constructivism
Curriculum	Implements school scheme of work	Integrates within subject	Integrates 2 or more subjects, providing for enrichment and remediation
Content Knowledge	Avoids content errors	Demonstrates sound and current content knowledge	Enables students to understand deep structure of subject
Classroom Climate	Maintains orderly environment, uses most of class time for learning	Maintains learning – focused environment, maximises time on task	Varies environment to suit learning goal, providing for cooperative interaction, relates time use to learning priorities
Lesson Structure	Provides overview, states objectives	Also makes transitions effectively and summarises lesson	Varies lesson structure when necessary to encourage discovery
Learning Activities	Provides activities that relate to objectives	Varies activities	Emphasises active learning assessment
Assessment	Checks for understanding	Also uses assessment data to modify instruction	Uses authentic assessment measures, giving feedback to students
Communication	Explains clearly, questions effectively	Also uses student answers to advance discussion	Also structures discussion to foster student-student interaction

Figure 8.5: Researcher/Tutor's Perception of Teachers' Baseline Levels of Teaching Skills

Behaviour Categories	Levels of Skill		
	Basic	**Intermediate**	**Advanced**
Model of Teaching	A B D E F G C & H maintained a whole class, teacher led discussion lesson		
Curriculum	A B C D F E G H		
Content Knowledge	C D & F put in place misconceptions – own subject knowledge appeared limited	A B E G H	
Classroom Climate	A D H E C children not involved, lots off-task behaviour	F B G	
Lesson Structure	A* C* D* E* F* H*	B G	
Learning Activities	A B C D E H F* very limited investigation	G	
Assessment	A B E G H C* D* & F* did not check for understanding		
Communication	B E* G H C D & F mainly teacher talk – only closed questions for children to answer	A	

Key: In the Figure the letters identify particular teachers
An * indicates not meeting Basic Level

In the first category, *Model of Teaching,* six teachers were using the format of a whole class introduction with the children grouped 'on the carpet' in front of the teacher with the teacher presenting topic 'X', asking a few children what they already knew about 'X', followed by explanations and directions for the task. The children then returned to their desks, usually in groups, to carry out the activity or the investigation. During this time of individual work the teacher moved from group to group checking on children's progress.

At the end of the lesson there was a return, as a class, to 'the carpet' to recount to the teacher either as an individual or a group what had been done or found out. This is a typical behaviour pattern from Hunter's (1984) 'six-step lesson plan'. When considering the specific structure of the lessons, Hunter's work was helpful in further distinguishing or categorising the model of teaching, the teachers were using, in order to place them on the Glatthorn and Fox model.

The exceptions to this use of the *basic model* were a reception and a year 1 class. Teachers C and H's children remained sitting in a circle, on the carpet, with the teacher directing individuals to perform a task and then asking other children for comments or ideas on what was happening or had happened.

Examination of planning documentation showed that in the *curriculum category* the teachers were implementing the school's scheme of work for science. For most of these teachers this meant use of the DfEE's science curriculum for Key stages 1 and 2 developed by the Qualifications and Curriculum Authority (QCA) 1998.

In the *content knowledge category* of the model, five of the teachers could be categorised at the Intermediate level. Teacher C was working at the *basic level* in that she avoided content errors. Teachers' D and F who did not reach the *basic level* had classes conducting experiments where the children's findings did not match anticipated results. It was interesting to note that both these investigations were concerned with aspects of melting or dissolving. Neither teacher seemed aware that misconceptions were being put in place.

Classroom climates were generally orderly with children completing the set tasks in a positive manner. Teacher C's problems may have been the result of poor behaviour management skills with a lot of time being lost in endeavouring to get the children to sit still or raise their hand if they wanted to say something. Many children lost interest in the discussion as a result of these constant interruptions. It could also be that teacher C, who did not have much background in science, was not confident about the lesson and this transmitted to the students with the result that they 'played-up'.

As indicated earlier the *lesson structure* for six of the teachers was very similar. All eight however, started their lessons by telling the children what they were going to be doing.

Only teachers B and G talked to the children about what they were going to be learning and concluded their time with a summary or plenary session.

The structure of the *learning activities* offered was similar for a number of the classes despite a broad range of year levels though the planned investigations did relate to the learning objectives given. Five of the classes working in groups had all groups provided with the same resources for the same 'investigation' to be carried out. The exception was Teacher G who was working at an *'intermediate' level.* The children in this class, though having the same resources ie. bits and pieces to create electrical circuits, were investigating different ways they could be put together to create lighting for stage sets they had created. In Teacher F's class the 'investigation' was extremely limited. The context of the lesson concerned what happens when a solid is added to a liquid. The children were only given one solid (salt) and explicit instructions on what to do and when. There was no opportunity for children to talk about what they saw and/or did. In the teacher-led discussion classes, Teachers C and H directed what the children did in the investigation by asking individual's to perform a task or try something out, consequently they were functioning at the *basic level.*

Assessment of the learning appeared to be from observation and questioning of individuals as they worked leading to in-head knowledge for teachers A, B, E, G, & H. Of the teachers who were not yet at the *basic level,* Teacher F used the children's notes copied from the board to determine if the science task had been completed. Teacher F and Teachers C and D did not use any observable strategy for monitoring their children's learning. The questioning techniques and skills of the teachers varied but all eight teachers gave clear instructions and explanations of what was to be done in the lesson. Teachers C, D & F tended to use only closed questions and were waiting for the 'right' answer. *Communication* in these classes was always teacher-dominated. Teacher A was the only teacher observed using the ideas the children had to open up and further explore the topic.

As can be seen in Figure 8.5, and in the descriptor notes, at the base line data point of the project many teachers were operating throughout the eight categories at the *basic level.* Potential problems were signalled in that some teachers were categorised as not being at a *basic level* in some areas. On a positive note six of the eight teachers demonstrated sound content knowledge when teaching science lessons.

The CBAM Model - changes in teachers' practice

The second model employed to oversee changes in teachers' practice was The Concerns-Based Adoption Model (CBAM). The CBAM model has four main categories within the model to examine the relationship between attitude and behaviour in a change process. In each of these elements, (attitude and behaviour), are seven stages through which teachers may pass as they undergo the change process. Three diagnostic dimensions of the model were used to monitor/ examine the research cohort's attitude/s and behaviour as they endeavoured, through use of the Framework for Pair Peer-Mentoring, to make changes to their practice. These dimensions were:

1. Stages of Concern (SOC) in order to identify how practioners felt about the change process.
2. Levels of Use (LOU), which addresses what the practioners are or are not doing, to implement the innovation.
3. LOU also includes reference to types of use (TOU) within each level of use.

Allocation of the types of concerns, levels of those concerns and for levels of use for a baseline CBAM were determined by the coding of individual teachers' comments, made either to the group or to the researcher/tutor, about particular concerns. The comments used arose in informal chat and discussions at induction INSET sessions and the first school-based researcher/tutor - teacher meetings.

As an example of what a particular teacher's placement looked like, Table 8.9 presents Teacher H's allocation of level on the CBAM model (see chapter 7 pp. 108-109 for details of the CBAM Model). Teacher H typifies the baseline responses of teachers undertaking the Pair Peer-Mentoring Project. Her responses are shown through a matrix union of the three diagnostic components used: Stages of Concern (SoC) in order to identify how she felt about the mentoring Framework; and Levels of Use (LoU) and Nature of Use (NoU) to address what she was or was not doing, to implement the Framework.

Table 8.9: Teacher Exemplification of SoC, LoU, and NoU

DEFINITION OF CBAM	REFERENCE FROM FIELD NOTES ON TEACHER H
Stage of Concern: Informational level typified by saying 'I want to find out about it'.	*I want to find out if by doing it, it will help me know if am taking a modern approach and if it will re-assure me about my teaching. Am I doing OK?*
Level of Use: Preparation level	*I've thought about how we could do it but I'm not sure how useful it will be if I use it.*
Nature of Use; Acquiring Information level typified by: Seeks descriptive material about the innovation. Seeks opinions and knowledge of others through discussions, visits or workshops.	*These INSET sessions are fine but the best part has been when we had to observe one another ... when we were doing the teaching bit - that was hard. I will need to practise that.*

To provide an overview of the research cohort teachers, Table 8.10 was constructed to show their designated level of concerns(SoC) and their level and nature of use(LoU) of the Framework at the baseline collection point of the Pair Peer-Mentoring Project.

Table 8.10: Research Cohort's Baseline Stages of Concern

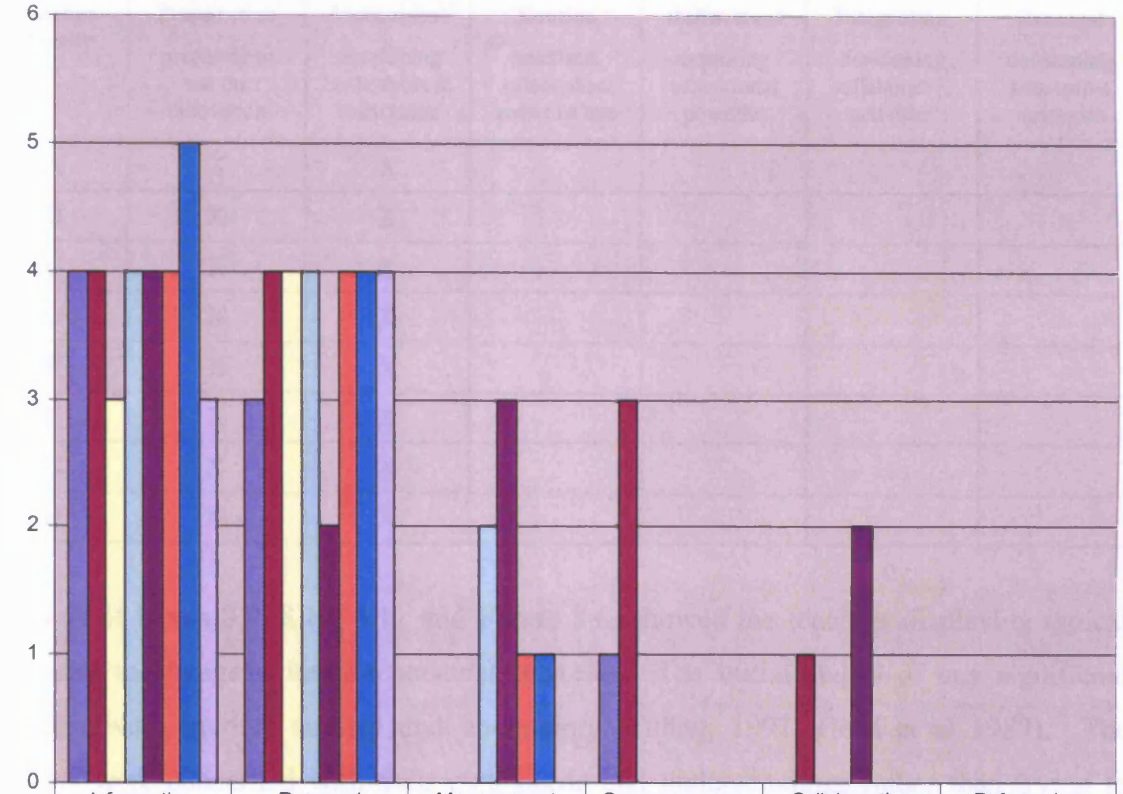
AFFECTIVE / ATTITUDINAL						
Stage of Concern / Nature of Concern						
Teacher Identity	**Informational** lack of information / skill	**Personal** personal impact	**Management** effect on time & resources	**Consequence** impact on students' learning	**Collaboration** ability to work with / relate to others	**Refocusing** re-evaluation of aims & objectives
A	X	X		X		
B	X	X		X	X	
C	X	X				
D	X	X	X			
E	X	X	X		X	
F	X	X	X			
G	X	X	X			
H	X	X				

It was apparent that though types of concern could be placed on a baseline table this did not give a clear picture of the level of concern individual teacher's might be experiencing within each category. It was therefore decided to use the number of comments individual teachers made about a particular concern and use this information to create a graph to visually interpret the degree of intensity of their concerns. Figure 8.6 provides this visual representation.

Figure 8.6: Researcher/tutor's Interpretation of Baseline Levels of Teachers' Concerns

Scale for visual representations:

5 = more than 4 comments
4 = 4 comments
3 = 3 comments
2 = 2 comments
1 = 1 comment
0 = no comments



	Information	Personal	Management	Consequences	Collaboration	Refocusing
A	4	3	0	1	0	0
B	4	4	0	3	1	0
C	3	4	0	0	0	0
D	4	4	2	0	0	0
E	4	2	3	0	2	0
F	4	4	1	0	0	0
G	5	4	1	0	0	0
H	3	4	0	0	0	0

Table 8.10 and Figure 8.6 show an initial picture of teachers focused on personal issues of what the mentoring project would mean to them, what they thought peer pair-mentoring was about and what they considered they would have to do.

Table 8.11 shows levels of application of the Framework for Pair Peer-Mentoring was primarily related to gathering knowledge about peer mentoring and developing the basic skills needed to make effective use of such a Framework.

Table 8.11: Research Cohort's Baseline Level of Use

BEHAVIOURAL / PRACTICAL						
Level of Use / Nature of Use						
Teacher Identity	**Preparation** preparing to use the innovation	**Mechanical** developing basic skills & knowledge	**Routine** practised, established patter of use	**Refinement** exploring educational potential	**Integration** developing collaborative activities	**Renewal** developing innovative strategies
A	X	X				
B	X	X				
C	X	X				
D	X	X				
E	X	X				
F	X	X				
G	X	X				
H	X	X				

Analysis of tables 8.9, 8.10, 8.11 and Figure 8.6, showed the teachers displaying typical responses to change – intense personal interests. The initial stages of any significant change always involve anxiety and uncertainty (Fullan, 1991; Hord et al 1987). The teachers were concerned with their own needs and understandings rather than trying to implement aspects of the Framework for Pair Peer-Mentoring. Evidence of the non-implementation of the Framework at this early stage in the Project was confirmed at the first researcher/tutor - teacher meetings, where only incomplete Action Plans were found and records of mentoring sessions were reported to be on 'on bits of paper' which had subsequently been lost.

On-going Data Collection Instruments

As a strong emphasis on professional reflection and collaborative action research was central to the research project, changes in the processes and outcomes of the teachers' practices were studied together. In order to achieve this, evidence was collected from researcher field notes, teacher action plans, teacher records of mentoring episodes, a re-visit to the question 'expectations of gain', an evaluation form, tutor field notes of feedback meetings, and the video proforma.

Researcher Field Notes and Teacher Action Plans

Summer term 1999

The first researcher/tutor - teacher meetings showed the teachers' problems were concerned with establishing their mentoring partnerships and learning the skills inherent in the Five Step Model or Framework they had been asked to use. To support the teachers' learning of the skills of the Framework three examples of different types of data collection had been modelled and practised at the second INSET session. The teachers had been asked to further practise these skills back at their school by observing a lesson taught by their mentoring partner and documenting what was seen.

Extracts from the field notes are given here as an illustration of the concerns and problems which were the focus of these first meetings in March / April 1999.

Extract 1.
Teachers are saying meetings and discussions are difficult. They want to know how to phrase key questions. To give prompts which facilitate or help the 'mentee' come up with solutions for themselves – "It is hard". Also "especially when there is so much to discuss how do you keep the discussion focused on the area of concern?"

Extract 2.
Today, looked at records the teachers were keeping and found they were writing far too much no wonder they' re having trouble – they can't seem to concentrate or really focus on the area of concern - not as an observer nor as a data collector
Think this aspect of the Framework is much more difficult than either the teachers or I anticipated or understood!!

For the first researcher/tutor - teacher meeting, in addition to the 'practise' observations, the mentors/mentees were expected to create a personal Action Plan and were given a minimum of three weeks to write one before a meeting with the researcher/tutor was scheduled.

The Action Plans were to be developed from a self-needs analysis that exposed an individual focus of interest. The process of a self-needs analysis was to encourage teacher self-reflection while at the same time provide some understanding for the researcher/tutor of their current stage of development. A time-line for implementation plus criteria used to determine success was to be part of each teacher's Action Plan. Support and training in Action Plan writing had been provided at the second INSET workshop.

An extract from the field notes shows that at the time of the first meetings no teacher had prepared a complete Action Plan.

> *Teachers haven't written plans. I'm being met by every one saying either:*
> *"Tell me what to do"*
> *"You're the expert, show me"*
> *"Is this OK?"*
> *"I thought I would do it or finish it off when you were here to help me".*

The incompleteness and/ or general vagueness of the research cohort teachers' Action Plans, is demonstrated in the following transcripts from Teacher C's 1999 Summer Term Action Plan and the relevant field notes:

Teacher C's Action Plan	**Field Notes**
Review	
As a result of needs analysis I have decided I would like to develop my skills in recording & working with a peer.	*There was no Needs Analysis as such. She had just thought about it. Teacher C says she has a vague interest in looking at recording methods – more structured. Agreed to bring out to the school Mary Jowett's 1999 article on 'Science / Whole Investigations 3F'. She might like to use these worksheets as a basis for her own recording.*
Plan	
Collect picture resources for use in science lessons w/be .26th April.	
Wed. 28th meet with teacher D to discuss plans about recording. Feedback meeting after everything 7th May. Observations esp. when supply available - ½ day to share after SATS?	

In working through all the teacher's Action Plans, including Teacher C's, it was noted that the teachers had as a core issue or interest exploring ways to better understand the level of knowledge or skills of their pupils. The field note extract reads:

> *Noticed common elements are effective assessment, new & different ways, this includes a much broader way of the chld. recording their science learning. Others wanted ways to encourage the kids to generate questions – "if they ask Q's I'll know where they're at."*

Action Plans on how to achieve the above mentioned focus areas were discussed and drawn up at the first researcher/tutor – teacher visits. However, not all the research cohort teachers completed their plans at this time and there was some delay in teachers forwarding this documentation to the University. Though the teachers had re-iterated their desire to use the peer mentoring Framework to find and try out new ideas whilst having the support of a colleague to bounce ideas off and to check whether they were succeeding or not, the researcher/tutor had a strong feeling that some of the teachers would probably not carry out their Plans.

Autumn Term 1999

A review of the peer-mentoring pairs in the Autumn Term of 1999 showed a variation in the enthusiasm/interest of the five teacher pairs – ranging from a desire for a meeting early in the term *'to get organised'* (two pairs) to arranging a meeting some time into the term (three pairs) and then really only because the researcher/tutor requested one. This general reluctance seemed to signal a less than hoped for interest in the pair-mentoring project which was flagged up again at the meetings. The field notes read:

> *Surprising to encounter such widespread 'apparent' lack of enthusiasm. All committed to continue in the new school year - all had signified their willingness to continue in the project! Think what is happening in schools with the intro. of the numeracy hour is the answer.*

For the researcher/tutor the key area of interest at these meetings was to what extent each teacher had used the Framework to critically appraise their teaching:

- had they used the notes taken or the feedback sessions to think about their area of focus?
- how detailed or general were the notes taken at each of the peer mentoring sessions?
- had they re-appraised their Action Plans to see if they had achieved their own stated criteria for success?
- did any of the above factors inform their new action plan?
- what did inform their new Action Plan?

The ability to look objectively at their own teaching and to be able to identify successes and weaknesses was seen, by the researcher, to be a critical step in allowing the teachers to professionally move forward.

The field notes from a typical meeting read:

> *Once again no teacher has used notes or specific information to develop a new Action Plan. Most haven't even looked at their notes, didn't know where they were???? No one has checked back against their criteria for success - judge their performance!*

The over-riding characteristic of the limited number of notes, produced from a very few teachers' mentoring/feedback sessions, is of a wealth of general material. It was challenging to identify the focus for the lesson and what points, ideas were shared with the mentor partner. Consequently, time at meetings concentrated on what the mentoring pairs intended to do and what their focus was going to be in their Action Plans for the coming term.

Intense questioning and discussion with the researcher/tutor was necessary to develop an Action Plan that had an achievable, clearly understood focus with a defined timeline. Only one teacher co-ordinator had initiated any structured strategy for moving herself and her colleagues forward in the Autumn Term. Two teacher pairs had thought about an Action Plan but were nebulous and general in their ideas and seemed to require the support of the tutor/researcher to crystallise their ideas. The other two pairs in the research cohort required even more time spent in trying to establish what they felt they had achieved, possible areas of interest and ways forward.

Field notes show teacher comments such as:

> *"We <u>have</u> thought about what we might do but didn't want to commit ourselves, put our ideas into an Action Plan". "What we could do and how to go about it – we tried something but waited for the meeting with you".*

Examples of a lack of a specific focus can be seen in Teacher G's Autumn Term Action Plan which talks about trying out different assessment methods with her mentor partner being asked to observe or discuss whether the assessment method was successful.

Teacher G's Action Plan	Field Notes
Review	
Attempted a new method of differentiation reviewed this with my peer-mentor. Haven't yet found time to develop new planning tool for myself & colleagues to use.	*Focus areas for teachers at this time show some movement away from assessment and recording methods to effective differentiation and setting / pitching lessons at an appropriate level (this is of concern for teachers who had changed year of phase of teaching this year). For the other teachers, a variety of effective assessment strategies and different ways of recording science continue to be of importance. As all these foci tend to be 'big picture' this may explain why teachers tend to write or talk about their peer mentoring sessions in general and fairly vague terms. A more specific focus might have helped them to critically appraise their own and the partner's teaching.*
Plan	
Develop a planning sheet taking into account an open-ended strand. Continue to consider & try out of different methods of differentiation.	

Another area where teachers were vague was in the use of their Supply Days. All but one of the teachers did not know exactly how much time they had used nor quite how much time had been allocated to support them in their co-ordinating role. In talking with the teachers what had seemed to be the most influential factor in judging what was successful were their own perceptions of the lesson/s and remembered ideas/thoughts exchanged at the feedback sessions. Whether these were accurate recollections was difficult to determine.

To help in facilitating ways forward, including effective use of the Supply provision, the researcher/ tutor provided the teachers with a logbook and a worksheet pro-forma for recording mentoring sessions. This pro-forma, which was included in the inside cover of the logbook, was to act both as reminder of the key steps in the Framework and as a scaffold to use in keeping a record of their sessions. These materials were introduced in order to give more structure and support to the teachers when working as peer mentors. Additionally, the logbook would provide a record of meetings of the research cohort teachers and a way, for the researcher, to more effectively monitor progress and development of Framework skills.

Spring Term 2000

In the Spring Term meetings the teachers did not seem able to recall what they had written in their Autumn Term's plan and needed to look at copies held by the University. Once again, no teacher appeared to have critically appraised or reviewed their planned actions. When talking, descriptions of their Autumn Term's Action Plans and teaching were confined to broad terms of what happened and generalisations about successes. The teachers did not seem able to pinpoint or identify what it was that they were doing to ensure this success. That is, the teachers did not articulate specific strengths or weaknesses in their trialed strategy, nor what their responses had or might have been to problems or difficulties.

Though written in very broad terms, the teachers did independently write their Action Plans in the Spring Term. An area of interest, such as differentiation or assessment was selected for a focus on the basis of interest. However, the teachers didn't reflect on their practice to think about why they might be interested in a particular area. For example, field notes from meetings with teachers still interested in differentiation show that they were being questioned, and failing to answer questions about:

> *What is happening in your class? With your kids? What indicated or stimulated your interest in differentiation? What aspects of differentiation are you interested in? Why? What are you currently doing about this aspect? etc. Teachers' don't seem to ask themselves these questions. They can't really answer me either. Their area of focus is just too broad!! Can't work out how to help them overcome this.*

The teachers were not as yet selecting a component within an area to concentrate on, nor breaking down that area into a number of components and working on and developing each part in a systematic way to build up their teaching repertoires. Areas are selected and when 'done', another area is selected for example, differentiation, followed by recording methods.

Another example from the field notes taken at this time illustrates this problem.

> *The teachers, when acting as a mentee, do not critically think about what they do or what they would like to do therefore, it is not possible to write a specific focus for an Action Plan. As a result it is difficult for the teacher mentor to actually support or help develop the mentee's individual professional growth other than in a very general confidence boosting way.*

An additional, on-going problem for the researcher/tutor was the research cohort teachers failure to, or difficulties with identifying or considering their criteria for success as shown in the following extract:

> *They apparently haven't thought about any criteria for success or how they'll know if what they are doing is working when they wrote their Action Plans. They didn't in the past and couldn't identify any when I asked!! Need to review this again at the meetings.*

This necessary element of an Action Plan was discussed at the researcher/tutor – teacher meetings and at the Term Collective Meeting. Later perusal of the teachers' plans showed that teacher Action Plans for the Spring Term were not modified to include criterion for success.

Despite the researcher/tutor's continual support over one and a half years it appeared, on the basis of the experiences described above, that the research cohort teachers were not able to effectively articulate or delineate areas of their practice into specific foci nor identify precise ways to gauge whether their teaching had been successful or otherwise. Evidence of the research cohort teachers' lack of skill or ability in describing their practice was further reinforced when the teachers' records of their mentoring sessions were examined.

Teacher Records of Mentoring Episodes

Two of the five steps of the Pair Peer-Mentoring Framework are Data Collection and Private Review. To carry out these steps it was necessary for the teachers, when acting as the mentor to collect data by writing a factual account of what actually happened in the lesson or the planning session. It was equally important as part of reviewing what happened that this documentation was looked at and summarised. That is, the recording of mentoring episodes was a critical part of the Framework. It was something that was very poorly done throughout the life of the Project.

Early records of mentoring episodes were kept on pieces of paper and subsequently 'lost' or were a general summary of the lesson so it was difficult to see what the mentor was observing - the focus or what the mentee felt about the lesson or the content of the Feedback session. An exemplar of recording is given here to illustrate the type of documentation the teachers were writing in the Summer Term of 1999.

Focus for observation not given **Teacher B Observation April 1999**

Lesson : grouping animals/classification

Beginning:
Questioning about what is an animal. Involve lots of children. Including all chld.
Chld. Started arguing about what is or is not an animal.
Children split into 4 groups of 4/5 chld. In each to discuss ideas with each other ready to feedback.
Chld. Started thinking about talking/communication of number of legs etc.
Group back – recorded answers. Animals can – breathe, move, see/eyes, eat, babies
Then thought about idea of differences ie. no. of legs, can/can't fly, tail no tail, walking not walking, some fur, some skin. etc

The recording continues in this way with further details of the lesson and concludes with the *The Plenary.*

* *To discuss some of the ways of sorting.*
* *To ask the children what they thought they learned today that they didn't know before.*
* *Discussed any things that interested us ie. Do penguins have fur/feathers?*

There was no other notes or points, or a summary of what the mentor was looking for or what he/she might feedback to the mentee. Similarly there was no record of what the mentee thought about the lesson and/or ways she might improve.

In an endeavour to overcome records being 'lost' or written in very general terms (another exemplar can be seen in Appendix 13) a mentoring log (an A5 file) was provided for teacher use in the 2000 Spring Term. To promote the use of the Framework, on the inside cover of the log was a guide sheet with prompts for key steps in the Framework. The teachers were encouraged to check the steps when using the file to record their mentoring of one another. The guide sheet is illustrated in the box below.

Date: Names:
TASK: eg. observation, planning
FOCUS:
IDEAS / COMMENTS
SUMMARY / POINTS TO CONSIDER
WHAT IS GOING TO HAPPEN NEXT?

Teachers did not use their logbooks when working with their partner, either because they "forgot to get it", or "I don't like its shape". Teachers who did use the log utilised it as a form of reminder notebook as the following extracts demonstrate.

Teacher E

Focus for 2nd assessment – New concept about Air – still do as class – put ideas on board. At least ½ to ¾ constructs to be filled – need to push chld. to really think. Expect them to justify what they want to go onto the concept map.

Next meeting – feed back with Barbara. Choice of dates 12.1.2000 or 6.1.2000.

Need to have a few notes about the assessment before do feedback with Barbara present.

Rearrange date!

Be focused in AP's have ready for B. Photocopy AP for Barbara.

Teacher D

Thurs. May 5th 2000

Video coming

What am I doing

Strategies

What worked / What found out

Criteria for observations – made at start of course! Look for form! Help!

This lack of records - either none, incomplete, vague or general made it extremely difficult for the researcher/tutor to monitor the research cohort's implementation and adoption of pair peer-mentoring.

Revisited Question 'Expectations of Gain' and Project Evaluation Form

(i) Expectations of Gain

At the end of 1999 when the Pair Peer-Mentoring Project had been running for approximately one year the teachers were again asked in a one-to-one interview "What do you expect to gain from being involved in this Project? The categories of gain synthesised from the three collection points were self-gain, sharing experience, confidence building, working collaboratively, building relationships and the mentoring process spreading beyond immediate partner. A summary of the movement the teachers appeared to have made, within these categories, from the baseline data point to this mid-term point is given in Table 8.12 (see Table 8.8 for the baseline data).

Table 8.12: Teacher Perception of Gains at the Baseline & Mid-Term data collection points

Perceived Gain	Baseline Data*	December 1999*
self-gain	A C D F G	G
sharing experiences	B E H	E F
confidence building		C D E FG
collaboration	B	AC BG
relationship building	E	C B F
spreading beyond partner 'buddy'		D

*The letters denote teacher identities

As can be seen in Table 8.12 most of the teachers were moving away from concerns about themselves and were seeing the potential of peer-mentoring to (i) build confidence and (ii) as a way to develop collaborative relationships with their peers. Examples of transcript statements for each category are given in Figure 8.7.

Figure 8.7: Examples of teachers' comments for each category of gain from the mid-term data

self-gain	"A less defensive and more positive attitude toward the way I choose to teach science".	**[Teacher G]**
sharing experience	"A sounding post - someone to bounce ideas off and try out new things with my partner's support".	**[Teacher E]**
skill building	"Gaining from work on assessment, pre and post: - building it into my medium term planning (MTP)".	**[Teacher F]**
	"Developing observation skills, relationship skills".	**[Teacher B]**
confidence building	"I am more confident in different aspects of science teaching".	**[Teacher D]**
collaboration	"A very collaborative experience".	**[Teacher A]**
	"An opportunity to work alongside a colleague instead of alone".	**[Teacher C]**
Relationships	"I'm developing relationships with other staff".	**[Teacher F]**

The teachers' perceptions that they were now more confident and had developed some valued relationship and collaborative skills through being part of the Pair Peer-Mentoring Project was reflected in their responses to a formal evaluation conducted at this time.

(ii) Project Evaluation Form

In December 1999, as an element of the ongoing monitoring of the larger AstraZeneca Project, the research cohort teachers were asked to complete a written evaluation form of the Pair Peer-Mentoring Project. The evaluation form was designed and administered by the Director of the AstraZeneca Project and as such presented an objective insight into the successes and problems of the mentoring project at this time. In the evaluation, the teachers answered questions relating to the training (INSET) provided, and their needs and expectations from the Pair Peer-Mentoring Project. A summary of the findings from the evaluation is presented in Figure 8.8.

Figure 8.8: Overall Summary of the research cohort teachers' responses to the Pair Peer-Mentoring Evaluation Form

Overall Ranking of Pair Peer-Mentoring	**Excellent**	**Good**	**Fairly Good**	**Unsatisfactory**	**Poor**
	1	**5**	**2**		
Expectations of Gain from participating?	**Sample comments** Approaches for helping / mentoring colleagues. Improve methods of co-ordinating science. Ways of motivating colleagues to do practical science.				
How far have expectations been met?	**Sample comments** Helping other teachers through this 'buddy' system has been useful. Interesting approach to peer-mentoring. More time is needed to develop this skill. There have been difficulties to find time to do school based work. It has regalvanised my teaching of science. Although the onset of PANDAs and the constraints of KS2 tests and the need for summative assessments and extra Y6 revision has had a large impact.... Introduction to peer mentoring was illuminating but difficult to work into a work load rapidly being swamped by Literacy / Numeracy Hour planning & provision.				
Which parts have you found most useful & why?	**Sample comments** 'Buddy' system has forced analysis of own teaching in order to support colleagues. Work on observing and helping colleagues. Sharing experiences with colleagues. Researcher/tutor's visits.				
Which parts were less useful & why?	**Sample comments** Difficulties in finding time to fit everything in. Science is being constrained by the impact of an emphasis on the 3R's.				
How useful did you find the handouts & support material?	**Sample comments** Very useful. Lots of practical ideas & support for mentoring in 'Mentoring in Primary Science' book (SCIcentre 1998, Coates, Vause, Jarvis & Mckeon).				
How useful did you find the tutor's visits to the school?	**Sample comments** Very useful & supportive (because they reduce isolation, provide a chance to discuss concerns such as timescales as well as opportunities to reflect on values & beliefs). Especially helpful for identifying future action				
As we are only part way through the 'course/ project' please comment on what further support & help you feel you need.	**Sample comments** Time to work through support materials. Close guidance from tutor. Opportunity to share ideas.				
Any other comments?	**Sample comments** A very useful and interesting 'course/project', but on top of the commitments for daily teaching & extra curricula work, I'm feeling somewhat frustrated & overwhelmed.				

The responses from the two instruments, the interview question on expected gains and the evaluation form, indicate that in December 1999, the Pair Peer-Mentoring Project was having success in building teachers' confidence and getting them to support one another's science teaching but additional encouragement was needed to help them make effective use of the Framework to critically reflect on, or appraise their teaching. As a way of assisting the teachers develop their skills in use of the Framework the researcher/tutor introduced the idea of a termly collective meeting for the five mentor pairs. These meetings would enable the researcher/tutor to 're-teach' or review the skills of the Framework whilst the teachers would have the opportunity to talk, share ideas and exchange experiences. As Wallace (1997, p.81) says 'teachers could learn to engage in critical and realistic reflection on what and how they were doing, while working and using the language of the subject'.

Tutor Field Notes of Feedback Meetings

By the Spring Term of 2000 it became clear that because of other school commitments some teachers were deferring implementation of their Action Plans. This meant that proposed mentoring sessions often did not occur. The researcher/tutor felt that if she attended these Feedback meetings then at least some part of a pair's plan would be carried out. Attendance at these sessions would also provide an opportunity for 'informal' modelling of the steps of Data Collection and Private Review. It would be a chance to facilitate the teacher's reflective thinking about their practice. A transcript from the Field notes show:

Context: Feedback Session was a meeting re: Mentee's Medium Term plans for materials and properties of materials in a Key Stage 1 class.

Notes: *Mentee had been given a medium term science plan to use for the next half-term . The planning was a series of topics. Mentee was disappointed - she didn't feel it was cohesive, & not really catering to the needs her kids. She wanted to take more responsibility for her own planning & felt she needed to plan to suit her own class. The Mentor's Q's were basically how to use & add to the plan rather than encouraging the mentee to think how she might plan. Nothing was said about the poor quality of the planning.*

I suggested they first thought about what is involved in planning – lesson objectives, teaching strategies, variety of activity types, assessment & then plan together to develop a cohesive set of lessons to develop the concept/skills/understandings in a way suitable for the mentees' class.

Another example of teachers discussing practice can be seen in the next extract from the field notes.

Context: *The teacher had been interested in allowing her year 2 students to devise their own recording method for a science investigation. Her colleague was to observe the lesson in which this strategy was implemented. The teacher had not expressed a specific focus for her mentoring partner to think about nor provided criteria for success as a discussion point for herself and her colleague.*

Notes: *The feedback meeting was concerned with general talk about the failure of the children to 'adequately' record their findings from their investigations but 'they had really done quite well'. The mentor partner did not ask such things as:*
"Why do you think the children weren't able to effectively record their science investigations?"
"What kinds of things do you want to see recorded?"
"What does 'adequately record' mean to you?"
"What skills do you think you need to do this?"
"How have you taught these skills?"
"Do you think all your children have these skills?"
"What else might you do to put these skills in place?" etc.

After observation of the pairs' feedback the researcher/tutor modelled going through the questions with the mentee. She talked to the teachers and discussed the kind of skills they needed to be evolving so they were effectively critically appraising and reflecting on each others' teaching practices in an effort to grow and develop as teachers of science.

Despite these kinds of interventions by the researcher/tutor, the Spring 2000 Feedback meetings continued to display a general and surface expression of ideas. It seemed the major difficulties being encountered, by the pairs, was first to determine a focus, secondly an inability to, or perhaps understand how to, communicate key points from observations and / or planning meetings, and thirdly how to outline criteria for success. That is, in their feedback sessions the teachers did not isolate elements or factors that were important in achieving the desired learning outcomes of the lesson nor could they point to exact indicators of their success, rather there was just a feeling that lessons had been 'OK'.

The inability of the research cohort teachers to concentrate on an actual focus and criteria for success may have been the result of a lack of expertise in articulating the skills or understandings the teachers wanted to talk about or expected to see, or it may be that the teachers did not know how to effectively critically appraise a lesson. It appeared that the teachers had not been successful in acquiring or using the Framework skills of Data Collection, Private Review and Feedback. These skills just seemed to be too difficult for the group to perform.

Video Proforma

At this point the researcher/tutor decided to trial videoing individual teachers' lessons to facilitate the development of more in-depth reflective skills. In looking at their own lesson, teachers would have the 'in-head' knowledge of where they were coming from and what they were trying to do and this in turn would make it easier for them to identify and articulate the strategies used, successes, problems, and future steps (TTA, 1998). In effect, the researcher was testing the hypothesis that ' viewing a video of own practice will enable teachers to effectively reflect on their own practice and by learning these skills when looking at themselves it may then be easy to transfer these skills to help a colleague critically appraise lessons'.

The teachers were asked to use a reflective proforma (Appendix 8) with sections to complete before and after the video recording. The reflective sheet (proforma) was designed to help teachers articulate their planning and pedagogy by presenting questions about the purpose of the lesson and proposed learning outcomes, the lesson's structure and on its completion an evaluation on what had happened and what had been learnt. If the teachers could effectively use the proforma to critically appraise their own practice it may then be easier to help colleagues effectively reflect on their own lessons/teaching.

The research cohort teachers agreed to have a science lesson videoed for their perusal and investigation and to use the proforma prior to, and after, viewing the video. The teachers were also prepared to discuss the experience, including the benefits and problems with the rest of the research group at a collective meeting. At the collective meeting the teachers agreed the videoing was a positive and worthwhile experience and that they had all learnt from it.

Extracts from notes on three of the teachers, made by the researcher/tutor at the time of the videoing and at the collective meeting, are reproduced here as an indication of ways the teachers were critically appraising their practice.

Female G. Year 4 class

Lesson Focus: Teacher / children communication - the quality of her interactions with the class.
The lesson was based on a recap of what the children knew about sound - how sound is formed. The teacher also talked over with the children whether it was always necessary to see sound vibrations in order to hear sound. Twenty to thirty minutes was spent with the teacher using props to show vibration of sound and to have the class identify the kind of vibrations needed for high and low sounds, and loud and soft sounds and when you could hear sound but not see the vibrations. The class spent the remainder of the period in cutting and sorting a number of teacher created statements about sound into true or false categories. The teacher spent this time moving from group to group helping the children with the task.

Teacher's reflection of practice
The teacher's reflections on her lesson were detailed when talking about the things she felt she did well - *"the way I talked to the children; I felt my questioning was good; the level was good; all the children were involved." "Some open/some closed Q. at different levels made them accessible to all"*. She also talked about things she could improve such as length of time spent demonstrating and questioning. *"Pre-sorted mixed ability – groups could have been better"*. An area of the video she found especially interesting was the children working at their sorting activity. The video made her much more aware of what individual children or groups were doing or saying when working independently.

Teacher's ability to transfer skills
In her initial comments on her experience the teacher said she felt she would now be better at observing a colleague. There was the implication that the video had helped her identify elements in her own teaching and she could use this knowledge when working with a partner. The teacher later modified her statement *saying "I am not sure about being able to transfer the skills of looking at myself to observing a partner. There wouldn't be that knowing where you are coming from"*.

Use of Proforma
The teacher had completed some sections of the proforma but was not prepared to share her comments with the rest of the group at the Collective Meeting.

Teacher B, Year 2

Lesson Focus: Teacher did not clarify what the focus was for herself
The timetable was structured so that only half the class had science at a time. The lesson was the first in a series of lessons on living things. The teacher spent the first ten minutes in a class discussion on what they had learnt about plants last year and listing on the board what kinds of things the children thought plants needed to grow. Next the children shared their ideas about where they could place plants in their classroom, and what they would need to do, so these conditions would be met. The teacher then went on to discuss with the children four little investigations they could do with plants to check out their ideas. One investigation was a control with the plant getting all the things the children thought it would need and in each of the other investigations the plant would only have two of the three things a plant needs to grow. Working with half a class gave the teacher time to ask each child for his or her idea it also allowed the children to work one to one with the teacher and set up their own small plant experiment.

Teacher's reflection of practice
The teacher's reflections on her lesson showed she was pleased with the way the introductory section of her lesson had gone and went on to use it as an exciting way to introduce the lesson to the second half of her class. *"It worked well. I feel I allowed each child to share their ideas with the rest of the class and this motivated and interested the children in finding out about plants as living things".*

Prior to teaching she had looked carefully at her planned learning objectives and when watching the video referred back to them to make sure she had kept herself and the children on task - *"it is easy to go off on a tangent; the kids can easily lead you off; I was pleased to see that I stuck with my plan".*
Problems she felt she had with the lesson *"The initial introduction seemed too long – one boy barely contributed to the discussion but did this as I wanted to give all children a chance to speak". "I would still want to give time to every child but feel I could quicken the pace a little and this would make the lesson more lively".*

Teacher's ability to transfer skills
Teacher B was not confident that reflecting on her own teaching through looking at her video would help her to appraise a colleague's lesson.

Use of Proforma
The teacher did not use the proforma when viewing the video of her lesson.

Teacher A, Year 3

Lesson Focus: Teacher trialing a format produced by the Association for Science Education (ASE) for promoting children's ideas for investigations - did the ASE material help generate more creative or original thinking?
The teacher was beginning the topic living things and was interested in having his class generate ideas for ways they could investigate factors that are involved in a plant's growth. As a key objective he wanted to see if the class could come up with some innovative investigations.
Fifteen minutes was spent in the introductory phrase of the lesson with the teacher and the children reviewing work they had done in the past with plants, and things they knew about plants. The children were next put into groups of three or four to come up with an idea/s they could investigate. Each groups' ideas were read out and talked about by the teacher and if new were written on a chart as a potential investigation. If a group's ideas were already recorded the idea was acknowledged but not added to the list. The children completed the lesson by copying the chart into their science book.

Teacher's reflection of practice
In discussing the video the teacher's comments were almost solely concerned with his performance. How much more interesting, animated, and amusing he was in his teaching than he thought. It had been a very positive experience. His comments on the ideas from his class were, *"Considering my limited aims ... I considered it a good lesson". "We were actually able to carry out 2 of the ideas, using 6 plants & we could have done more".* He didn't specify any problems or whether or not he felt his objectives regarding the ASE material had been met. The teacher did however, make the suggestion of using a class member or members to video parts of lessons rather than the video concentrating on the teacher.
At the Collective Meeting the rest of, this teacher's, time was spent in showing the ASE material and asking others whether they had used them or thought they were useful.

Use of Proforma
The teacher did not use the proforma when viewing the video of his lesson.

It would seem in light of the teachers' discussion of the videoing that there is little evidence in the above extracts or in other teacher's documentation to support the first part of the researcher/tutor's hypothesis that ' viewing a video of own practice will enable teachers to effectively reflect on their own practice'. Only two of the eight teachers, teachers G and B, appeared to try in any consistent and constructive way to analyse their lesson. Each of these two teachers spent a little time in thinking about what they wanted to do and viewing the video with this in mind. Teacher G went on to make some attempt to use the proforma when looking at her video. Teacher B, in using her lesson's learning objectives as a basis for analysing the video of her teaching also showed some inclination to do more than think about her teaching in a general and surface way.

There was also no evidence in any of the research cohort teacher's comments or documentation to support the second half of the hypothesis which stated that 'by learning these skills when looking at themselves it may then be easy to transfer these skills to help a colleague critically appraise lessons.' None of the teachers felt confident that because they could try to analyse their own teaching when looking at a video that this would give them skills they could transfer to observing or discussing colleague's lessons/s. The teachers all spoke of the importance of having 'in-head' knowledge of knowing your class, knowing where you were coming from and knowing what you wanted to do, when reflecting on your teaching.

A review of the teachers' responses to being videoed and their non-use of the proforma indicates that a more critical consideration of the structure of the proforma should have been made. Thought could have been given to adding questions that helped the teachers to examine what they *saw* on the video, questions like 'What messages were you giving in you body language?', 'Where were you located in the class?', 'How much did you move around the class?' In posing questions such as these teachers would have been looking at their practice in ways that are only possible through use of some form of camera. Seeing their practice in this way may have encouraged the teachers to take a more insightful or critical view of their practice. As the proforma stood, it was possible for the teachers to answer the questions on the proforma without actually 'seeing' their teaching. However, regardless of the shortcomings of the protocol it appears essential that prior to a video session teachers should spend time in clearly thinking about what they are going to do in the lesson, and why and how they are going to do it. It is important for teachers to ask questions of themselves about their teaching. To help do this, teachers need to make use of a proforma or some form of organiser to structure their analysis of a planned lesson. Then when viewing the video they need to utilise the key elements of the proforma to reflect on what actually happened in the lesson, that is evidence based understanding of their practice. Once teachers are confident and effective reflective practioners they may be able to facilitate or help a colleague's practice.

End of Project Data

The starting point for the end of project data was derived from asking the research cohort teachers to re-visit two questions from questionnaire 2, the open-ended one-to-one semi-structured interview, the questions being, 'Expected Gains' and 'Beliefs about Teaching and Learning in Science'. This was followed by the teachers completing a detailed proforma on their beliefs about teaching science, adapted from Cronin-Jones' (1991) Teacher Interview Protocols, the researcher/ tutor placing teachers on the Glatthorn and Fox (1996) Model of Level of Teaching Skill; a final placement by the researcher/tutor of the teachers on the CBAM Model (Hord 1987) to indicate or reveal changes in their practice; the teachers filling out proformas on the Positives and Negatives of the Mentoring Process, and teacher and headteacher interviews by the researcher/tutor on the impact of the Pair Peer-Mentoring Project.

Revisited Questions

(i) Expectations of Gain

At the beginning of July 2000 the research cohort teachers were again asked in a one-to-one interview "What did you gain from being involved in this project?" To indicate the movement the teachers appeared to have made, within the categories of self-gain, sharing experience, confidence building, working collaboratively, building relationships and the mentoring process spreading beyond immediate partner, the baseline, mid-term and end of project responses are given in Table 8.13 (see also Table 8.8 & Table 8.12).

Table 8.13: Teacher Perception of Gains from Participation in the Pair Peer-Mentoring Project

PERCEIVED GAIN	Baseline Data*	December 1999*	July 2000*
self-gain	A C D F G	G	G
sharing experiences	B E H	E F	A D
skill building			B
confidence building		C D E FG	A B C D F G
collaboration	B	AC BG	A B D E G H
relationship building	E	C B D	B C D
spreading beyond partner 'buddy'		D	A B D E F

* The letters denote teacher identities

Examples of transcript statements for each category are given below in Figure 8.9.

Figure 8.9: Examples of teachers' comments for each category of gain from the end-of-project data

self-gain	"Focussed my ideas – positive feelings".	**[Teacher G]**
sharing experience	"Sharing materials with other colleagues in the school".	**[Teacher D]**
skill building	"I am now able to be a science co-ordinator".	**Teacher B]**
confidence building	"Greater confidence in my values and teaching methods through observing, analysing and reflecting on my lesson plans and teaching".	**[Teacher G]**
collaboration	"As a team we have raised the profile of science in the school".	**[Teacher A]**
relationships	"Opportunities to discuss science issues and others with a 'buddy'.	**[Teacher E]**
spreading beyond partner buddy	"Building it in to all the classes... would improve teaching overall".	**[Teacher A]**
	"Due to working with colleagues, provided a planning tool (MTP) for the whole school".	**[Teacher H]**

As can be seen in Table 8.13 and Figure 8.9, by the end of the Pair Peer Mentoring Project the teachers were focused on the confidence building and collaborative aspects of pair peer mentoring plus its potential to facilitate the professional learning of their colleagues. This indication of the teachers' belief in the benefits of peer mentoring is supported by data in a later section of this chapter, the proforma on the positives and negatives of the peer mentoring process.

(ii) Teachers' Beliefs about Teaching and Learning in Science Post Mentoring Project

Another element of the open-ended one-to-one semi-structured interview was a question asking teachers what they believed was important when teaching science. In both the base line data and the end-of-project data, responses to this question fell into three main groups. The first of these groups had a focus on children, their ideas and their knowledge and understandings. The second group of responses had a focus on the teacher; the way he/ she should 'teach' and the skills, knowledge and attributes he or she should possess. The third group of responses related to organisational or environmental aspects of teaching.

Teacher's comments are categorised into these groups and are presented for both baseline and end-of-project data in Figure 8.10. Shaded areas indicate post-project comments. Where there were similar baseline and end-of-project comments both the baseline and end-of-project comments are shaded.

Figure 8.10: Categories of teachers' beliefs on what is important when teaching science

Groupings and their Focus	Identity of Teacher Comments Baseline	Identity of Teacher Comments Post-Project
Child focus – children's ideas		
encourage children to talk and share ideas	**B E**	
value what children say	**B**	**C D**
good relationship with children	**C D G**	
children's self esteem	**C**	**B C**
find out about children - what makes them tick	**B**	
Child focus – children's knowledge and understandings		
children have a practical, visual memory so they can carry through school 'what they did'	**G**	
children learn to respect others, and the environment they live in		**H**
Teacher focus – children's learning		
children enabled to achieve at own level	**E**	**E**
encourage children to devise their own investigations	**F**	
encourage children to work cooperatively	**F**	
teacher fosters children's confidence and ability to deal with new concepts	**F**	
lessons relevant and interesting to children	**C D F G H**	**B C E G D**
teach to stimulate curiosity and 'awe and wonder' of the world	**H**	
teach that learning is fun	**E**	**E D**
children taught skills for life		**H**
there are clear expectations		**B C D**
empower children to have skills to develop knowledge & understandings in science		**G**
Teacher focus – self skills, knowledge, attributes		
teacher self-critical appraisal to ensure future successful lesson	**E**	
teacher has background knowledge and a good level of understanding	**G**	**B**
teacher is enthusiastic - enthuses children	**E G**	**E G**
teacher role-models behaviour wants children to display		**G**
Organisation and environment focus		
external influences denote what is taught	**A**	
controlled or structured environment	**D F**	
good organisation	**C E**	**B E**
structured, focused environment enables children to learn		**A**
teacher provides structured, focused environment		**F**
a safe secure environment		**C D**

In examining the data in Figure 8.10 it appears that the research cohort teachers had made a slight shift of emphasis away from a child-centred approach towards teacher responsibility for children's science learning. Many post-project comments focused on the teacher's need to model and structure lessons to ensure children are able to effectively learn. The teacher's practice was still seen as a critical factor in the teaching of science, as in the baseline data (see Figure 8.3), but there was less stress on the child and more highlighting of what the teacher should do and how the environment should be ordered. This change of emphasis from the child to the teacher was not something the researcher/tutor had anticipated as a consequence of using the Framework. It may be in having spent some time focusing on their teaching the teachers had become more aware of how a teacher's practice can influence the quality of children's learning.

As indicated earlier (p. 114) it was felt that additional information was needed to understand or interpret the research cohort teachers' beliefs about teaching science. Therefore, a more detailed, specific proforma to elicit these beliefs was introduced in the post-project data collection phase. The interview protocols were chosen from Cronin-Jones' (1991) work *'Science Teacher Beliefs and their Influence on Curriculum'* and were adapted for the Pair Peer-Mentoring Project. These protocols looked at primary science teaching in the following ways, the Teacher's Role, What Teachers' Believed Children Should Learn In Science, How and What Children Learn and Limitations of their Learning, and Teachers' Teaching Strategies and Techniques. Though the protocols' use was limited in the Pair Peer-Mentoring Project because they were not part of the baseline data, their trialing did indicate a valuable instrument for use in future projects. The specific answers the research cohort teachers gave to the Cronin-Jones protocols can be found as a series of tables in Appendix 14.

A general summary of the responses to the Cronin-Jones' protocols show the research cohort had a much greater variety of beliefs than could be categorised into the three main groups seen in questionnaire 2's baseline and end-of-project data, that is, a focus on children, their ideas and their knowledge and understandings; a focus on the teacher, the way he/ she should 'teach' and the skills, knowledge and attributes he or she should possess; and a focus on the organisational or environmental aspects of teaching (see Figures 8.3 and 8.10). There are however, within the Cronin-Jones' protocols, comments that suggest the research cohort teachers saw some aspects of their practice in terms of a child-centred approach and in terms of the teacher's role and responsibilities; attitudes indicated in the open-ended interview question. Examples of these types of comments are given below:

Teachers' responses with the child as the focus:

Question: 'While teaching, how do you decide what to ask children?'
Responses: *"Targeted questions for ideas, to check understandings and / or knowledge, solutions to problems"; "Listening to; response to children's questions."*

Question: 'What kinds of inter-actions do you like to encourage?'
Responses: *" In investigations children interact with one another – listening, helping, questioning, sharing ideas and equipment."*

Teachers' responses with the teacher's responsibilities as the focus:

Question: 'How important is it for you to have a well-developed background in the science topics you teach?'
Response: *"Confidence in own good subject knowledge instils confidence in children."*

Question: 'What is your role in the learning process?'
Response: *"Provider of: knowledge; understandings; meaningful lessons."*

Regardless of this more in-depth probing of the teachers' beliefs about science teaching the researcher/tutor continued to feel that the teachers were providing, in the main, answers they 'felt' they should be giving, their ideal image of the teacher rather than a response to their own practice. There was still a rhetoric – practice gap. There were the odd exceptions where the researcher/tutor felt the responses were an honest reflection of their actual practice. One example is seen in two teachers' reply to the question 'What sorts of things do you think your pupils expect to learn?' when each replied *"I haven't asked"*.

Some confirmation of the researcher/tutor's perception of this gap between what the teachers were saying, or writing in a protocol and what they were doing in the classroom was seen in the end of project observations of the teachers teaching, which is discussed in the next section.

End of Project Levels of Teaching Skill

Towards the end of the project, (May/June 2000), the researcher/tutor again observed the research cohort teachers teaching. For seven of the eight teachers the video session was used as the basis of the observation. The eighth teacher had a 'normal' observation visit. The video lesson was used for the observations as an expedient use of the teachers' and the researcher/tutor's time. As in the baseline data the researcher/tutor used the Glatthorn and Fox Model of levels of teaching skills and indicated by ticks and brief notes on the proforma the teachers' levels and reasons for choice as well as a general comment on the lesson as a whole. Figure 8.11presents the researcher/tutor's end-of-project perception of the research cohort teachers' levels of teaching skills.

Figure 8.11: Researcher/Tutor's Perception of Teachers' End-of-Project Levels of Teaching Skill

Behaviour Categories	Levels of Skill		
	Basic	**Intermediate**	**Advanced**
Teaching	A B C E F G D H maintained a whole class, teacher led discussion for the lesson		
Curriculum	C D E F H	A B G	
Content Knowledge	H C D F it was not clear what lesson objectives were – what exactly the children were to learn	A B G H	
Classroom Climate	D E had to work hard at beginning & end to maintain order C F lots of confusion, lots of 'off-task' behaviour throughout the lesson	A B G H	
Lesson Structure	A B E F G C D H did not talk to children about what they were doing and why		
Learning Activities	A B C D E F G H		
Assessment	B H C D F no checking for understanding was seen	A E G	
Communication	C D F teacher talk confined to trying to keep children 'on task'	B G H	E A tried for student-student interaction in the lesson beginning

Figure 8.11 indicates that, in the main, teachers showed only small shifts in teaching skill development by the end of the pair peer-mentoring process. The *model of teaching* was still that of *basic* for six of the teachers with the two remaining teachers using a whole class teacher led activity which although not categorised in the Glatthorn and Fox model as *basic* is still a very conventional style of teaching. As was seen in Figure 8.5 (p. 162) these two teachers either taught in a year 1 or a reception class.

It was of some concern to the researcher/tutor to observe that the teachers were continuing to use as their normal teaching model, many aspects of Glatthorn and Fox's *basic model* of teaching. Teachers had been encouraged to use an inquiry model in their science teaching in university INSET (core sessions) where the inquiry approach had been modelled and recommended by 'experts' in the field. It was expected that with this exposure and their mentoring experience some trialing or experimenting with different models of teaching would have been seen in end-of project, teachers' practice.

The children continued to be grouped 'on the carpet' with the teacher presenting the topic by asking children what they already knew or for ideas about ways to investigate the topic. Following this discussion two of the teachers did incorporate some exploration of the material then demonstrated or modelled what the children should do (teachers B & G). The other teachers gave explanations and directions for the task and the children returned to their desks to carry out the activity or the investigation. All six teachers continually moved from desk to desk checking on an individual's or the group's progress. At the end of the lesson the class returned to the mat for a plenary which was always an oral recount to the teacher and the other groups on what had been done and / or discovered.

However, it is worth noting that if the researcher/tutor observation of the lesson had not been the videoed lesson it may have been possible to see more flexible/innovative teaching practice. All the teachers expressed some degree of apprehension about being videoed and several had conveyed to the researcher/tutor that they had made a choice of a 'safe' lesson for the filming. The teachers, albeit promised confidentiality and ownership, were not prepared to 'try something out' in front of the camera. Their unease can be summed up in the following quote from Teacher B: *"For the video I stuck to a 'safe' controlled format. It would have been useful to video a wholly practical session."*

In looking at other categories within the Gatthorn and Fox Model, a re-examination of planning documentation showed that in the *curriculum category* five teachers continued to use as their science curriculum the QCA documents but three teachers (A, B, & G) were integrating their own ideas or other resources, that is modifying or adapting this material to create their own scheme of work for science. While in the *content knowledge category* though no teacher exhibited lack of content knowledge it was not easy to understand exactly what teachers C, D, & F had planned for the children to learn.

The teachers having difficulties maintaining focused *classroom climates* and effectively *structured lessons* (C, D, E, F & H) were teachers whose practice was very similar to that of a practioner observed by Evans (1996) in the course of her research. Evans' account is a particularly apt description of the style of teaching teachers C, D & F were actually doing rather than the style of teaching they said they believed in or thought important:

> *The teacher failed to give adequate direction and guidance to the children before and throughout the lesson. Children's individual learning needs, ability levels and interests were insufficiently accommodated or even considered. Pupils treated as a class rather than individuals. Their efforts went unrecognised, No interest was shown in what they were doing, and the teacher lacked a general awareness of what was really going on in the classroom.* (Evans et al 1994, p.169)

Examination of Figure 8.11 also indicated that while the overall teaching style of the research cohort teachers appeared to have stabilized at the *basic model* of teaching, there was some movement towards *intermediate* and *advanced* levels in the categories of *assessment* and *communication* with several teachers now using strategies such as concept mapping to monitor and include the children in their own learning, and others encouraging children to record their investigations in different ways. These teachers (A, B, E, G & H) were trying, in greater and lesser degrees, to use different techniques and approaches to their teaching to improve their students' learning. They were moving towards greater risk-taking in a safe environment, and were willing to experiment with new ideas. Nonetheless, overall it seemed that the research cohort teachers were not yet ready or had not received the stimulus and / or the support needed to move toward consistent operation at the advanced skills level in all or most of the categories within the Glatthorn and Fox Model. It seemed clear that the Pair Peer-Mentoring Project, at this point in time, had not provided that impetus.

The re-placing of the research cohort teachers on the Gatthorn and Fox Model facilitated researcher/tutor understandings of teacher behaviour in the class. The final placement of the teachers on the CBAM model added to this understanding by giving information about the research cohort's ability to use the peer-mentoring Framework.

The CBAM Model - changes in teachers' practice

In terms of use of the Framework and the consequences this may have had on their practice, the researcher/tutor again positioned the research cohort teachers on the CBAM model. The end-of-project CBAM, used the same three diagnostic dimensions, as in the baseline collection phase, to examine the research cohort's attitude/s and behaviour to use of the Framework for Pair Peer-Mentoring to make changes to their practice. These dimensions were:

1. Stages of Concern (SOC) in order to identify how practioners feel about the change process.
2. Levels of Use (LOU), which address what the practioners are or are not doing, to implement the innovation.
3. LOU also includes reference to types of use (TOU) within each level of use.

Allocation of the types of concerns, levels of those concerns and for levels of use for the end-of-project CBAM were determined by the coding of individual teachers' comments, made either to the group or to the researcher/tutor, about particular concerns. This data was collected at the last school-based researcher/ tutor and teacher-pair mentor meetings, from comments and discussion generated at the end-of-project collective meeting and from examination of the completed evaluation proformas (see pp. 201-202 & Tables 8.17 & 8.18). Analysis of the information gained from the end-of-projects data is presented in Tables 8.14, 8.15, 8.16 and in Figure 8.12.

Table 8.14 presents an example of what a particular teacher's, Teacher E, placement looked like when allocated a level on the CBAM model. Teacher E's responses were chosen as typifying the research cohort's end-of-project 'Concerns' related to the Pair Peer-mentoring Project. Her responses are shown through a matrix union of the three diagnostic components used: Stages of Concern (SoC) in order to identify Teacher E's attitude to the mentoring Framework; and Levels of Use and nature of use (LoU) to address where she was in relation to adoption of the Framework.

Table 8.14 presents Teacher E's allocation of level on a matrix union of the CBAM model.

Table 8.14: End-of-Project Teacher Exemplification of SoC, LoU, and NoU

DEFINITION OF CBAM	REFERENCE FROM FIELD NOTES ON TEACHER E
Stage of Concern: **Personal Impact , Management, & Collaboration levels** **These levels are typified by saying** **'Am I doing it correctly?'** **'I need the time & resources to do this'** **'Is this helping me work with my colleagues?'**	*Having some useful discussions with X but finding time is a little onerous.* *I am getting some chance to share what I have learnt with the rest of the school staff so that the school benefits.*
Level of Use: **Mechanical/Routine level**	*I am developing my co-ordinating skills as feel more confident to support others.*
Nature of Use; **A mechanical to routine level is typified by:** **Most effort being concentrated on short-term day-to-day use with some settling into an established pattern of use. Little reflection is shown.**	*Slip easily into comparing notes at Feedback meetings. Necessary to have Feedback meetings with Barbara present to prompt deeper thinking. Wouldn't have made progress without input from Barbara.*

An overview of all research cohort teachers' level of Concerns (SoC) and the level (LoU) and nature of their use (NoU) of the Framework for Pair Peer-Mentoring at the end-of-project data collection point is provided in Tables 8.15 and 8.16.

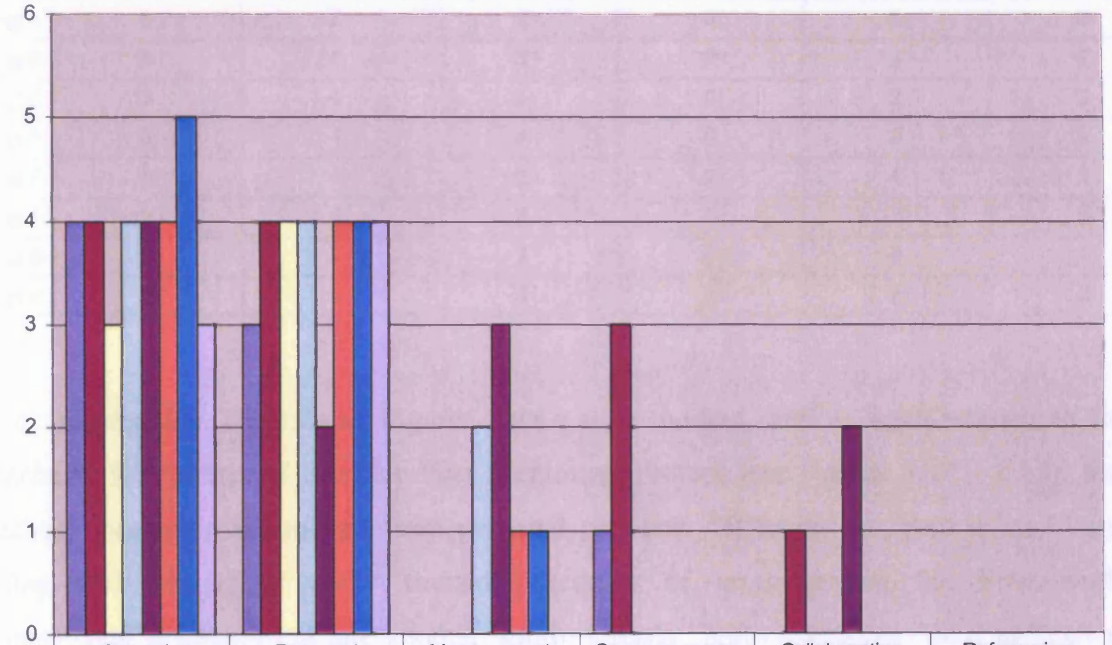
Table 8.15: Research Cohort's End-of-Project Stages of Concern

	Affective / Attitudinal					
	Stage of Concern/Nature of Concern					
Teacher Identity	**Informational** lack of information / skill	**Personal** personal impact	**Management** effect on time & resources	**Consequence** impact on students' learning	**Collaboration** ability to work with / relate to others	**Refocusing** re-evaluation of aims and objectives
A		x	x		x	x
B		x	x	x	x	x
C	x	x	x		x	
D	x	x	x		x	
E		x	x	x	x	x
F	x	x	x	x	x	
G		x	x	x	x	x
H		x	x		x	x

While Table 8.15 presents the research cohort's levels of concerns at the end of the Pair Peer-Mentoring Project, as with the baseline data, the researcher/tutor felt that a better understanding of the level of concern individual teacher's might be experiencing within each category could be illustrated through use of a graph, Figure 8.12. The number of comments individual teachers made about a particular category was again used to graphically interpret the intensity of their concerns. Figures 8.12 A & 8.12 B provide a visual representation of the researcher/tutor's interpretation of the research cohort teacher's levels of concerns at both the baseline and end-of-project data collection points. The baseline data is shown for ease of comparison.

Figure 8.12 (A): Researcher/tutor's Interpretation of Baseline Levels of Teacher's Concerns

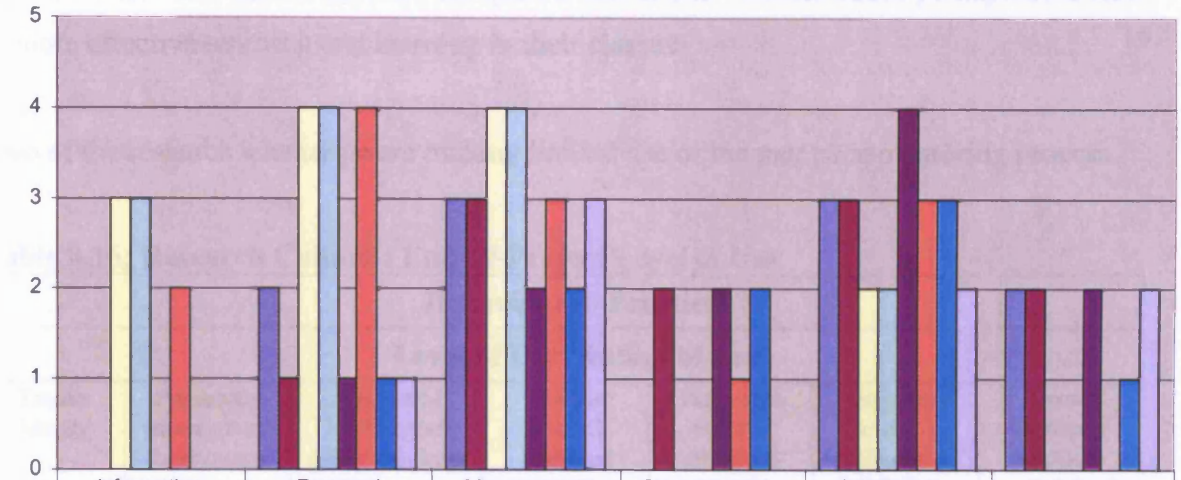
5 = more than 4 comments
4 = 4 comments
3 = 3 comments
2 = 2 comments
1 = 1 comment
0 = no comments



	Information	Personal	Management	Consequences	Collaboration	Refocusing
A	4	3	0	1	0	0
B	4	4	0	3	1	0
C	3	4	0	0	0	0
D	4	4	2	0	0	0
E	4	2	3	0	2	0
F	4	4	1	0	0	0
G	5	4	1	0	0	0
H	3	4	0	0	0	0

Figure 8.12 (B): Researcher/tutor's Interpretation of End-of-Project Levels of Teacher's Concerns

5 = more than 4 comments
4 = 4 comments
3 = 3 comments
2 = 2 comments
1 = 1 comment
0 = no comments



	Information	Personal	Management	Consequences	Collaboration	Refocusing
A	0	2	3	0	3	2
B	0	1	3	2	3	2
C	3	4	4	0	2	0
D	3	4	4	0	2	0
E	0	1	2	2	4	2
F	2	4	3	1	3	0
G	0	1	2	2	3	1
H	0	1	3	0	2	2

In examining the Tables and Figures above it is evident, and is again shown in the Teachers' Evaluation of the Pair Peer-Mentoring Project (see Tables 8.17 - 8.18), that teachers' concerns had moved from personal concerns *"What do we have to do?"* and *"How will this effect me?"* toward outcomes of implementing the Framework, management of mentoring one another within already tight constraints *"It is difficult to find the time to do this properly"*, and more positively, towards the opportunities mentoring gave for working collaboratively with colleagues, *"We shall each gain insight into our own teaching"*. There was only occasional minor discussion/comment about the impact of mentoring on the learning of the children in their classes.

Similarly Table 8.16 indicates that at the end-of-project data collection point six of the research cohort teachers' use of the Framework for Pair Peer-Mentoring had shifted, albeit in a less than anticipated application, to an adoption of the Framework as a regular part of their teaching life. Their use of the Framework was, for the most part, mechanical with only three teachers exploring more complex levels of use[10] which would perhaps have lead to more effective teaching and learning in their classes.

Two of the research teachers were making limited use of the pair peer-mentoring process.

Table 8.16: Research Cohort's End-of-Project Level of Use

Behavioural/ Practical						
Level of Use /Nature of Use						
Teacher Identity	**Preparation** preparing to use the innovation	**Mechanical** Developing basic skills & knowledge	**Routine** practised, established pattern of use	**Refinement** exploring educational potential	**Integration** developing collaborative activities	**Renewal** developing innovative strategies
A		x	x	x		
B		x	x	x	x	
C		x*				
D		x*				
E		x	x			
F		x				
G		x	x	x	x	
H		x				

** Indicates teachers infrequently using the framework for Pair Peer-Mentoring*

The limited movement of the research teachers along CBAM's six stages of use, as seen in Table 8.16, might be explained by the fact that by July 2000 there was only one pair of teachers, Teachers A & B who were meeting very regularly in a pair peer-mentoring relationship. Other teachers in the research cohort were still interested, such as Teachers E, G and H who had begun to explore pair peer-mentoring with another partner while Teachers C & D seemed to be making only incidental use of the mentoring process. The teachers' view of the Framework is further ascertained by examination of their evaluation of the Project which is given in this next section of this chapter.

[10] To explain the latter levels, the term 'routine' implies that at least one aspect of the innovation is fully incorporated into the routine. However, little preparation or thought is given to improving innovation use or its consequences. A routine level of use might be followed by a level of 'refinement' in which the user varies the use of an innovation, in order to increase the impact on teacher learning. Variations in which the innovation is used are based on knowledge of both short-term and long-term consequences for teachers. A level of 'integration' implies practitioners are incorporating their own ideas into use of the innovation. When teacher-users reach the 'renewal' state they re-evaluate the use of the innovation and plan alternative methods to benefit children's learning.

Teachers' Evaluation of the Pair Peer-Mentoring Project

As an additional review of the impact of the Pair Peer-Mentoring Project at the final Collective Meeting held in July 2000 the research cohort teachers were asked to make written comments on what they felt were the positive and negative aspects of the Pair Peer-Mentoring Project. In effect they were asked to evaluate, in their own words, pair peer-mentoring. The teachers' comments were analysed and coded into general categories which are given in Tables 8.17 and 8.18

Table 8.17: Post-Project Teachers' Evaluation of the Pair Peer-Mentoring Process - Positive Factors

Categories of Gain	Specific Gains within the Category	Teacher
Provision of Materials	Benefits of lesson planning sheet - used throughout the school	A B
	Use of the Medium Term Planning Sheet (MTP) throughout the school	H
Advantages of Having a Partner	Useful to have a 'buddy' - It works well, it is non-threatening and supportive	A B F
	Helped both to focus on more detail	G
	The 'mentor' gained more than the 'mentee'	B
	Sharing of experiences was good	E
	Learnt a lot from partners	E
	Sounding-board for ideas	F
Professional Dialogue	Developed a professional relationship	B
	Formalised a reason to sit down and talk	F
	Able to talk about ideas with someone else	F
	Good opportunity to have a professional discussion - allowed professional discussion	E A
	Useful to all meet together - exchange of ideas and reassurance	D
Skill Building	Developed understanding of monitoring and evaluation	A B
	Action planning	E F
	Observation and feedback skills	F G
	Confidence to teach at another Year level or Key Stage	C D E
	Prepared to take risks	E
Use of Video	Video useful to analyse own teaching methods and for future planning	B D
Tutor Input	Helped put Framework in place	E
	Kept participants focused and on task	D E G
Bigger Picture of the Process	Allowed time and space to develop and spread new ideas - INSET	A B G
	Profile of science in the school maintained and / or raised	A B G
	Development of literacy through science medium	B
	Improved SATS results	A

The teachers' comments in Table 8.17 reflect Rothera et al's (1995, pp.106 -107) study which showed that constructive comments and guidance are very highly valued by teacher-mentees when a colleague is acting as their mentor. This table also demonstrates that, like the Rothera study, the teachers enjoyed the opportunity to observe one another teaching. It appeared to give them new insights and sometimes reinforced their own classroom practices and enhanced their self-confidence.

For some of the research cohort teachers, this new insight and confidence lead to the undertaking of a number of new approaches or techniques, as mentioned earlier (see page 195), and perhaps a trialing of a new style of teaching. As Rothera et al suggest:

> *'these experiences lead to an increase in confidence and flexibility; and to the development of a more relaxed style; as well as more thorough preparation of the individuals, and management and organisation of practical teaching to better effect' (p.108).*

On the other hand, the problems identified earlier, using the skills of the Framework; creating and keeping accurate documentation; and having limited time; also had considerable impact on the research cohort's perception of the peer-mentoring process. Some of these difficulties were indicated in the teachers' evaluation of the project as can be seen in the summary of the factors the research cohort felt inhibited their adoption of the process (Table 8.18).

Table 8.18: Post-Project Teachers' Evaluation of the Pair Peer-Mentoring Process: Factors that Inhibited the Process

Categories of Inhibiting factors	Specific Difficulties within the Category	Teacher No. of comments
(1) Time	Time for observations, meetings, feedback - need to use own time	B(2) D G
	Problems in getting Supply Cover	C
	Other school commitments constrained time available for the mentoring process	C E G
	Delays in feedback session resulting in key points being forgotten	D
	Time needed to develop use of Framework	B C D E
(2) Using the Framework	Initial difficulties in being a non-participant observer	B
	Need to develop observation skills	C
	Need to develop feedback skills	B E(2)
(3) Documentation	Log Books not used – difficult shape Log Books introduced late – not used consistently or at all.	B C D F
(4) Need of Tutor	Tutor used as a source of knowledge	E
Presence	To enable teachers to carry out the process effectively - to establish a focus: to stay on task	C E(2) G
(5) Use of Video	Threatening - pressure to participate	C
	More video sessions would have been more beneficial	B
(6) Support for the	No colleague prepared to be partner	G
Process	Need for both partners to be reasonably confident teachers of science	F
	The Model/Framework only made sense when put into use	E

The difficulties with time, indicated in Table 8.18, are a common dilemma (Gottesman and Jennings 1994; Freeman 1997; Malderez and Bodoczky 1999) for any teacher endeavouring to participate in a mentoring process. For example within the Pair Peer-mentoring Project the available time and restrictions of funding meant the number of potential meetings of the pairs was limited. Though researchers in the mentoring field, such as Freeman (1997, p. 63), consider effective mentoring relationships require a regular and frequent meeting schedule -'mentoring relationships are distinguished by their consistency' the nature of primary teaching makes it unrealistic to consider meetings between a mentor and mentee on a weekly or even fortnightly basis. The research cohort teachers had tried for at least two meetings with a possible third per term but most pairs were unable to keep to this schedule. Other elements which caused problems such as the skill development of observations, feedback and keeping documentation probably arose because the necessary time, support and training which would have allowed the research cohort teachers to make proficient use of the Framework was not available or had failed to be effectively put in place.

In view of the fact that the researcher/tutor and teachers' view was not always the same, as triangulation the headteachers' views were sought. The headteachers, of the schools concerned, and the research cohort teachers were interviewed. Analysis of this data is presented in the next section of this chapter.

Headteacher and Teacher Post-Project Interviews

In order to gain an 'outsider's' view of pair peer-mentoring the headteachers of the eight research cohort teachers were interviewed on their perspective of the impact the Pair Peer-Mentoring Project had on the school and on the teachers concerned. The interviews took place in the headteachers' offices and were taped with their permission. Each interview consisted of eight questions and took approximately one half to three quarters of an hour to complete. The headteachers were encouraged to say as much or as little as they wanted in relation to the questions. Transcripts of the tape were made by the researcher/tutor and manually coded and synthesised.

The questions asked of the headteachers were:

- *As Head did you have any regular formal or informal monitoring or supervisory meetings with the coordinator or their partner?*
- *From a Head's perspective what difference has it made to the teachers?*
- ***What difference has it made to the students in their classes?***
- ***Has it made a difference to other teachers in the school?***
- ***Has it had any negative impact on the teacher the class the school?***
- ***Were there any unexpected gains or losses?***
- ***Other comments?***
- ***What kind/s of evidence did you use to answer these questions?***

To see if there was congruency between the headteachers' responses and the view of the Project the research cohort teachers might have, the teachers were also asked for their responses to six of the same questions (in bold). The teachers were asked to write short answers to the questions at the last collective meeting. An amalgamation of the headteachers' and the teachers' replies (either the teacher pair's view, or the individual teacher's view) was made for each school and are presented in Tables 8.19 through to Table 18.23.

Table 18.19 presents the teacher and headteacher perceptions of the impact of the Pair Peer-mentoring Project on School One.

Table 8.19: Teachers and Headteacher Perceptions of Impact of the Pair Peer-Mentoring Project on School 1

Question	Teacher Level of Monitoring or Supervisory Meetings	Teacher	Question	Headteacher Level of Monitoring or Supervisory Meetings
In your role of coordinator or mentor partner did you have any regular formal or informal monitoring or supervisory meetings with the Head?	Informal meetings at regular intervals to give details of involvement in project. Co-ordinator briefed Head prior to tutor end-of-project visit. None in relation to the peer- mentoring process - promoted the benefits of the process to Head throughout project.	**B A**	**As Head did you have any regular formal or informal monitoring or supervisory meetings with the coordinator or their partner?**	No formal meetings but teachers A & B made a point of keeping me fully informed. Rely on key figures/subject managers to report what is happening in their subjects. Have kept Governors updated at all times.
	Perceptions of Impact			**Head's Perception of Impact**
Being a participant has made what differences to you as a teacher?	Monitoring and evaluation techniques have improved. Benefited from observing other teaching styles, ideas. Science and literacy links developed. Colleagues ask more often for planning and investigation ideas. Have a better understanding of another KS.	**A B** **B**	**From a Head's perspective what difference has it made to the teachers?**	Very pleased with the development of both teachers. Specially pleased with teacher B. Has grown tremendously in competence and confidence and could be a coordinator.
What difference has it made to students in your class?	More focus on pupils' ideas and efforts to give them a forum to explain their ideas or feedback their findings. Children accepting of having another adult in the class - greater confidence, sense of worth. Links between pupils of different KS's established	**A** **B**	**What difference has it made to the students in their classes.**	Children enjoy science. This can be seen in displays and the work going on in classes - lessons are very stimulating. SATS results have improved - may be coincidence but feel project has contributed to this.
Has it made a difference to other teachers in the school?	Mentoring Lesson Planning checklist used as model for school science monitoring. Feedback indicates a more collaborative process would be preferred. Colleagues approach more often for ideas and input on lessons. Now seen as non-threatening.	**A B**	**Has it made a difference to other teachers in the school?**	It certainly has, with one teacher in particular making fantastic progress as the result of input from A & B. Science has benefited in all sorts of ways - higher profile.
Negative impacts on you, the class, the school?	Time impact on selves - time to carry out the process. Positive results outweighed negative aspects.	**A B**	**Negative impact - teacher/class/ school?**	None
Unanticipated gains or losses?	Became more upbeat about the teaching of science. We became a team over time.	**A B**	**Unexpected gains or losses?**	No losses. Gains - the SATS results were very pleasing.
Other comments?	Useful to have a partner who is like-minded and enjoys the subject.	**B**	**Other comments?**	Congratulations to the University. Project has made a great deal of difference to science teaching in this school.
	Level of Evidence used to answer Questions			**Level of Evidence used to answer Questions**
What kind/s of evidence did you use to answer these questions?	Efforts to extend ATI planning. Feedback from monitoring observations. Discussions and follow-up with peer-mentor partner.	**A B**	**What kind/s of evidence did you use to answer these questions?**	Reports from subject coordinator (A), class visits, work displays. Monitoring and evaluation reports on science teaching.

Table 18.20 presents the teacher and headteacher perceptions of the impact of the Pair Peer-mentoring Project on School Two.

Table 8.20: Teachers and Headteacher Perceptions of Impact of Pair Peer-Mentoring on School 2

Question	Teacher Level of Monitoring or Supervisory Meetings	Teacher	Question	Headteacher Level of Monitoring or Supervisory Meetings
In your role of coordinator or mentor partner did you have any regular formal or informal monitoring or supervisory meetings with the Head?	One formal meeting with University staff prior to an Ofsted inspection. Occasional informal meetings.	**C D**	**In your role as a Head did you have any regular formal or informal monitoring or supervisory meetings with coordinator or their partner?**	More informal - because in middle of project had an OFSTED inspection.
	Perceptions of Impact			**Head's Perception of Impact**
Being a participant has made what differences to you as a teacher?	More confident about what / how I'm teaching. Dissemination of ideas Yrs 1 & 2. Development of observation and planning skills. Consistency of activities through Year group.	**C D**	**From a Head's perspective what difference has it made to the teachers?**	Improved both teachers' competence levels.
What difference has it made to the students in your class?	More enjoyment of science, more enthusiasm. Clearer about what they are doing in science as able to explain better.	**C D**	**What difference has it made to the students in their classes?**	Because teachers had learnt a lot it impacted on their classes - improved the children's competence and enthusiasm.
Has it made a difference to other teachers in the school?	Teachers plan together more with coordinator able to lead planning. Reviewing of lessons and changes made in light of their review.	**C D**	**Has it made a difference to other teachers in the school?**	Yes. Each teacher in a team, teams plan, review and make future preparations collectively thus, they had a huge impact.
Negative impacts on you, the class, the school?	No	**C D**	**Negative impact -teacher/class/school ?**	Difficulties from poor Supply Cover.
Unanticipated gains or losses?	Having the time together to produce the Scheme of Work.	**C D**	**Unanticipated gains or losses?**	Gained from being part of Project. Major issue is getting Supply Cover.
Other comments?	Personal circumstances have not allowed intended level of work. Continue the process next year.	**C D**	**Other comments?**	Peer mentoring was confusing - clarity about who had to do what? Needed more regular contact from the University.
	Level of Evidence used to answer Questions			**Level of Evidence to answer Questions**
What kind/s of evidence did you use to answer these Questions?	Discussions with each other about the things we have done.	**C D**	**What kind/s of evidence did you use to answer these questions?**	OFSTED happy with the science teaching going on, said children making progress.

Table 18.21 presents the teacher and headteacher perceptions of the impact of the Pair Peer-mentoring Project on School Three.

Table 8.21: Teachers and Headteacher Perceptions of Impact of Pair Peer-Mentoring on School 3

Question	Teacher Level of Monitoring or Supervisory Meetings	Teacher	Question	Headteacher Level of Monitoring or Supervisory Meetings
In your role of coordinator or mentor partner did you have any regular formal or informal monitoring or supervisory meetings with the Head?	Coordinator had informal meetings with Head to give some idea of what was going on. Met with mentoring colleague on a regular basis in role of Senior Management. Head did not sit in on any meetings or observations.	E F	**As a Head did you have any regular formal or informal monitoring or supervisory meetings with coordinator or their partner?**	Not in a formal way. Tended to meet with coordinator and expected coordinator (teacher E) to keep up to speed in the area. I have not formally watched any science teaching.
	Perceptions of Impact			**Head's Perception of Impact**
Being a participant has made what differences to you as a teacher?	Much more aware of other teaching styles - ways of delivering particular science concepts, other class- room management techniques. Allowed time for professional discussion. Evaluated lessons as a pair - partner providing another viewpoint.	E F	**From a Head's perspective what difference has it made to the teachers?**	Improved confidence and not only in science. A feeling of expertise in a subject has led to a more professional discussion of teaching - eg. a discussion about a teaching approach. Also a feeling of self-worth - can share knowledge.
What difference has it made to the students in your class?	More accepting of another teacher in the room. Lessons now have a more focussed objective with assessment more integrated with the lesson.	E F	**What difference has it made to the students in their classes?**	Children pleased with and want to share their science work. It is now common for students to bring their science work to show the Head.
Has it made a difference to other teachers in the school?	Staff more aware of, and positive about science. Less afraid to express feelings about teaching science.	E	**Has it made a difference to other teachers in the school?**	Staff as a whole now more comfortable with science. Prepared to ask for help, if needed.
Negative impacts on you, the class, the school?	Problems with finding good Supply Cover - not disturb running of school. Initial panic at being observed.	E F	**Negative impact - teacher/class/school?**	Minor. Quality of Supply Cover sometimes causes disruptions to school.
Unanticipated gains or losses?	The unexpected level of support from colleagues. Has really extended my own teaching and attitude to lessons. More confident about having more practical lessons, and less formal recording.	E F	**Unanticipated gains or losses?**	Level of conversation between teachers - high order professional dialogue. The readiness of staff to recognize that they have colleagues who have skills they can tap into.
Other comments	Whole idea very positive. Peer mentoring is non-threatening and supportive. Idea had a good effect on teachers' attitudes to science and science teaching generally.	E F	**Other comments?**	Project has been very valuable. The school had a problem with science and the project addressed just this - it was excellent.
	Level of Evidence used to answer Questions			**Level of Evidence to answer Question**
What kind/s of evidence did you use to answer these questions?	Discussions with colleagues as the coordinator and as a peer-mentor colleague. Seeing children's work, and lessons from other classes.	E	**What kind/s of evidence did you use to answer these questions?**	Anticipated good and improved SATS results in science. Personal discussion and observations.

Table 18.22 presents the teacher and headteacher perceptions of the impact of the Pair Peer-mentoring Project on School Four.

Table 8.22: Teacher and Headteacher Perceptions of Impact of Pair Peer-Mentoring on School 4

Question	Teacher Level of Monitoring or Supervisory Meetings	Teacher	Question	Headteacher Level of Monitoring or Supervisory Meetings
In your role of coordinator or mentor partner did you have any regular formal or informal monitoring or supervisory meetings with the Head?	None. Head informed of process when partner left and I began working with a new partner.	G	**As a Head did you have any regular formal or informal monitoring or supervisory meetings with coordinator or their partner?**	Not a school priority. Very informal - on basis of when science team wish to come and share something it is up to them. The science team is strong, self-sufficient and self-sustaining. They will see me if they feel it is necessary.
	Perceptions of Impact			**Head's Perception of Impact**
Being a participant has made what differences to you as a teacher?	More open to others' objective observation. Now a supportive colleague who can make a difference to the teaching of science, a non-threatening and empowering way.	G	**From a Head's perspective what difference has it made to the teachers?**	Their confidence has grown. It has reaffirmed their own knowledge and skills and that if is alright to put their beliefs about how science should be taught forward into their teaching.
What difference has it made to the students in your class?	They are keen and natural scientists - happy to be observed whilst working.	G	**What difference has it made to the students in their classes?**	I don't know. I have not seen/observed any lessons. I haven't seen any year group.
Has it made a difference to other teachers in the school?	Only to mentoring partners. Hope to extend to other staff over time. Each of us branching out.	G	**Has it made a difference to other teachers in the school?**	At the planning stage the teachers are respected members of their teams. Ideas that would come from them would be picked up by most of the other teachers/.
Negative impacts on you, the class, the school?	None	G	**Negative impact - teacher/class/school?**	The problems of having teachers out and the difficulties of getting effective Supply teachers
Unanticipated gains or losses?	The introduction to colleagues teaching styles and their class's responses.	G	**Unanticipated gains or losses?**	Teacher time if they have to do any work for the project. This time must then be taken from some other area and something loses out.
Other comments	A valuable and positive experience for all involved, but difficult to have sufficient time available for the complete process.	G	**Other comments?**	The positive feedback from teachers on the quality and consistency of training. The benefit/ importance of support at the school level.
	Level of Evidence used to answer Questions			**Level of Evidence to answer Question**
What kind/s of evidence did you use to answer these questions?	Personal memories / brief notes. Children's responses / personal feelings.	G	**What kind/s of evidence did you use to answer these questions?**	School development planning meetings - future plans for the development of science.

Table 18.23 presents the teacher and headteacher perceptions of the impact of the Pair Peer-mentoring Project on School Five.

Table 8.23: Teacher and Headteacher Perceptions of Impact of Pair Peer-Mentoring on School 5

Question	Teacher Level of Monitoring or Supervisory Meetings	Teacher	Question	Headteacher Level of Monitoring or Supervisory Meetings
In your role of coordinator or mentor partner did you have any regular formal or informal monitoring or supervisory meetings with the Head?	A formal meeting with Head to discuss science. The subject action plan. Mentoring and science evaluation also discussed.	**H**	**As a Head did you have any regular formal or informal monitoring or supervisory meetings with the co-ordinator or their partner?**	Each staff member has a PD interview with Head - regarding personal needs. There is also a half year subject curriculum review - subject leaders get overview of teachers. Schemes of work looked at in relation to review.
	Perceptions of Impact			**Head's Perception of Impact**
Being a participant has made what differences to you as a teacher?	Planning and lesson objectives have been more focused and detailed. A wider variety of strategies used for questioning and assessment. Have developed observation skills.	**H**	**From a Head's perspective what difference has it made to the teacher?**	H is more focused, more enthusiastic, more confident. Now provides INSET for school.
What difference has it made to the students in your class?	Children put forward own ideas more easily - also developed their science language and observation skills.	**H**	**What difference has it made to the students in the class?**	Yes has made a difference. Children seem more interested in science.
Has it made a difference to other teachers in the school?	Staff more aware of, and positive about science. Have had INSET sessions on MTP and assessment. Now looking at science and literacy.	**H**	**Has it made a difference to other teachers in the school?**	Profile of science raised. Feed- back from my teacher interviews shows teachers are now more interested, now want more support.
Negative impacts on you, the class, the school?	None	**H**	**Negative impact - teacher/class/school?**	Not obvious to Head.
Unanticipated gains or losses?	Whole school involvement in a science challenge.	**H**	**Unanticipated gains or losses?**	Gain - whole school science week.
Other comments	Project has generally had a good impact on the school re: whole school approaches to planning, assessment.	**H**	**Other comments?**	School was delighted to be part of the Project. More money for resources is needed.
	Level of Evidence used to answer Questions			**Level of Evidence to answer Question.**
What kind/s of evidence did you use to answer these questions?	Feedback from staff - very positive. INSET where information from project has been disseminated to staff.	**H**	**What kind/s of evidence did you use to answer these questions?**	Teacher professional interviews. Subject Coordinator's report at curriculum review.

Examination of Tables 8.19 to 8.23 shows good congruency between the headteachers and the research cohort teachers. Both groups were pleased with the way the Project had worked and with the positive impact it had achieved on the teachers' practice. What was surprising to the researcher/tutor was the relative superficiality of the evidence that the headteachers used as a basis for their answers. An example being the reply from the headteacher of School Four when asked, 'As a Head did you have any regular formal or informal monitoring or supervisory meetings with coordinator or their partner?' The head replied *"Not a school priority. Very informal - on basis of when science team wish to come and share something it is up to them. The science team is strong, self-sufficient and self-sustaining. They will see me if they feel it is necessary."* The same Head also replied to the question 'What difference has it made to the students in their classes?' with *"I don't know. I have not seen/observed any lessons. I haven't seen any year group"*. As a group the headteachers seemed prepared to accept on very little objective or concrete evidence that having their teachers participate in the Project was 'a good thing'. They seemed to rely, in the main, on casual, informal conversations to monitor the teachers' interest and development in science teaching. *"Oh, I used to say how is it going from time to time"*. *"Most of the time I didn't need to do anything - they would come and tell me what they were doing"*. The headteachers views can therefore only be used as a general confirmation of the previous findings.

Further examination of Tables 8.19 to 8.23 indicates that at all levels, the teachers, the headteachers, colleagues, children and the school saw the pair Peer-Mentoring Project as a success. For the researcher/tutor, though acknowledging much had been achieved, such as confident teachers interested and enthused about science, there appeared to have been limited achievement in terms of understanding and using a structured framework to mentor a colleague.

An overview of the analysis and examination of the data generated from the Pair Peer-Mentoring Project is presented in the next chapter 'Discussion and Conclusions'. This chapter provides a summary of:

(1) The researcher/tutor's perception of the unfolding/use of the Framework for Pair Peer-Mentoring.
(2) The problems the teachers and the researcher/tutor encountered in implementing and adopting the Framework.
(3) Elements or factors that need to be considered when introducing a Framework for peer mentoring.
(4) What a new framework might look like as a suggestion for a possible way forward.

Chapter Nine Discussion and Conclusion

Orientation

This chapter provides an overall summary of the findings of the Pair Peer-Mentoring Project. The research cohort teachers' confidence in their ability to teach science and the development of their collaborative practices is discussed. The chapter also details how the teachers' limited skills in use of the Framework impacted on their growth as articulate, reflective practioners. It concludes with a discussion on the possible future value of introducing a peer-mentoring Framework that is highly structured and strongly supported in its implementation. .

Introduction

The research thesis set out to explore a way in which experienced primary school teachers could help one another improve the effectiveness of their teaching and learning in science; their pedagogical practices. The two-year project introduced a mentoring framework that encouraged pairs of experienced teachers to exchange knowledge and expertise in order to optimise development of their content and/or pedagogical knowledge and to provide a possible structure for the development of subject leadership skills.

It was anticipated that through the introduction of pair peer-mentoring a line of communication between primary school colleagues would be established. Teachers would have the chance to think and talk about their lessons and in so doing bring to a conscious level techniques they use instinctively. It was expected that pair peer-mentoring would also increase the amount of time teachers spend on discussing instructional matters, provide technical feedback from respected peers thus improving the skills of analysis, challenge and articulation of pedagogy and expand teaching skills since mentors often learn as much or more than a mentee. Use of a mentoring process would also help professionalise teaching since it offered teachers a chance to be involved in decisions that impacted on them and their students.

The Pair Peer-Mentoring Project worked with individuals in their own way and at their own pace making it a useful strategy to support individual, continual growth within the teaching profession (Smyth 1991; Kelly et al 1992; Joyce and Showers 1995). As a result it was expected that the research findings would rely to a large extent on the perceptions of the researcher/tutor and the teachers themselves with the proviso that while both would be likely to be accurate in terms of their own understandings, they would not necessarily represent a complete evaluation of the whole process (Tickle 1989; Carney and Hagger 1996; Vonk 1996).

The first part of this chapter considers the outcomes of the Project with regard to the implementation and adoption of the Pair Peer-Mentoring Framework with particular features or factors which may have inhibited or contributed to its successful establishment tentatively identified.

Outcomes of the Project

Effects of the Pair Peer-Mentoring Project on the Research Cohort Teachers

Positive achievements

The value of trying to achieve change through a supportive mentoring relationship, with its attendant increase in confidence and self-esteem, emerged very clearly from the Pair Peer-Mentoring Project. Headteachers' statements endorse the value of the Project and indicate that pair peer-mentoring had a positive benefit not only on the research cohort's own teaching, but for their pupils and other teachers in the school.

> *"Teacher X is more focused - more enthusiastic - more confident. It has raised the profile of science in the school".*

The teachers' statements also very powerfully suggest the valuable contribution the Project made to the teaching and learning of science in their primary schools with teachers talking of being 'confident to teach science'. This increased self-confidence carried over to an increased belief and confidence in their ability to 'teach science well'. Recent educational research such as the Hay McBer Report (2000) for the DfEE recognises the importance of teachers being confident about themselves and their teaching abilities, for effective student learning.

> *Effective teachers show confidence in most situations, expressing optimism about their own abilities... Over time this confidence grows, so that a teacher sees him or herself as a fully rounded professional, able to succeed in most circumstances.* (Hay McBer, p. 20*)*

Another constructive contribution of the Pair Peer-Mentoring Project to the professional development of the research cohort was the opportunity it gave for the teachers to discuss and interact professionally. The cohort teachers described their professional discussions as being one of the greatest benefits in being part of a mentoring partnership. Exemplars of such descriptions being:

> *"It was good to have someone to share with, it (the process) makes me feel a lot more upbeat about the teaching of science."*
> *"Getting constructive criticism/support from a 'buddy' was the best part."*
> *"Working with a peer, though initially stressful, was one of the main benefits of the mentoring process."*

From the researcher/tutor's experience of monitoring Feedback meetings it was also apparent that the teachers enjoyed the opportunity to have professional discussions with a colleague. Meetings were prolonged because the teachers talked about many other things as well as the 'focus'. It seemed to the researcher/tutor that for the teachers, mentoring meetings gave them the 'right' to have a professional discussion. It was somehow legitimate to take the time to talk to a colleague professionally if you were part of a mentoring pair. This finding substantiates that of Baird and Mitchell (1986), Wall and Smith (1993), Chapman (1999), and McGrath (2001) who suggest that having regular and frequent discussion/ sharing/ problem-solving meetings with peers optimises teachers' opportunities to effectively engage in a change process.

Problem Areas

Despite their enjoyment of professional discussions it was also clear from teacher statements that their levels of mentoring skills were very insecure. The major difficulties or problems the research cohort teachers talked about related to observations, reviewing a lesson and feedback. That is, they lacked confidence and skills in use of the Data Collection, Private Review and Feedback steps of Framework.

Their embryonic developmental level of mentoring skills meant the research cohort teachers' did not feel comfortable about critically appraising a colleague's lesson/s. They did not have the expertise to effectively identify/discuss the lesson aspects or understandings they wanted to talk about or expected to see and often retreated to a general discussion about work. Being able to identify a focus for observation, to understand how to communicate key points from observations and/or planning meetings and to carry out in-depth reflective practice are highly critical skills that take some time to develop. Time the research cohort teachers did not necessarily have.

The Apparent Contradictory Effects of the Project

The completion of the Project in July 2000 therefore shows the research cohort teachers feeling good about themselves, confident about their ability to teach science well, enjoying professional dialogues but lacking the assurance to apply the Framework's steps in a mentoring process. The possible contributing factors to this apparent paradox are suggested as being:

* the teacher sample;
* the research cohort's ownership of and involvement in the change process;
* the time available for the implementation and adoption of pair peer-mentoring;
* the nature and style of support from the researcher/tutor; and
* the structure of the Framework.

Each of these factors will be discussed in turn in the following sections.

The Teacher Sample

Non-self-selected teacher participants

Hopkins and Bollington (1989, p.163) advise that the achievement and balancing of a number of components is the key to the success of an innovation. One of the components they state as being of significance is the characteristics and activities of the players. In the Pair Peer- Mentoring Project the players or the teacher sample was made up from teachers in schools that had been identified as having serious weaknesses or some problems with their science teaching. These schools were engaged in a two-year professional development project initiated by the AstraZeneca Science Teaching Trust, the University of Leicester and the LEA for the teaching of science for teachers in inner-city primary schools. One requirement of the AstraZeneca Project was that the headteachers sent at least two of their staff on INSET courses provided by the University. Since not all headteachers consulted with their staff, a sometimes arbitrary selection of teachers was made for attendance at these courses. This resulted in some University INSET Courses having participants who perhaps had neither a particular commitment to the proposed professional learning nor a particular interest in the Course's planned outcomes.

From examination of research projects in the fields of INSET, professional development, mentoring and change it seems to the researcher/tutor that, unlike the Pair Peer-Mentoring Project sample, the studies written or the findings given concern only teachers and other professionals who self-selected or volunteered to be part of the research. The participants in the described studies were perhaps teachers undertaking Masters Courses, or individuals who saw involvement in a research project as part of the promotional path, or who for their own interest and/ or learning wanted to be part of research to understand more about their profession (for example, Gingiss 1993; Elliott and Calderhead 1995; Reich 1995; McIntyre and Hagger 1996; Freeman 1997; Rae 1997). Working with such a clientele allows researchers to select their 'subjects' and/or the freedom, when writing up their findings, to 'drop-off' those who were not committed throughout the study. In the Pair Peer-Mentoring Project there was not the freedom to choose teachers from a range of interest, understandings, commitment or abilities. The researcher was obliged to work with fixed teacher participants who were there to undertake the professional development or training whatever their abilities, interest, understandings, willingness, or commitment to the Project.

Deficits in subject knowledge

Another aspect of working with a cohort of teachers who had not self-chosen to be part of the Project was the level of their subject knowledge. *Primary Matters* (OFSTED 1994) profiles good subject knowledge as one of a number of general effective teacher/teaching issues that are important for positive learning outcomes. The AstraZeneca Project had as an integral part of its remit the provision of a core science content course to address weaknesses in subject knowledge. In the first year of the Pair Peer-Mentoring Project, the research cohort teachers participated in this course where their subject knowledge was audited, details of which can be found in Jarvis, Pell & McKeon (2003). The audits from the Core Course showed that seven of the eight research cohort teachers did not have strong science subject knowledge. Examination of their biographical histories also showed that no teacher in the research cohort had undertaken any further academic studies (in science or in any other subject) since commencing their teaching careers nor had they participated in multiple In-service activities. Since qualifying, most of the teachers' on-going professional learning had been confined to training for things such as the Literacy and the Numeracy Hour and participation in whatever INSET was provided on the school 'Baker Days'.

The researcher/tutor feels the research cohort's lack of confidence to discuss/challenge a partner's practice discussed earlier in this thesis therefore stemmed in part from the teachers', perhaps unacknowledged, tenuous and insecure confidence in their own subject knowledge and understandings. This insecurity with subject knowledge was not just confined to science but incorporated such things as learning theories and theories about, & development in, 'good practice' (analyses of Questionnaire 1 in chapter 8).

Not being secure in their own knowledge base (Shulman 1987) also had a secondary effect, in the researcher/tutor's opinion, which limited the research cohort teachers' ability to expand their professional roles which was asked for in the Pair Peer-Mentoring Project.

Difficulty in extending professional roles

The model of mentoring used for the Project's Framework was specifically selected to be manageable because it had five skill steps and only a short amount of time needed for teachers to work together. However, it became clear as the Project developed that the cohort teachers found it difficult to take on the roles of mentor/mentee without being overwhelmed by the additional demands on their time and energy. Many teacher pairs reported personal stress caused by the difficulty of balancing the commitments of daily teaching, extra-curricula work, personal life with participating in the mentoring scheme (see Tickle 1989; Fullan and Hargreaves 1992; Pring 1996; Moyles, Suschitsky & Chapman 1999; Ovens 1999; Smith and Coldron 1999 on primary teachers experiencing high levels of stress related to increased demands in the workplace). Typical comments from the teachers were:

"I'm feeling somewhat frustrated and overwhelmed" or
"Difficult to keep the process going when you are overwhelmed by school work"

The research cohort teachers' feeling of being overwhelmed by schoolwork was a manifestation of the secondary effect of tenuous pedagogical content knowledge. It is suggested /theorised by the researcher/tutor that if a teacher's own special form of professional understanding is insecure (not being really confident about what you know or how to teach it) tension and stress are generated. Additional demands, made at this time, asking for change are magnified.

The Research Cohort's Ownership of and Involvement in the Change Process

Teachers' professionality orientation

Much of the writing on change and the processes of change maintains that ownership in the change is inherent for success and individuals should be allowed to respond and adjust to change in different ways and at their own pace (Fullan 1982, 1985; Hord 1987; Louden 1991; Fullan and Hargreaves 1992). A characteristic of the research cohort teachers, perhaps reflecting their 'atypicality', was their lack of desire for ownership of the change represented by the Pair Peer-Mentoring Project. They were not prepared to self-initiate major steps of the Framework, remaining for the most part dependent on the researcher/tutor, wanting to be told what to do and how to do it throughout the life of the Project.

An explanation of this behaviour may be found in the work of Hoyle (1975) and later Evans (1999) who present a slightly different way of viewing the change process. Hoyle and Evans while endorsing the above mentioned characteristics and needs of the change process suggest that the level and extent to which teachers might be prepared to change is much more directly related to their professionality orientation. They consider teacher professionality can be represented as a continuum of professionality from 'restricted' to 'extended' with restricted professionality represented by teachers with a narrow classroom based focus relying on experience and intuition. Extended professionality is represented by teachers who have a wider vision of education and a reasoned and analytical approach to the job (see chapter 3, pp. 33-35). The research cohort teachers' reluctance to take ownership of the Framework, and their researcher/tutor dependency might be because they were teachers operating towards the lower end of the professionality continuum with the consequence that they had limited interest in and/or desire for ownership of those aspects of peer pair-mentoring that required a more in-depth or complex approach to their practice.

Lack of appropriate language with which to communicate

This slower rate of development could have been as a result of the research cohort's professionality but other perspectives are also possible. One being that since the teachers did not have extensive experience in self or peer professional development they may not have formulated an appropriate language to talk to one another about alternative ways of viewing their classroom contexts. Consequently, they would be slow in bringing about changes in their teaching practices because they would only be beginning to develop the appropriate language in which to do so. Teachers need to have a suitable language to talk to one another (Vonk 1996; Malderez and Bodoczky 1999).

Lack of experience in working with colleagues in a learning environment

Yet another perspective is suggested by the research cohort teachers' superficial level of interaction. Their interactions were focused more on performance than on the theoretical underpinning of practice which Edwards and Ogden (1998) suggest is inadequate to promote reflective practice. That is, though the teacher pairs were engaging in talking about their own practice with a colleague, using and assessing new or different teaching strategies, and taking on-board someone else's ideas it was at a very simple and surface level. It was reflection of day-to-day practice, what McIntyre (1993) calls the 'technical' and 'practical' level. They had not developed a recognition that they needed 'to challenge' which is reflection at a 'critical' level. It is reflection at the critical level that develops pedagogical knowledge..

As suggested in Chapter 7 (pp. 136-137) Elliott and Calderhead's (1995) work indicates that the teachers may have these difficulties because they have not built up learning relationships with their colleagues. To repeat their quote:

> *It is possible that the only model for learning and development to which mentors have access is one which is grounded in classroom teaching. The only adult relationships in the school to which the mentor can relate (such as those among other teachers) are based on friendship and not related to learning.* (p. 51)

Whatever the reason for the research cohort teachers' level of expertise, their professionality, their lack of language and/or experience to work with colleagues in learning partnerships, or their technical level of reflective practice, the corollary is that they did not appear to substantially increase their pedagogical knowledge during the term of the Pair Peer-Mentoring Project. The structure and frequency of the INSET workshops and the on-going researcher/tutor support had not adequately met the needs of all the research cohort teachers to take ownership of the change process.

Time Available for Implementation and Adoption of the Framework

Limited school support

The Pair Peer-Mentoring Project had endeavoured to be realistically matched to the research cohort's lack of non-contact time, possible lack of subject expertise, and probable lack of experience in working with an experienced colleague or colleagues. However the constraints of time and restrictions of funding for training and support in the Project meant there was only a small amount of time for the teachers to become au fait with the skills of mentoring and then to put them into practice.

The teachers found it particularly challenging to find time to work together as a mentoring pair. While there was University Supply cover, it was limited and though headteachers had agreed to the Project they left their teachers *'to get on with it'* (see chapter 8, p. 211). As a consequence the research cohort teachers had to use their own time to meet, observe and support one another in their professional learning. For many teachers having to work this way, to self-initiate every encounter with their partner, other colleagues and the school administration, was very difficult. It was a further reason to avoid full participation in the changes the Pair Peer-Mentoring Project called for. As Hord (1987, p. 9) had counselled, 'failure to allow sufficient time for implementation and institutionalisation of innovations results in problems and mistakes'. In future Projects greater school support would be beneficial.

The importance of continuous support for mentors/mentees

The support programme used, (which maximised the time and funding available), expected too much self-initiated learning from the teachers. There was a need for a much more intensive provision. The teachers were often in difficulties and were unsure quite how to proceed as they were developing their skills and needed tutor assistance, but this was limited. A much more structured support plan, and meetings held at more regular, frequent intervals both at schools and the university would have enabled support for the mentoring task when and where it was needed. Such intensive early assistance may have led to more independent and effective 'mentoring pairs' (Bush, Coleman, Wall & West-Burnham 1996). However it should also be expected that help would still be needed over a prolonged period. It can take two to three years of active assistance for specific innovations to be effectively incorporated into a teacher's practice (Hord 1987; Louden 1991; Fullan 1992; Huberman 1992; Cavendish 1994; Buzzard & Jarvis 1999).

The Nature and Style of Support from the Researcher/Tutor

Researcher/tutor expectations of teachers' level of expertise

It is possible that the researcher was not present in the cohort teachers' classrooms often enough to gain any real indication of their professionality. Not truly understanding the teachers' professionality may have led the researcher to miscalculate the developmental stage of the teachers, to misunderstand their needs and their level of expertise, throughout the life of the Project.

> *It is through day-to-day interaction with colleagues, conversing with them, and becoming familiar with the ways they think about and approach their work, that their[the teachers'] professionality is gradually revealed.* (Evans 1999, p. 39)

These misunderstandings resulted initially in unrealistic expectations by the researcher/ tutor of the rate and extent of the research cohort teachers' development within the Pair Peer-Mentoring Project. The researcher/tutor had rationalised that as the cohort were experienced teachers they would be relatively effective reflective practioners. As such the teachers would have some knowledge and understandings of their own practice that they could articulate and build on as they developed and used the skills in a mentoring framework. Anticipating this level of teacher expertise allowed the researcher/tutor to believe that the cohort would build up a reasonable level of mentoring skills in the short term, be able to apply these skills in the longer term, so that within the two-year study there would be significant development of content and/or pedagogical knowledge. This did not happen. The researcher/tutor had allowed her 'self', her taken-for-granted beliefs and assumptions to influence her situational understanding, a problem for participant researchers identified by Altrichter and Posch (1989), Elliott (1993), Stanley and Wise (1993), and Lomax (1994). The reality was that the research cohort teachers' level of expertise at the beginning of the Project was less than expected and as a consequence their progress and development within the Project was slower and more difficult than anticipated.

Researcher/tutor's expectations from teachers' confidence about their level of expertise

The second misjudgement made by the researcher/tutor of the research cohort teachers' expertise related to their confidence. While the researcher/tutor understood that the research cohort teachers lacked confidence at the beginning of the Project, comments throughout much of the monitoring of the Project and the end-of-project data indicated that the teachers had grown in confidence and felt confident and able to teach science. This was a less than accurate perception as was revealed in the reappraisal of their teaching skill level where use was made of videos of the teachers' lessons. The teachers showed only small shifts in teaching skill development (see chapter 8, p. 162 & p. 193 for discussion of teachers' placement on the Glatthorn and Fox Model). Post-video discussion between the researcher/tutor and teachers also revealed they had a very limited ability to articulate or identify elements in their science teaching. Despite this the teachers remained confident in their own 'expertise' though not confident enough to be able to effectively comment on another's practice. When pressed all teachers confessed that it was not enough to know about own practice to be able to comment on anyone else's practice. The following quote typifies their responses:

> *"I am not sure about being able to transfer the skills of looking at myself to observing a partner. There wouldn't be that knowing where you are coming from".*

As a participant in the whole process the researcher/tutor speculated that a more accurate interpretation of the teachers apparent inability to 'mentor' a colleague was not a question of confidence in their own ability to teach science (though this could be misplaced as hypothesised earlier) but lack of the language in which to do so. That is, as they couldn't articulate their own practice in detail they were not able to do so for their peer partner (see previous 'appropriate language' p. 218). Videoing the teachers on a consistent basis with researcher/tutor or some other support in place when the teacher reviewed her/his tape may have helped overcome this problem. Such support would help facilitate the teacher's understanding, recognition and articulation of all facets of his/her practice.

Researcher/tutor style

In a collaborative research study, such as the Pair Peer-Mentoring Project, there are inevitable pressures experienced by both the researcher/tutor and teachers as each have different expectations from the process and possess different expertise. To minimise these tensions, the researcher/tutor had involved herself in the Project as an 'educated' witness from within the context' (Lomax 1994). Such an approach encouraged the research cohort teachers to freely discuss personal or pair dilemmas with the researcher/tutor, with one another and with other pairs. Difficulties mentioned in meetings, or in formal and/or informal written evaluations, and ideas about specific areas or items of concern were always immediately addressed by the researcher/tutor and automatically included for discussion and resolution by the group once collective meetings commenced.

Complications did however arise for the researcher/tutor because of the need to balance 'support' with 'push'. The researcher/tutor wanted to be supportive and flexible at all times in all phases of implementation and adoption of the Pair Peer-Mentoring Framework and provided valuable assistance to the research cohort teachers. However meeting the needs of the teachers as they developed mentoring skills had to be balanced against the need to encourage them to initiate changes and modifications to the Framework so its final form reflected their requirements. As has been detailed earlier (see chapters 7 and 8), the researcher/tutor was not totally successful in balancing these two components. Regardless of her best efforts the teachers remained dependent on the researcher/tutor's assistance for the 'mentoring' of their partner - the actual effective critical appraisal, reflection and articulation of practice for the duration of the Project.

The Structure of the Framework

The choice of the Gottesman and Jennings' (1994) model of mentoring as the basis of the Framework for the Pair·Peer-Mentoring Project was suitable and worthwhile although it needed adaptations some of which were suggested by the teachers. All the data intimates that while the teachers may not have been as successful as hoped for in carrying out the steps of the Framework they understood its structure and valued the way it provided them with an opportunity to work together in an equal partnership while acknowledging that they had limited time to actively support one another. An example of the appropriateness of the basic structure of the Framework can be seen in end of Project comments by some of the research cohort teachers about how mentoring sessions using the Framework, had given them the ability to change, both in professional life, in terms of new strategies/techniques for teaching and in beginning to look differently at their own approach to teaching. Others had found the experience of being listened to, and encouraged to think and talk about their teaching practices a positive step forward in how they felt about teaching, and themselves.

The research cohort teachers consistently spoke of pair peer-mentoring facilitating the development in their teaching of a clearly planned programme with logical learning objectives and assessment techniques, goals for future development and strategies for putting these ideas into action. The support translated into trust, trust of one another, of the researcher/tutor and enough confidence in their own teaching practices to experiment with different ideas. One of which was the altered timing of steps in the Framework. The cohort believed it was not practical to keep an observation or planning meeting time to 10 minutes. In their opinion Feedback meetings also took longer than 10 minutes. As a consequence, the teachers independently modified the model to accommodate their need to spend more time with one another.

By late third term and into the fourth term of the Project many of the research cohort teachers felt able to take risks. They were comfortable enough with their partner to want to try out different strategies. For some of the teachers their practice began to include more investigations, children being allowed/encouraged to become more independent or lessons structured in a slightly different way. Whether these changes in practice were long-lasting or not, the teachers felt empowered by their 'mentor' to try out strategies and ideas. They were secure in their trust of partner support, no matter what the outcome.

> *"Peer mentoring became a sounding board for trying new ideas"*
> *"Encouragement to go out on a limb and try something I would not have tried – for example, Concept Mapping"*
> *"Useful to meet up all together and discuss how we were getting on with things – reassurance and new ideas"*

Another aspect of trust, for one pair of teachers, was the movement towards openness with one another, and of being more open-minded. *"Initially we were too polite, we became more open and honest as we had more experience of observing each other"*. Her partner felt able to say things like, *"I was wrong" or "I learnt that from you. It was a good suggestion"*. This was an especially important move forward in this mentoring partnership as the teachers concerned had often originally not been willing to accept other points of view.

Implications For Future Teacher Training

Need for a mentoring Framework to have tightly structured induction, implementation and adoption procedures

It is the researcher/tutor's belief that use of the Framework developed in the Pair Peer-Mentoring Project will allow experienced primary teachers to improve the quality of their teaching of primary science. What does need to be adjusted however, is the manner and format of the Framework's introduction and support as teachers take on pair peer-mentoring. The findings and analysis of the Project detailed in chapter 8 and the issues raised in earlier parts of this chapter and in chapter 3 indicate that teachers' needs should determine the adjustments and agenda for change, both in time and content, when implementing peer pair-mentoring.

The Framework used in the Project was chosen for its simplicity - five steps which could be carried out in limited time with equity of relationships. While the apparent straightforwardness of such a format had benefits, one being the ease of understanding its structure, the down side was that to effectively carry out the five steps of the model participants needed to have a high degree of skill in reflective practice, including being able to easily articulate their practice, as well as experience in self and peer development. They needed to be able to readily draw from the layers below the visible part of their icebergs (see chapter 4, p. 62).

Teachers of restricted professionality or teachers who have lost confidence in themselves and/or their ability to effectively teach science (of whom the research cohort is a possible representative sample) do not immediately have accessible this necessary high degree of skill. They require additional supports and procedures to facilitate their implementation and adoption of pair peer-mentoring. A Framework for teachers in this category should have a tightly structured training and support format but also flexibility in the speed/rate of the implementation. This type of format would facilitate more efficient and effective teacher mastery and application of the skills required for pair peer-mentoring.

It is proposed to build on the successful elements of the original Framework by adding further structured support and procedures. Additional features would incorporate:

* increased number of INSET sessions and collective meetings;
* the use of example scenarios;
* tutor support for development of teachers' critical reflective skills;
* development of teachers' ability to identify criteria for success; and
* overt leadership from headteachers.

Increased number of INSET sessions and collective meetings

Meeting as professionals provides teachers with formal and informal opportunities for growth. The INSET sessions and collective meetings in the Pair Peer-mentoring Project made available training and support. An added bonus to the INSET sessions 'teaching Pair Peer-Mentoring' was the opportunity for sharing. This enabled issues and problems to surface that were not thought of by the researcher/tutor. Resolution or attempted resolution of these issues engendered the group's cohesiveness, their camaraderie with one another and the researcher/tutor. The collective meetings worked in a similar way for the teachers. Through identifying problems and sharing dilemmas and experiences with the group, the cohort teachers maximised their opportunities for professional learning.

For these reasons it is intended to have on-going, occasional INSET sessions and regular collective meetings as a essential elements within the 'new' Framework for pair peer-mentoring. In this way 'problem' areas or specific skills can be taught/ re-taught and reviewed on a continual basis whilst at the same time participants are developing their collegiality.

The use of example scenarios

Examples of scenarios were developed in response to the research cohort teachers' problem in understanding the Data Collection step of the Framework. Working through the scenarios, as a group, helped the research cohort teachers not only begin to be more skilful in 'classroom observations', but to also begin to identify the kinds of key questions or the sorts of prompts to use in a Feedback Meeting, and the kinds of questions or phrases that could facilitate 'mentees' to devise their own solutions. Though there was not enough time in the Pair Peer-Mentoring Project INSET sessions to make the most of this strategy it is potentially extremely useful as could be seen in the enthusiastic discussions generated and the number of ideas and advice the research cohort offered to the imaginary teacher in the case study. Because of the effectiveness of scenarios it is envisioned drawing on exemplar scenarios more frequently in the new Framework to aid the development of the mentoring skills.

Tutor support for development of teachers' critical reflective skills

Another strategy to be built on and into the format of induction, implementation and adoption of the new Framework is a frequent support presence at Data Collection and Feedback meeting times. In the latter half of the Pair Peer-mentoring Project the presence of the researcher/tutor at Feedback meetings ensured that Feedback sessions occurred. Through researcher/tutor modelling and discussion on how to conduct a short, focused appraisal of a lesson, the research cohort teachers as 'mentors' or as 'mentees' gradually began to practise their mentoring skills.

It is likely that in the same way some support presence, such as a tutor, at lesson observations or planning meetings (Data Collection), guiding and modelling how to think about a lesson or lessons, will engender a more complex level of teacher reflection. As an additional help in developing teachers' critical reflection, but one that encourages more independence, regular use would be made of videoing of the teachers' practice followed up by a joint review of tapes.

A possible alternate, more time-effective procedure would be to have teacher participants meet together for regular INSET sessions on reflective practice. The initial sessions would provide the rationale and the theory which should underpin participants' understandings of teaching and learning. There would be follow-up sessions to aid development of complex reflective thinking and articulation of practice. Support at schools through tutor presence would allow for reality-based practise of these skills. This is a format that follows the recommended training methods of presentation, modelling, practising, feedback, and support (Showers, Joyce & Bennett 1987). Having a tutor support presence throughout development in all steps of the Framework also has important secondary benefits. Being part of and privy to the whole process allows the tutor or the 'support' to have a depth of understanding about how the mentoring process is going on at an individual level as well as an awareness of common concerns. INSET sessions and collective meetings do not provide such depth of knowledge and as a consequence minor problems may become important issues that impede progress.

Development of teachers' ability to write an action plan and identify criteria for success

One of the areas the research cohort teachers found most difficult throughout the Pair Peer-Mentoring Project was the writing of an Action Plan and within this, identifying criteria for success – *"How will I know if I am successful or not?"* The strategies already described to encourage teachers to talk about and identify facets of their practice, eg. use of exemplar scenarios, use of video, tutor support during observations and 'mentoring' meetings will all help facilitate writing of an Action Plan and the identification of success criteria. In addition INSET would include training in the writing of Action Plans. It is suggested that the proformas for Action Plans would be more prescriptive and would include a specific section to be completed on criteria for success, for example:

My Criteria for Success are:

(1) _____, *(2)* _____, *(3)* _____ *etc.*

Overt leadership from headteachers

Teachers participating in a Project that asks for major changes in their practice need their headteachers' support. As outlined in Chapter 3 (pp. 49-53), the head teacher appears to be a key influence on his/her school since his/her leadership sets the tone of the school and establishes the parameters within which teacher growth may or may not flourish. Teachers in the Pair Peer-Teaching Project had minimal active support from their headteachers and often struggled, in a felt isolation, to manage their regular school duties with their need to reflect and articulate on their own and their partner's practice. Headteachers, administrative staff and other colleagues could make available additional non-contact time or even take an active interest in their progress. Therefore a critical requirement of the new Framework is a commitment by participants' headteachers to specific support which would include free time and regular updating meetings.

A possible structure for this new Framework which incorporates all the elements discussed is provided in the next pages.

A Suggested Structure for the Induction, Implementation and Adoption of a Framework for Peer Pair-Mentoring

INDUCTION TRAINING

Two INSET Sessions

The first INSET

Step 1.

A. The first INSET has two parts. The 1st part of the INSET should have as a focus some common general area of interest in science education the participants would like to address.

Possible areas for Primary teachers might be:

(a) conceptual development for science concepts that are considered 'hard' eg. forces, properties of materials, electricity; or

(b) pre-investigation skills, questioning.

B. The 2nd part of the workshop should cover how to set up a relationship with a partner. Eg. to think about relationships, to gain knowledge about the importance of relationships and to practice skills in relationship management such as forming & maintaining relationships.

The purpose of Step 1.A is to get teachers to think about and become interested in a specific area of science teaching. The area looked at in the 1st INSET will not necessarily be the area an individual teacher later chooses to independently work on. The 1st INSET is to introduce the participants to the idea of taking an in-depth look at a specific part of science education.

The second INSET

Step 2.

A. The second INSET has two parts. The 1st part of the INSET should be an introductory workshop to offer the intending teacher-partners a definition of task, a knowledge base, an introduction to the developmental cycle of the five step model and identification & initial rehearsal of the basic skills and processes of the Framework.

B. (a) The 2nd part of the INSET session should be used to establish the teachers' priority of interests. The teachers' first 3 choices should be established.[11] Each of these 3 choices can then be used as the focus or common task for the group to work on in the INSET sessions.

(b) Once the teachers' choices are made, the first choice is taken and worked on as a group task to produce an Action Plan, a time-line, and criteria for success. The tutor should model the process of writing a Plan, a time line & criteria for success with the group. The conclusion of this exercise should see all the teachers with the same Action Plan and set times on when they intend to carry out their planned observation and feedback meetings. That is, the teacher pairs will have a common task to practice when back at school.

[11] A possible strategy to establish the first 3 choices is Nominal Group Technique.

INITIAL IMPLEMENTATION

Two School Visits

Two INSET Sessions

The first school visit

Step 3.

The tutor should visit all schools to monitor the teacher pairs' practise use of the Framework steps. The tutor should be present throughout the process - from observation, to review, to feedback, for each of the pair and for all pairs. The tutor is to act as a non-participant observer.

The third INSET session

Step 4.

The third INSET has 5 points to be covered in the session.

(a) The workshop should start with a short training section. A possible topic for the training session would be reflective practice.

(b) The teacher pairs should then be given the opportunity to talk about their experiences in carrying out their Action Plans - their trialing of the steps of the Framework. As all participants will have worked on the same science area there will be a common ground for the discussion. The tutor should facilitate the discussion as he/she was present at all the teacher pair's feedback meetings and would have a good overview of problem areas and aspects of the process that were working well.

(c) At the end of the discussion the next focus area to be looked at should be chosen. The teachers should be offered the option to stay with their 1st choice if they need to explore it further or they can choose to work with their second choice.

(d) A detailed Action Plan, including a time line & criteria for success should again be produced. Dependent on the progress/outcome of the 1st exercise the tutor should either model the writing of a complete Plan or begin the process and allow the teacher pairs to complete their own Plans. All teachers should still be looking at a common area or topic.

(e) To finish the session the tutor should arrange times for the videoing of individual teacher lessons.

The second school visit

Step 5.

The tutor should video each teacher teaching a science lesson in the selected focus area. The teacher's pair-partner should also be present observing the lesson. As soon as is possible after the videoing the teacher and the tutor should review the lesson using a video proforma to promote quality reflection. The tutor should then be present (as a non-participant observer) at the subsequent feedback meeting between the teacher and his/her partner.

The fourth INSET session

Step 6.

The fourth INSET has 5 points to be covered in the session

(a) The workshop should start with a short training section. A possible topic for the training session would be self-needs analysis (SNA) and possible formats for SNA.

(b) The teacher pairs should then be given the opportunity to talk about their experiences in carrying out their Action Plans - their trialing of the steps of the Framework. As all participants worked on the same science area the use/ usefulness of the video and / or the pro-forma can be reviewed as a common ground for discussion. Tutor facilitation of the discussion should ensure all 'problematic' areas are exposed and ways to resolve them debated through.

(c) At the end of the discussion the next focus area to be looked at should be chosen. The teachers should be offered the option to stay with their previous choice/s or to move on to their third choice.

(d) A detailed Action Plan, including a time line & criteria for success should again be produced. The teacher pairs should develop their own Action Plan without any, or minimal input from the tutor. Teachers should still be looking at a common area or topic.

(e) To finish the session the tutor should arrange times for the next videoing of individual teacher lessons.

Steps 5 and 6 may be repeated as often as necessary[12].

ON-GOING IMPLEMENTATION

One INSET session

One school practise visit

One group collective meeting

The fifth INSET session

Step 7.

A. The fifth INSET has 2 parts. The 1st part is a short training session. The focus for the training session should be generated from the teacher pairs' issues and / or problems.

B. The 2nd part of the INSET should give the teacher pairs an opportunity to talk about their experiences in carrying out their Action Plans.

Next as the teachers should be now confident about using the Framework the tutor needs to move them on to determine the particular area/s of science in which they wish to improve their teaching. The teacher pairs should complete a Self-Needs Analysis proforma to prioritise their foci. Once the teachers have determined their focus of interest they should each independently write an Action Plan which should include a time line & criteria for success. The Action Plans should be completed at the meeting. This will allow for tutor support (if and where necessary) for individual teachers or teacher pairs.

[12] The proposed structure is based on a flexible approach to training for mentoring skills. Therefore step 5 and step 6 should be repeated as often as necessary until the tutor is confident that the teachers are capable of independently writing an Action Plan and / or are ready to self-initiate their own mentoring.

The third school visit

Step 8.

At the third school practise visit, the teachers should be independently using the steps of the Framework to mentor one another. They should have their own Action Plan and agenda. Tutor visits to each teacher pair should be twice per term as part of on-going support. More visits could be made if necessary - dependent on individual teacher's needs and the tutor's time.

First Group Collective Meeting – an end of term meeting

Step 9.

The first group collective meeting should be spent in a summary discussion of the teachers' experiences in trialing the Framework. The teacher pairs should be given opportunity to discuss

- the use/usefulness of their Action Plan;
- the successes / difficulties they are experiencing & encountering;
- any modifications they have found necessary to make to the Framework or their Action Plan.

The purpose of **Step 9,** the end of term mentors/mentees' collective meetings, is to offer the teacher pairs both collegial and tutor support. Collective meetings would also have the secondary benefit of promoting teachers' articulation of their practice.

ADOPTION

On-going Group Collective Meetings

On-going School Practise Visits

End of Term Collective Meetings

Step 10.

End of term collective meetings should be continued to optimise teacher opportunity to meet and share experiences with colleagues. Individual pairs' own learning agendas can be identified, and dealt with thus maximising the opportunities for professional development.

On-going School Practise Visits

Step 11.

The tutor should continue to attend Feedback meetings, at least one visit per term as part of on-going support. More visits could be made if necessary - dependent on individual teacher's needs and the tutor's time.

In addition to the above proposed structure support materials to guide teachers including such things as criterion checklists for self-needs analysis and protocols for examining actual teaching practice should be provided.

Alternate modes for the introduction of a pair peer-mentoring system

The structure for pair peer mentoring as presented would represent a huge commitment in time and money. However these costs could be minimised if schools themselves took on the responsibility for establishing a Framework for pair peer-mentoring as part of their obligation to staff and school development. A group of schools could band together and self-provide the training, the 'tutor' and the meeting space. This is but one example, there are many possible ways pair peer mentoring could be established in primary schools. It is this researcher's belief that the value of having primary science being taught by confident, articulate and knowledgeable teachers makes it worthwhile to explore these possibilities.

Conclusions

Working with a small, purposive sample provided the opportunity to gain considerable depth of insight into the science teaching practices of eight teachers who were willing to commit, over the long-term, to the Pair Peer-Mentoring Project. For these teachers, the study suggests that a well founded, appropriately structured and continually supported pair peer-mentor scheme, as developed in this thesis, can make a contribution to the professional lives of experienced primary teachers. The research indicates that access to a mentor can increase a sense of well-being and bring a reduction in negative stresses providing the teachers with a challenging enhancement of their own professional identity.

The implications of the research are that mentoring can be a more manageable additional activity for some, self-selected, teachers and that the outcomes of this activity point towards an enhanced professional life for those who engage in it. This affirms the capacity of mentorship to act as a catalyst for change in the management of professional life, which, in turn, has a positive inference for the school as a whole.

In terms of the Pair Peer-mentoring Project described in this thesis, notwithstanding their lack of experience and unfamiliarity with supported learning prior to the Project, the research cohort teachers were able to begin to develop more critical practices and begin to move towards becoming reflective practitioners. They wrote about how mentoring had facilitated them to:

" think more - about what I am doing, and what I can do to change what I am doing."

Teacher Needs Questionnaire

This survey sets out to identify the needs of experienced teachers who might be asked in the future to act as a mentor or a peer coach to a colleague.

Background Information

Sex M ☐ F ☐

Name (Optional) _____

Name of School _____

_____

Type of Teacher

Please tick the box for the position that applies to you

Primary Sci. Co-ordinator ☐ Primary D&T Co-ordinator ☐ Primary Teacher ☐

Secondary Sci. Head of Dept. ☐ Secondary D&T Head of Dept. ☐ Science Subject Teacher ☐ D&T Subject Teacher ☐

Science Special Respons. Allowance ☐ D&T Special Respons. Allowance ☐ Other (please give details) ☐

_____

1998 / 1999 Classes eg. Year 5 or Years 7, 8 and 9 _____

_____

_____

Educational Qualifications _____

_____

_____

_____

_____

Number of Years Teaching _____

Age (Please tick the appropriate box)

20-30 ☐ 30-40 ☐ 40-50 ☐ 50-60 ☐

On the following pages you will find a number of processes, skills or attributes listed. Please indicate which of these elements you believe are important or you think are necessary to be an effective peer coach.

Prior to Mentoring

Please indicate your choice by ranking the numbers. Exclude those you think unnecessary.

I think it is important to:-

1. Shadow an experienced mentor for a period of time – eg. A day
2. Have time allocated to be briefed on how the mentoring role fits into the wider picture of the school.
3. Arrange a timetable for mentoring activities / duties.

Ranking Order ___ ___ ___

Suggested Mentor Skills

Please rank the following skills in the order you feel is important for an effective mentor. Exclude those you think unnecessary. Begin with the one you feel is most important.

1. Able to demonstrate well-organised, purposeful teaching, appropriately paced and which employs effective questioning to elicit students' interest / attention;
2. Ability to assist teachers to forge strong and relevant theory-practice connections;
3. Ability to assist teachers to rethink their subject knowledge in a manner that meets school schemes of work and makes it accessible to students of differing abilities;
4. High expectations;
5. Positive re-inforcement;
6. Explicit feedback.

Ranking Order ___ ___ ___ ___ ___ ___

Mentoring Activities (Highly rated skills, from Rothwell, Nardi, and McIntyre 1994).

Please rank the following skills in the order you feel is important for an effective mentor to carry out. Exclude those you think unnecessary. Begin with the one you feel is most important.

1. Planning an individual program for teaching and learning and discussing progress;
2. Discussing with teachers teaching methods for the particular subject;
3. Observing teachers' teaching and providing feedback;
4. Discussing with teacher the lessons observed;
5. Organising a mentor timetable.

Ranking Order ___ ___ ___ ___ ___

Mentoring Activities in Non-teaching Time

Please rank the following processes or practices you feel are necessary to be an effective mentor. Exclude those you think unnecessary. Begin with the one you feel is most important.

1. A *Needs Survey* of yourself – what you are currently doing, the materials you use, and how you teach;
2. Have considered alternate content, teaching skills and strategies, and / or materials to improve the quality of own instruction;
3. Reflected on own actual classroom outcomes and subsequent actions;
4. Have collaboratively planned and developed curriculum and instruction in an attempt to attain shared goals with other colleagues;
5. Have pre-lesson discussion with colleagues;
6. Have post-lesson de-briefings with colleagues;
7. Have chance/s to observe other experienced teachers;
8. Other (Please give details) _____

_____

_____

Ranking Order ___ ___ ___ ___ ___ ___ ___ ___

Overview of Mentoring

Paul Stevens (1996) states certain elements are essential for effective mentoring. A summary of these elements is given below. Please rank the list in order of importance TO YOU starting with the most important first.

1. Planning – time to practice as a mentor, time to carry out the role, a timeline for mentoring activities / duties.
2. Liasing – collaborative planning between mentor and mentee;
3. Demonstrating – mentor articulating reasons for advice, that is, 'thinking out load' actions and rationale;
4. Facilitating – working alongside a colleague;
5. Participant observation during teach teaching;
6. Non-participant observation where the mentor observes the whole lesson with the focus or foci of the observation chosen by the mentee;
7. Spoken assessment as a diagnostic summary;
8. Writing assessment which could be in the form of a lesson observation schedule;
9. Guiding – detailed skills guidance, ethical guidance, counselling guidance.

Ranking Order ___ ___ ___ ___ ___ ___ ___ ___ ___

Training Needs

Listed below are a number of specific skills related to Subject Mentoring or Peer Coaching. Please circle those skills you think you might require training in.

1. Reflective practice – critical analysis of own teaching;
2. Theory and / or research findings on learning to learn;
3. Subject content knowledge;
4. Models of teaching related to best practice in subject;
5. Questioning skills;
6. Goal setting;
7. How to accurately record observations of others;
8. Interpreting what you have seen;
9. Ways of challenging your colleague – to go beyond what they already know;
10. Other – please give details _____

_____

_____

_____

Comments on any aspect of the questionnaire or general comments.

_____

_____

_____

_____

_____

_____

If you would be interested in further involvement in this research at a later date could you please tick the box. ☐

Thank you for your assistance in completing this Questionnaire. It should be returned in the enclosed envelope to:

Ms B J Buzzard
School of Education
Leicester University
21 University Road
Leicester LE1 7RF

TEACHER MENTORING OR PEER COACHING PROJECT

Questionnaire – Pre-project January 1999

Name: _____

School: _____

Year Level Presently Teaching: _____

_____

Educational Background: - Qualification etc.

_____

_____

_____

_____

Teaching Experiences: - How many years teaching, Year levels taught, Types of school taught in etc.

_____

_____

_____

_____

_____

_____

_____

_____

Staff Development Experiences: - Length of course, type of course, enjoyment of course, benefits of course, disadvantages etc.

Teaching Aspirations: - what do you hope for in your teaching career?

What are your beliefs about Teaching and Learning in Science?

The following phrases may be of help in trying to explain your beliefs.

Tell me what is most important in what you teach.
Tell me about someone who is totally different from you.

What are you expectations for the Mentoring or Peer Tutoring Project?

Continuing Professional Development
Individual Action Planning Sheet No. ☐

Teacher _____ Tutor _____

- Review

- Action Plan

Signed:

Teacher _____

Tutor _____ Date _____

PLANNING OF TARGETS DURING THE COURSE				
Key Targets	**How and When to be Achieved**	**Support Needed**	**Success Criteria**	**Review Partner**

Course Member's signature ..... Head Teacher's Signature .....

Needs Analysis
(Format A)

What I can do Now?

What do I teach in Science?	How do I teach it?	How I achieve this now. e.g. books, materials, work with colleagues etc.

How can I do a better job?

Could I Improve:-	**My Priority**	**How will I achieve this? e.g. books, materials, working with colleagues etc**
Teaching Methods?		
Science Content Knowledge?		
Science Skills?		

Needs Analysis
(Format B)

Refining Existing Science Teaching Skills for the classroom

Focus	Yes / No / Partly	Priority for me
Lesson Introductions Do I make links with previous work? Is the science interesting, relevant and related to the children's every-day life?		
Do I encourage the children to bring their own scientific experiences to the lesson in a non-threatening way?		
Do I have clear understanding of the science concepts I am covering in the lesson?		
Is my science language at an appropriate level for my class?		
Interaction with Children Do I involve the children in planning their science activities when this is appropriate?		
Do I give opportunities for the children to practice the science skills of:- close observation comparing classifying prediction carrying out a fair test collecting data recording data looking for patterns in data interpreting and/or explaining findings?		
When an investigation is taking place do I help the children to understand the process of fair testing?		

Focus	**Yes / No / Partly**	**Priority for me**
Do I use productive questions to move the children on in their scientific thinking? Do my questions encourage the children to give a variety of responses? Do I ask both closed and open questions? Do I provide opportunities for the children to learn to ask questions? Are there opportunities for the children to learn to classify questions into ones they can investigate and ones that need to be answered in another way?		
Children's Learning Do I notice if the children have alternative scientific views or misconceptions? Do I respond to these alternative views?		
Do all the children in my class use science specific language appropriately? Do they use it with understanding?		
Are a variety of methods used to record science? Do these methods meet the differing needs of the children in my class?		
Do I provide opportunities for all the children to learn how to properly and safely use the scientific equipment?		
Lesson Conclusions Are there opportunities for the children to interpret and share their science findings with the class?		
Do I encourage the children to evaluate/assess their own or a peer's work?		
Do I vary the assessment methods I use to:- meet the needs of my children provide me with an accurate picture of the children's learning?		

Needs Analysis (Format B)
Outside the classroom

Confidence of age range

1. How confident are you teaching Science to your own class?

very confident _____ _____ _____ _____ _____ very uncertain

2. How confident are you teaching science throughout the early years or junior phase?

very confident _____ _____ _____ _____ _____ very uncertain

3. How confident are you teaching science throughout the primary school?

very confident _____ _____ _____ _____ _____ very uncertain

Confidence in content/concepts
How confident are you in teaching the following content/concepts?

Forces - stability, gravity, friction etc

very confident _____ _____ _____ _____ _____ very uncertain

Energy and mechanics

very confident _____ _____ _____ _____ _____ very uncertain

Electricity & magnetism - current, static, electromagnetism

very confident _____ _____ _____ _____ _____ very uncertain

Use of computers in science - data handling, simulations & control

very confident _____ _____ _____ _____ _____ very uncertain

Properties of materials - gases, liquids & solids. Changing states of matter

very confident _____ _____ _____ _____ _____ very uncertain

Structures of buildings & bridges

very confident _____ _____ _____ _____ _____ very uncertain

Light, colour & reflections

very confident _____ _____ _____ _____ _____ very uncertain

Science of sound & music

very confident _____ _____ _____ _____ _____ very uncertain

The ecosystem - rocks, soils, plants & animals

very confident _____ _____ _____ _____ _____ very uncertain

Earth in Space

very confident _____ _____ _____ _____ _____ very uncertain

Needs Analysis
(Format B)

The Role of the Teacher with Responsibility for Science

Please rate each of the following from 0 (not part of the role) to 5 (most vital part of the role). In addition put a tick in the third column if you actually do this activity, and tick the final column if you feel it should be part of your role.

	0 1 2 3 4 5	Actually do	Should do
Storage and distribution of science materials			
Paper work re orders and stock			
Decisions about ordering equipment and books			
Advice to colleagues on suitable equipment			
Advice to colleagues on suitable pupil's books			
Keeping up to date with latest equipment and text			
Coordinating use of TV of science by colleagues			
Producing school science scheme			
Advising colleagues on the requirements of NC			
Advising colleagues on methods of organisation			
Advising colleagues on teaching approaches, eg related to open-ended tasks, gender, race			
Monitoring science throughout school to ensure NC coverage			
Acquainting new teachers with science in school			
Giving additional support for probationary teachers			
Running in-service sessions for staff			
Providing individual support for colleagues			
Working with other colleagues in classrooms			
Working with other colleagues teaching science			
Observing other colleagues teaching science			
Advising head on matters relating to science			
Advising head on colleagues strengths/weaknesses in science			
Advising governors on matters relating to science			
Assessing the state of science in school			
Organising assessment of children in science			
Advising colleagues on assessment in science			
Coordinating recording of teacher assessment			
Organising NC and other testing in science			
Giving advice on children with SEN			
Teaching science to other class regularly			
Visiting other schools with the same age range			
Visiting schools with older / younger children			
Attending science courses as school representative			
Keeping abreast of current thinking in science			
Attending family meetings on science			
Keeping parents in touch with science in the school			
Update / extend own scientific knowledge and understanding			

Viewing Your Video to Practise Reflective Thinking

In viewing the tape could you think about the following aspects:-

(1) What were the learning objectives for the lesson?
The focus, the one or two things you wanted the children to learn or the one or two things you wanted to learn?

(2) How did you structure the lesson to achieve these objectives?
e.g. whole class, individual work, desk work, pairs, groups?

(3) What specific strategies did you use ?
oral reporting, group discussion, charts, graphs, mind maps etc.?

(4) What did the lesson show you?
For an example, see over the page.

(5) If the lesson worked, why did it? For example:
Was it your classroom management, e.g. kids in pairs? (CLASS MANAGEMENT)
Was it the specific strategy, e.g. creating plasticene models of a bug? (STRATEGY)
Was it because the kids like drawing big charts? (MOTIVATION)
Was it that they knew a lot about the concept because of previous lessons? (PRIOR KNOWLEDGE)

(6) If you had problems, what were they? For Example:
The children off-task. Why? What could be done differently next time?
Had to repeat the instructions several times. Why? What could be done next time?
Had to work on a one to one basis with 6 kids? Why? What could be done next time?
Couldn't get around to hear what all groups were saying. Why? What could etc.?

An Example of Section 4 - What did the lesson show you?

If in the lesson you were trying out concept mapping as an assessment strategy you might need to think about:

*What concepts did the children have?

*Which children had these concepts?

*Were there any children who didn't contribute?

*What order did the children hold these concepts in? (*Concept maps are hierarchical in order, with more specific concepts coming under more general [inclusive] concepts).*

*What kind of relationships [propositions] did they have between concepts, i.e. what kind of linking words or phrases did they use? (*It is these linking words/phrases and the level of hierarchy shown on the concept map that demonstrates the depth of knowledge and understanding the pupil/s has/ve of the concept).*

*Could you work out a way of understanding the children's concept map/s?

*Do you need to find out more about use of concept maps?

*Could the map have been used as a pre and post assessment task?

*How you're going to use the information on the concept map/s.

*Would there have been a better (easier) way of coming up with this information?

*If you had children who didn't contribute, what you could do to find out what they know.

Teacher Interview Protocols
Adapted from Cronin-Jones (1991)

Name_____ **Date**_____

What is your role in the learning process, where do you fit in?

In science what sorts of things should students learn?

What do you think are the most important student outcomes in science?

How do students learn?

What sorts of beliefs do you have about what the students in your class are capable of doing?

What sorts of expectations do you think students have?

How do you feel about your background in your intended science topics for the year?

How do you manage your classroom?

How do you create a positive learning environment?

While teaching, how do you decide what to ask your students?

During lessons, what kinds of interactions do you like to encourage?

What is a typical assessment process/strategy for you?

When you are marking/grading papers from your science topic what do you look for?

What do you think is the major factor influencing how well students do on a test?

The 5 Step Model

Step 1	REQUEST a VISIT or MEETING	(5 minutes)
Step 2	VISIT or MEETING	(10 minutes)
Step 3	REVIEW NOTES and LIST SOME KEY POINTS	(5 minutes)
Step4	FEEDBACK MEETING	(10 minutes)
Step 5	REVIEW PROCESS	(5 minutes)

Developing the Skills of the 5 Step Model

The Skills are:

1. Observation Skills

    a) Peer Watching
    b) Peer Feedback

2. Post-Observation mentoring skills

    a) review of observation notes
    b) eliciting ideas / suggestions from mentee on where they could go / how to achieve their goal

3. Planning Skills

    a) medium term planning
    b) lesson planning

4. Creating a personal growth plan – action planning

Peer Watching

Peer watching is designed to move teachers from traditional isolation into a more collegial relationship of visiting classrooms of other professionals. It is a way of getting teachers accustomed to observing each other – it increases the comfort zone.

Peer watching is just watching and nothing else – no comments and no exchange of information. However, mentors can begin to develop their observation skills by practising taking notes or simply writing down the objective for the lesson.

Peer watching requires no interaction between teacher and watcher.

The only exchange necessary between the teachers is to decide on a focus for the observation.

Peer Feedback

Peer feedback is designed as a transition between merely watching and true mentoring. Peer feedback involves the mentor collecting the data and presenting it without comment. This offers teachers a chance to practice the logistical skills of feedback. Also in this phase note-taking skills can be refined; mentors can learn to focus on one concern, and they can experiment with data-gathering devices.

Review

At the end of the visit or the meeting, or as soon as convenient, the mentor individually looks at, and quickly summarises the data collected. After this analysis of the data, the mentor writes down 2 or 3 leading questions to ask of the teacher. It is important at this point for the mentor to check that no evaluative comments have been made. It is also sometimes useful to think of a few suggestions to give to the teacher but it is **best** if the mentor can challenge or help the teacher to come up with his/her own ideas.

The teacher, after the visit or the meeting, should also review or reflect on their lesson or planning meetings and think of some ideas to discuss with the mentor during the post-visit / meeting Talk.

Post-Visit / Meeting Talk

Either the mentor or the teacher should begin the Talk with a re-statement of the purpose of the visit or the meeting. The teacher should then express his / her ideas about the visit or meeting. After this initial exchange the mentor provides the specific data collected and asks the prepared leading questions. This should be done in a non-evaluative, non-judgemental way.

At this point the mentor should encourage and guide the teacher towards developing their own ideas and suggestions for future directions. The mentor should try hard not to give their own solutions.

Example 1. A lesson for which the focus was Questioning.

15 questions asked;
12 closed questions – generally factual recall;
3 open questions;
70% of questions directed at boys;
Questions targeted at all groups;
80% of class indicated willingness to answer questions by raising their hands.

Example 2. A lesson for which the focus was Closing/Conclusion.

10 minutes allocated;
A quick summary of main learning points (2 minutes by teacher);
7 minutes of child / child exchange – children telling one another what they had learnt about;
One group of children did not participate in exchange of ideas;
Teacher description of what will be done next lesson (2 mins).

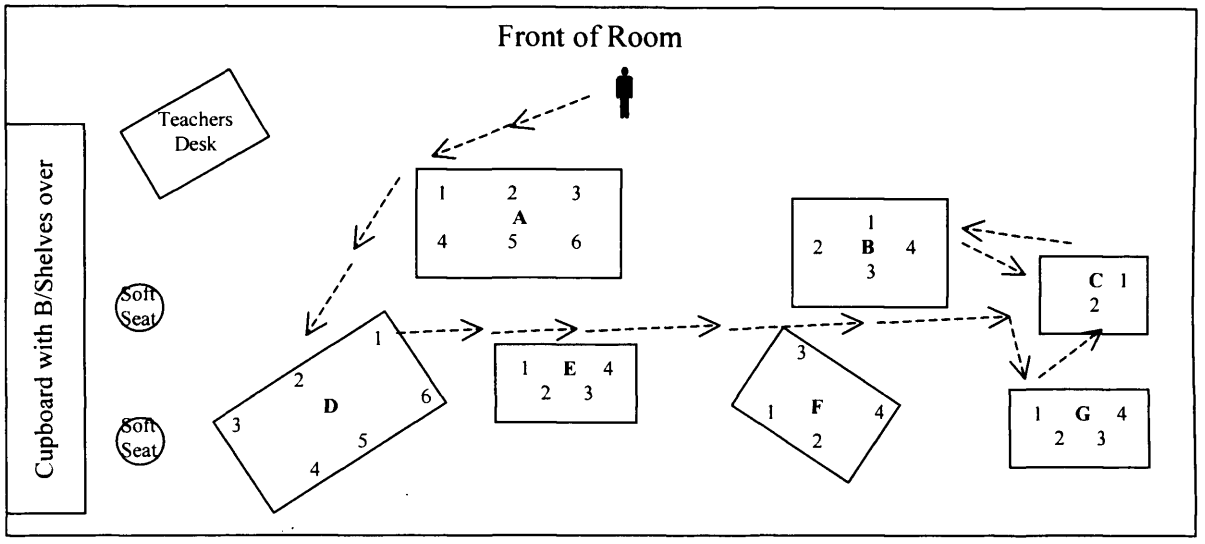
Example 3. A lesson for which the focus was developing children as independent learners.

4 corners of room set up as independent learning centres for the 30 children - children could choose which centre they worked at;
Resources for different activities at each centre;
Maths centre had 6 sets of workcards, other centres had 8 sets of cards;
10 children wanted to work at the maths centre;
At the maths centre, children argued amongst themselves about who could stay and who should go;
Teacher at desk, marking the work as the children completed sheets from the different centres;
5 children spend 7 minutes wandering around the room;
1 child did not leave her own desk.

Example for Science Co-ordinators Workshop

Example 1

The teacher has been teaching friction. He is concerned that he is not getting around to all groups to ask the pupils focus or key questions. He would like some feedback on what actually is happening in the lesson.



Data recorded in the order it happened in the 10 minute observation.

Table A	Focus Q's and interaction with students 1 &4 Students 2,3,5,6 continued running cars down ramp and recording results.	(1 min.)
Table D	Focus Q's and interaction with students 1,2,4,5 Students 3 & 6 sat quietly - appeared to be listening.	(about 2 mins)
Table C	Gave student 1 the instructions again Student 2 sitting staring at door.	(about 30 sec)
Table G	Helped Students 4 & 1 set up their equipment safely Checked students 1,2,3,4, knew what to do.	(about 1&1/2 min)
Table C	Checked students 1& 2 now getting on with task.	(30 sec.)
Table B	Reinstructed whole group on what they were to do. Helped student 4 set up ramp. Sent student 3 to get cars. Watched students get started. Helped student 2 with the recording.	(4 min)
Table C	Brought Students 1 & 2 back on task	(30 sec)

Example 2

The Year 2 teacher is teaching the topic Earthworms. She has thoroughly planned and has lots of resources. She is worried about her introduction as there are lots of instructions on what is to be done and how to take care of the earthworms, but she wants to start off in an interesting and motivating way.

All around the room there are charts featuring earthworms and books about them. The video is set up with a short film on the subject. On the board at the front of the room is a big book on Earth worms and on a low table there is a fish tank full of live worms.

Data Collection in 13 minute observation.

The children are asked to come and sit on the carpet in front of and very close to the worms and the big book.

Teacher tells children they are going to be studying earthworms in their science class and asks if anyone knows anything about earthworms. (30 secs.)

Most children put their hands up. Teacher asks 3 students, one after the other, to tell the others what they know. Students selected are all towards the back of the group.
Each child tells something about earthworms. Student 3 has a little trouble explaining Teacher gives him lots of prompts and wait time. (4 ½ mins.)

As student 3 talks, worms in the tank begin to climb out. Two children at the front and close to the worms begin to pick them up and put them back. Most children appear to be watching worms.

As child 3 finishes teacher notices worms, gets cover from desk and covers top of the tank.
(30 secs.)

Teacher talks to children about all the different things they are going to be doing over the next two weeks. Most children looking at worms. (2 mins.)

Teacher moves big book and talks as she writes on the board rules for handling the worms. Whole class read rules aloud. (2 mins.)

Teacher begins instructions on - what each group is to do today, where they are to sit, who is responsible for collecting the different materials they need, and how they are going to tell one another what they have found out. (3 1/2 mins.)

Example 3

The Year 4 teacher often does investigations with her class and is quite pleased with the way things are going. However, she would like to improve the children's science skills so she can allow them opportunities to conduct more open investigations.

It is a cooking class where each group is to make a small fruit cake. The teacher has as her main learning objectives that the class practice close observations and prediction. She is also interested in their ability to see patterns in their data and interpret and explain their findings.

The observer / mentor used a checklist modified from the student observation checklist in the Mentor Handbook for the 12 minute observation.

Skills children involved with	**Yes/No/Partly**	**Notes**
Close observation	Partly	Chld. in groups 1,2,4 carefully examined dried fruit using hand lenses. Group 3 put dried fruit straight into bowl. Flour, butter, sugar, milk not examined by any group. Teacher allowed 6 mins for activity.
Comparing	Yes	Groups 1, 2, 4 compared diff. kinds of dried fruit.
Classifying	Not Seen	
Prediction	Yes	Chld. made predictions and completed spaces in their worksheet. Chld.s' predict. Not shared with other groups of class. Tch. Allowed 6 mins. For activity.
Collecting data	Not Seen	
Recording data	Not Seen	
Carrying out a fair test	N/A	
Looking for patterns in the data	Not Seen	
Interpreting and explaining findings	Not Seen	

Example of Teachers' General Notes when Data Collecting
Peer Review Observation

Initial observations

Class engaged on work in understanding magnetism. Class organised in 5 tables. Two at back testing a set list and colouring to record magnetic/non-magnetic, then to draw up own list of objects which were magnetic. These to presumably reach some conclusion in terms of pattern? Two middle tables to work creating a magnetic course and person/thing to navigate this with paper clip attached and magnet held underneath.
Table nearest door (opening) using free magnets in concert with rubber banded magnet attached to small toy bus/lorry. This to determine orientation of magnet poles to push pull.

Extended group observation.

As far as I could tell; lowest group were nearest door? Middle-ish were on holding exercise of racetracks and brightest were on investigation.

- I spent bulk of time with door group. These were more than happy to demonstrate the 'magical' properties of their magnets (they used this and similar words - it obviously made a great impression on them). Namenpreet clearly understood the principals, but her grasp of English meant that it was put across rather in the manner of a conversation with a car mechanic in France. Chris and Kyle were engrossed and understood clearly. Preetika seemed to have her mind on moving about more, she seldom seemed to be at the table for long. Liam was playing with the task (still on it but at his own level) and Petra was similarly engaged.
- The work sheet was beyond them; firstly through language and their own low reading ability. They couldn't remember quite what it was they were meant to be doing. With adult (ie me) intervention they had a go. But given their relative levels they didn't understand the importance of recording. Petra neatly coloured in the lorry picture. Strangely they could all do what was required, but under questioning their ability to conserve the information was extremely weak, without having another try to remind themselves, by which point the importance or recording had deserted their minds!
- Chris had difficulty in distinguishing orange from red and green from blue, but this may be just a curious observation to make!
- The sheet wanted the children to distinguish between the ends to push the lorry forwards and the end that pushed it backwards. This was complicated by the fact that the children kept removing the magnets and this led to frequent reversions – although a final record of opposite colours would render this point meaningless?
- It was also curious to note that the girls more readily entered into the colouring recording than they boys in the group. The need to play was exhibited by the boys to a markedly larger degree; although as I previously noted Preetika was absent from the table for a lot of the proceedings – I recall her being present at my first appearance and then shortly before I had to leave.

General Observations

The holding activity of the race courses was very attentively and quietly undertaken and yielded interesting results. The groups doing the investigative tasks appeared to have reached some firm conclusions regarding magnetism. One girl was even able to state that metals were magnetic, but upon being asked if they all were (by the teacher) she replied that only iron things were.

Table 1: Teachers' Beliefs about Science Teaching and Learning: The Teacher's Role

Question Asked	Teachers' Responses	Teacher
What is your role in the learning process?	Translator	**A**
	Facilitator	**A B D E F GH**
	Enabler	**A B C**
	Provider of: knowledge	**A C D F**
	understandings	**A F**
	meaningful lessons	**G**
	A role-model for scientific learning	**G**
	Link between children, parents, school	**E**
How important is it for you to have a well developed background in the science topics you teach?	Teacher must first trial investigations to find problems, questions prior to pupils' involvement	**A F**
	'Nerve wracking' without prior trialing.	**A**
	Clear understanding of subject matter by teacher leads to a clear focus for lesson	**B E**
	Confidence in own good subject knowledge instills confidence in children.	**B C D E G**
	Allows you to motivate yourself and children	**E**
	Important to know and understand what children will be taught in order to provide a good foundation of learning.	**H**

Table 2: Teachers' Beliefs about Science Teaching and Learning, What Children Should Learn in Science

Questions Asked	Teachers' Responses	Teacher
In science, what sorts of things should children learn?	Grounding in basic areas e.g. understand specific concepts	**A**
	A systematic approach	**A**
	Necessary reflection on results	**A**
	Things that are relevant to everyday life	**B**
	Facts that will enable them to carry knowledge and interest beyond school	**B**
	Understand the world around them - why and how things happen / work	**C D E F G H**
	Safety issues	**C D**
	Science Process Skills	**C D**
	Science language	**D**
	Respect for the world (the environment) they live in	**E G**
	A curious / questioning approach	**E**
	Understand themselves	**H**
What do you think are the most important pupil learning outcomes in science?	Relationship between predictions and results	**A**
	A systematic "fair' approach	**A**
	Controlled 'messing about' is how we learn science	**A**
	A sound subject knowledge or some knowledge and understanding	**A**
	Appreciation, interest, curiosity and motivation to learn and find out about the world around them	**B C D E G**
	Enjoyment of the subject	**B E F G H**
	Using equipment safely and competently	**C D E**

Table 3: Teachers' Beliefs about Science Teaching and Learning, How and What Children Learn and Limitations of their Learning

Questions Asked	Teachers' Responses	Teacher
How do you think children learn best?	When they feel interested, happy, safe, and valued	**A B**
	Practical activities - hands-on experiences	**A C D E F G H**
	Lessons are well organised and taught	**B**
	The level of lesson matches pupil's ability	**B D**
	Subject matter relates to everyday life - prior knowledge, interest and / or experience	**B C D H**
	Kinaesthetic activities, also research, reading, class and group discussions and parent supported home-tasks	**G**
What sorts of things do you think your pupils expect to learn?	Practical applications - decent paper aeroplanes, viable parachutes	**A**
	Gain knowledge; facts. Facts – dependent on Attainment Target	**B C D G**
	How to find out information for themselves	**B**
	How to work together in an investigation	**B**
	Know more than they realise - need to build up self-belief	**E**
	Lots of writing	**E**
	Haven't asked	**F H**
	To develop independence in science work	**G**
What limitations are there in what children in your class are capable of doing?	Difficulties in expanding on conclusions in oral and written formats	**A**
	Cooperative group work	**B E**
	Recording difficulties for some - use differentiated recording	**B**
	Children need lots of support and clear directions/ explanations	**C D**
	SEN children need adult support to record	**C D**
	Limitations in the variety / amount of resources	**E**
	Safety issues	**E F**
	Articulation of prior knowledge	**E F**
	Limit of life experiences`	**F H**
	None if necessary stimulation, guidelines and resources are provided	**G**

Table 4: Teachers' Beliefs about Science Teaching and Learning, Teachers' Teaching Strategies and Techniques

Questions Asked	Teachers' Responses	Teacher
While teaching, how do you decide what to ask children?	Initial questions - the focus decided when planning	**B C D E F**
	Targeted questions for ideas, to check understandings and / or knowledge, solutions to problems	**A B C D F G H**
	Go on tangent if helps lesson, encourages original thought	**E**
	Listening to; response to children's questions	**F G**
	Questions that work towards learning objectives	**F G**
What kinds of inter-actions do you like to encourage?	In investigations, teacher/ children interaction to move lesson along	**A E F G**
	Children/children interactions with mid and end-of-session plenaries to explain what they have found out	**A E**
	Whole class discussion -see what other children think or can add	**A G H**
	In investigations children interact with one another - listening, helping, questioning, sharing ideas and equipment	**B C D E F G H**
	Interactions between children/ other adults/other classes, if warranted	**E**
	Acting out concepts / ideas kinaesthetically	**G**
When you are marking work from your science topic what do you look for?	Good conclusions and reasoned results from investigations	**A B**
	Sensible answers to questions	**A**
	Clarity of explanation	**B G**
	Original ideas and ways of accounting for results	**B G**
	Children demonstrate evidence of understanding	**B C E**
	Evidence of understanding concepts or, skills and co-operative learning	**D E**
	A demonstrated understanding of the learning objective, for example identifying a fair test, or accurately labelling a diagram	**F**
	Use of scientific vocabulary	**G**
	Responses to teacher questions or teacher-set activity	**H**

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