

**MALTESE PRIMARY SCHOOL TEACHERS' DEVELOPING UNDERSTANDING OF
EFFECTIVE USE OF ICT IN CLASSROOMS THROUGH AN ENQUIRY GROUP
PROCESS**

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ABSTRACT

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Maltese primary school teachers' developing understanding of effective use of ICT in classrooms through an enquiry group process.

The context of this research was the European Union (EU) funded Specialised Animated Interactive Learning (S.A.I.L.) project that set out to incorporate group work as well as to integrate information computer technology (ICT) within primary school classrooms in three European countries. As part of this project, online resource material on the Romany culture was developed and introduced to a group of primary school teachers in Malta. A self-selected group of five of these teachers formed a collaborative enquiry group. The focus of the research was the teachers' developing classroom practice and pedagogic understanding as evidenced by their developing use of pedagogic language and observations of classroom practice.

The research methodology evolved during the project to describe and understand the ways the enquiry group sessions were influencing pedagogic understanding and practice. The teachers' classes were videotaped and used during the sessions to demonstrate, discuss and problematise classroom practice. The teachers led the sessions and the researcher acted as a facilitator. Data collection instruments included videos of classroom practice and the enquiry group sessions; an initial free writing exercise and questionnaire; teachers' classroom logs; and a final interview.

Data analysis was an on-going process as it was important to develop an understanding of the dynamics of the enquiry group process and how this translated

into classroom practice during the five weeks in which this occurred. Concordancing of the transcripts was used to identify key lexical items and their frequency and this was followed by an analysis of how specific lexical items were used in each session. Critical incidents were also identified; providing an understanding of the ways the enquiry group process supported classroom change.

The research provides evidence of the ways the enquiry group process adopted influenced classroom practice and the teachers' pedagogic understanding which has implications for teacher professional development models and programmes. All five teachers' classroom practice changed over the five-week period, as did each teacher's use of language about their practice. This was evidenced by lexical item use within the enquiry groups and three categories emerged: (a) new lexical items adopted by individuals; (b) the change in use and meaning of specific lexical items; and (c) the way they used lexical items to convey a pedagogical issue that they were integrating within their classrooms.

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ABSTRACT

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Chapter 1 Introduction

1.1 Introduction

Learning how to use a computer was the novelty of the last century: the computer has now become a necessity to function in today's society. Teachers are aware of this and are trying to integrate ICT within their classroom practice. This has become a professional development issue. The way we can support the professional pedagogical development of ICT within the classrooms is the focus of this thesis.

The main issue is that the computer within the classroom is still far away from its objective of being utilised as a tool to aid learning, and possibly even further away from being used to change teachers' practice. The first step is for the teacher to play with the computer just as a child plays with a toy in order to learn what it has to offer. It is this 'doing' which has to happen first and foremost before a teacher can become comfortable with ICT in the classroom. After all, as Confucius said, 'I hear and I forget, I see and I remember, I do and I understand.'

This thesis is organised in two sections:

The first part, comprising chapters 1 and 2, describes how the research was conceived, its context and how it was developed. It also describes some preliminary background enquiries.

The second part, comprising chapters 3, 4, 5 and 6, focuses on the way the research unfolded, its interpretation and its outcomes.

Chapter 1 is broken down into the following topics:

- 1.2 My background
- 1.3 Background to the S.A.I.L. project
- 1.4 The Maltese context

- 1.5 ICT research globally and the need for the research
- 1.6 The setting up of the research
- 1.7 The pilot
- 1.8 Conclusion

1.2 My background

I have been employed as a teacher trainer by the University of Malta since 1996. My duties have included training teachers from Diploma to Masters level, covering courses on areas of English language awareness and on pedagogic practice.

Initially, in 1996, my research interests lay within the lexical field. I was especially interested in how language learners learnt vocabulary items, and the influence of the second language on their learning. However, I began to question the validity of my work and its usefulness within society. In particular, I questioned how my research was informing language learning pedagogy.

As a result, in 1999 I started to just teach and observe how students were working and what was helping them to achieve their objectives. One of the predominant factors that I observed both in my teaching and the students' learning methods was how the aspect of collaboration in project work appeared to help them to achieve their pedagogic objectives.

I also became involved in management projects with Deloitte and Touche. Whilst training staff and monitoring the outcomes, collaboration again seemed to be an important factor in supporting learning. During this time, I upgraded my own ICT skills and later, through my classroom observation, noted the rather slow uptake of ICT in schools in Malta.

1.3.1 Background to the S.A.I.L. project

In 2001, after spending a few years in teacher training and teaching Advanced Level students at the University of Malta, I was invited to a conference set up by the University of Malta detailing the European Union Programmes. One of these was the Minerva Socrates Programme which had the following stated aims:

‘(1) to promote understanding among teachers, learners, decision-makers and the public at large of the implications of the use of ICT in education, as well as the critical and responsible use of ICT for educational purposes;

(2) to ensure that pedagogical considerations are given proper weight in the development of ICT and multimedia-based educational products and services;

(3) to promote access to improved methods and educational resources as well as to results and best practices in this field.’ (EU Socrates, 2001; p.1)

After talking at length with Dr Antoine Gambin, who had experience in project management, he decided to set up a company (Metis Co. Ltd), and to apply for a project under this action, combining my research interests and his ability to create a consortium with Metis as the co-ordinating institution. The consortium comprised the business world [Educational Software Products (ESP) and Apple (Malta)] and the academic world [University of Malta (UOM) and the Equal Partners Foundation which is a non-governmental organisation whose focus is on special needs].

The proposed project was called S.A.I.L. – an acronym for Specialised Animated Interactive Learning – and was to involve research and development of ICT software for use within classrooms in Malta and elsewhere in Europe. It was to run for three years in all. My role within this project was to be the academic Coordinator and researcher.

I decided to use my work on the S.A.I.L. project as an opportunity to study for a PhD. In fact, the project provided me with an opportunity to explore issues related to the effective training of teachers, as the project was concerned with the introduction of the ICT package in the primary classroom. The software package was to be created as a

reference tool which children would access to find out information on social minorities in Europe.

The S.A.I.L. project proposal was accepted by the EU and was launched at a general conference in 2002. The project focus was on the design and implementation of software aimed for use by 9 – 11 year-olds in the classroom.

1.3.2 Summary of research focus and approach

This section provides an overview of the ways my research focus and methodology changed over the project. Aspects of this are discussed in more detail in chapters 2 and 3.

My original intention was to focus my PhD research on how the teachers' perceptions of the software and ICT integration changed over time. Therefore, my initial PhD research question was: how do teachers' perceptions influence their uptake of new ICT methodologies? The context was to be the S.A.I.L. project.

At that time my research methodology involved carrying out initial questionnaires, analysing classroom practice and holding a reflection exercise at the end of the project, see Appendix 1 (lesson plan observation sheet) and Appendix 2 (observation teaching logs). Originally it seemed that this would reveal issues related to the uptake of ICT, but whilst conducting the research and the implementation of the project, I realised that I could not answer these research questions using this approach. In addition when I was observing the outcomes in the classroom, I did not really understand their practice and the context in which the teachers were working.

I was describing only what happened at a surface level and from an outsider's perspective. I was not able to understand the teachers' developing practice or get close to describing what was happening pedagogically as a result of the introduction

of the materials. This seemed to need an insider's perspective and the teachers were not expert in explaining this.

On the whole the S.A.I.L project progressed as scheduled, while I worked on the data collection changes which needed to be effected – further details on this will be covered in Chapters 2 and 3. The most radical change that occurred at this stage was the setting up of an enquiry group. This was initiated by the volunteer teachers who were interested in sharing and discussing classroom practice related to the implementation of the S.A.I.L. software. This group helped me to understand the process that was occurring.

I had already noted the seeming importance of collaboration within continuing professional development, and this new situation provided an opportunity to research the collaborative process itself. My research focus became the teacher and how he/she adapted to change and the setting for exploring this became the enquiry group. Therefore my research question became: how do teachers collaborate within an enquiry group when introducing a new ICT package?

1.3.3 The S.A.I.L. project

The objectives of the S.A.I.L. project were:

- to develop classroom research strategies and a research mentality through the use of ICT from the early years of schooling;
- to encourage students to take responsibility for their own work by being given control over what, how and when they learn;
- to teach lifelong skills that are useful for coping with new and unforeseen situations, including the skills of evaluation and assessment of their own work (the underlying approach was based on the premise that students generally learn how to learn from their own failures and successes, thus making them more efficient learners for the future);

- to provide present and future teachers of primary and middle school children with the opportunity to limit their intervention in teaching processes through the use of specially designed software which is orientated specifically to giving more autonomy to the students;
- to build a trans-European cultural awareness in the classroom through the themes in the freeware that were produced by S.A.I.L. partners (students and teachers were to be introduced to aspects of cultural minorities in Europe through project work which would be researched through the freeware developed specifically for their project).

(Gambin, 2001)

1.3.4 The S.A.I.L. deliverables

S.A.I.L. had two major deliverables:

1. The collaborative development of a software package as a tool to attain specific pedagogical objectives;
2. The implementation of the software package in classrooms that exposed the teachers to new ICT skills and teaching methods whilst tackling topics on social diversity.

The project plan had a key learner-centred theme: one of ensuring pupils were engaged in discovering their abilities and skills. In addition, it set out to empower the teachers through training that would enable them to exploit the full potential of ICT-based educational tools for the planning, delivery and assessment of teaching.

This meant that the partners adopted specific constructivist pedagogic approaches that were suited to fulfilling the project objectives.

The pedagogic element that was central to S.A.I.L. was the introduction of a new learning culture in Maltese primary classrooms, based on the principles of learner training and learner autonomy by means of innovative methodologies through the

collaborative design of educational multimedia packages. Further details on the Maltese context are given in the section below in 1.4.1.

The work plan set out to introduce an inclusive culture in the classroom, allowing students with learning needs at the extremes of the learning spectrum to find it easy and fun to integrate with mainstream students. These efforts meant that in a new classroom environment students were allowed to work on their own and in groups, thus allowing the teacher space and time to look at students at work and assess their personalities and preferred learning processes.

S.A.I.L. worked in a very efficient manner with the target beneficiaries of the project. The work plan involved pilot activities in five classrooms, the creation of the materials for the freeware package and the development of teaching ideas. The process of development of this freeware was intensive and it also included discussions on methodology and constant exchanges with teachers who participated in the pilot project activities.

The aim was for each teacher to develop their own teaching ideas and methodology on how best to integrate ICT tools in their teaching. This research did not actually achieve this but it developed an approach to facilitate teacher training.

The chart below illustrates the duties assigned to all the participants during the project, including my role as Academic Co-ordinator.

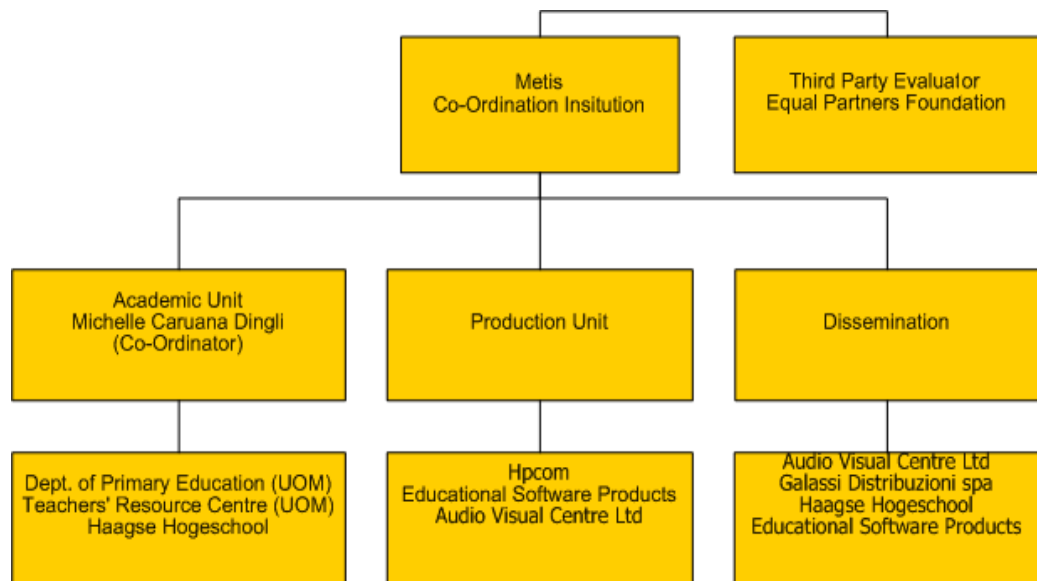


Figure 1.1: The S.A.I.L. structure. (Gambin, 2001)

As Academic Coordinator I was responsible for the teachers' and materials development, while the companies looked after the design of the software. Figure 1.2 shows the development process.

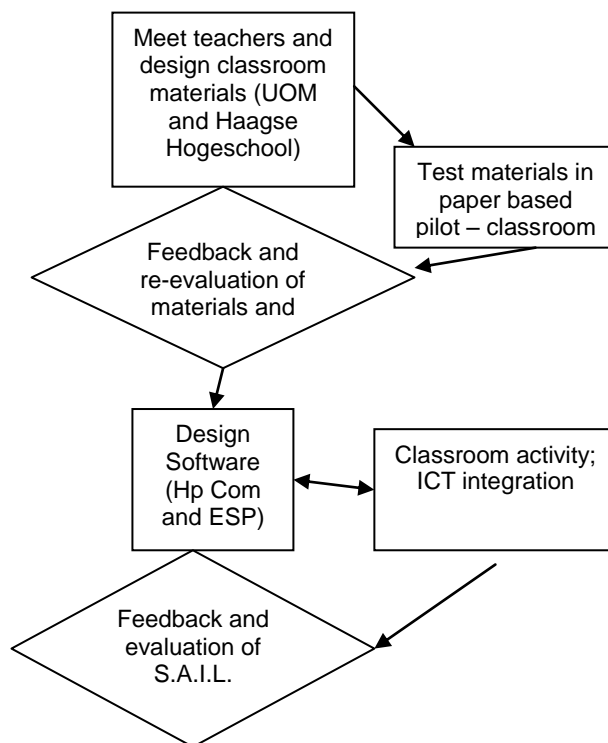


Figure1.2: The S.A.I.L. development process

It is important to understand the context in which the project was being developed to understand this research. Computers had been installed within Maltese classrooms, and teachers were being trained in how to utilise them. However, the uptake of ICT within Maltese schools had been slow. Maltese teachers had learnt how to use the applications, but did not simultaneously learn to develop their classroom pedagogic practice. The S.A.I.L. project provided an opportunity to rethink the nature of the training that was provided. The following section describes the Maltese context in more detail.

1.4.1 The Maltese context

This research was conducted in Malta, a small island in the Mediterranean located between Sicily and North Africa. Its education system is made up of a combination of government, Church and private schools for a population of around 385,000 inhabitants. There are 111 primary schools, of which 74 are state primary schools, 22 are Church primary schools and 15 are private primary schools.

At the time the S.A.I.L. project started in 2002, Malta had invested in supporting a high standard of ICT hardware, software and infrastructure in all of its schools. For example in Maltese State Primary schools, the teacher is literally surrounded with technology: there are three or four desktop computers in every classroom, connected to a single printer. Within this setup, a large monitor, connected to a video recorder, is available for whole-class displays. In addition, every primary school teacher has a laptop/notebook computer which is connected to the monitor setup. All this technology is networked and internet access is available on all computers in the classroom. Furthermore, each school has a school server which connects all the classrooms, a facility which proved essential for the S.A.I.L. project.

In the Church schools and the private schools in Malta, they are still working on a system of computer laboratories with specialist computer teachers. However, some

Maltese schools are realising that they need to integrate computer work within the curriculum rather than teach it solely as a subject, so some schools have adopted a system of computers on a trolley.

Once technology is recognised and accepted, the next challenge the teachers have to face is the way it should integrate into their professional routine. This is a pedagogical issue, where teachers need to understand not just the how but also the why. As Abbott (2000) points out, 'teachers need to be helped to see the possibilities and encouraged to explore the potential for themselves' (p. 98). In addition to this they have to realise that it does not mean reinventing the wheel (of teaching), but adapting what they already know to include ICT within their classrooms.

A survey of software and its use in Maltese state primary schools was undertaken by Borg (2003). This research involved 60 teachers from each year group and the following types of software use were found:

- drill and practice software including activities involving continuous user intervention and feedback;
- tutorial packages that include explanation of the skills or concepts covered and complemented by drill and practice activities;
- creative content-free open-ended software that enables the user to be creative, both textually and graphically;
- reading packages containing interactive text and illustrations, usually following a sequential narrative;
- reference packages containing information on a particular topic or subject, occasionally complemented by very basic interactive quiz games.

The survey found that the most commonly used software was the drill and tutorial type. However, differences in use were found between year groups: in Years 1 and 2 there was greater use of creative software than in other years; in Years 3 and 4 there

was greater use of software to support reading development; while in Year 5 and 6 there was focus on creative and reference software.

The Minerva S.A.I.L. project created a reference package that covered seven European Minorities. This was located on an internet website (<http://www.educ.um.edu.mt/S.A.I.Llibrary/>). This site could be accessed for information by the teachers during the project, and feedback on how it could be modified to suit the best interests of the students and the teacher was relayed to me by the teachers.

A teachers' package, which contained ideas on teaching practice and the collection of materials on European Minorities, was also created. The aim was to create something that would use the potential of ICT more fully and support a social constructivist approach to teaching and learning. Unlike the commonly used drill and practice software, which is more like an electronic version of a printed worksheet and which uses teacher-centred pedagogy; this approach was learner-centred.

ICT is not a substitute for the teachers' input. General ICT packages, such as the Encarta encyclopaedia (<http://encarta.msn.com>), may contain vast amounts of data not necessarily related to the project at hand and pupils need to be directed in their search criteria. Thus teachers need to provide guidance to children during project work. The degree of this direction depends on the nature of the topic being tackled and the capabilities of the learners. That was the reason why the teachers' package was created in this project.

The challenge for this project was to move teachers from a teacher-directed to a learner-centred approach. It was the nature of the training that they would receive that was important, the focus being on the process of learning and the teacher.

It is easy for teachers to avoid the challenge of promoting constructivist learning themselves by restricting their teaching agenda to cover only the content covered by the exam. They may opt to churn out information for children to absorb and to subject children to mechanical exercises that can be easily repeated and corrected (Borg, 2003). In this situation, constructivist learning via the use of ICT may be regarded as too time-consuming to be worthwhile.

The training approach used within the project was designed to reflect the learner-centred methods that the project was promoting for use in the classroom, the project aimed to provide the teachers with an experience of the learner centred approach.

1.4.2 The nature of ICT professional development among teachers in Malta

The Maltese national strategy report for 2004 – 2006 on ICT and education, Ministry for Information and Investment (2004) talks about ‘increasing the ICT content delivered in all schools at all levels’, and its focus is on further training of peripatetic teachers by ‘increasing the teaching capacity of the ICT teachers at all levels of the educational system.’

The role of the ICT peripatetic teacher is to go to the schools s/he is assigned to and give demonstration lessons to the pupils for the teachers to understand how they can integrate the use of ICT during their own lessons. The main aim of the peripatetic teacher is to help the classroom teacher to acquire the necessary skills and competence in using ICT in class. Apart from in-class support, after school sessions are sometimes organised where the class teachers are offered extra individual help and guidance in various aspects of ICT use in class. Sessions might cover the creation of resources with particular software, like Print Shop for charts, handouts, flashcards, banners and booklets; Kid Pix for on-screen activities; the preparation of class presentations using Microsoft Power Point; or the use of internet and emailing.

In Malta, teachers graduate from University and then start working. There is no requirement for teachers to be trained before they begin teaching in classrooms. They are however obliged to attend an in-service course once every two years, and it is the role of peripatetic teachers to go round classrooms updating teachers and supporting the integration of the new technologies that are evolving.

Malta has been moving away from a highly centralised and bureaucratic system to one that encourages broader involvement and more collaboration among stakeholders. This move was not recognised or analysed in the MIT and I (2004) report. As a result there were no suggestions for modifying training methods.

In contrast Bezzina and Testa, a Maltese university lecturer and head of a boys' secondary school in Malta respectively, explored a theoretical rationale for a teacher-led approach to school improvement in 2005. They found that teacher-led change promotes reflection and dialogue, and encourages critical conversations.

The mandatory biennial in-service training courses held for teachers by the Department of Education are very useful, in that they allow teachers to update themselves on new textbooks, etc., but no further development opportunities exist. This could be the reason why ICT has not been successfully integrated within Maltese classrooms – something pointed out several times by politicians in Malta (Sant, 2006). Lack of uptake of ICT in classrooms is a global issue, and the next section covers some of the literature related to this problem.

1.5.1 Research about the poor uptake of ICT globally

At an international level, equipping schools with desktop computers, peripherals, software and internet technology has been a major concern (Riley, Holleman and Roberts, 2000). As a result, most school technology planning efforts have focused

predominantly on equipment acquisition and internet connectivity. This has also been the situation in Malta (Bartolo and Saliba, 1999). However, access to these technologies in schools has not altered instructional strategies and learning (Cuban, 1993; McAdoo, 2001), despite the promise of technology supporting innovative practice and transforming learning across subject areas.

Hughes and Ooms (2004), state that one of the major factors contributing to teachers' lack of preparedness and innovation in using technologies to support learning is the absence of on-going, focused professional learning opportunities. They also point out that one-shot workshops focused on learning software without specific content-based examples of use (McKenzie, 2001) and without pedagogical and curricular connections naturally result in teachers feeling unsure about the use of ICT within their own classrooms.

The response to the need for better professional learning for technology integration has been addressed in different ways. Putnam and Borko (2000) talk about the integration of a community of teachers using laptops, Loveless (2001) analyses the importance of teachers' perceptions, and Hughes and Ooms (2004) focus on collaborative learning. This work will be discussed in more detail in Chapter 2.

Consequently, if the teacher is ICT literate, the training should be supportive – allowing time to learn new technology skills, explore the integration of these within the curriculum, access up-to-date resources and participate in a community of teachers working with the technology (Pianfetti, 2001).

1.5.2 The nature of this research

This section looks at the development of my research question: how do teachers collaborate within an enquiry group when introducing a new ICT package?

The focus of the question was the reaction of the teachers to the constructivist training approach. Trainers may adopt various methods of teacher training, for example through mentoring and the giving of specific instructions on the classroom pedagogic approach.

My observations over the years have led me to believe that the efficacy of the training approach is dependent on the approach to teaching normally adopted by the teacher in the classroom. The teacher will already have their own style of teaching and often trainers do not take that factor into account.

Communication often fails as words mean different things to different people. An approach to training is needed, which allows for negotiation of meaning in order to minimise misinterpretation. As Wittgenstein (1958) pointed out, the crucial element in any account of meaning must be the fact that meaning is communicable and this is achieved through negotiation of the message. Yet the use of a shared dialogue to construct meaning to train teachers is still quite novel as an approach to training teachers to integrate ICT within their classrooms. Putnam and Borko (2000), Swan et al. (2002), and Hughes et al. (2002) began this type of professional development for technology integration – further details of their work is found in Chapter 2. It is important for clear communication that when training teachers in how to use ICT, training must be based on what the realities of the classroom context and current classroom practice.

This process and its impact on teachers and their practice are under-researched (Hughes and Ooms, 2004). Windschitl and Sahl (2002) pointed out that:

‘..it is important to have consistent work time with colleagues who share a desire to advance their teaching while exploring the use of technology in the classroom. Such relationships play a key role in sustaining growth in instructional sophistication and technology use. Conversely, the conditions of professional isolation and minimal preparation time during the school day virtually assure that teachers will not make fundamental advances in their instruction or experiment with technology.’ (Windschitl and Sahl, 2002; p.204)

In this research the dialogue between teachers sustained the communications bridge between the introduction of ICT and their classroom pedagogies. This bridge was formed through the group process, socialisation and the co-construction of knowledge within the enquiry group. ICT research has a body of knowledge (unfamiliar to the teachers), while there is a body of knowledge about classroom pedagogy and teaching practice (which is more accessible). There needs to be a bridge between the ICT being introduced and the classroom pedagogy that supports the teachers in engaging with the ICT pedagogy.

At the beginning of the enquiry group process I set out to record the teachers' classes so that they could discuss them when they met up as a group. The teachers could play back their classes to their peers and discuss what was happening and why. The video recording of these discussions then provided a tool by which I could also record transactions in the enquiry group meetings. This medium of recording data was useful as it made explicit not only the voices but also the body language, language nuances and facial expressions of the teachers. The aim of this was to introduce an experiential model which allows for interaction between peers. Their experimentation and discussion being recorded allowed the evidence to be collected and analysed.

Kelly's theory of personal constructs (1955) provides a basis for understanding experiential learning. Kelly's basic assumption is that individuals make sense of the world through constructs which they have developed for themselves over a long period of time. According to Kelly, people function in terms of their expectations and make plans on the basis of expected outcomes. They are active in their constructions. Similarly, Rogers (1975) argues that we respond to events in accordance with how we perceive and interpret them, therefore almost prophesying how the events will then develop (Rosenthal and Rubin, 1978). According to this viewpoint, if we expect our actions to fail they will do so. As a result we need help to enhance our self-concept and thereby change our perceptions of the future. Chapter 2 provides further discussion of the role of this model within this research framework.

1.6.1 Setting up of the project and the research

The project took place over three years. During the first year, materials were collected on the theme of the Roma people and the software was designed. Finding common ground between a Roma community and participating students would allow students to understand the implications of belonging to a European cultural minority, even though they had never met a Roma. The students utilised abstract knowledge to understand what it meant to be a 'Roma' or gypsy – a description often used in a derogatory or insulting manner.

In the same year, a group of five teachers volunteered to take part in the project and the research. The second year was spent on the training of the teachers and the integration of the software into their classrooms. During the third year, detailed analysis of the research data from year two was carried out.

The project focus was the design of the software, its implementation and the dissemination of the materials, whilst the research focus was on the training that the teachers received, and the ways their understandings of effective pedagogy in relation to the use of ICT in classrooms developed.

1.6.2. Research purpose

This research set out to create a professional development environment in which teachers were given opportunities to present and discuss with colleagues their own classroom practice in relation to the use of the S.A.I.L. materials. Teachers, just like pupils, must be encouraged to examine their understandings through sharing and negotiating openly with their peers.

As Andrews and Lewis (2002) concluded from the research they carried out when teachers built a professional learning community that examined their understanding,

'shared understandings through professional learning can impact on action in the classroom' (p. 251).

The trainer must be willing to ask, listen, question and ask for clarification. This way the teachers' capacity for meaning can be developed as they experiment on how to integrate ICT within their classrooms. The Future lab report 14 (2006) by Fisher et al, discusses the Talking Heads project in which head teachers in UK schools were involved in a commissioned evaluation from Bristol University. The Talking Heads project looked at a sample of ICT users and made the following point: 'a key feature of the Talking Heads community has been the role of facilitators in administering and developing interactive help, support and encouragement for the heads' (Fisher et al, 2006, p. 30). My research provided a structure for teachers to take on this role and I took on this facilitator role.

It is difficult to implement new pedagogical practice unless the teacher sees that it is relevant and authentic (Loveless, 2001), Chapter 2 has further details. The expected new practice involved not only new pedagogy in relation to the integration of ICT but it required a student centred/ group work approach – something novel to these teachers. The research is based on the premise that teachers are likely to come to appreciate the benefits of implementing this constructivist approach through the more personal interpretation process if this is incorporated in the training they receive.

The social nature of teaching is discussed in terms of professional discourse communities developed in interactions with colleagues, whether within subject domains or in the broader structure of the school. Putnam and Borko (2000, p. 8) report work by McLaughlin and Talbert, which provided teachers with the opportunity to participate in such a community 'that supports the risk taking and struggle entailed in transforming practice.' They argue that for teachers to be successful in constructing new roles, they need opportunities to participate in dialogue. Furthermore, Putnam and Borko (2000, p. 9) put across the notion of distributed cognition and suggest that

when diverse groups of teachers with different knowledge and expertise come together, as they did in this research, community members can draw upon and incorporate each other's expertise to create rich conversations and new insights into teaching and learning.

1.6.3 The start of the project and research ethics

Three introductory information meetings were held at the start of the project. The first information meeting was held for all the teachers and heads of schools at a conference hall at the SAS Radisson Hotel in Malta on the 15th of October 2002. The aim was to inform heads, deputies and teachers about the project and also to recruit teachers.

96 heads and deputy heads of schools attended, but I could not sign up volunteers immediately, as the teachers who would be carrying out the activities were not present. Therefore this session became more of a general meeting, discussing what S.A.I.L. was hoping to achieve, and it served the purpose of introducing the organisers to the schools' management teams. During this meeting I set up another meeting for teachers interested in being involved in the project at the University of Malta. The head teachers went back to their schools and enlisted the teachers who would be willing to participate after school hours and these were invited to this later meeting.

24 teachers attended the next meeting held on the 14th of January 2003. However, after initial discussion and a presentation on different learning styles given by my colleague Mr Colin Calleja from the University of Malta, it became apparent that some teachers had attended thinking that it was an EU Comenius Action that would involve them in travelling abroad. Therefore many of them dropped out, leaving five teachers who were willing to take on this project within their classrooms. After explaining what the project involved, I arranged the first detailed meeting of the pilot for the week commencing 21st January 2003.

From the very initial stages of this research, the ethical principles of honesty, fairness, justice and benefice, and respect for others were constantly present. The five teachers were made aware of the purpose of the project before they agreed to participate and they were informed of the research I was engaged with, they were not deceived in any way and voluntarily took part in the project, as per Bera (British Educational Research Association, 2004) revised ethical guidelines. After their initial meeting where they volunteered to participate in the project, I met their heads of schools and discussed with them what they and I were going to embark on. Having explained the broad purposes of my research and being given permission to visit the schools whenever I needed to, I then asked the teachers who took part in this research to sign a consent form allowing me to utilise their contributions to research.

Following this I wrote out a statement for the students to show their parents, whereby it was stated that I was not going to use their children's images and that the purpose of recording was solely for research purposes and the teachers' further pedagogical development. I also passed on my email address to all for further details and a contact point. After this the teachers were given the Roma paper-based materials and also a brief outline of what I was hoping to achieve in this study. The relationship between the teachers and me as the researcher was clear and the benefits were seen as mutually beneficial. The teachers were aware that they could stop participating in the project if they wished, in fact the consent form signed stated that they could withdraw from the research at any time.

The teachers were active participants in this research: they talked to the children's parents about their progress with the project. In fact, in several of the schools there were exhibitions of the students' work on display for parents to view. In addition, at the end of the project the teachers put together a paper which was jointly published in the S.A.I.L. publication and they gave a presentation at an international conference. However in this thesis the teachers' names are anonymised.

1.7.1 The pilot

The first meeting of the pilot (February 2003) was attended by five volunteer teachers. Table 1.1 provides some background information about these teachers and further information is provided in Chapter 4, Section 2.2.

Table 1.1: Overview of the participating teachers and schools

Name	Gender of pupils	Name of School	Type of School
David	Boys and Girls	Primary School A	State school
Martha	Boys' school	St Michael	Church school
Rose	Boys and Girls	Primary School B	State school
Greta	Boys' school	St Salle	Church school
Marceline	Boys and Girls	St Anthony	Private school

The agenda of this meeting was:

- (1) Introduction of the theme – Roma
- (2) Setting up lesson plans; see Appendix 1
- (3) Discussions of the S.A.I.L. materials.
- (4) Group work activity, which involved the teachers. This was based on designing a story around a piece of music, whilst working in a collaborative group
- (5) Arranging days and times when I would be able to visit classrooms.

The pilot was planned around a paper-based version of the materials that would eventually be presented as software on the website. The reason for this was that the project organisers were still collating the materials and they also had to check that the content was appropriate for use in primary classrooms. It was important that the project evaluated the level, content and usability of the materials before resource was invested in putting them online.

During this meeting I set out to train the teachers in classroom group work as this was a key pedagogic feature of the S.A.I.L. materials. Collaborative approaches are not widely used in Maltese classrooms, so the notion of shared task responsibility needed

to be understood, as it was felt that this might be an obstacle to the use of the software. The training that was held during the pilot used the traditional trainer-centred approach discussed earlier in Chapter 1.4.2.

This meeting was followed by visits to each of the teachers' classrooms to observe them implementing the S.A.I.L. materials. The second and final meeting in the pilot involved all five teachers and myself in an evaluation of the S.A.I.L. materials and their attempts at implementing them.

During the pilot my personal research aim was to test my evaluation tools to see if they were effective in collecting data on the changes that were taking place in the teachers' classrooms. My tools for evaluating classroom practice were paper-based observational teaching logs, which concentrated on the interactions that took place, the time they took and the methods adopted (see Appendix 2).

The teachers completed the five scheduled lessons that they had planned in the first meeting – each created a different project based on the theme of the Roma.

- (1) David's class put together a puppet show
- (2) Martha held a party, where children put together various games that the Roma would have played
- (3) Rose's class put together a food display and a poetry reading session
- (4) Greta's class created mini drama plays for all the class
- (5) Marceline's class created books on the Roma.

For the second meeting on the 26th of September 2003, all the materials the students and teachers had created were displayed at the Malta Centre for Sciences and Technology, and all the primary schools were again invited to see their work. An evaluation questionnaire (Appendix 3) was completed during the session which I

videotaped. The following comments typify those provided as a response to the questionnaire:

'It was a great experience (but) I would have preferred to discuss with other teachers from other schools, what they were doing, which stage where they in.'
Greta (feedback pilot session)

'All the teachers found it useful getting together with other teachers to share ideas.'
Rose (feedback pilot session)

'...and to discuss what is happening in each other's classrooms'
Marceline (feedback pilot session)

1.7.2 Reflections on the pilot

The pilot established that the level and content of the S.A.I.L. materials were appropriate. The feedback collected through the evaluation questionnaire (Appendix 3), revealed that the training approach used did not support the transition to these new classroom approaches. The teachers suggested further meetings where they could discuss and support each other in developing effective practice using the materials.

Further to the completion of this pilot, I decided that:

- (a) the teachers needed further training on collaborative classroom work;
- (b) the training methodology would be learner-centred and would involve an enquiry group in which teachers could share and discuss practice and co-construct notions of effective pedagogy around the use of the S.A.I.L. materials;
- (c) a video camera would be used to record the teachers' classrooms and also the teachers' meetings in any future research phase.

During the observation process I was dissatisfied with the observation tool I was using, which were classroom observation tools which I had used previously whilst observing teachers for work purposes (Appendix 1 and Appendix 2). It seemed that I was just recording the classroom methodology, the time they spent on the task and the amount of teacher talking time that took place. I was not really able to describe in

any detail what was taking place or understand why it was taking place. Chapter 3 discusses the research methodology in further detail and how the teachers' development influenced the research.

1.8 Conclusion

This chapter has described the background for this research into the use of ICT in Maltese classrooms. The research uses the context of the EU funded S.A.I.L. project, which aimed to develop materials and train primary teachers in their use in order to explore the implementation of ICT. The pilot of the materials in schools provided an opportunity to not only evaluate the materials and the training, but to explore and refine the research methodology and my research question.

The approach I adopted within the pilot of listening to teachers' needs led to the realisation that an enquiry group would be a more effective approach to training. My research question and methodology shifted as a result of this, as I was now provided with an opportunity to develop an understanding of the enquiry group process and its influence on the pedagogic understanding of the teachers involved. The five teachers in the pilot were to become informants in the research, but were also acting as co-researchers. I will discuss this approach further in Chapter 2.

The research was to involve the exploration of a collaborative process used to develop notions of effective classroom practice. The focus of the training and research had shifted from a researcher/teacher-led process to a collaborative learner-centred one. This came as a direct result of adopting a grounded approach to listening to the needs of the teachers and adapting my tools and methods accordingly. In this way it was hoped that the research would be more effective and purposeful. The epistemological root was that reality in this research was socially constructed by and between the persons who were experiencing it through their interactions. The following chapter and the concluding part of section one of this thesis provides an overview of the literature that relates to the key areas within this thesis.

Chapter 2 Context of the Research: A Review of the Literature

2.1 Introduction

The aim of this research was to develop an understanding of the ways a teacher enquiry group can support the introduction of ICT into its classrooms. The previous chapter described the background to the research, its relationship to the S.A.I.L. project, and the ways the research area and methodology evolved during this period through the pilot study.

The way the research evolved had implications for the way the research was conducted and the nature of the training itself. In addition, there was a need to consider these implications carefully in relation to the literature and the needs of the teachers within the project. The pilot study was influential in informing the content of the literature review and consequently the direction the research followed.

This research set out to describe the outcomes of five teachers when integrating new ICT software in their classrooms. The aim was to document and analyse in detail the reflective process through the analysis of language used (Chapter 5) and to develop an empirical model which represents how language is used during reflections as a metacognitive process for evaluating and integrating new processes.

As a result the literature which influenced this study is based on pedagogical aspects, reflection, cognitive interaction and collaborative enquiry groups. Therefore this chapter describes:

2.2	Introduction to Section
2.2.1	The influence of the pilot on the research
2.2.2	Summary of the research design after the pilot
2.3	The literature that influenced this study – Dewey and Schön
2.3.1	ICT and pedagogy
2.3.2	Reflection
2.3.3	Educational Interaction.
2.3.4	Implications for this research design
2.3.5	Enquiry groups
2.3.6	Similar studies
2.3.7	Situative perspective to create knowledge
2.4	Conclusion to chapter

2.2 Introduction to Section 2.

This section will describe how the research design for the study evolved from the conceptual framework discussed in Chapter 1. It will also explain how the methodology ensued from the research design.

2.2.1 The influence of the pilot on the research

The pilot set out to evaluate the materials that were being developed as part of the S.A.I.L. project. However, it proved to be instrumental to the design of the research as it changed the focus to include enquiry groups. These changes occurred due to the difficulties encountered during the pilot. The reasons for this change have been analysed in Chapter 1, Section 3.2.

I could list the challenges that occurred within this project ad infinitum: for example administrative – the keeping of records, and bureaucratic, such as working with the Department of Education to gain permission to complete the research. However, this chapter describes the nature of the literature that influenced this study: the design of the software, the schools, software development, etc. Consequently, the difficulties which I will address here are related only to the research methodology.

As already mentioned previously in Chapter 1, Section 3.2, when designing the pilot I had designed the data collection tools to be paper-based questionnaires and observation sheets. These were designed to focus on three aspects:

- (a) Classroom activity – group work, pair work and individual work;
- (b) Teachers' activity – teacher talking time, observation and feedback;
- (c) Task outcome.

They did provide the above information; however they did not depict classroom interaction, nor did they enable the exploration of the ways in which the teachers achieved their objectives.

In addition to these observations, the teachers felt that they would be more effective if they met during the training, exchanged views and discussed what was happening in their classrooms. Hence, the focus of research moved from observation of *what* was happening in the classroom to *group discussion* of teachers' experiences of ICT integration. The research design developed as the work progressed. I had worked within a task-based action research framework (Nunan, 1993) in the initial pilot that supported the development of the materials, which then developed into a more in-depth case study (Stenhouse et al, 1988) of teacher learning. In fact, group discussions played an important role in the professional development of these

teachers' learning, with the result that I had to change the way I was collecting the data to focus on these meetings where language was being used while the teachers were developing their practices.

Consequently, the video camera became an important and effective tool both in stimulating and recording discussion: the videotaping of each teacher's classroom practice provided a visual record in addition to the audio taping of the discussions that were occurring within the enquiry group, as already mentioned in Chapter 1. The video camera supported the sharing and discussion of practice during the enquiry group meetings, as teachers talked about what they had done in the classroom – the latter had been videotaped and was then played whilst discussing their classroom practices in the enquiry group. The use of video as a research tool is discussed further in Chapter 3, Section 9.

The research now focused on the interactions that occurred in the enquiry group and their pedagogical practices as they implemented the software. What is meant by 'interaction' in this context is discussed in Chapter 2, Section 3.3.

Researchers such as Hughes and Ooms (2004) suggest that the training of teachers using enquiry groups is a relatively new phenomenon, and point out that:

'Historically, approaches to teaching teachers to integrate technology have been ineffective. Training occurring at school or district levels as one-day workshops that focus on technology tools, not a specific subject area or grade level, have been shown to not change teachers.' (Hughes and Ooms, 2004; p 398)

In the same research, they propose that working within an enquiry group has more positive results than more lecturer/instructor directed sessions. This is discussed further in Chapter 3, Section 4.

2.2.2 Summary of the research design after the pilot

In this section I provide an overview of the research approach adopted, as this provides a context for the discussion of the literature that follows in this chapter. The research design emerged after the pilot and the literature review reflects this. Further discussion on research methodology is found in Chapter 3.

After the pilot, five teachers volunteered to be involved in the research study. They agreed to design five lessons each around the theme of the Roma using the project materials that were made available on the *www.brimba.org* website, and to meet regularly during the time they were implementing these lessons in their classrooms. This enquiry group is the case study that is the focus of this research.

Case studies are a 'natural way of reporting' (Lincoln and Guba, 1985; p.43), they produce detailed accounts of participants' experiences. A case study is a generic term for the study of individual, group or phenomena. It is an overall strategy for studying the case rather than a genre (Stake, 1995); Yin defines a case study as:

'an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (Yin, 1994; p.13).

Stake (1995, p.xi) defines case study research as 'the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances'. This case study was made up of the five teachers, they worked together in a systematic way to investigate the best way to integrate the Roma software into their classroom practices.

The following are the various ways a case study could be defined:

Table 2.1: An overview of case studies

Bassey (1999)	<ul style="list-style-type: none"> • Theory seeking and theory testing • Evaluative • Action Research
Yin (1993)	<ul style="list-style-type: none"> • An explanatory case study • A descriptive case study • An explanatory case study
Stenhouse (1988)	<ul style="list-style-type: none"> • Evaluative case studies • Action research case studies • Educational case studies
Stake (1995)	<ul style="list-style-type: none"> • Intrinsic • Instrumental

This research was an educational case study of enquiry into developing effective practice (Stenhouse, 1988). It was concerned with understanding how the teachers integrated new practices in their classes; the teachers reflected systematically on what had happened in their classrooms in the enquiry group sessions and examined the best way to integrate the Roma software. Hence the focus was on the enquiry group process within this educational case study. My research question being: *how do teachers collaborate within an enquiry group when introducing a new ICT package?*

During their period of participation the teachers worked on integrating the materials in their own classrooms during their extra-curricular period. As these classes were taking place at different times during the academic year, I went to different classrooms and videotaped the lessons to support the discussions during the later enquiry group training sessions. In this way the individual classroom observations/videos of practice informed the enquiry group and provided the data to evidence any changes in practice.

The teachers met regularly and using the videos of practice as a trigger discussed the approach that they were adopting, the problems that they were encountering and how these were overcome. Duration and venue of the meetings are shown in Table 2.2 below;

Table 2.2: Duration and Venue of S.A.I.L. meetings

Meeting Number	Led by	Duration (mins. secs)	Venue
1	Greta	40.46	St Salle
2	Rose	37.08	Primary School B
3	David	44.47	Primary School A
4	Martha	37.50	St Michael
5	Marceline	27.14	St Anthony
Average		37.33	

The teachers were the ones who owned what was happening within the classrooms and the enquiry group. Whilst as a researcher I was collecting the data and verifying that my research question was being investigated. In figure 2.1 a description of the whole process is provided whereby the distinction between the teachers' path and the researchers' path is clarified.

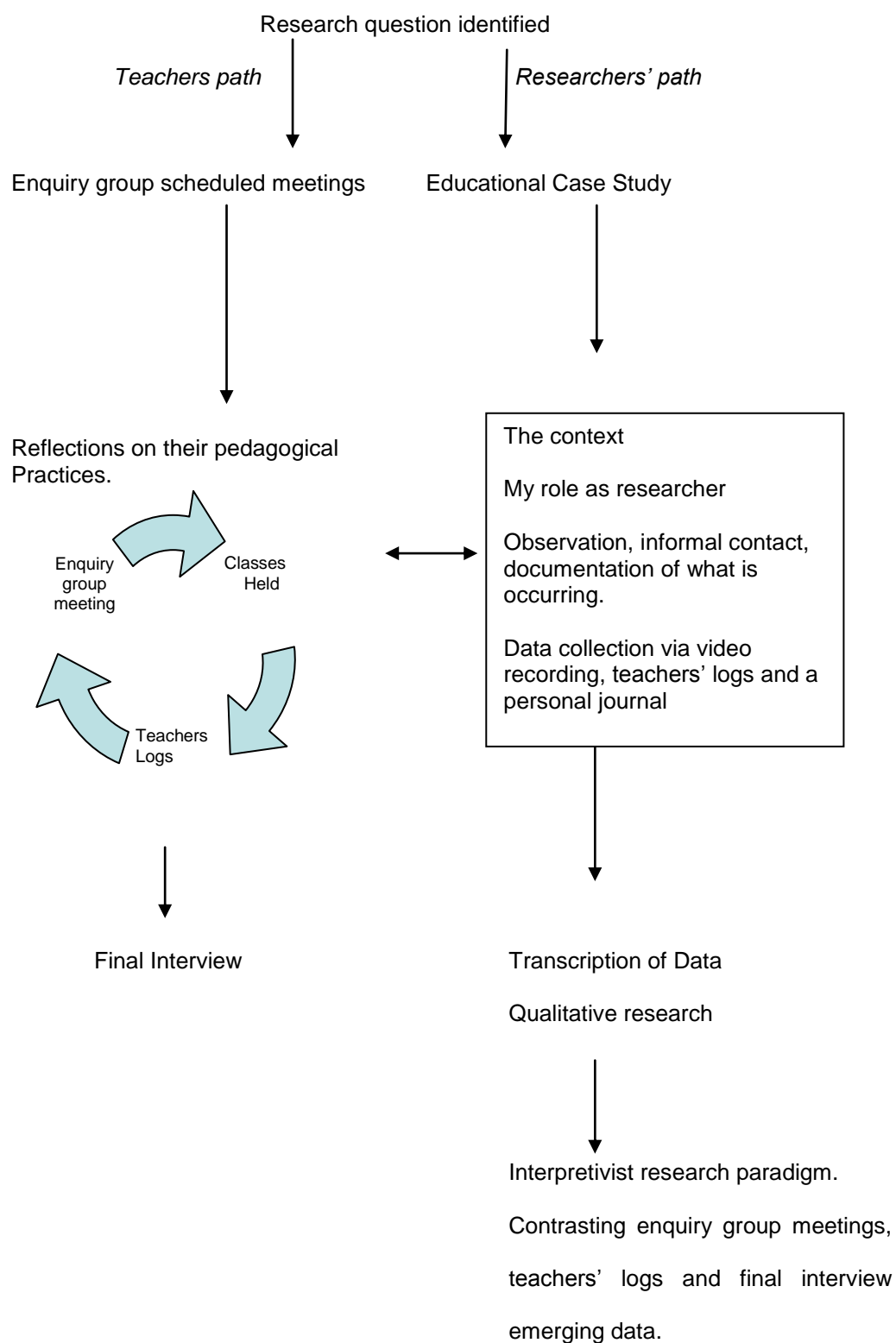


Figure 2.1: An overview of the research design

This research had a number of phases: the teachers came to the enquiry group five times and talked about their classroom practice and then went back to their classes to try out what they had learnt in their enquiry group. Each of these phases had the following sections:

- Planning – teachers prepared their lesson plans and listened to their peers in the enquiry group;
- Action – they gave their classes after listening to each other's lessons;
- Reflection – this occurred throughout the research after the class was held by completing the teachers' log and in the enquiry group meetings.

The belief that their methodology needed to integrate ICT within the classroom led the teachers to participate in this research. They constructed themselves as the agents of change within their classroom, thereby giving their students more opportunities. The teachers worked together to enquire into effective practice, they worked to change their day-to-day practices with the aspiration to improve their pedagogy within this educational case study. It was a form of self-reflective enquiry undertaken by participants in an enquiry group.

This research drew on constructivism Vygotsky (1978), Dewey's (1933) and Schön's (1983), thoughts on reflection, and the perceptions of ICT in the classroom (Loveless, 2001). More information in this regard will follow in the literature review in Section 2.3. The reflections were held through the teachers' logs, listening to each other and at the end when they had completed the task of integrating the software within their respective classes sharing their thoughts with me.

As this research developed, I was very wary of influencing it. I did not want to portray that there was a correct way to implement the software within the classrooms. Therefore I discussed generic ideas on how to integrate ICT within the classrooms and they developed their practice experientially through discussion and reflection in

the enquiry group. This was the research focus within this educational case study - the voice of the participants rather than that of the researcher (Cohen et al., 2000). My role was to facilitate this process and as a researcher monitor and record what was happening. It was a study where the teachers took on a new pedagogical tool and were implementing it in the classroom.

2.3 The literature that influenced this study

This research sets out to explore the ways the teachers were influenced by what they discussed in the enquiry group within this educational case study. It attempted to explain the changes that occurred as part of the enquiry group process. The review of the literature before this research was conducted had revealed that an enquiry group had the potential to support teacher professional development. In Section 2.3.6 of this chapter there is a further discussion of the research conducted by Windschitl and Sahl (2002) and Hughes and Ooms (2004) who conducted similar studies.

In order to understand more fully the nature of this study, it was important to examine pedagogical professional development issues which surround ICT integration, how reflections contribute to the building of pedagogical knowledge, the theory of educational interactions and the constructivist element of the enquiry group. The interest of this research lay in how the teachers would communicate their experience and turn it into knowledge about teaching. The literature review covers the following:

- (1) ICT and pedagogy – research done already
- (2) Reflections on teaching
- (3) Educational interaction – theoretical strands
- (4) A cognitive perspective
- (5) A discursive perspective

The research in these various fields as well as how it contributed to the research design will be discussed below.

2.3.1 ICT and pedagogy

Often teachers' thinking is influenced by both the social contexts (Vygotsky, 1978) in which they operate and the institutional cultures that profoundly shape the meaning of their work (Minick, 1985). Their perceptions of their roles as teachers, their identities, and how they interact with the students and school are of paramount importance to any pedagogical model.

Putnam and Borko (2000) identify the multiple settings in which pre-service and practising teachers are able to develop their professional understanding, expertise and integration of new knowledge. They locate their work in teacher development within a view of cognition, which is characterised by being situated in physical and social contexts, thereby allowing the teachers to socialise and interact. In this research the social nature of teaching is discussed in terms of the professional discourse communities developed in interactions with colleagues, whether in same subject domains or in the broader culture of a school's way of thinking and acting.

Loveless (2001) looked at various models which dealt with teacher perception whilst conducting her case studies on the integration of ICT. Her research is based on personal constructs and presents complex descriptions of the teachers' own biographies and identities. It includes their experiences of learning, their personal goals, values and beliefs about education and schooling, their views of mind and learning, their views of the purpose of the subject matter, and their personal biographies in terms of culture, gender and ethnicity.

In addition, past studies of how teachers used technology in their pedagogical practice have noted the importance of various contextual factors such as the characteristics of

staff development experiences, access to technology, availability of support and opportunity to interact with colleagues (Hennessy et al., 2005). These suggest that the teacher perceives the use of ICT through a network of predetermined criteria. Before beginning to utilise ICT within their classrooms, teachers already have expectations of how it should be used and the function of ICT pedagogy.

Loveless (2001) proposed the model (shown in Figure 2.2) to represent the teacher looking at issues to do with classroom use of ICT. In this model the identity of the teacher is formed through the perceptions they form, their subject knowledge, the community in which they interact, their pedagogic and didactic models.

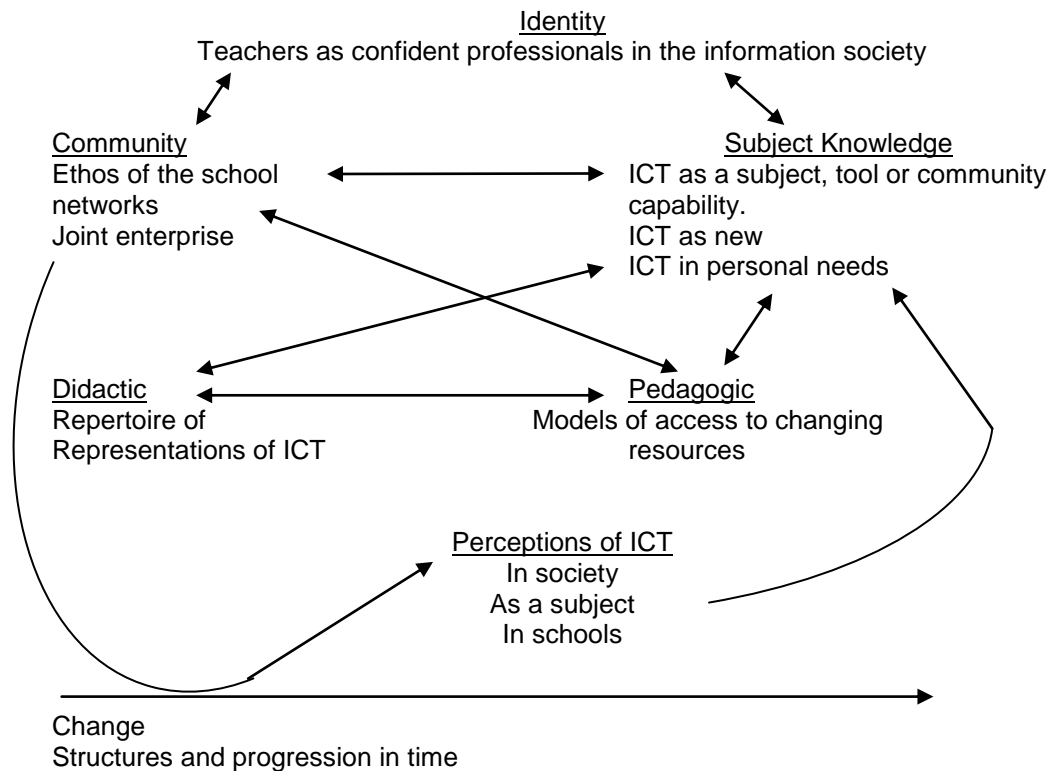


Figure 2.2: The revised model and the interaction between primary school teachers' perceptions of ICT and their pedagogy (Loveless, 2001)

Another model proposed by Stein et al. (1999) is designed from the perspective of a professional developer seeking to plan a programme of teacher development in technology education. This professional development model shown in Figure 2.3 is

divided into three main sections separated by the dotted lines. These sections indicate areas of teacher professional knowledge (that is, personal construct knowledge, subject matter knowledge, school knowledge, pedagogical content knowledge and curricular knowledge). These areas will be addressed or developed as attention is paid to the particular focus of each section during any professional development programme that uses this model as a basis.

As the study they conducted showed, the teachers' actions and thoughts were influenced and determined by their personal constructs. At the same time the model integrates, extends, and reorders their ideas, at the core of which is reflection and development.

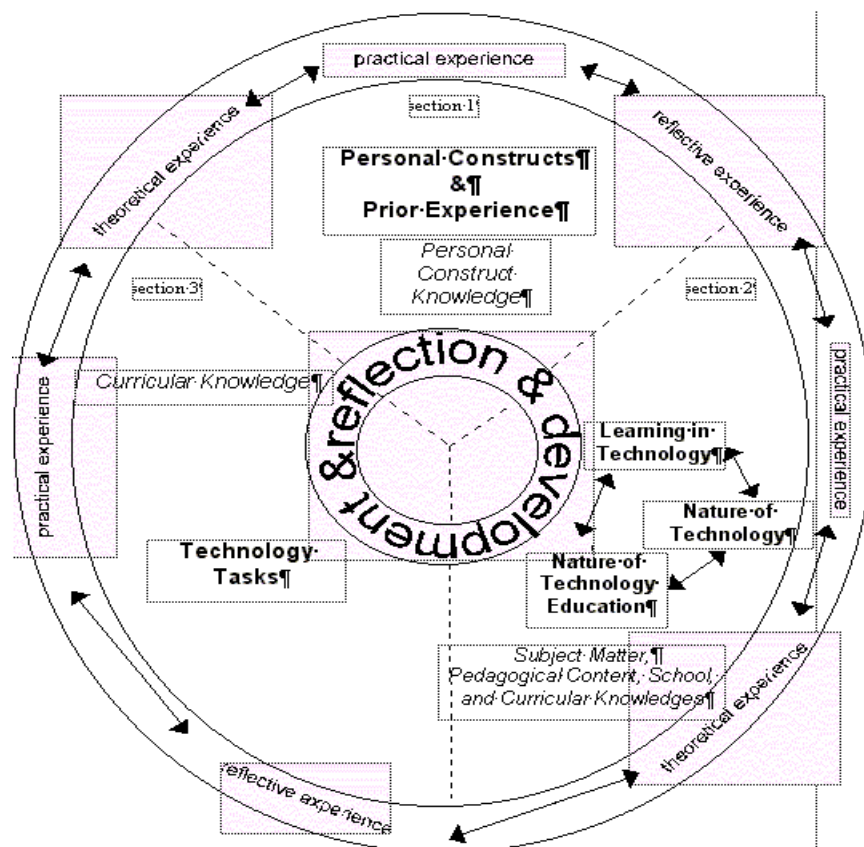


Figure 2.3: A Professional Development Model for technology education (Stein et al., 1999)

These professional development models build on the notion that classroom pedagogy is conscious and thoughtful, involves experimentation and reflection, and is affected

by the context in which it is developed. Teachers' performances in classrooms and other learning environments are affected by many aspects of professional knowledge.

Mosley et al. (1999), break it down to:

- their approaches to teaching;
- their beliefs about subject matter;
- their subject knowledge;
- their way of representing subject knowledge appropriately for learners;
- their craft skills (management and organisation);
- their teaching behaviours;
- the context in which they are teaching.

Watkins and Mortimore (1999) summarised the research and development of a more complex understanding of pedagogy over the last thirty years into four main components:

- (1) a focus on contexts for teaching in classroom life;
- (2) a focus on different types of teachers and styles;
- (3) a focus on teaching and learning within a learning community which acknowledges the importance of pupils as thinkers and as knowledgeable;
- (4) knowledge and the purpose of education.

They proposed the view of learning communities in which learners and teachers are co-constructors of knowledge and defined pedagogy as 'any conscious activity by one person designed to enhance learning in another' (Watkins and Mortimore, 1999).

Furthermore, teachers' backgrounds, the way they learn, the way they perceive their role as teachers and the role of ICT are all factors which contribute to the manner in which they interact within an enquiry group (Loveless, 2001). The nature of these interactions within a community is the focus of this research, as they scaffold their learning they interact and communicate their practices. This acknowledges the

importance of the learners as thinkers (the teachers in this case) reflecting on their practices and the social construction of knowledge.

2.3.2 Reflection

Stein et al. (1999) highlight the importance of reflection in continuous professional development. In this research teachers had to reflect on what they already knew to take on new practices within this knowledge. Being able to reflect solely on what was happening in the enquiry group was not enough to indicate that they had become reflective practitioners. The evidence of change, if it occurred in the classroom, would show that the socially constructed knowledge shared within the enquiry group had transformed their practice. The teachers understood the validity of their pedagogical approaches by relating them to past experiences and shared experiences through the enquiry group. This would happen through dialogue within the enquiry.

Dewey (1933) talks about reflection and the way the individual thinks. He identifies different ways of thinking, the following is an overview:

1. Suggestions, in which the mind leaps forward to a possible solution;
 2. An intellectualisation of the difficulty or perplexity that has been felt (directly experienced) into a problem to be solved;
 3. The use of one suggestion after another as a leading idea, or hypothesis, to initiate and guide observation and other operations in collection of factual material;
 4. The mental elaboration of the idea, or supposition as an idea or supposition (reasoning, in the sense in which reasoning is a part, not the whole, of inference);
 5. Testing the hypothesis by overt or imaginative action.
- (Dewey, 1933; p.199-209)

Schön's (1983) work links with Dewey's (1933) work as he looked at the way people reflected. He talked about the way that educators reflect – the conclusions a person arrives at while reflecting. Schön described reflection through a process of reflection in action and reflection on action. Reflection in action is reflecting on what one is doing while one is doing it – changes happen and redesign happens and reflection on action is the post-mortem where the teacher reviews her actions. He proposed this view on

reflection to create a world that more faithfully reflects the values and beliefs of people in it, through the construction or revision of people's action theories.

Greenwood (1993) views this Schönian model as flawed as it fails to recognise the importance of reflection – before-action. One reflects before one starts a process. In addition, the Schönian process of reflection does not take into account the interactive elements present in this research, that is, the dialogue that may occur while reflection is taking place. It is a very individualistic point of view which does not take into account the social elements that surround reflection.

Vygotsky's theory (1978), that language is the medium of social life and that interaction is thus the primary site for the development of higher mental processes plays a part in this reflection process. According to Vygotsky (1978), individuals in any social setting are going to be at different stages of 'proximal development'. That is, they will have different needs for activities that will challenge them to grow and develop, and they will also have different needs for support according to the process they are undergoing.

The teachers willingly chose to participate in this research as they were willing to take on new challenges to enable their pedagogical growth. They were willing to engage in a task which could possibly involve a change in behavioural patterns to include ICT integration within their classroom practices.

Reflection during this process would help the changes to occur. The Schönian model could not be utilised directly in this research as it needed to take into account the interactive element which was present in the enquiry group and the reflections after the enquiry group case study. Reflection towards action, whereby in this instance teachers gained an insight into how their classroom could be through what others related, would be carried out through the dialogue in the enquiry group. This form of reflection would also allow them to question and share any insecurity they might have

had. It would also allow me as a researcher to analyse the language, mainly through concordancing, to identify the point whereby these reflections might be associated with some future change in practice.

Several important distinctions among different notions of reflection have been made in teacher-education literature. Such as those like Schön (1983), who has drawn attention to the distinction between reflecting before (which he rejects as form of reflection) , during and after action, and others who have made the distinction between reflecting about teaching and reflecting about the social conditions which influence one's teaching (Van Manen, 1995). Another important distinction that has been made is between those programmes of work that emphasise reflection as a private activity and those which seek to promote reflection as a social practice and public activity to be carried out involving an enquiry group. Those who have stressed reflection as a social practice (Solomon, 1987) have argued that the lack of a social forum for the discussion of teachers' ideas inhibits the development of the teachers' personal beliefs, because these only become real and clear to us when we can speak about them to others (Solomon, 1987).

Consequently, the stages of reflection in this work are labelled to describe the phases the teachers would experience; Table 2.3 gives an overview of these. In fact, the dialogue part of the reflective process which would occur in the enquiry groups was of paramount importance. This research wanted to convey the notion of reflection and the critical moments that occurred within the process of implementation of new pedagogical ideas. Teachers were to reflect on what they had seen (videos of lessons) and discussed in the enquiry group, and then integrate their new practices within the classroom through the knowledge they had built in the enquiry group meetings.

Table 2.3: The various definitions of reflection in this research.

Teachers' logs	Reflection on action	This is a conscious activity which allows the teacher time to go over what had happened in their classrooms.
Teachers Meetings	Reflection towards action	By listening to others' reflecting during the enquiry group, the teachers absorbed information and formed new pedagogical practices.
Interview	Retrospective reflection	Teachers looked at how they had developed and reflected in a systematic manner in order to learn from it.

The social aspect of constructivism focuses on how knowledge is constructed within a group or community, in this instance the enquiry group. Knowledge is considered to be created and legitimised, not through personal conviction but by means of social interchange in its many forms – which is endorsed by the discursivist theory (Chapter 2, Section 3.2). Constructivism considers knowledge to be built with the individual and by the community. It considers social interaction as central to this building of knowledge affected by individuals, communities, societies and cultures.

The chat the teachers engaged in during the enquiry group both reflects their pedagogical practices reflected to them and simultaneously constructed pedagogical identities, roles and relationships within their classrooms. Language is analysed in this research to see how the teachers achieved these reflections and constructions.

Consequently, the range of instruments used in order to capture reflection was of paramount importance, the overview of which is seen earlier in Table 2.3. When

teachers completed their logs they reflected on their immediate practice – **reflection on action**. They were experimenting with new practices and taking down notes. This was a personal process and one that the teachers carried out individually. The reason why I am calling this ‘reflection on action’ is due to the fact that these reflections were on the lesson they had just delivered – they recorded their intentions, adjustments, successes and failures, etc. These reflections on actions were important as they were records of their work which had just happened.

The reflection on actions were then discussed in the enquiry group, collectively, as it was here they could share what they were doing in their classrooms by presenting and discussing their video. They shared a frame of reference with regard to task and purpose, and worked on a joint outcome by considering how to ‘tinker’ further. Their discourse was characterised by the explication and negotiation of ideas and decision making (Hennessy and Murphy, 1999). Reflection here provided a supportive role and the integration of new ideas – **reflection towards action**. During the interviews, the ways the students and teachers had developed during the whole process was discussed and reflected upon through **retrospective reflection**. This reflection process required them to reflect upon the whole process of development of their pedagogic practice during the five lessons. ‘Retrospective reflection is as a collaborative effort to systematically re-examine a process in order to learn from it’ (Krogstie, 2009; p. 418). The interview questions (appendix 6) served as an outline for the teachers to reflect upon systematically as individuals, with these questions the teacher looked at what worked, what could have been improved upon and what they would be doing next.

The process of reflection is not a level of use that has to be achieved but a process of thought development. The notion of repertoire is a key aspect of this approach. Practitioners build up a collection of images, ideas, examples and actions that they can draw upon. Schön (1983), like Dewey (1933), saw this as central to reflective thought.

When a practitioner makes sense of a situation they perceive to be unique, they see it as something already present in his repertoire.

'To see *this* site as *that* one is not to subsume the first under a familiar category or rule. It is, rather, to see the unfamiliar, unique situation as both similar to and different from the familiar one, without at first being able to identify what it is similar to or different from what was already known. The familiar situation functions as a precedent, or a metaphor, or an exemplar for the unfamiliar one' (Schön 1983; p.138).

In this research it was the participants' treatment of their 'action' reflections which became a focus for their reflections in the collaborative meetings.

Even when the learning process appears to be relatively straightforward, mental structures are formed, elaborated and tested until a satisfactory structure emerges. This constructivist perspective needs to be taken into account when considering the nature of the training process.

Central to the constructivist ideas is the individual's construction of his/her own meaning or perspective for any event or concept. While this is what every trainer hopes to achieve, the teaching style, background, schools, pupils, heads and surroundings of teachers all differ. As a result, teacher training needs to be developed in response to the needs and context of the individual teacher. The important point is that individual teachers construct their knowledge and understanding rather than the latter being just something that is prescribed to them. **Reflection towards action** allows the practitioner to develop this knowledge built upon who they already are as an individual.

Reflection may also occur at some point after class; this is termed **retrospective reflection**. In this research this took place during the interviews. In practice, it is not easy to do this as teachers usually have no time to think about their work, let alone talk about it with colleagues. The participants in this project saw it significant for their own professional development – in fact, they volunteered for it. They carried out

reflection in the enquiry group through educational interaction, which entails talk about pedagogical practices and then retrospectively reflected upon what had occurred with me.

Two theoretical strands can be identified as underpinning analysis of educational interaction, namely cognitive psychological and discursive approaches. Further development on these two strands is discussed below.

2.3.3 Educational interaction

Much of recent literature is concerned with examining the use of ICT within the broader contextual framework of understanding learning more generally (Laurillard, 1993). Learning is recognised as being a complex process, involving both internal and social constructions that are mediated by affect (Edwards and D'Arcy, 2004). The former entails the way learners construct meaning from a personal perspective, while the latter refers to how the learners refine and confirm their understanding collaboratively within a community of learners.

2.3.3.1 *A cognitive perspective*

From the cognitive perspective, researchers aim to map their analysis of educational interaction onto cognitive constructs within the Vygotskian (1962) tradition. The emphasis is on language as the mediator of higher mental processes and the role played by discourse in student's learning. Much of this work examines the cognitive changes that occur in the learner at the expense of considering the talk itself.

Gordon Pask (1979) has provided a comprehensive theoretical framework as well as several empirical studies on learning and teaching. More recent constructivist work on dialogical, conversational aspects of acquiring knowledge run the risk of re-inventing

or overlooking Pask's work and ideas (examples are Richards and Lockhart, 1994; Stokoe, 2000).

Pask worked on unifying theories across disciplines. Therefore, if one had to look at 'conversation' in Paskian terms, this would be part of cybernetic theory (CT). Pask's view encompasses or 'adumbrates' (Pask's term) all aspects of the theory of conversation which include the sociolinguistics of conversational interaction, the conversational implicature of Grice (1969), the descriptive pragmatics of communication of Bateson (1985) and the normative pragmatics of Habermas (1979a).

The following model in Figure 2.4 is a 'skeleton of a conversation' (Pask, 1979). It shows an overview of two participants in conversation about a topic. The teacher and learner go through a series of processes as depicted by the vertical and horizontal connections which create 'a universe of discourse'.

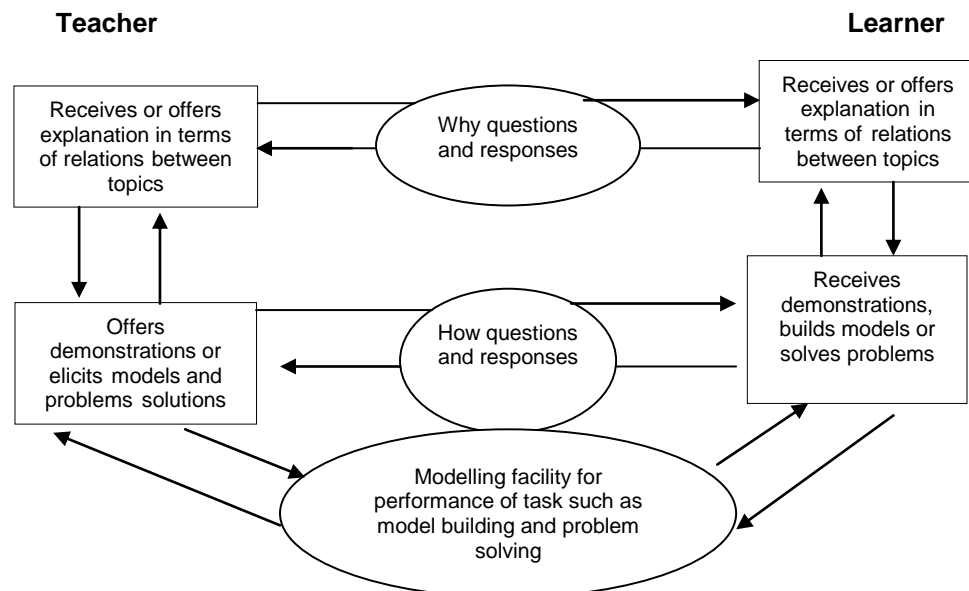


Figure 2.4: Pask's skeleton of conversation model (Taken from B. Scott, 2001)

Pask maintains that all exchanges have a minimum of two logical levels. — The 'how and why'. The how is concerned with how to do a topic and the why is concerned with the explanation or justification of a topic. These are complementary and Pask refers to them in terms of 'why as comprehension learning and how as operation learning'. These two clear distinctions give a formal definition of what it means to understand a topic.

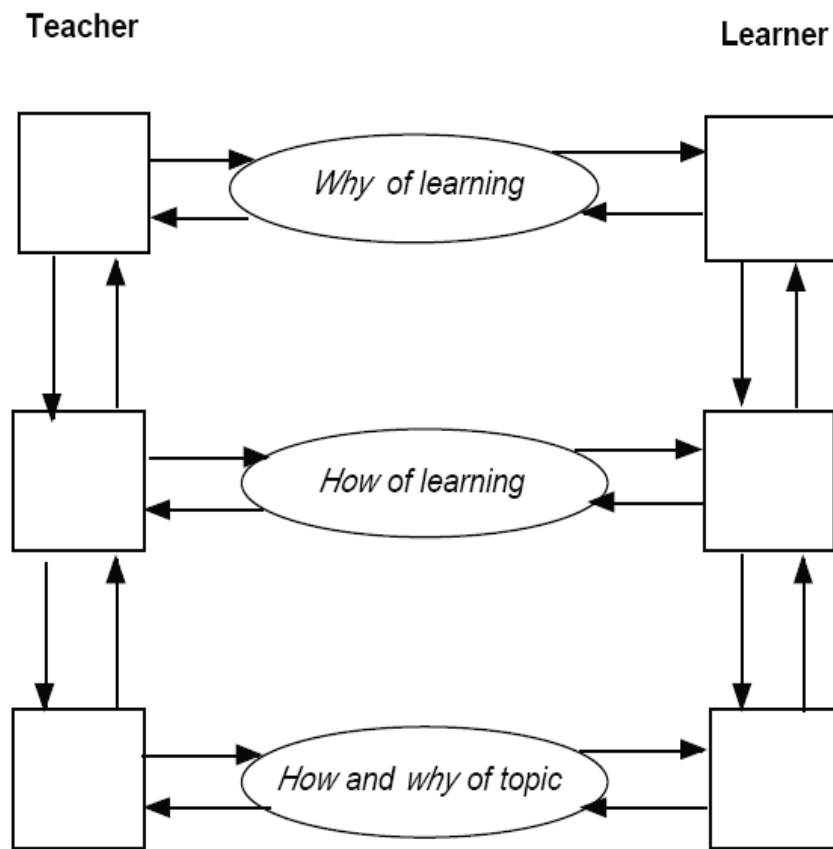


Figure 2.5 Laurillard's model of constructivist learning; a full learning conversation (B. Scott, 2001)

Therefore by looking at the above figure, the full learning constructivist conversation has three main components:

- conversation about the 'how' and 'why' of a topic, as in the basic Pask model;
- conversation about the 'how' of learning;
- conversation about the 'why' of learning, where the emphasis is on encouraging 'personal autonomy and accepting responsibility for one's own learning' (Scott, 2001; p. 350).

If one were to apply this model to teacher training, a trainer may:

- model a process;
- offer an explanation;
- request that a teacher trainee teaches back;
- ask teachers to try out their own lessons.

Meanwhile teachers are allowed to:

- request 'why', 'how' and further explanations;
- offer their own explanations and examples;
- carry out practical examples.

On the other hand, Laurillard (1993) points out that the system of process control and production is hierarchical with no fixed ordering of levels of control. She distinguishes a domain of exchanges of descriptions, conceptions and misconceptions about both 'how' and 'why' from a general domain of tasks. She divides the model into three spheres (Figure 2.5):

In the Pask model, exemplar lesson plans would be presented to the trainees and discussed. The conversation with the tutor would be given primary importance and classroom pedagogy would be modelled on these plans. In the Laurillard model, the focus in learning would be more on achieving the objective – in this instance the task

of integrating ICT when discussing the Roma. Following the Laurillard model in a teacher training forum, teachers would be expected to:

- engage with the task;
- produce an outcome;
- reflect upon practice through discussion.

This model allows teachers to construct their own interpretations of an effective lesson plan. Thus the teachers are identifying with their own lessons as they have made them their own.

2.3.3.2 A discursive perspective

Discursive theorists, in contrast to cognitive theorists, argue that language is the site of action rather than the mediator of inner mental processes (Edwards, 1997). They claim that social life is constructed in everyday interaction. The focus of attention is upon the practical accomplishment of educational matters such as discussion tasks. Rhetorical and discursive strategies and devices are analysed as these are mobilised in interaction.

Therefore, the difference being between the cognitive and the discursive approach is that the former considers the development occurring in the head of the individual, while the latter concentrates on the social interaction which affects the perceptions of the individual towards the subject matter. They are different domains. The cognitive model of learning talks about the theory and how this is implemented; the discursive approach on the other hand allows for the implementation of the theory – learning in action. The discursive one opens up the notion that learning is not just cognitive but kinaesthetic.

Such studies of educational discourse share a number of related features. Firstly, they are unmotivated by a particular educational or communication theory (Baker, 1997), so there is no aim to inform practice in a prescriptive sense. Secondly, there is an overriding concern for analysis to examine the sequential organisation of discourse and how participants naturally orient to and achieve orderly conversation. Consequently, the concern is on the 'how', not on the 'why' speakers interact.

In recent years, in theories of cognition and human learning, there has been an increasing focus on social and cultural aspects of learning context (Stokoe, 2000). The focus has been particularly on the spoken interaction and the powerful effect of the social process through learning whilst knowledge is being constructed. As a result, knowledge is constructed among people as they talk about matters in a consensual domain (Vygotsky, 1978). These are the domains that they have in common. Previous research on educational discourse has focused on two main aspects: the framework of discourse, where the discourse patterns are mapped while speakers interact; and the content, where the discourse is analysed. These two strands of thought underpin analyses of educational interaction. From a cognitive perspective

'researchers aim to map their analyses of educational interaction onto cognitive constructs within the Vygotskian tradition [...] Discursive theorists argue that language is the site of action, rather than the mediation of inner mental processes.' (Stokoe, 2000; p. 185)

Related strands of work derive from the ethno-methodologists and conversation analysts who both study the spoken word in educational settings and share a focus on the mundane talk-in-interaction. The ethnographic approach emerged in the late 1960s. It was created through the adaptation of methods that were used by social anthropologists and some sociologists in non-educational sectors (Hammersley, 1988). Ethnographic analysis is an approach which allows the researcher to collect a rich, detailed picture of observed events, thus describing the social processes which are occurring. In the early stages ethnographers took field notes of what was happening. This was followed by the tape-recording of events and reporting of findings using short transcripts of extracts. Their concern was always to report the whole event that was occurring. They would depict the social life to understand what was happening. Therefore they focused on an observed event whereby language may not have been the focus of such an occurrence, but one of the tools that aided the depiction of the whole scene.

Conversation analysis grew out of this approach from the dissatisfaction that some sociologists felt in reporting events that were happening. It tries to explain how the social world works through the study of micro-levels of social interactions. The focus of conversation analysts is to understand how social interaction is achieved, minute by minute, through everyday talk and non-verbal communication. It is a demanding methodology as it uses a very detailed and laborious style of transcription. It has still to be applied to any great extent in educational and computer-related research. It has been utilised by Stokoe (2000) and Baker (1997), who created specific coding for their research needs.

2.3.4 Implications for this research design

A key concept that has emerged from a consideration of cognitive and discursive theories is the complementariness between knowing and doing – the conceptual and the procedural knowledge. Another key concept is that of conversation which explicitly includes the acknowledgement of negotiation and agreement in learning. This means that analysing the ‘understanding’ and the ‘feedback’ components of a process are vital in modelling the process of learning. This process is similar to how the knowledge of the world is co-constructed by people as they talk together (Jonassen, 1991).

It seemed appropriate as part of this research to understand the ways in which teachers moved from listening and learning to knowing and implementing within the classroom. It was clear that they needed to be given opportunities to discuss their practice, and that by recording and analysing these conversations it was possible to develop an understanding of their shared understanding of classroom practice, and also of the actual process involved. It is interesting that the teachers in the study recognised the importance of these conversations as it was they themselves, in the pilot study (Chapter 1, Section 7), who had requested the enquiry group approach to training.

If we were to expect the teachers to negotiate and establish discourses within an ICT training framework, optimal operational conditions would be needed. A consensual domain (a Vygotskian term defined above) would need to include the following elements within the group:

- ‘a personalised element
 - a functional element
 - a socialisation element
 - classroom management
 - checking how others have achieved their objectives
 - products done
 - showing of materials used.’
- (Nunan, 1990; p. 250)

Classroom learning is to a large extent about communication, and consequently talk. It involves the social use of language to enact regular activity structures and to share systems of meaning among teachers and students. The similarity between the discursive and cognitive approaches above is that learning occurs when there is *present negotiation of meaning within the group*.

My enquiry group research enquiry needed to allow for a combination of both approaches so that teachers could implement what was being learnt (cognitive process) as they conversed about what they had reflected on when integrating ICT within their classrooms (discursive process). I felt that this would support the development of an understanding of the process involved in how the teachers changed their pedagogical practices as a result of the introduction of an ICT lesson.

This research, like many studies, such as Loveless, (2001); Windschitl and Sahl, (2002); and Slough and Chamblee, (2000) began by focusing on how teachers' perceptions of ICT influenced their classroom practice. The focus evolved into a study of how the changes in pedagogic understanding and practice took place, the process involved in the integration of ICT, the nature of effective training and, very importantly, the conversations teachers had in relation to their practice – the language they used. I am suggesting that language use is a marker for what they understand about practice; this is further discussed in Chapter 4.

Several studies have already suggested that teachers who use technology tend to become more constructivist in their pedagogical orientation over time (Becker and Ravitz, 1999; Means and Olson, 1995; Mehlinger, 1996). Becker and Ravitz, (1999) conducted a study where they conceptualised four categories of teacher belief and practice that have contrasting constructivist and traditional poles. These were:

- (a) the tasks given to students;
- (b) the structure of the curriculum;
- (c) general teaching style; and
- (d) related perceptions.

They reported on the experience of 441 teachers employed in the US elementary and secondary schools that were participating in a project entitled National School Network. These teachers completed questionnaires made up of 15 questions about:

- (a) the teachers' teaching responsibilities;
- (b) their use of various types of computer software;
- (c) their perceptions of the Internet and its relevance for their own teaching;
- (d) the extent to which they believed that each of 19 aspects of their teaching practice and related perceptions had changed during recent years;
- (e) whether they believed that computers had been a primary or contributory factor to that change;
- (f) whether they had already found the Internet to have had an impact on their teaching.

The results showed that the use of computers and the Internet is more consistently related to certain types of changes in practice and teacher perception than others. In particular, frequent use of the computer was related to:

- (1) teachers being more willing to discuss a subject about which they lack expertise and allowing themselves to be taught by students;
- (2) orchestrating multiple simultaneous activities occurring during class time;
- (3) assigning long and complex projects for students to undertake;
- (4) giving students greater choice in their tasks and the materials and resources they could use to complete them.

'The relationship between technology use and pedagogical change is truly causal and not the mere conjunctions of innovative teachers who happen to both use technology and develop a more constructivist pedagogy. However this work still leaves unanswered the question of whether the causal impact is limited to teachers who were already inclined to teach in a constructivist manner and simply needed the appropriate resources to do so, or whether the experience of using computers or the Internet in a substantial way with students itself leads otherwise 'non-constructivist teachers' to rethink their pedagogical priorities and philosophies of teaching.' (Becker and Ravitz, 1999; p. 381)

Means and Olson (1995) conducted case studies of nine innovative US schools or programmes which were using computer-based tools and resources to support project-based activities within the curriculum. These cases came from nominations of worthy examples of educational use of computers and were chosen to represent diversity of social setting and innovation strategies. Teachers saw computer use as 'dramatically enhancing student motivation' (p. 126). They also reported a range of performance benefits beyond the development of technical skills, including enhanced creativity.

The case studies indicated that the relationship between technology use and pedagogical change is not merely conjectural: teachers who used technology within their classrooms became more constructivist in practice. Furthermore, they indicated that the supportive conditions, such as a conducive physical environment and the use of technology, may cultivate pedagogical beliefs that underlie constructivist practices. In particular, they found that frequent computer and internet use appear to be related to teachers:

- being more willing to discuss a subject about which they lack expertise;
- organising multiple, simultaneously different exercises in class;
- assigning complex projects to students;
- giving students greater choice in learning tasks;
- recognising the initiative that students can take outside the classroom to produce high quality work.

Kommers (2005) stated that 'as yet there has not been a study that trained teachers in this constructivist manner using technology'. The focus of this research was indeed the training of teachers using a collaborative group approach in which reflection on their practices through language provided evidence of change. The key notion is that analysis of the discourse used by the teachers during the 'training' process would help develop an understanding of what it meant to integrate the software and map out the events that had occurred.

A central part of this research is the group dynamic within the enquiry group and its relationship to changes in pedagogic understanding and practice. The next section explores the literature related to these notions of community in relation to enquiry.

2.3.5 Enquiry groups

According to the Lave and Wenger's (1991) definition of communities of practice, a community minimally has three dimensions: mutual engagement, joint enterprise and a shared repertoire of actions.

The mutual engagement I envisaged for my enquiry group was to involve the teachers in working on the integration of the software within their classrooms; this would require constant attention from my part to coordinate details. This group would not be a community of practice, but one of enquiry. Such a group would need help with their collaboration skills, which would be achieved through purposefully designed tasks. These would be carried out through the pedagogical ideas presented initially, a conducive physical environment, and an out-of-the-school meeting place. In summary, I had a critical role of fostering and supporting teacher collaboration as a vehicle for ICT integration.

In this research, teachers integrated the Roma theme in their classes during their extra-curricular project hour. This context was another factor which differentiates the group from a community of practice where a group of teachers shares a common purpose but does not share a common subject (Bonk et al., 2002). It is for this reason that the term *community of enquiry* has been used in this research, as enquiry involves a group of teachers focusing on a specific topic with a common subject area (Hughes and Ooms, 2004).

Through collaborative learning discussions with fellow practitioners, the teachers will create a community which they will identify with, and be central to shaping their practices. Collaborative enquiry groups, involving small groups of teachers who collectively investigate pedagogical and content issues, have emerged as a promising strategy for facilitating sustained teacher learning (Crockett, 2002; Kasl and Yorks, 2002). For example, collaborative enquiry groups have been used to sustain educational reform in mathematics (Zech et al., 2000) to provide structure for professional learning and improving practice, and to improve teachers' early literacy instruction and student learning in K-2 (Ladson-Billings and Gomez, 2001). Within these enquiry initiatives, teachers developed content knowledge, engaged in critical collegiality and actively learned to create and sustain communities of enquiry.

The teachers within this research project requested that they start meeting after the pilot activity. It was felt that they would be able to 'compare ideas and exchange what is happening in the classroom in this way'. This was a grass roots approach at its best.

2.3.6 Similar studies

In recent years, collaborative enquiry groups have been adopted for technology-focused professional development (Bonk et al., 2002; Hovermill, 2003; Hunter, 2001; Keller, Ehman et al, 2003; Maloy et al., 2003; Swan et al., 2002). These technology-focused enquiry professional development initiatives shifted away from the short-term

technology 'workshop' approach and, alternatively, incorporated many of the research-based characteristics of optimal learning, for example, sharing a common subject area and applying the pedagogy using this area. In other initiatives, enquiry groups involved cross-content peers that shared a purpose (e.g. Bonk et al., 2002; Hunter, 2001).

Hughes and Ooms (2004) examined the process of establishing and sustaining content-focused technology enquiry groups. They developed a teacher professional model where groups of teachers with similar content and grade areas identified problems of practice and inquired into technology supported solutions. Their action research involved a longitudinal study that focused on the participating teachers' learning and technology integration during the first year of implementation of a new content programme in an urban school in Minnesota. They worked with a group of five teachers from March 2002 to June 2003.

Two peer discourse groups were studied, one involving their colleagues within their schools and the other involving their colleagues from the university. It was concluded that the learning that had occurred would not have been accomplished without participation in this enquiry group, because the learning was intertwined with the discourse and tools with which the teachers had interacted. The researchers aimed at creating cognitive dissonance among the teachers, thus inducing them to question and further 'develop their latest visions' (Hughes and Ooms, 2004) for technology integration within the curriculum.

The researchers concluded that their work supported previous research that indicated that enquiry group professional development provided insights into the challenges teachers faced in integrating ICT into classrooms.

'We believe there is much to learn from action research conducted focused on teachers' technology inquiries and encourage future enquiry groups to adopt such a participatory stance toward enquiry.' (Hughes and Ooms, 2004; p. 398)

In addition, Windschitl and Sahl (2002), traced the activities of three teachers as they constructed with peers a range of uses for laptop computers in the classroom and reconciled these activities with the context of their institutional culture. In contrast with Hughes and Ooms who worked within a university context, these teachers were piloting laptop computers in school classrooms of 10- to 14-year-olds.

These researchers also found that collaborative enquiry groups within groups of teachers were effective in supporting development of good classroom practice. The ways in which these teachers eventually integrated computers into classroom instruction were powerfully mediated by their interrelated belief systems about learners in their school, about what constituted 'good teaching' in the context of the institutional culture, and about the role of technology in the students' lives.

The difference between these studies is the focus of this research study. The manner in which teachers changed their perceptions of the tool was more important than examining the 'how' or 'when' they integrated computers within their classrooms. The way they discussed what was happening in their respective classrooms became the focus of this research. This research was concerned with how the teachers were developing their pedagogical practices. The enquiry group was a forum in which knowledge was being created through the participants' dialogue.

2.3.7 Situative perspective to create knowledge

Using a situative perspective on knowledge, thinking and learning, Putnam and Borko (2000), have suggested that teacher learning is affected by the physical or social context within which learning is situated, the kinds of discourse communities supported, and the accessible tools. According to them, the optimal learning environment situates teacher learning inside and outside their school. Therefore, teachers are more likely to get *entrenched* in their own ideas and do *not* have access

to alternative theories and ideas when they are not meeting other teachers and reflecting on their pedagogical practices.

Research indicates that valuable learning activities involve teachers reflecting on their own beliefs (Joyes, 2006; Putnam and Borko, 2000). This is understood as having access to alternative practices and beliefs that are reflective of their subject and grade level, whilst observing the positive impact these practices have on students' learning (Richardson and Placier, 2001; Sandholtz et al., 1990; Snoeyink and Ertmer, 2002) and engaging in learning over time (McKenzie, 2001).

The increasing availability of computer-based tools and resources and the growing emphasis on using these in subject teaching and learning has a potentially significant impact upon established patterns of classroom interaction. However, development of appropriate pedagogy for integrating use of ICT in subject teaching has seemingly lagged behind the massive hardware investments (Hennessy and Deaney, 2006). The need for pedagogical adaptation means that teachers often have to re-evaluate their position within their classroom, concentrating on the process of learning. Teachers using computers increasingly see themselves as facilitators of learning. This facet has to be considered when discussing the integration of ICT within the classroom.

Similarly, language teachers often perceive their role as facilitators of the learning of languages and students are perceived as independent, active and responsible learners. Digital technology has rendered the production and organisation of information more provisional and fluid and this has led to the belief that ICT-based activity lends itself to open-ended, exploratory learning with opportunities for pupil reflection, experimentation, explanation and interpretation (Hennessy and Deaney, 2006). This is similar to the cognitive active reflective role the language learner is presented with during the language learning process.

Another key feature of the teachers' emerging pedagogic role is to foster development of new pupil strategies and skills for knowledge building and application in light of the information base becoming accessible.

In accordance with the cognitive approach (Pask, 1979), the new strategic skills and understandings require focus on the processes of learning rather than on its products, thereby allowing for self-organisation of learning. In the theory of language learning, this is what is referred to as the Input Hypothesis (Krashen, 1981), whereby Krashen refers to the fact that students need to hear a language and have access to it, and then structure their output accordingly, the focus being on the process rather than the product. A fluency approach is being adopted in this research, in contrast to an accuracy one.

Recent literature within the ICT field has moved away from the accuracy methodology, or, as Scott (2001) proposes, a transmission model, whereby trainees are given either a model to copy or an approach to adopt (the accuracy/product approach) in helping learners locate, extract, filter, edit, interpret and summarise appropriate information (e.g. Scrimshaw, 1997, Loveless et al., 2001) and develop an awareness of where information has come from, who put it there and why (the fluency/process approach).

Comparing the process of integrating ICT with that of learning a language, Bailey and Celce-Murcia (1979), refer to the possibility of using collaborative teaching for teacher training:

'A collaborative teaching set-up can also provide an ideal situation for practising coaching [...] a process by which two teachers work together in a teaching team, but for the purposes of enhancing teacher development rather than pupil instruction per se.' (p.320)

To sum up, if one had to look at the 'process' rather than the 'product' of ICT integration within the classroom, one would be able to contrast the integration of ICT more directly with that of learning a language, and place it within the framework shown below in Figure 2.6 instead of within the language block.

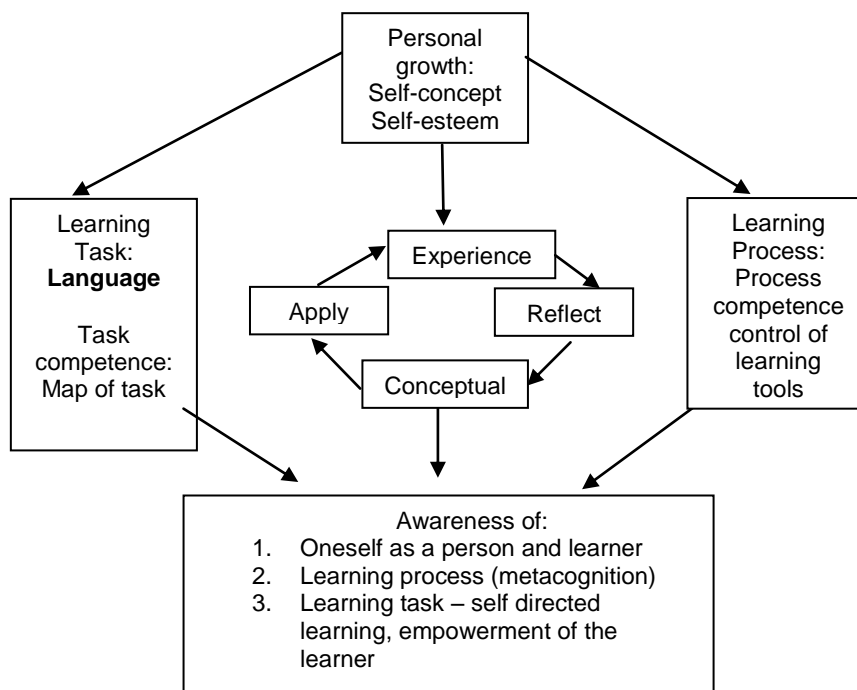


Fig. 2.6: Adapted from Nunan Collaborative Learning (1993)

In this model the main components are:

- (1) the personal growth;
- (2) the learning process;
- (3) the learning task.

These three areas are seen as the mainframe of the notion of language learning as learner education or, as I have argued above, cognition education – whereby the learner takes control of the learning processes and organises them to structure the

output (Krashen, 1981). The discussion, or discursive approach, that takes place while this process is occurring helps the learners to conceptualise the process, create the scaffolding structure and integrate new knowledge through reflective processes.

The literature provides evidence that the way teachers use language in relation to the use of ICT reflects their practice, their competence in use of technology and their pedagogic practice:

‘The learning that did occur most likely would not have been accomplished without participation in this enquiry group because that learning was intertwined with the discourse and tools with which the teachers interacted.’ (Hughes and Ooms, 2004; p. 6)

Technical issues may predominate early on, leading to reflection on practice. There appears to be less potential transformation when teachers focus on integrating technology into their current practices (Maloy et al., 2003), unless a facilitator encourages teacher exploration of new learning methods or technologies (Bonk et al., 2002).

Naidu et al. (1992) stated that ‘small-group talk and writing yield cognitive and social gains that far outweigh the difficulties of setting up and maintaining teacher groups.’ They believed that such groups evolve forms of talk that sustain initial enthusiasm and ensure on-going renewal. They came to this conclusion after their study of a group of English teachers at tertiary level institutions in Bangalore, South India. This PhD research will examine the nature of the language that teachers may use as they develop their understanding in their enquiry group, since this may reflect their development whilst implementing new pedagogical practices.

Overall, the common content area or purpose will facilitate sustained reflection and discussion with regard to content knowledge and pedagogical beliefs. In the workshop approach to technology professional development, a lack of common subject area among participants has been cited as an impediment to learning (Snoeyink and

Ertmner, 2002). In this enquiry group approach, the studying and understanding of the temporal dimension of collaborative work represented a considerable theoretical and practical challenge (Issroff, 1999).

The focus of this PhD has been informed by the literature reviewed above and applied the action research enquiry approach to a study of the group. The optimal conditions for continuous professional development have indicated that enquiry groups are more effective (Windschitl and Sahl, 2002; Hughes and Ooms, 2004), with the teacher taking more control of their students' own learning, as indicated by Becker and Ravitz's (1999) study, where students were given more control.

The evolution of the teacher's role when constructing a supportive environment for learning with ICT is exemplified by the emphasis made on pupil research:

'communication and collaboration in a recent international study of technology innovations in 28 countries [...] and a corresponding shift in the teacher's primary role to one of advising, structuring, guiding and assessing.' (Hennessy and Deaney, 2006; p. 729)

With this shift comes different language use as teachers express themselves according to the phase they are in. In particular, the shift in focus is away from screens and ICT equipment in the classroom to the process of learning characterised by exploration, reflection and discussion. The language used is indicative of a developing understanding of practice.

Teachers within this research group had never been trained in a collaborative constructivist manner. They had never used collaborative methods in the classroom. They were used to pair work and the occasional group work to practice language speaking skills, but had never used group work to achieve objectives. Therefore, they

were in a process in which they were constructing their pedagogy and deciding what was relevant to their learning needs.

This research has the following new facets:

- (1) it was an enquiry group case study; and
- (2) it utilised concordancing to analyse the language used in the enquiry groups.

2.4 Summary

Effective teachers in general adapt to their pupils' needs by preparing appropriate materials and setting constrained tasks with clear objectives and meaningful contexts (Nunan, 1990), thereby allowing learners to become collective resources for their own learning. This happens as the learners define what they are being taught and what the focus of the class is, albeit not consciously. In this instance the enquiry group led the focus of the research.

This research set out to explore changes in pedagogic practice associated with the introduction of ICT in classrooms. One of the key aims of the S.A.I.L. project was to design software and training to encourage constructivist classroom practices. The material used was that of software designed on the Roma topic, which had an underlying constructivist pedagogic design. Consequently, teachers adopted constructivist practices within the classroom whilst meeting regularly to inquire on new practices that each was trying out in his/her respective classroom. As reported above, when integrating ICT within the classroom there is some evidence that teachers tend to become more constructivist in their classroom practice (Becker and Ravitz, 1999).

This chapter has reported on the literature that provides the rationale for the design of the enquiry group approach to the CPD 'training', which is the context for the research. It has demonstrated a link between developing classroom practice and changes in the nature of the discourse about teaching and learning that teachers use.

Chapters 1 and 2 have explained how the aim of this research evolved into one of developing an understanding of ways in which a teacher enquiry group can support the introduction of ICT into the classroom, and any discourse change that occurs while this was happening. While the precise nature of the enquiry group process is discussed in Chapter 2, and it showed that enquiry groups can influence pedagogic understanding (2.3.4 - 2.3.6), the intention of this research was to explore the evidence that the enquiry group promotes these changes in practice, Chapter 3 looks at the methodology that was used to examine this.

Chapter 3 The Research Methodology

3.1 Introduction

This chapter will examine the manner in which the data was collected. This was focused on the way language was being used within the enquiry group, in order to collect evidence of the enquiry groups' workings. The research was based on an intervention study whose aim was to integrate ICT within the primary classrooms as part of the S.A.I.L. project (as detailed in Chapter 1). In this project, a small group of teachers prepared to work in a collaborative manner with their pupils in their classrooms. Their method involved using computers to research a curriculum area – the Roma people.

In fact, the teachers met regularly and discussed what was happening in their classrooms, as detailed in Section 3.4. They formed an enquiry group to exchange ideas and practices, and in the process established individual pedagogical practices for integrating ICT within their classrooms.

Consequently, the focus of the research became the manner in which the teachers were interacting with each other to form these new practices, what they were saying, and how it was being said. The research set out to explore the discourse used in the enquiry group as a collaborative knowledge building activity and the association with what happened in their classrooms.

As the study took place, the research methodology evolved to describe what was happening within these group sessions, the literature review reflected this change as described in Chapter 2 and methodology emerged which will be discussed in this chapter. As a result of this, this chapter will look closely at:

3.2	The influence of my own values and beliefs
3.3	The research paradigm
3.4	The research – enquiry group methodology
3.5	Content Analysis
3.6	Conversational Analysis
3.7	Strength of this research method – lexical concordancing
3.8	What was done
3.9	Instruments
3.10	My own role as a researcher
3.11	Critical Incidents
3.12	Conclusion

Based on past research, my experience and literature reviews discussed in Chapter 2, this research followed the proposition that content-focused, collaborative enquiry groups would facilitate teacher learning of technology and teacher use of technology for subject-specific student learning activities.

3.2 The influence of my own values and beliefs

I have been influenced as a teacher by all the different students that I have taught over the past twenty years. Having started my teaching career in Malta at the age of 18, with an introductory pedagogical course on Teaching English as a Foreign Language (TEFL), I taught English to international students for four years. I then moved to the United Kingdom where I obtained my undergraduate degree in teaching and a Master's degree in education, which focused on language learning. While I was completing these studies, I also obtained the Cambridge postgraduate Diploma in TEFL.

After completing my studies, I started working at the University of Newcastle and then at Amersham College, Buckinghamshire. After 10 years in the UK, I came back to Malta where I taught English at Advanced Level, and aspects of applied linguistics, language awareness and methodology courses at undergraduate and postgraduate level at the University of Malta. During this period I also researched various aspects of applied linguistics.

As a result of my experience, one of the beliefs that I have formed during these years is that education is *not just* the reproduction of facts passed on from the teacher to the student: it is a *process* which introduces the student to a new concept or matter, through an experimental process. Consequently, this also influences the teacher who is able to contribute something more than just facts. It is this process of learning which the student takes with her or him throughout life. Knowledge acquired in this manner becomes personal, part of her or his life and not an extraneous fact reproduced for examination purposes.

Therefore, I believe that we construct our own knowledge and this is achieved by:

- (1) using what is available through one's surroundings and social structure;
- (2) communication and self-evaluation with peers
- (3) Aiming to achieve one's own objectives.

3.3. The research paradigm that influenced this study

'The research methodology adopted in such a study is determined by the research paradigm that represents the perspective of the researcher towards the problems being studied' (Waxman and Bright, 1993; p. 4). At a fundamental level, the discussion of research paradigms relates to the conceptions of truth and knowing (Carspecken and MacGillivray, 1998). These are often categorised as empiricist/objectivist versus interpretivist approaches to reality, although it has been argued that integrative polytheorism is more promising, depicting a more realistic view of what is happening.

This can only be done through an interpretivist approach, as one cannot create reality without the interpretation of what is understood, as discussed in Chapter 2.2.

In the research I attempted to utilise my sensitivity to the meaning behind the data while maintaining a self-awareness of my position as researcher and natural tendency to invoke my existing understandings (Strauss and Corbin, 1990). The act of interpretation of each item therefore involved attempting to stand back and ask:

- what was going on here?
- what is the significance of this object?
- what were my feelings?
- how does this relate to the other data at that point, and within the emerging story?

The evidence was often difficult to display as it was often bulky. So I had to craft my own data displays to suit the individual needs of the study. However, valid analysis requires, and is driven by, displays that are focused enough to permit a viewing of a full data set in the same location and are arranged systematically to answer the research questions at hand. This dilemma was answered with the statistical analysis of the language. However, true representation of data is only valid by extended text, because it is only in this manner that one can note themes, patterns, comparisons and detect differences. This was carried out via the transcriptions and the cross-referencing of themes (discussed further on in this Chapter).

As a teacher trainer, I am convinced that a teacher learns more when able to share who they are with their students. There is much more to teaching than the passing on of knowledge; it is also sharing of the experiences. Even though we talk about student-centred classrooms and develop our practice to include student-centred classrooms, my experience is that this approach is rarely applied to the continuous professional development of teachers. The commonly provided mentoring schemes and example lesson plans, though relevant, do not support changes in practice effectively, as Fisher et al. (2006) state in the 2006 Futurelab report:

'There is an underlying implication in this discourse (teacher training discourse) that the process of learning is instrumental and unproblematic: in essence, all teachers need is to be given the right 'training', the right 'development' and the result will be observable and measurable in their performance.' (Fisher et al, 2006; P 11)

Several theories of human learning and cognition have focused on social and cultural aspects of the learning context, particularly on the discursive interaction and the powerful effect of social processes in learning. The focus of this research is based upon Vygotsky's theory that language is the medium of social life and this interaction is the primary site for the development of higher mental processes (e.g. Vygotsky, 1978). These theories were discussed earlier in Chapter 2.

Vygotsky's theory has informed educational policies, resulting in an increased emphasis on oracy and its assessment (e.g. Ministry of education 2002 report), with the focus of attention being practical accomplishments of educational matters such as rhetorical and discursive strategies that are located in the interaction within the student framework within the classroom (Sinclair, 1991).

What is typically missing in the sequence of in-service teacher training is the space for teachers to compare teaching experiences, and to experiment with new approaches widely reported in the literature to be effective in supporting reflective practice and noted to support changes in the classroom (Crockett, 2002; Kasl and Yorks, 2002; Windschitl and Sahl, 2002). Conversational analytic methodology is an ideal way to explore such a forum as it is language saturated. Through the collaboration, the teachers take turns to talk, constructing their talk around others' discourse. Constructive group work, such as the one carried out in this research, is rarely undertaken in Malta, yet this seems ideally suited to on-going in-service training.

In such a training approach one has to leave space for personalities, abilities and the different experiences that the teachers have in order to enable them to be more creative and innovative in the classroom. My experience has shown me that when a certain 'teacher', who was what I would have tentatively labelled non-mainstream, was employed by a school, the work carried out with the students was innovative, while a more mainstream teacher, termed 'the academic' by Hargreaves, A. (1999), tended to lack creativity. In addition, I have found that teachers who emulate or copy other trainers lack security and are often very unwilling to take risks, and consequently tend not to adapt and change within the classroom. Having the support of peers who are in relatively the same situation, facilitated by an experienced trainer, can help give space to teachers to express fears and overcome insecurities.

Besides having their own opinions on education, the teachers with whom I was working within the S.A.I.L. project also came to the training session with their own personal experiences, backgrounds and learning styles. They had their own understanding of what was being introduced to them and how it would be carried out in the classroom.

It is interesting that when I began the S.A.I.L project and the pilot I was possibly influenced by the mainstream approach to teacher training. I did not adopt an approach that valued the teachers' experiences, neither did my own values reflect upon them when planning or carrying out the training. It was working with the teachers, meeting them in their schools, observing their lessons and understanding their 'real' needs that enabled my values to surface, affecting my practice. Additionally, my background as a linguist began to take on importance within the research. As the methodology developed, it became clear that there was a need to study in some detail the language the teachers were using in relation to their practice. As a result, I began to draw upon my own knowledge and the wider literature in this area, as outlined in Chapter 2.3.6.

Quoting Huberman (1973; p. 216), Hargreaves, A. (2001), talks about teachers tinkering in their classrooms and how this helps their development. I believe that the communication of this thinking, a discursive perspective (Edwards, 1997), as discussed in Chapter 2), the verbalisation of the cognitive perspective process (Chapter 2), and the sharing of it are what give the teacher a higher chance of implementation and growth.

The added advantage of the sharing of experiences is that it influences one's peers and more 'tinkering' (referred to as experimentation in Chapter 2) gets done in the classrooms, giving rise to change and possibly less burnout for teachers. Through the use of video recordings of their own practice, teachers in this research were able to share with their peers a visual record of what they were 'tinkering' with: this acted as a stimulus for discussion in the enquiry group.

The research was focused on the exploration of the process of their talking about their 'tinkering'. It was carried out whilst watching the development of practice which showed how teachers were influenced by their peers (Putnam and Borko, 2000) and recording their discussions whilst these changes were happening.

3.4 The Research - enquiry group methodology

There has been some focus in recent literature on the use of enquiry group methodology as a means for teacher training. Studies report on teachers investigating pedagogical and content issues (Hughes and Ooms, 2004; Hennessy et al., 2005) and reflecting on their own beliefs as an enquiry group (Andrews and Lewis, 2002).

Hughes and Ooms (2004) set up a School Enquiry Group project in 2002 in an urban K-8 school to collaborate with teachers. It started in March 2002 and involved three humanities teachers, one music teacher, one middle school coordinator, one university faculty member and three graduate students.

It was a 'longitudinal, multiple-case embedded research design' (Hughes and Ooms, 2004; p. 397). The enquiry group was the primary focus of the analysis. Data was collected by using pre-involvement and annual interviews, which focused on their experiences as teachers and ICT users, whilst classroom observations and enquiry group meetings occurred monthly, lasting 45 minutes. The data was analysed by using Nvivo software. Data coding was based on previous research carried out by Hughes et al (2002) and the wider literature on enquiry groups and teacher training (Hughes and Ooms, 2004). Teachers in this study were given a small stipend to recognise the input that they were providing.

Hughes and Ooms (2004) found that the content-focused technology enquiry groups as a professional 'development approach for urban teachers as well as teachers at large' worked well. The groups' focus initially wavered, but eventually refocused on the subject matter which had an arts/humanities basis.

Hennessy et al. (2005) examined the role ICT played within the classroom by assessing how useful the socio-cultural learning perspective is in terms of examining the roles of the key participants in structuring activity and classroom interactions between pupils and teachers. They found that 'indeed there appears to be more demand for organising, managing and supporting peer collaboration in the context of technology-supported learning' (Hennessy et al., 2005; p. 189).

Their research was conducted through a collaborative programme of small-scale projects undertaken by 15 teacher-researchers using various forms of computer-based ICT, again to support subject teaching. It was based in secondary schools in the UK and the main phase of the programme took place from 2000 to 2001. Participants were split into groups of three to five members pursuing similarly themed projects which covered six curriculum areas across the schools. They were given grants to support their work and were released from some of their normal duties.

Each participant was visited in school by a member of the university team who observed a lesson. These observations focused on the teachers' roles and ways of using technology in the specific setting, and provided a basis for reflection for the researcher and teacher. After the lesson, each teacher had a two-minute reflection interview. Observations and interviews were audio taped and transcripts were returned to participants for corroboration. Data was also supplemented with some digital photographs, student work and researchers' observation notes.

In the Hennessy et al (2005) research, lesson observations provided detailed examples of teaching episodes and corroboration of themes emerging from the interview. Findings from each case-study were validated by subject specialists within the faculty. Interview transcripts were imported into a computer database (QSR NUD*IST) and thematic codes were developed through the systematic collection and analysis of data pertaining to the teachers' roles and ways of using technology. This comparative analysis of the ways of using IT helped to build up the picture of what was happening (Glaser and Strauss, 1967). Interestingly similar to the Hughes and Ooms (2004) study, the initial categorisation of the themes underwent 'minor reorganisation' and was mapped onto those articulated in the key writings in this field, such as Putnam and Borko (2000) and Loveless et al. (2001), mentioned in Chapter 2. This then formed an interpretive framework for the teachers' pedagogical strategies. They found that learning would have occurred without the enquiry group discussion. Similar to the research reported in this PhD, Hennessy et al. (2005) and Hughes and Ooms (2004) used coding to analyse the transcriptions. They started with predetermined themes based on the literature and found that they had to create their own coding, these being adapted to the results that they were collecting. The resulting typology of strategies was thus primarily data-, rather than theory-, driven.

3.5 Content analysis

My initial research question was: *how did teachers' perceptions change while introducing ICT within their classrooms?* As stated in Chapter 1, my approach changed once the teachers met to exchange their views. Therefore, this investigation on how teachers change their practices through their training requires a naturalistic methodology which allows for individuals to give accounts of their understandings of their meanings and the researcher the opportunity to probe these results by observing the expression of meanings of their classroom practice. The group shared and checked their interpretations of their videotaped classroom practice as I video-recorded their discussions, unlike in the work of Hennessy et al. (2005) and Hughes and Ooms (2004).

The question changed to: *how do teachers collaborate within an enquiry group when introducing a new ICT package?* Consequently, it was through the analyses of the data that the teachers produced during the process of change that I was able to notice specific recurrences. I started with issues such as the questions teachers were asking and moved on to how they were using lexical items. It was these lexical items which were analysed and quantified. More about the data collection methods surrounding data analysis may be found in Chapter 4.

During this research I was simultaneously analysing my data and triangulating my work with other work which was being conducted at the time. On the one side was the work of Hughes and Ooms (2004), which looked at the language used by teachers within an enquiry group. On the other side was the work of Loveless (2001) who examined the way teachers perceived the use of ICT within their classrooms.

As already mentioned above, Hughes et al (2002), noted that as teachers learned new technologies and began to integrate them in student learning experiences, their monthly enquiry group meetings offered a chance for the teachers to explore the implications and complications of using technology collaboratively. They designated

codes according to the areas that the teachers talked about. For example the code 'questions about technology' was examined within the data corpus within the time frame March – May 2002 (p. 402). This preliminary pattern was then further elaborated by examining the excerpts within the data corpus in addition to looking at issues such as who was asking the questions and the turn-taking that took place.

That was the case in this research. Transcripts were first read and coded in detail, answering the question *what are the teachers talking about here?* Codes were then compared and contrasted to form common areas of content.

3.6 Conversational Analysis

In a way it is easy to identify the topic of conversation and the content of what is being said; the organisation of that topic is another matter. Usually in educational talk the topic is defined externally by a teacher, or facilitator. In this case it was I who had defined the topic as the integration of the Roma software. Fisher (1996) argues that for an educational discussion to be deemed 'effective' or 'successful', students must demonstrably accept the topic as given by the tutor.

Heyman (1986) explored formulations of topic by teachers and pupils. His research was conducted in a school setting and was focused on whole-class interaction. Almost all research into language in educational settings (qualitative or quantitative) looks at the primary or secondary school. Debate and discussion play an important part within the continuous professional development of teachers. However, very little work has been done at primary level (Hughes and Ooms, 2004; Hennesy et al., 2005).

Stokoe (2000) focused on small peer group (3-4) discussions of university students. She adopted a conversational analytic approach to the study of educational talk-in-interaction. The focus was specifically upon the production of topical talk in a university seminar context. Small groups of students were video-recorded carrying out

a discussion task. The data were transcribed and subsequently analysed using conversational analysis. Three themes were further explored: first, the opening sequences of the discussion were analysed; second, the order of the topics; and third, which topics were on or off-topic. They found that the students, did most of the time adhere to the conversational procedures and do get down to talking about the topic set for them. In addition, their treatment of off-topic and on-topic matters did largely concur with educators' expectations. This research emphasises the notion that any other analysis would have missed this data. It is through this conversational analytic methodology that one can develop an understanding of the participants' understanding of the activities in which they are engaged.

Hunter (2001), used a 'problems of practice' approach that targeted new learning through enquiry of specific situated issues relating to students, parents, curriculum, and/or pedagogy. Bonk et al. (2002) and Keller et al. (2003) used a 'problems of practice approach' for action research training. Both these strategies utilised discourse as a tool to examine the environment in which teacher learning occurs.

The following research describes approaches to exploring the notion that teachers' pedagogic language changes alongside transformation of classroom practice and then provides evidence of this within this enquiry group research. Previous studies such as Hughes and Ooms (2004), have examined the content that enquiry groups covered, and Windschitl and Sahl (2002) traced the activities of three teachers as they progressed within the classrooms, discussed in this research in Chapter 2.3.5. This research also examined the actual language used while the enquiry group was taking place.

In this research the need to train the teachers to integrate ICT within their classrooms decided the content of their training sessions. They had to discuss what they were doing within their classrooms, they were taking on the responsibility of how they were going to do it. The manner in which this occurred was determined earlier by the

teachers, influenced by factors that surrounded them, which included their peers in the enquiry group. The language with which they exchanged their experiences was the primary focus of this research.

The language data was analysed to show how the patterns of the meetings developed. These enquiry group meetings, in which they shared their classroom experiences, provided language which showed the changes that were occurring. These results were found through conversational analysis and lexical concordancing.

3.7 Strength of this research method – lexical concordancing

Studies into the use of ICT in classrooms such as the Impact Evaluation, Multimedia portables for teachers' project, and Ways forward to ICT, (Watson., 1993; BECTA, 1998; Moseley et al., 1999) all used large-scale surveys for their studies. Smaller scale studies have devised methods for investigating teachers' attitudes, perceptions and attitude scales and have constructed elicitation instruments which also provide opportunities for quantification of response through statistical analysis or straightforward counting (Loveless, 2001; Dawes, 1999). This study followed the group of teachers and their development by recording their reflections.

To be able to analyse these reflections, which are central to development (Stein et al., 1999), I wanted to utilise a tool that was used in another area of study – linguistics, as I felt that the contribution of this field would help to understand on a deeper level what was happening in the enquiry groups. Concordancing of the data would allow me to do this as it is a widely accepted methodology for grouping words together and how these convey meaning. It has the added advantage that it brought together bodies of knowledge, as Underwood states in her concern about the ICT educational community:

'what I would want to flag up is the failure of the ICT educational community to make contact with the central body of educational research. This is in part because at times we fail to use the language and theoretical perspectives common across the discipline.' (1994; p. 139)

3.8 What was done

The initiative of this research took off when the S.A.I.L. project was accepted by the European Union. A meeting was set up for all the primary schools in Malta, asking the head teachers to come along with a teacher who might be interested in participating in an EU project. This meeting was well attended, but mostly only by head teachers.

As a result, head teachers went back to their schools and identified teachers who might be interested. Around 20 teachers then attended a second meeting. This consisted of an introductory talk about the project – an exercise in collaborative group work using Roma music. A follow-up was arranged, so that teachers who were really interested in participating in the project would attend. The five teachers who participated in this project are listed in Chapter 1.7.1.

The pilot was set up and teachers were given a pack of notes, which included materials on the Roma and teaching ideas. I arranged days and times in which I could go round and carry out lesson observations. A meeting was scheduled for the end of the pilot, where I would be able to collect collective feedback. Again, further details with regard to the pilot are provided in Chapter 1.7.1.

After the feedback session, held at the end of the pilot exercise, material appropriateness was discussed and software designed. In addition, the training of the teachers was re-evaluated and redesigned. This resulted in the modification of the research method to include enquiry group meetings.

During the research part of the project, the teachers met five times whilst keeping in contact with each other via mobile phone and internet. Their meetings took place

between January and March 2003 on a Friday afternoon from 4 p.m. onwards. There was no formal structure or scheduled time for meetings to end; they were allowed to come to a natural close.

Each time they met, one of the teachers would show the video of their classroom practice as a trigger for the discussions. If other teachers came to the meetings with work their students had completed or needed to discuss an item that had occurred within their classrooms, then these items would often be discussed first. Then the chair would make his/her mini presentation and invite a general discussion on:

- (a) how they had planned the lesson;
- (b) how it developed;
- (c) what they would improve;
- (d) what they felt had worked well.

The meetings were not purposely structured; each meeting started with a teacher as the chair of the meeting and then things moved on from there. All meetings were video-recorded in order to capture as complete a record as possible of the discussions held. Body language and nuances can be just as important as the actual language used (as discussed earlier in this chapter in the conversational analysis in Section 3.6).

I supported the teacher by videoing examples of their classroom practice using the S.A.I.L. resources. Before I did this, the pupils were told what was going to happen by the teacher and consent forms signed. During the first lesson, I introduced myself to them and told them that I was focusing on their teacher. My own physical presence was to manage the video recorder and, interestingly, the pupils soon become accustomed to this.

The video camera recorded the way the integration of ICT was occurring. I tried not to move around the classroom too much with the video camera, unless the whole class moved to a corner, in which instance I followed them. They were aware of my presence and actually appeared to enjoy having me there, as I received thank you notes from some of them at the end.

3.9 Instruments

The following is an overview of the research process showing when the research instruments were used.

Table 3.1: An overview of the research process

Date	Research Design	Action	Instruments
January – June 2003	1 st Pilot carried out Training on collaborative learning held with the participating teachers Evaluation	Meeting 1: Heads of schools Meeting 2: Met possible teachers and explained the project Meeting 3: Group formed Meeting 4: Feedback	Free Writing Activity (a) Observation and Field Notes during classes (b)
July – September 2003	Field notes of the pilot analysed	Preliminary meeting: Explanation of software and how it is used by ICT expert Readings on possible classroom implementation emailed to teachers	Baseline Interview Questions re ICT usage (c) Research Journal kept
October 2003 – May 2004	Action research carried out	Enquiry group 1: led by Greta Enquiry group 2: Led by Rose Enquiry group 3: Led by David Enquiry group 4: Led by Martha Enquiry group 5: Led by Marceline	Research Journal Kept Teachers' logs are completed after each lesson (d) Video/audio recording of meetings taking place (e) Main period of revisiting data sources Identification of key issues and questions for Phase 2 interviews and observations
June 2004	Reflection	Individual Interview	Audio recording of the interview (f) Observations

Below are the research instruments and how they were used to collect the data:

(a) Teachers' background

A free writing exercise was held at the beginning of the research project: the teachers were asked to write what they felt education meant to them and to describe their background and experience in teaching.

Without a clear outline of what to write, teachers might have found it difficult to decide what to concentrate on in response to the request to write about their educational experience. However, it also allowed them to write what was of importance to them.

(b) Researcher Observation and Field Notes during classes

This was based on annotations I made while going round the classrooms to video record lessons

(c) Questionnaire – ICT use

A questionnaire collected data on ICT usage and classroom practice (Appendix 3). This was used to collect information on how much access the teachers had to ICT, how they integrated ICT, and what preconceptions they had about the use of ICT within the classroom.

From the very start the teachers found that the questions were not relevant to them, so they wished to express themselves in another manner. They wrote notes about what they were doing in the classroom. They felt that it was more interesting to explain what they were doing than how many times they used computers within their classes.

(d) Teachers' logs and student logs

Logs were completed by the teachers after each of the five ICT lessons in which they were using the Romany software. These logs captured the teachers' reflections on classroom practice (Appendix 4).

(e) The video in the meetings and the classroom

The video was utilised to collect all the teachers' discourse as they talked/exchanged their experiences and it also recorded what happened in their classrooms, this was done to show their peers in the enquiry group.

The validity and reliability of using a video camera in this research could be seen to be an issue because teachers might feel inhibited in front of the camera or act specifically for it. However, placing a digital video recorder in a strategic place in the meeting room allows most of what happens to be recorded, thus providing the fullest possible record of the research. Additional advantages are that a recording can be replayed many times; and it can capture many details that cannot be observed easily by other means, such as the tone of language used by teachers during the meetings. Schratz (1992) comments about video use in the classroom:

'Audio-visual recordings are powerful instruments in the development of a lecturer's self-reflective competence. They confront him or her with a mirror-like 'objective' view of what goes on in class. Moreover, class recordings which are kept for later use, can give a valuable insight into an individual teacher's growth in experience over years.' (p. 89)

However, the use of a video recorder within a classroom can be disruptive for pupils and can create a certain amount of performance anxiety for both teachers and pupils. Also, it cannot really be used as an everyday activity, as it is very time-consuming to go through the recordings and analyse what has occurred (Swann, 2001).

Potential problems were overcome as teachers were aware of the purpose of the recording. In the classroom it was so that they could share their experiences with

other teachers, and in the enquiry group meetings it was so that I could record their sessions for research purposes.

The teachers automatically associated my presence with that of the video recorder, which meant that they did not feel that they had to perform in front of it. They knew why I was recording them; it was for research and record keeping. Their only issue was whether teachers who were not in the research enquiry group would see the recordings. If so, they felt they might be inhibited and would not be able to be honest and disclose what they really felt. As Rose said in interview: 'Ah, it's on again [...] .so this time we must watch that red bulb in case it might go off again. You're not going to show it so somebody else, uh?' Here she was so relaxed that she was joking with me; she felt that if I was going to show it to third parties she would have to perform, which she did not do in front of me.

There were five enquiry group meetings which were held every two weeks. All discussions were recorded and then transcribed.

(f) Interview

Each of the five teachers was interviewed after the enquiry group meetings had finished. I prepared a set of questions for the teachers (Appendix 6) as a guide, but let the interview progress as 'openly' as possible. The intention was to explore how they had felt when introducing ICT within the classroom, and also if they felt that the training method, using an 'enquiry group method', was effective and why it was or was not. Each interview was recorded and transcripts were prepared.

The people and the nature of the research determined the research instruments. I felt it was unrealistic to carry out prescribed methods with this group, as they were experienced teachers who had been in various classrooms through the years and wanted to give their own personal input to the research as mentioned in Chapter 2

Section 2.2. In addition, they had expectations of what training meant, and these included discussions on students and implementation issues. The fact that they were a volunteer group of five participants also influenced me, as I felt under pressure not to waste their valuable time.

3.10 My own role as a researcher

(a) Notion of identity

Within the S.A.I.L project, this research my official role was that of an academic Coordinator/researcher, who informed practice and was not directly involved in the learning process. In addition I was also a PhD student carrying out a study on how the enquiry group was working to integrate the Roma software.

(b) How did it work?

When the teachers told me that they wanted to meet, the 'power' within the training sessions changed and they took control of their learning. I took on the role of the organiser of meetings, going round the classrooms videoing practice, and supporting them if they needed anything, as discussed in Chapter 2.2.2.

The pupils were pleased that I went round. I got little notes from them saying that they 'loved me being there'. It seemed that I did not disturb their classes, and if I did, it happened in a positive manner.

(c) Groups were autonomous

Once the meetings were set, I realised that it was I who was learning from the teachers as I listened to their exchanges. From the observations I was making in my personal journal on how they were adapting materials, and from the way they were collaborating within the enquiry group and integrating ICT within their respective classes, I knew that 'critical incidents' were occurring and that they were responsible for these changes. As a matter of fact, Rose referred to me as a 'friend' and Martha as 'one of us'.

3.11 Critical incidents

During the research, the teachers started moving away from the traditional exercise and started to experiment with the use of ICT within their classrooms. This indicated to me that the teachers were going through a process of change. How it was happening and what was making it happen I did not know, and I felt that I did not have control over it. I just believed that if it was working, I had to let it work and not interfere. However, I was constantly concerned that I was not following a set research pattern and that they had taken over the research and I was acting as a facilitator.

The result was that the teachers were experiencing 'pedagogical growth' through the enquiry group meetings. They developed their own classroom practices, drawing on their personal and general knowledge, and saw what worked in their own and their peers' classrooms. 'Critical incidents' which occurred were instrumental in shaping their ideas and pedagogical practices:

'Incidents happen, but critical incidents are produced by the way we look at a situation: a critical incident is a value judgement we make, and the basis of that judgement is the significance we attach to the meaning of that incident.' (Tripp, 1993; p. 8)

The teachers' challenge was to integrate ICT within their classrooms. During the enquiry group meetings they listened to each other, exchanged views, reflected on their practices, and analysed what was working and what wasn't. This changed their awareness of what was happening in their classes and, more importantly, changed their perception of what they could do in their classes. They moved beyond the 'everyday working way of looking at things' (Tripp, 1993; p. 136) to looking at their classes through their peers' eyes.

Tripp (1993, p. 140) suggests that there are four kinds of judgement necessary for professional teaching:

- (1) Practical – the basis of every action in the conduct of teaching, made on the spot;
- (2) Diagnostic – the profession-specific knowledge and academic expertise to recognise, describe, understand, explain and interpret practical judgement;
- (3) Reflective – based on more personal moral and value judgement;
- (4) Critical – carried out through formal investigation involving challenge to and evaluation of the judgements and values revealed by reflection.

The teachers within this enquiry group research utilised all the above. Reflections of 1 were recorded in their teachers' logs, whilst 2, 3 and 4 were discussed with their peers in the enquiry group meetings. It was only after reading the transcripts of these meetings and analysing the language used that I realised that I had achieved what my research had set out to do: to investigate how teachers developed their use of ICT within a constructivist framework. The teachers had asked for the enquiry group meetings to occur (Chapter 1), and change had occurred within this framework.

3.12 Conclusion

In this chapter I discussed the way the research was conducted and how it evolved into an examination of the way the teachers interacted and exchanged their views on classroom practices in an enquiry group, with my role as researcher being concerned with examining the language being used. The teachers changed their practices as a result of the reflections that occurred during this research.

Hughes and Ooms (2004) worked within an enquiry group approach to professional development with a group of teachers. They looked at *what* the teachers discussed as they learned new technologies and began to integrate them in student learning experiences; and they did this by designing codes according to the areas that the teachers talked about. Their focus was the content.

This research started off by looking at the content and then moved on to analyse the **'way'** the content was conveyed by looking at the language used, through concordancing and coding of the data. It was interested in the **'way'** the teachers were interacting within the enquiry group to build knowledge.

The next Chapter will look at the data collection process, the data analysis approach and results, as well as providing contextual information in relation to the members of the enquiry group.

Chapter 4 Data Analysis

4.1 Introduction

This research seeks to explore the ways a teacher enquiry group can support the introduction of ICT into classrooms. This chapter provides an overview of the data collection process, and the data analysis approach and results, as well as providing contextual information in relation to the members of the enquiry group. Chapter 5 provides a fuller interpretation of the data and draws out key aspects of the nature of teacher development within the enquiry group process.

In this research, I was looking for information about changes in practice, not from a classroom perspective, but through a teacher's perspective, and was capturing and interpreting this. The pilot study showed that it was difficult to understand practice from a snapshot of a classroom, the focus of the research was on understanding the pedagogic practice, why they were doing what they were doing whilst I was observing and not simply the end result. Consequently, I decided to explore the enquiry group process through the use of videos of five participating teachers' classroom practices, and through their explanations and discussions of these practices, to reveal their developing understanding of practice. As discussed in Chapter 3, Section 5, I felt that the ways their language might change while they were discussing these videos would be an indicator of their changing understanding of pedagogy (Tharp and Gallimore, 1988).

At the start of the research exercise I also collected biographical and pedagogical data through a questionnaire and free writing. This was followed by the enquiry group process which involved five meetings of the five participating teachers over a period of seven weeks (Chapter 2). During this time, I visited each school to video-record lessons in which the teachers were using the Romany software. One of the video-

recordings was then presented by a teacher and discussed during each enquiry group meeting.

During the enquiry group meetings I video-recorded the group and afterwards analysed the language used by the teachers and the ways their use of language changed over time. Finally, at the end of the research process, I conducted an interview with each of the participants to explore how the teachers perceived their development and understanding of pedagogic practice.

The chapter is organised under the following sections:

- 4.2 The teachers' backgrounds
- 4.3 The background culture
- 4.4.1 Overview of method
- 4.4.2 The data
- 4.5 Coding Analysis
- 4.6 The Meetings
- 4.7 Conversational Analysis
- 4.8 What was discussed.
- 4.9 The Interview
- 4.10 My role
- 4.11 Specific lexical items – lexical Concordancing
- 4.12 The summary of data
- 4.13 Factors that influenced the teachers
- 4.14 Conclusion

A point that must be highlighted when discussing the discourse of these teachers is that their first language is Maltese. However, they spoke mainly in English during this exercise, as it was perceived to be in the academic domain and this is the language of academic discourse in Malta. They lapsed into Maltese on only a few occasions in order to pass a quick remark or to agree with a colleague. Subsequently, for research

purposes, I translated these utterances into English to help with the data analysis, these did not interfere with the data analysis as the meaning they covered was minimal, and often they were just language fillers. However, sometimes when I quote data it might seem to the native English speaker that the syntax is incorrect: but in fact this shows first language influence. For example, one of the teachers in the study said 'it was informal on the table' (Martha, Interview. 183). This is a verbatim translation from an idiomatic Maltese expression which means that the situation was an informal one.

4.2 The teachers' backgrounds

4.2.1 Analysis of the free writing and initial questionnaire

The following provides an overview of the teachers' backgrounds at the time of the research: their teaching experience, what they taught, and their educational beliefs. It is not meant to be a detailed analysis of the teachers' backgrounds, but an indication of their beliefs and motivations. These factors might have influenced the way the teachers reacted to the training experience and would need to be taken into account when interpreting the findings.

Data collected through the initial questionnaire (Appendix 3) and the free writing activity (Appendix 5) at the start of the research exercise showed the teachers' views on student-centred education and how ICT could be used in the classroom. The free writing consisted of the teachers' thoughts on what teaching meant to them, and something about their teaching experience. I did not structure the questions; I just asked them if they would write down something about themselves so that I could better understand their teaching background. This also allowed them to indicate what they considered relevant.

Table 4.1: Initial questionnaire and free writing activity: Computer usage and teaching background (computer use within the group across the measures has been ranked 3 = highest usage 1 = lowest usage)

	Greta	David	Rose	Marceline	Martha
Use of student-centred education before the research	3 Once a week	3 5 – 10 lessons/ month. Uses small group based activities	3 5 – 10 lessons/ month. Uses small group based activities	1	1
Computer usage	3 Uses computer for English reading and some ICT skills are taught	2 Computers are hardly ever used, except for Maths to reinforce what has been taught	2 Computers used for games during break and by the peripatetic teacher	1 Does not use computers	1 Does not use computers in the class at all
Views on ICT	No evidence	3 'can be integrated to teach any subject'	2 'can be used to find information and handouts'	1 Does not use ICT as 'the ICT teacher normally gives them easy tasks to familiarise themselves with the computer'	2 'It is the children's future'
Computer at home	3 Has access to a computer at home. Used at least once a day	3 Has access to a computer at home. Used at least once a day	3 Has access to a computer at home. Used once a week	1 Has access to a computer at home. Rarely uses it	3 Has access to a computer at home. Used once a day

Marceline was the most unfamiliar with ICT at the beginning of this exercise, while Greta used ICT the most and David was the most positive about their use.

4.2.2 Teachers' personal background and school type

The previous section looked at the teachers through the viewpoint of their classroom practice and access to ICT. This section portrays their personal experiences and the school setting.

Below is a summary Table of their qualifications and school type, followed by a more detailed description of each individual, using the information offered by them in the free writing activity. It details the teaching experience, the qualifications that the teachers possessed and the type of school in which they taught. In Malta, the main categories of schools are Roman Catholic, private and government schools.

Table 4.2: Teachers and description of the schools

	Greta	David	Rose	Marceline	Martha
Teaching Background	6 years' teaching experience	6 years' teaching experience.	15 years' teaching experience	8 years' teaching experience	11 years' teaching experience
Teaching qualifications	BA (Geography) then a PGCE	B.Ed (Art)	Learnt how to teach from a fellow teacher. Then took a pedagogy course at University	Facilitator course at University	B.Ed
School Type	Boys' Church School	Mixed Government School	Mixed Government School	Mixed Private School	Boys' Church School

What follows are the results of the free writing exercise, where the teacher gave a little outline on what influenced him/her to become a teacher. These are of differing length as the teachers wrote these without further prompting. The following is an overview of what they wrote.

Greta

Greta feels that her life has been divided into phases. The first phase of her life was that of a young girl playing with her brother and sisters, then the years of schooling and sixth form came along. She got married young and started a family. After a few years she took up nursing as a profession, simultaneously helping her mum give

private lessons at home, as her mother is also a teacher. She then went back to university and graduated as a teacher in 1998. She has been working at a boys' Church school since then.

David

David teaches at a government school. He has been teaching year 5 students (10-year-olds) for the past six years. He graduated from the University of Malta, specialising in Art, and uses this background as pivotal support for his teaching at primary level.

In his opinion, a teacher is a person who opens the doors:

‘presents opportunities and stimulates his learner to develop in a multitude of spheres: socially, linguistically, artistically, emotionally, etc. He is not there to impose himself but to trigger off something. A good teacher helps his students to unlock their potentialities and develop their talents. Education is really the basis on which our future society has to be built.’ (David free writing exercise)

Yet he is also a realist and believes that as teachers what we ought to do is to try and achieve the best results in the present circumstances.

Rose

Rose started her professional career working with the Civil Service. Due to family needs she decided to take up a career as a teacher. She received no formal training and was helped initially by former teachers. After a while she enrolled on a pedagogy course at the University of Malta. She has been teaching at a government school for the past ten years.

She believes that education is not just teaching children how to read and write. Everything teachers do is for the well-being of the child and must therefore be focused on developing the whole personality including the ability to work. ‘The

teacher should foster in his pupils fine qualities like honesty, integrity and consideration for others.' In her classroom she tries to treat her pupils as individuals, so she tries to cater for all their needs and talents. 'Also, teaching in my opinion is loving and giving; and you want to believe in your children'. This seems to be the basis of her philosophy towards education in general.

Marceline

Marceline works in a private school where the focus is on the transfer examination, which allows the students entrance into an academically orientated church school. She obtained a university diploma in pedagogy; coincidentally Rose (see above) studied with her in 1996. She believes that education means challenging children, providing new stimulating material for them and involving them in the educational process.

Martha

Martha taught while undertaking her undergraduate course in teaching. She graduated as a teacher in 1991. Since then she has worked in Church schools. She stated that she prefers to teach 6- to 10-year-old children as she can assign tasks and work with them more easily than with younger children who need more of her attention.

In her opinion, education is the process where she imparts knowledge to her students and they grasp this and make it their own. She also believes that listening to the students' experiences is of value in the classroom. 'On the other hand, I myself can learn from their experiences and students themselves learn from each other.'

She has encountered a variety of situations in class as her students have different learning abilities and she does not have access to a classroom assistant. She believes that education is helping children in their understanding and learning of new

subjects, and in the sharing of ideas and information; it also guides them in their behaviour in continuity with their education at home. She quoted B. F. Skinner in her writing to reflect her views: 'Education is what survives when what had been learnt has been forgotten.'

With regard to ICT, she believes that in an ideal teaching situation the children in class would be surrounded with the necessary tools for 'hands on experience':

'Computers in class are one good source for children to use although it is not advisable to be used at all times or for all subjects as vital human contact would become non-existent.' (Martha free writing exercise)

4.3 The background culture

Learning within the process described within this research is the result of dynamic interaction between the individuals (the participating teachers), the setting, the pupils and me (the researcher). A factor which often plays a key role within such research, besides the background of the individuals, is their motive to take part in the research. Recent research on teacher learning has shifted the focus from teachers as isolated individuals to groups or communities in which they participate (Stein and Brown, 1997). Teachers' thinking, in this view is social in nature and distributed across the individuals (Putnam and Borko, 2000).

The situation of all these teachers was similar in that they were trying to integrate the Romany software within their classrooms and they were practising teachers. The data from the interviews, which were held at the end of the research, established that they had taken part in the research for slightly different reasons:

- (a) To collaborate. The initial research plan did not make specific arrangements for the teachers to meet and exchange ideas and practice. However, after consultation with the teachers, it was their suggestion that we should meet more often as they felt they needed the support found within the group.

- (b) For professional development. They primarily wanted to find out more about the opportunities offered for professional development within the project and to learn more about the Minerva project. They joined the project because they were all keen to learn about new teaching resources and to reflect upon and change their practice.
- (c) To socialise. Two of the teachers used to know each other years before the project had started and had not met since. The project allowed them to socialise as a group and they also met up outside the group.

Learning within this group was to be located in the cognitive structures and mental representations of individual teachers, and was to become situated in the 'fields of interaction' among individuals (Hanks, 1991). In fact, Vygotsky (1978) maintains that learning for individuals always takes place in a social context where learners seek support from more able peers or teachers and/or technical tools or artefacts in their 'zone of proximal development'. Through guided participation in this shared activity, individuals were to appropriate the knowledge, skills and information needed to function within their particular group (Putnam and Borko, 2000). Just as children acquire knowledge and behaviours specific to the familial and community contexts, the participant teachers will acquire knowledge and behaviour that were part of the context of their group.

4.4.1 Overview of method

This research focused on how teachers changed their practice over time. Teachers worked in an enquiry group, which differed from their usual training methods. The teachers exchanged their experiences and built up their individual pedagogical views in this enquiry group. This enabled the teacher to participate in a new domain (Chapter 1, Section 7), that of being part of an enquiry group. This Neo-Vygotskian

method (as discussed in Section 4.3) attends to the socio-cultural context of cognitive activity with particular focus being paid to the conditions in which learning is taking place. The data collected within this method, being a group effort, reflects this form of learning in which the responsibility is not of an individual but that of the collective group proceeding towards a pedagogic objective.

The fact that the enquiry group meetings were held off school premises on neutral ground meant that the teachers interacted within the enquiry group meetings in a free manner, minimising 'political' influences on their discourse.

During these meetings, the video-recording of the classroom practice was used as a trigger for the teachers' discussions in the enquiry group. The teachers controlled the discussions, my role being one of intervening at points when assistance was required, where I acted as facilitator and then faded into the background once again. This allowed them to explore the problem areas they identified in integrating ICT within their classrooms.

As a result of this, the focus of the data analysis was how the teachers moved on in their pedagogical practice and understanding. The data analysis had to reveal what was happening within the group. The question that needed to be addressed was: *how were they scaffolding their learning in their group?* Scaffolding is mainly described in terms of dynamic interaction (Tharp and Gallimore, 1988), but teachers also adapt to their pupils by adjusting their materials and by setting clear objectives according to their pupils' needs. This is referred to as 'cognitive task structuring' (Hennessy et al., 2005), which defines 'assisted learning' (Bonk and Cunningham, 1998). Effective classroom practice places the task within the 'zone of proximal development' and the teachers create a socio-cognitive activity which maximises opportunities for instructional conversation with the learners. This research applied this approach within a context in which the teachers were learning about practice and examined the discourse the teachers used.

The facilitator (me) and the teachers collaborated to ensure that new pedagogical objectives were achieved. A key idea from Rogoff and Gardner's (1984) work was that 'children themselves take a significant role in structuring' (p. 110), and influence the nature and direction of scaffolding through simultaneously adjusting their levels of participation and requesting assistance. In this research it is the teachers who were involved in this process and took on greater responsibility and involvement (Rogoff and Gardner, 1984) in their own learning.

4.4.2 The data

I felt the need to look at the data collected from the teachers' logs, the enquiry group meetings and the interviews from different contexts, thereby making sure that I was describing the whole picture. I recorded the data through the video camera as well as taking notes in my journal and consulting the teachers' logs.

Table 4.3: The strengths and weaknesses of the tools

Different methods	Strengths	Weaknesses
The teachers' logs	<p>Processed and allowed for repeated review by the teacher</p> <p>I was not present – unobtrusive</p> <p>Teachers' exact interpretation of what had happened</p>	Reporting bias
The enquiry group	<p>The discussion provides evidence of the way the teachers exchange ideas</p> <p>Authentic exchanges and focus on the intervention</p>	<p>Could go off on a tangent to the discussion</p> <p>Difficult to analyse all the utterances after video recording due to multiple participants</p>
The interview	<p>The focus was on the intervention</p> <p>Insightful about their thinking processes after their experience</p>	<p>Bias due to the questions asked</p> <p>Incomplete recollection – could be emotive responses</p>

Several readings of all the data sources, both during and after the field work, generated a set of codes and categories which identified a range of themes and connections arising from the data which was organised and grouped into larger categories. These categories were tested and refined in the search for validating the evidence. This approach is similar to that described by Strauss and Corbin (1990). The description of coding is found in Section 4.5 of this chapter.

As mentioned earlier, an initial analysis of the data in Phase 1 was used to create lesson observation tools, which were later replaced by the video camera and a diary of impressions. The chronological relationship between data collection, categorisation and analysis is summarised in Table 4.4.

Table 4.4: The relationship between data collection, categorisation and analysis

<i>Date</i>	<i>Research Design</i>	<i>Instruments</i>	<i>Level of Analysis</i>
<p>January – June 2003</p> <p>Phase 1</p>	<p>The pilot</p> <p>(The researcher led training on collaborative learning in the classroom with the participating teachers)</p> <p>Evaluation</p>	<p>Free writing activity</p> <p>Observation and field notes during classes</p>	<p>Evaluation of research method</p> <p>Conclusion of this phase led to the enquiry process being used in the research</p>
<p>July – September 2003</p> <p>Phase 2</p>	<p>Field notes of the pilot analysed</p>	<p>Baseline interview questions regarding ICT usage</p>	<p>Research design confirmed</p> <p>Outlined the interview questions</p> <p>Range of categories and questions for further investigation identified</p> <p>e.g. discourse used among the teachers</p> <p>Broad categories and cross themes identified e.g. lesson timing</p>

October 2003 – May 2004	<p>Research in the enquiry group process carried out</p> <p>(1) The enquiry group process established. I started going round the classrooms</p> <p>(2) The enquiry groups met over a period of 7 weeks</p> <p>(3) Teacher classroom-based discussion</p> <p>(4) Final individual interview</p>	<p>Video of classroom practice for each teacher made by the researcher</p> <p>Teachers' logs completed after each lesson</p> <p>Video recording of enquiry group meetings taking place</p> <p>Main period of revisiting data sources</p> <p>Audio recording of the interviews</p> <p>Observations</p> <p>Field notes</p>	<p>Identification of key issues and questions for Phase 2 interviews and observations by ongoing analysis of transcripts</p> <p>Identification of links with Hughes and Ooms' work and consideration of cross themes.</p> <p>Simultaneously examining the links with the Laurillard model of CPD. See Chapter 2, Section 2.3.3.1</p>
June 2004 – June 2006	Full Phase 2 data analysis interpretation		Revisiting categorisation and theoretical frameworks

As the research process was being completed, data transcribed to enable me to enter and organise text using the word processor as well as to code and categorise the data using the concordancing software, described in Chapter 3. The search for and presentation of key linkages between data sets through further manipulations and cross-referencing was greatly helped by having the text in Word format. This allowed me to utilise several methods to look at the same piece of data, thus identifying the units of analysis and coding of actions as described in the following figure.

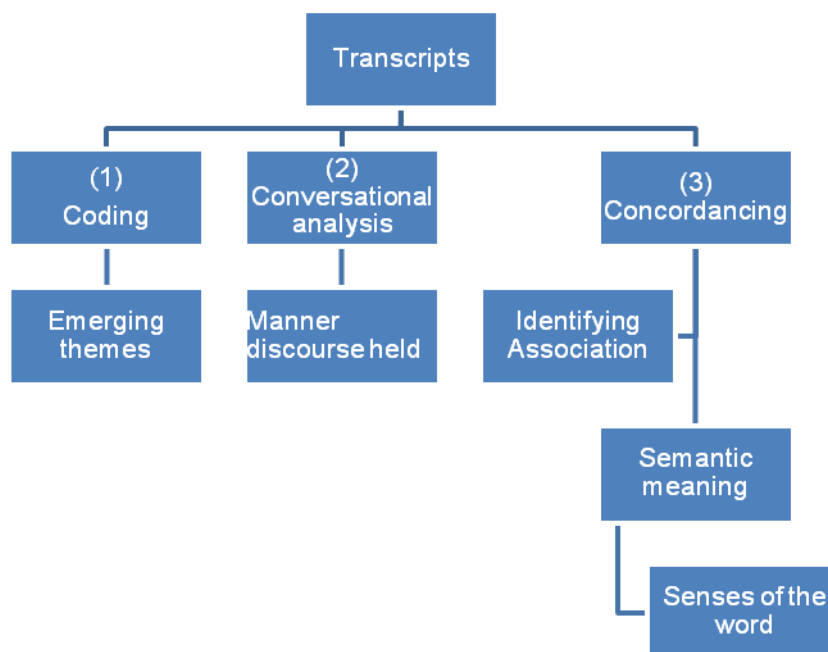


Fig 4.1: Overview of data analysis

To be able to show how the language changed, I first transcribed the data as described in Chapter 3, including when the Maltese language was used. These were mostly language fillers, such as 'mela', which means yes. Then all was translated into English. This was not problematic, as the Maltese language use was negligible for syntactic purposes. The English language constructions are more of an issue to the outside reader. Since the teachers are bilingual, the language spoken depends very much on the domain it is being used in. Consequently, for language analysis purposes this was not an issue, as the language they would have used in this domain, which is perceived as an academic one, would have been English. The

teachers have studied all their lives in English, university lectures are delivered in English, and all academic materials are in English. Their level of English use may seem problematic to the native English speaker, which is due to the Maltese influence on the syntax.

After the transcriptions were completed, I went through the data and (1) coded the emerging themes, (2) looked at the manner the discourse was used and (3) concordanced the words which referred to teaching and learning.

Mercer et al. (2004) looked at how computer-based activities stimulated and improved the quality of children's talk and collaborative activity in primary maths and science, through a combination of these methods. Their methodological aim was to ease:

'the tension between wanting to analyse talk as contextualised activity enabled by naturalistic observation and the use of qualitative methods such as sociocultural discourse analysis, and to provide generalisable results based on a large sample of cases, as is made possible by experimental methods and qualitative analysis.' (p. 205)

They overcome this difficulty by combining different analytic methods. In this research I adopted a similar approach by combining analytic methods to the data analysis process, which was three-tiered. It involved focusing on:

(1) Content Analysis (enquiry groups, logs, interviews). This method involved going through all the data and cataloguing it thematically. Here the emphasis was on what was said rather than how it was said. This was a lengthy process as it involved transcribing all the text, which I went over three times. This was done first to actually write the words being used – what language was used, the manner, 'the how' in which they were being said, and finally to translate any native language words. Once that was done, I went through the text and coded in the columns of the text all the topics they had discussed. I then grouped these

topics into clusters, which were later divided into the sections shown in this data. Researchers may utilise existing categorising systems or develop their own. For example Underwood and Underwood (1999) used an interaction analysis schedule to analyse the dialogue between children. The problem with this is that at times it can result in coding which is not topic relevant. The creation of one's own grouping system (Loveless, 2001) allows for the system to reflect the actual language being used in that specific instance. This is a considerable theoretical and practical challenge. It is far from ideal as a tool on its own (Mercer et al., 2004), as it is dependent on the researcher's interpretation of the data.

(2) Conversational Analysis (enquiry groups). This method is widely used in the analysis of talk. It focuses on the understanding of how social interaction is achieved through everyday talk and non-verbal communication (Stokoe, 2000). This allowed me to see how the participants interacted. For example, as the sessions proceeded and the teachers became more familiar with each other, light banter was present in the discussions. Therefore emphasis was on the way the meetings were developed through identifying the patterns that emerged. Conversational Analysis was not a main tool in the analysis; however, it contributed in the presentation of the whole picture of what was happening.

(3) Concordancing (enquiry groups and final interview). This method looks at the language used from a linguistic usage point of view, thereby showing the way language items are used to reflect the meaning conveyed by the teachers. Here the emphasis is on the construction of meaning around set words; content and the form of the word is not marginalised, but is an integrated part of the analysis. By analysing the data in this manner, I introduced a quantitative approach within the study. I located key words within short extracts of the transcriptions through the Kwic facility of the programme, and then searched for their occurrence within all of the transcriptions through the line facility (Mercer, 2000).

The following is a discussion on how concordancing contributed to the analysis of the data.

The quality of evidence about the language which can be provided by concordances is quite superior to any other method as it analyses every single lexical item, either individually or in chunks. As Sinclair points out in his seminal work, *Corpus, Concordance and Collocation* (1991):

‘First and foremost, the ability to examine large text corpora in a systematic manner allows access to a quality of evidence that has not been available before. The regularities of pattern are sometimes spectacular and, to balance the variation seems endless. The raw frequency of differing language events has a powerful influence on evaluation.’ (p. 4)

Automatic concordancing of texts has been an established facility for many years, and for some special studies, manual or automatic concordancing (for example, to the Bible or Shakespeare) has been used. The early efforts concentrated on established literature, so that quotations and allusions could be located and figures of speech could be studied; there was no interest in sampling everyday language. The labour involved in carrying out concordancing has been reduced by the use of easy to use software. Before the creation of this type of concordancing software, only great works were concordanced.

For this analysis I used the Simple Concordancing programme Version 4.07. This involved saving the MS Word file transcripts of the enquiry group meetings as .rtf documents. By utilising the programme I was then able to scan the transcripts to isolate specific references to words. It worked more efficiently than Microsoft Word would have, as the words were highlighted using the tool, counted at the end, and their context linked to the codes. In the example below I scanned David’s interactions for the word *student*.

Student

David Meeting

- 138 'What is that?/(Rose) A student said I am going to'
254 'puppets, so this year's students went to the class'
282 'floppy./(Michelle) Martha's student has a web site, cool'

David Interview

- 14 'beneficial to, to give the students the chance to choose'
18 './.(David) But I found that students were much motivated/'
99 'be also made available to the students, I mean the students'
99 'to the students, I mean the students should should be'

Below is an example of the word *understand*. I first found the usage in Enquiry

Group Meeting 2.

- 55 '(Rose) but they understand more
56 (Marceline) some of them don't understand at all, they don't know how to express themselves at all
123 (Rose) the subject I told them it has to be related to the content but they could not understand it. Sometimes they have a composition with a picture of a cat, and they have to write, sometimes they ask you to invent the ending
125 (Rose) they couldn't understand'

After analysing the context it was used within during this meeting, I searched all other transcripts, including the interviews, as seen below in Greta's Interview.

- 15 (Greta) 'No he wasn't here, it's the first time here. This year the first time. Regarding children's work I was pleased, although I needed more time, you understand because since it's an hour lesson, till you go down to the lab and coming back, you always find some classes waiting when it's time.
120 (Greta) It depends what you mean by good practice, I can't understand what you mean
125 (Greta) No, no, we always have an aim when we are doing a lesson. Especially in the computer class who prepared it beforehand, as we have only one hour. So for example if you want to them to understand how to access to open a file, access their work, how to save their work, you know
195 (Greta) Of course some of them didn't even know what who Gypsies were, one of them stood up when we introduced the subject and said my mother is a gypsy teacher. Because he did not frankly understand what a gypsy was.
196 What did he understand?'

Firstly, analysing the context in which it was used allowed me to understand the meaning in which a lexical item was used. I was able to then quantify the usages.

For example, taking Greta's interview as an example of the technique, she used it twice with reference to the students, and twice to clarify something to me. She talked about how the students did not understand the ICT systems and the theme.

Concordancing the line would have shown the following, which quantifies the use of understand but not the meaning.

55 'the children/(Rose) but they understand more/(Marceline) some
56 /(Marceline) some of them don't understand at all, they don't
123 continent, but they could not understand it. Sometimes they
125) ending/(Rose) they couldn't understand it/(Michelle) it is'

By utilising this method above, I was able to recreate a more holistic picture of what was happening when analysing the data. During this process, the recurrent questions that were on my mind were: *how is the talk reflecting the process which is occurring?*

Coding of themes alone creates a lack of flow of description of the data and to an extent ignores the context (Coffey et al., 1996). To overcome this and to show the context present, I looked at the questions teachers asked and the turn taking that took place through conversational analysis, as these described the element of negotiating meaning. In addition to this, concordancing allowed analysis to be made of specific lexical items and how these were used throughout the meetings, thereby showing the semantic focus of the 'presenter' – the teacher leading the session – and her/his peers throughout these meetings. Both aspects were used to contribute to the answering of the questions *how were they using the language?* and *did the language used reflect the process that was occurring?*

As a result, the process was examined not only through the content themes, which emerged in the data, but also through the language used and the discourse patterns created by the teachers. This allowed me to follow their use of language throughout the research and to follow the process they were going through within the enquiry group.

An example of how the different research techniques provided a rich mapping of the data is shown in Table 4.5.1, which presents the results for the word *pupil*. This provides an overview of the general themes associated with the use of this word that were elicited by each approach. These are discussed in more detail later in Section 5 in this chapter.

Table 4.5.1: Results for the mapping of ‘pupil’

Coding	<i>Teaching logs</i> (mean occurrence)	<i>Meetings</i> (mean occurrence)	<i>Interview</i> (mean occurrence)
Pupils’ positive	4	5	9.6
Pupils’ interest in the subject	3		
Pupils’ difficulties		6	
Concordancing			
<i>Pupil</i>		3.6	2.2
‘They’ – with reference to pupils		96	71.8

This Table provides an example of the difference between coding and concordancing. The teaching logs, meetings and interviews using coding showed that the teachers discussed the pupils’ attitudes to their lessons. In contrast, concordancing the word, which highlights the number of times the lexical items *pupil* or *they* were used, showed that these words were not used specifically in the teaching logs. This is due to the fact that the teachers’ logs included their reflections on the lesson, automatically inferring pupils without any use of the word itself. *Pupil* however was then revealed as a theme within the logs through coding. These results are discussed in more detail in Chapter 5, where they are analysed in depth.

In addition to coding and concordancing, I utilised conversational analysis to gain an insight into the manner in which the discourse was being conducted. If we are to explore topical talk in conversation, whether treated by the speakers as related or unrelated to an informal agenda, we must first interrogate the notion of how the theme is established and maintained. The coding of themes is itself an illustration of

what is talked about, but conversational analysis explores how topicality is accomplished practically by participants in conversation. Themes are therefore conceived as things which are defined externally by the analyst after reading the transcripts and coding. Conversational analysis explores how talk is initiated and maintained, and moves between one participant and another to study the manner in which the discourses occur. An example of such an instance is when the teachers discussed pupil group work. Below, Martha is describing an incident that had happened in her class (Lines 90 – 96, Session 7):

In the analysis

(.) – indicates 1 second

= -- indicates overlapping of speech

(Greta) (.) 'they used word as well'

(Martha) = 'they used word as well, and the children I have 29

Video shows the class practice, teachers look at it, Martha indicates with her finger pointing to two students

Andrew and Gabrielle who are really good at computers, who are really good at it more than I am, so (she points to the student on screen)

He was, Andrew go and show them so he was the notion that he knew how to show them, don't do it I said, (emphasis) you show them and let them do it, and that's how we got along with one computer.'

For the purpose of this research, I did not need to transcribe the whole text in this manner, as I was present during the whole data collection and knew what was being said and what was meant by it. However, in order to convey such elements to others, this way of representing talk gives a clearer picture of the manner in which the discourse was held, and this approach focused on aspects of turn taking and questions.

4.5 Coding Analysis

To be able to code the text, all the text was collected under one speaker; then each line was coded in general. So all utterances that were spoken by a participant were put together, grouped according to the meeting they had occurred in, and then read so that the patterns could be identified. The language was then coded by the meaning that it was conveying.

The following example of this process, which features Rose in the third enquiry meeting, in Line 162 she is talking about how the students worked in a group; Line 179 is a question; and Line 193 regards student behaviour. Other examples from Rose's transcript are found in Section 4.11. Following this analysis, the codes were grouped into sections, for example group work, so that patterns of what was talked about and how often emerged.

- 162 (Rose) 'How they fight to have a go on the computer, did you see that group, they fought about the project when they finished a sentence'
165 (Rose) 'Mine are naughty'
167 (Rose) 'to say the story'
176 (Rose) 'How they enjoy it'
179 (Rose) 'Did you tell them about the birds?'
183 (Rose) 'Ah I see! So the ones inside know'
185 (Rose) 'Ah I see, I see'
187 (Rose) 'But you helped her'
191 (Rose) 'I prefer boys'
193 (Rose) 'Sometimes girls can be spiteful'
196 (Rose) 'Exactly, if when you tell them something they remain with that sort of grudge against you, the boys no, they love you. You can get angry with them and then after a while he comes and gives you a cuddle.'

The sub-themes that emerged from the enquiry group meetings were then further grouped under the broad areas of: Lesson Preparation, Computers Available, Group Work, Computer Application Problems, Student Difficulties and Questions. In Table 4.5.2 there is a sample of the way the data was put together after it was coded.

Table 4.5.2: Sample of coding spreadsheet

Teacher Initials	Code	Broad area
Rose	ICT – use of application	Computer application problems.
Martha	Hardware problem, classroom organisational issue that arose.	Computer application problems.
Greta	Students using software together when completing an activity.	Group work.

4.5.1 The teachers' logs

The teachers' logs (Appendix 4) provided another means for the teachers to write about their own development from their perspective, giving some insight into how they viewed their development and the issues they felt were important to their pedagogical practice. The questions in the log were concerned with lesson evaluation, that is, whether they thought that their lesson had been successful or not, and the reasons for this. All the participants completed their teaching logs except Martha, who described her practice in detail in the open-ended interview. She explained to me in the interview that she had a very difficult class that year, and all her energies were taken up with them.

Table 4.6: The themes discussed in the teaching logs

	Greta	David	Rose	Marceline	Mean Range
New Classroom method	3	4	3	5	3.75
Teaching objectives achieved	3	4	5	3	3.75
Lesson timing -- negative	3	2	3	1	2.25
ICT Issues	1	1	0	0	0.5
Student group work – positive	4	4	4	4	4
Students' interest in subject	3	4	1	4	3
Materials development by student	3	1	3	4	2.75

Below are examples of specific comments made on each of the themes listed above. The first two themes emerged from the questions in the log, while the rest emerged from the free discourse data they were encouraged to include in their logs.

New classroom method

This theme includes the classroom layout, the roles the students took on, and how they built their knowledge:

‘This is not a way I have worked before as the focus is more on group work rather than individual learning. Children are encouraged to share the things they have learned with their classmates. They have become the ‘teacher’.’ (David, Lesson 2)

‘They have looked for information on the Internet, particularly on the *brimba* site, and now they’re using the knowledge they acquired to construct the newspaper.’ (David, Lessons 4 and 5)

In fact, students in David’s class put together a newspaper directed at the Roma population, featuring news on sports, entertainment and various other items. This was something they had not done before.

Teaching objectives achieved

Here the focus was on the targets that the teachers had set, which were successfully met: ‘yes- although one can never be 100% sure’ (David, Lesson 1).

Lesson timing

‘I would have liked to have the time to go around the children to watch them more carefully to see how they were tackling the task, but we did not have enough time.’ (Marceline, Lesson 4)

‘I was pleased with my final lesson. Again, I would have preferred (needed) the lesson to be longer.’ (Greta, Lesson 5)

ICT Issues

This theme dealt with all the issues related to ICT, these being technical, resourcing and pedagogical issues:

‘The projector was not working and the server had some problems.’ (Greta, Lesson 2)

‘I would have divided the children into more groups if we had more computers because they were crowded and it was rather difficult.’ (Rose, Lesson 1; Rose had 4 computers at the back of her class and her laptop.

‘I could have let them browse first and ask them which parts they were interested in and let them choose their own topic.’ (Marceline, Lesson 1)

Student group work – positive

‘Work was done in groups. So everybody gave a helping hand. If it’s a picture or a line or a background, they did it! ‘(Rose, Lesson 2)

Students’ interest in subject

‘Although it was the first time for some of the children, they were interested especially in reading the Muscha story. They read through some of the material and tried to find out about the Roma’s history, caravans, food and customs.’ (Marceline, Lesson 1)

Material development by students

‘The children worked on sentences, creating ways to make the exercise interesting and worked on spelling.’ (Marceline, Lesson 3)

The teaching logs provided a means for the teachers to start reflecting on their classroom practice (*reflection on action*). This resulted in the teachers evaluating their lessons in terms of what had worked well and what hadn’t; further discussion appears in the summary of data.

4.6 The meetings

The purpose of the enquiry group meetings was to exchange information about what was happening in the classrooms. I did not chair these meetings, but one of the teachers did. The role of this person addressing the meeting (the presenter) was to start with information about how she/he was implementing her/his practice through a presentation and discussion of the video of the implementation of the Romany materials within her/his classroom. This provided the scaffolding for the meeting.

I had originally adapted to the teachers' needs by providing teaching ideas and materials for the use of the Romany materials, and setting clear objectives before the meetings (in the pilot). In this way, I had set up their cognitive task structuring (Anghileri et al., 2002). The teachers then took up this responsibility in their group by starting the discussion with what they had completed in class, setting up their own cognitive task structuring which maximised the opportunities for instructional dialogue between them.

As already mentioned, a teacher was responsible for 'chairing' the exchange of information during each meeting. The teachers were asked to talk about what happened in their classes and addressed these questions:

- What had happened?
- What had worked well?
- What would they have changed?

They showed their work through the video recordings, and their peers then asked questions about what had happened. The above questions helped them structure their presentation on what had occurred in their classrooms. The idea was that this would create a focus for the discussion and act as a trigger for discussions related to pedagogy.

First the teachers and I looked at the videos. This was then followed by the above discussion. The issues the enquiry brought up and discussed were solely based on what they thought was relevant or what they felt they needed to share with each other. As a matter of fact, the issue of the layout of the classroom was brought up by most of the presenters, except for Greta, who had held her classes in a computer lab with the assistance of an IT teacher and her teaching assistant Joyce. The meetings covered a variety of issues, from the lack of computers to the number of pupils and the need to re-organise the classroom furniture.

Within each of the five enquiry group sessions, the interaction allowed for questions and other issues to be addressed throughout the session (Table 4.7). The following themes emerged after coding:

- Lesson preparation – not only from the teacher chairing the session;
- ICT issues – both positive and negative issues due to computer availability in class;
- Student difficulties – both behavioural and special needs;
- Questions – these ranged from concept checking questions by the teachers during the presentation, to asking for clarification and information on the software.

Table 4.7: Issues addressed by the ‘the presenter’ of the enquiry

	Greta (session 1)	David (session 2)	Rose (session 3)	Marceline (session 4)	Martha (session 5)
Lesson Preparation	Lesson preparation, how to do it	Theme and difficulties it caused Use of a class-based approach being ‘ok’			
ICT issues		Layout of lessons Difficulty sending emails Technical difficulties, e.g. use of hyperlink in the integration	Layout of lessons Need for computers in class, not lab Sceptical about ICT	Layout of lessons Technical difficulties	Layout of class

		of a comprehension activity	integration		
Student group work positive	Talked about how the students enjoyed working with their friends	Dependency on the brightest student in group work	Students help (each other) High ICT ability of one the students	Creativity of students	Talked about students enjoying working with their friends
Student difficulties	Problems encountered in lessons -- behavioural ones	Special needs issues		Special needs issues	Team work issues
Type of questions asked by the presenter	She did a lot of concept checking, as she was the first presenter of the group		Concern about the students' product	Classroom discipline issues	Children's behaviour. Exam pressures

Once the teachers understood the curriculum context, the resource, and how it was going to be used within the class, they did not ask concept checking questions – the questions were more focused on the procedural elements.

Marceline asked the most questions during the initial stages of the research, as she felt the least confident in the group. She did not use a computer at home and her questions were based on finding out what her colleagues would do in a specific situation and whether her judgement coincided with theirs.

In Table 4.8 the parentheses indicate how many times the themes outlined above were mentioned in each of the sessions 1 to 5. For example, Greta mentioned lesson preparation 7 times in total, and once in the first session.

Table 4.8: Issues discussed collaboratively in the five meetings

	Greta <i>Did not attend Session 2</i>	David	Rose	Marceline	Martha <i>Did not attend Sessions 3,4</i>	Average
Lesson preparation	7 (1,0,3,2,1)	4 (0,0,3,1,0)	8 (0,3,3,2,0)	8 (4,2,2,0,0)	7 (1,1,0,0,5)	6.8 (1.5 per person/session)
Student group work positive	1 (0,0,0,1,0)	6 (0,0,1,4,1)	7 (0,5,1,1,0)	6 (0,0,1,3,2)	7 (0,0,0,0,7)	5.4 (1.2)
ICT issues	5 (2,0,2,1,0)	3 (2,0,1,0,0)	11 (4,5,2,0,0)	4 (1,0,0,3,0)	3 (1,0,0,0,2)	5.2 (1.2)
Student difficulties	0 (0,0,0,0,0)	5 (0,3,1,1,0)	6 (0,4,2,0,0)	15 (3,5,2,5,0)	21 (5,8,0,0,8)	9.4 (2.1)
Questions	14 (5,0,2,2,5)	2 (0,0,2,0,0)	16 (9,1,1,5,0)	42 (23,13,2,2,2)	15 (13,2,0,0,0)	17.8 (4.0)

Table 4.8 shows that ICT issues declined as the sessions progressed, only being mentioned in the last session by Martha, who had missed the previous two sessions. Similarly, lesson preparation was focused on at the beginning, and then their focus became the students and their difficulties. Questions were asked mainly at the beginning of the research exercise, with Marceline asking 23 questions in the first session and only two at the end; and Martha asking 13 questions at the beginning and none at the end. Examples of Marceline's questions in the first enquiry meeting – led by Greta -- are here below:

162 (Marceline) 'What are your normal computer lessons? what do you teach? what do you normally give them?'

164 (Marceline) 'not about this what about this, I mean when you do computer lesson'

166 (Marceline) 'do you take one subject for example like me?'

168 (Marceline) 'computer skills?'

During these meetings the teachers reflected on what they had done in their classrooms. This discussion allowed the teachers to structure their thoughts through the support of their peers, thereby allowing them to refine practice by focusing on what they would do to improve future actions, (*reflection towards action*; a discussion of this term is found in Chapter 2.3.2).

4.7 Conversational Analysis

Conversation analysis helps to portray the meaning of language used within a context, and context limits the range of meanings that can be selected. There are meanings that are expected and appropriate to contexts of all kinds, ranging from what you would expect in a classroom to what you would expect in a supermarket. The second is the lexicon available to each of the speakers – the range of language use that they are able to utilise. For example, some speakers might find it difficult to integrate into a discussion at a literary luncheon.

Conversational analysis allows the reader to understand the manner in which the teachers discussed a theme. Even if the lexical item is the same, the analysis looks at the context it is used in. The video helps in descriptions of this nature as it is a visual means of collecting data. In the example below, Greta (interview) is talking about group work which she carried out during her lessons. Through this excerpt it can be seen that it was not just the group work which was her focus, but her role in the classroom as it was happening:

135 'I think it is a difference if you work in a lab or in the class it's different as well. In the Lab they are all facing the computers so they are eager to start whatever you are telling them to do.'*(emphasis)*

Then she goes on at a later stage to say:

138 'Ah (she smiles) and with group work it was even more fun because they were working in groups'

The use of concordancing of the above text would have marked this as talking about group work. The content it refers to is not specified, coding this data allows for the fact that in the first instance Greta's main argument concerned the place where the activities were being held– her emphatic tone indicated this. In Martha's meeting, the example below, David was being positive about how his pupils had reacted to peer collaboration, but this can only be understood when one understands how he was

pausing between one lexical segment and another, marked below as (..) He talked about how control was transferred from him to his students, the undertones of the conversation were positive:

48 'first they choose what they wanted, I mean we started with the topic Gypsies so, there was some control, but then (*emphasis*) they chose what they would like to find out (..)' (Enquiry Group Meeting 5)

To be able to depict a holistic picture of the meetings, conversational analysis also allowed for the analysis of the length of social and administrative talk, who is taking control of the meeting and the type of questions asked, as mentioned earlier. At the beginning of the research analysis, these were areas which I was focusing on, but the focus then shifted more towards the study of how they were utilising language to discuss what was happening in their respective classes and concordancing became a more useful tool in the mapping of lexical items throughout the research.

4.8 What was discussed

The transition between activities was not distinct, as the teachers tended to form discourse in the sessions around a description of events. At the beginning of the process, the teachers felt insecure and not part of the group. Their discourse did indeed focus on the lesson preparation, but computer application problems were always expressed with reference to the students. These are depicted in Table 4.8 where the students' reaction to group work was discussed further during the third, fourth and fifth meetings. It was only during the last part of the research, in the interview (Tables 4.9 and 4.10), that they referred to the fears they had originally felt, how the activity had affected them, and the support they had found within the group. For example, Marceline moved away from issues on preparation and discipline problems:

224 'the parents to get rid of them, found the information and printed it.' (Enquiry Group Meeting 3)

Here she is referring to the fact the parents prepared the students work:

154 'and the first time they were, I mean distracted, they weren't really concentrating on, I mean the first time maybe because of the...'(Enquiry Group Meeting 4)

To discuss issues on personal confidence and time management:

10 'you know I was not so confident like when I am teaching in the classroom, I lacked confidence that was what I felt.' (Interview)

12 'and the fact we don't have them in the classroom, the computers, I mean with continuation of work, there is a limited time and you have to leave the computer room, you have to leave the work and even the children you have to tell them listen you have to stop, so that's a problem.' (Interview)

4.9 The interview

Following the implementation of new pedagogical practices, I visited each of the five different schools to hold an interview. This took place in a quiet and private place out of the classroom but within their schools. The teachers were asked to discuss issues which they had not discussed during the meetings, including the influence of the other teachers upon their teaching practice and how they felt they had changed.

The focus and setting for the interviews differed from the enquiry group meetings. The focus for the interviews was reflection upon the training process and how this had influenced classroom practice – in other words, *retrospective reflection* (term discussed in summary of data Chapter 2 Section 3.2. Here the teachers compared their present pedagogical practice to previous methods and discussed what had influenced their change.

Interviews were carried out in quiet rooms. The questions I asked only served to prompt their reflections (Appendix 6). The themes were identified through the concordancing tool described earlier, where the context was first looked at to understand meaning and the words that referred to them were then counted.

Table 4.9: Comparison of the themes mentioned in interview

	Greta	David	Rose	Marceline	Martha	Average
Creativity	2	2	1	2	1	1.6
Other teachers	3	9	37	32	20	20.2
Less on timing	2	2	2	1	2	1.8
Aims	2	1	1	1	1	1.2
Student group work	7	14	18	1	8	9.6
Computer application problem	1	3	2	2	4	2.4
Student differences	3	1	2	1	4	2.2
Change	3	16	9	20	18	13.2
Construct. Learning (student)	3	5	6	6	7	5.4

Table 4.9 details the frequency with which each of the themes was mentioned. There were several comments on each of the sections since the coding had sub-themes, as mentioned previously. However, for display purposes, I had to group their comments in the above sections.

Table 4.10 expands the Table by providing the instances of the themes, with the addition of responses to the interview question about their future practice.

Table 4.10: Individual themes

Themes	Greta	David	Rose	Marceline	Martha
Aim	Group work Aims achieved	To work as a group Activities kept going on for a long time	To involve parents	Before a new project you have to start with something you know. I started with the idea of creating sentences.	Children asked questions and researched answers on the computer
ICT issues; computer applications problems, staff attitude towards ICT + computers available	Head changed; attitude towards IT different Need computer in class	Limitations of computer, one did not work so 3 in the class .	I was scared at the beginning, I admit	She felt that she was not the computer teacher at the beginning and hence would have IT problems 30 minutes not enough	Students were not 'internet trained' One computer for all the class Students had computer classes, but did not even know how to use the shift key
Group work	Leader, bossy child Deleted work Fun They work all the time	The motivation was high Working in groups should be done earlier	This project helped them to work together, and I think they learned new things	Not all the students have computers at home, so first they had to get used to the computer They were constantly discussing what they were going to do	Certain groups worked well together. Others all wanted to be leaders A change in the way the students worked together
Creativity	Poetry -- will use again next time	No strict boundaries as extra-curricular They are discovering their world around them	The children enjoyed listening to the story, It was as though it was mine	Creative work is good for the children	Freer activities on ICT to paper-based approach

Change in the classroom	New skills developed by students	Meetings very fruitful as you hear other teachers' experiences	It was important we did it out of school. I put it down in my development programme	The 4th and 5th lesson were really good	All the teachers and pupils came up with different activities
	Positive experience			All the time we spoke of different ideas and the children	
	Downloaded pictures from the Internet for the first time	You learn a lot when you share ideas	We shared ideas and we shared our difficulties.		Other teachers resist change, I found this to work well and will continue to do so
	Integrated with other subjects	Students came up with the materials on their own, the teachers role to guide them	Some of us took others' ideas and adapted them to their own classes		
		Learnt from the children some things about using the computer	I never was against IT. I never sat down and said I should start doing it, but now I want to use it		What I learnt before was through trial and error. Courses do not help you through mistakes, other teachers do help you.
		Learnt a lot from this			
Future	Will use group work and creativity exercises with ICT	Will use the computers to do the same sort of activity, integrating it with English.	For the students before the computer was just a toy, now they know and use it as a research tool and they can do creative writing on it	I hope it gets better but it has to be included within the curriculum, not as a separate subject	Will use the computer as a research tool in future activities

The teachers found that their role in the classroom was different to what they had previously been used to. This issue and their training influenced their practices, and these were discussed in the reflective interviews. There is an overview of the methodology the teachers used and the role of the interviews in the research in Chapter 3, Section 3.8.

4.10 My role

I was interested in exploring my emerging role over the sessions, and to this end I used conversational analysis to examine the nature of any discourse in which I was involved. At the beginning of the research, I was perceived as the organiser and the provider of information. This changed, and during the enquiry group sessions I was perceived as the facilitator. As Martha pointed out in her interview:

183 'and then we started, first we had this whole group of teachers and then it became us five. For us it was better, maybe it wasn't good for you but for us it was good in the sense it was informal on the table it was not you and me it was us'
185 'The you and me, the you there and me, turned into us.'

As the enquiry meetings progressed, it was only necessary for me to participate towards the beginning and at the end of each meeting. During the interviews my role changed again: I was the listener, a vehicle for reflection, recording what they were saying.

The following examples are evidence of the different language I used. In the first example, I am giving input about the font and usage (in my role as organiser of the research); in the second, taken from a later stage of the research, I am asking questions about their development (to be able to evaluate the effectiveness of the method); and in the third, I am just asking questions to instigate discussion (to be able to record their thoughts).

The following is taken from David's session:

50 (Michelle) 'Yesterday I had another meeting they have arranged the font, you can click on the size of the font to make it larger, what else was there that came up... the pixels, that is fixed that is it. em that is it. Before we start when shall we meet again, just in case someone has to leave a little early, where shall we meet, What do you think? You were mentioning Comenius when is that?'
240 (Michelle) 'this is what we were talking about earlier'
247 (Michelle) 'Look at the background look at these two'
250 (Michelle) 'Ok at this point we stopped because the teacher came in to tell us injections'

Below is an example of the language used, further on in the process, during Marceline's session:

120 (Michelle) 'How is it going David?'
367 (Michelle) 'So in a way they're constructing their own learning aren't they?'
369 (Michelle) 'Ok, did it affect you, was it because the children were constructing their own learning? '
371 (Michelle) 'Ok, this is what you were saying earlier, ok'
378 (Michelle) 'It's ok though?'

An example of the interaction during interviews comes from Rose's interview:

102 (Michelle) 'Yes ok how do you think ICT should be used in the classroom? (this is an interesting one)'
104 (Michelle) 'Ok, what did you understand? What was the outcome?'
106 (Michelle) 'Could it be that children are so stimulated by computers?'
108 (Michelle) 'Yes'

4.11 Specific lexical items - Concordancing Analysis

The above section looked at the way speakers packaged their thoughts through individual discourse patterns and how the meetings developed. However, by analysing specific lexical items, such as *learn*, I was able to compare the semantic meaning the teachers gave to specific lexical items through concordancing.

By utilising concordancing in my research, I was able to establish the use and frequency of use of words. By distinguishing features of the citation, through coding I was able to offer an explanation of the occurrence. This allowed me to analyse:

(1) The pattern of word occurrence in texts by selecting specific words. The criteria for word selection were the semantic fields of learning and teaching. So words with the roots *teach* and *learn* were listed as these reflected the teacher's focus.

(2) Comparison of usage of words by different users.

The following provides the results of the analysis of the most frequently used words *students*, *they* (students), *work* and *learn*. For each one of these, there is an illustration of how the teacher used it, through concordancing of text. In this instance word usage is not being examined; only the counting of the words is being carried out as an indication of the subject that was being addressed.

Table 4.11 (a): *Student*

	Greta	David	Martha	Rose	Marceline	Mean usage
In the meeting	1	3	2	4	8	3.6
In the interview	1	4	3	2	1	2.2

Marceline Meeting

- 94 (Greta) 'One of my students worked with slides, 2'
 95 'opinion, is that even those students who are weak you'
 167 (David) 'For example, my students whilst they are'
 297 ' him the sentence, the other student sat back and wonders'
 305 (David) 'To get thirty students to work on the'
 306 'in an hour/(Marceline) How many students/(Michelle) David has'
 307 (Michelle)' David has thirty students, they are very quiet'
 307 'they are very quiet your students/(Greta) Mine got'

Table 4.11 (b) *They*

They, which is third person usage, was here specifically used to refer to the students.

	Greta	David	Martha	Rose	Marceline	Mean Usage
In the meeting	160	90	146	97	119	96
In the interview	61	92	124	50	32	71.8

Please see Appendix 7, for the result of the concordancing of *They* in Rose's meeting, it shows how Rose used *They* to specifically refer to the students.

Table 4.12: Work

	Greta	David	Martha	Rose	Marceline	Mean Usage
In the meeting	37	19	18	22	48	28.8
In the interview	38	17	23	41	21	28

Martha meeting

15 'ok, this is where she worked/(Martha) this is a'
 24 'computer, everyone wants to work on it, because the'
 24 'that. So I decided one day to work comprehension on computer'
 34 'So they are working on the comprehension'
 37 'them the answer, they were working on the computer, maybe'
 42 'thirty minutes so that you work in class, because I'
 78 'children would have prepared work much more better'
 89 'of six as a team then they worked one for every two, this'
 97 'class was very quiet, people working together around there'
 108 'to do all, when they did this work, what they did last year,'
 108 'when they did this kind of work they have to be boys,'
 109 'class was it motivated and it worked well/(Martha) it was'
 110 'you're in a team you have to work together its up to you'
 114 'thing you're doing this kind of work together and... Yes they'
 130 'this time around they worked hard on their own, I'
 134 'the other three groups are working and I did not help'
 195 'went home and did extra work/(all) um hum'
 197 'Easter, even you planned to do work over the Easter holidays,'
 197 'never done that with my my works/(.)/(Michelle) you'

Table 4.13: Learn

	Greta	David	Martha	Rose	Marceline	Mean Usage
In the meeting	1	2	14	2	14	6.6
In the interview	3	25	28	15	5	15.2

Greta meeting

217 'be able to help each other, learn from each other and take'

Teachers using these specific semantic fields show where their thoughts are focused – language is an external representation of their thinking. Thereby, when a teacher utilises the word *work*, their cognitive process is thinking of the why and how of work, (Laurillard, 1993).

When I concordanced the lexical items above, the trend emerged that teachers were thinking of the students more during the enquiry group meetings, as per Tables 4.11 (b) and 4.10(a), than during the interview. This is natural since in the meetings the focus was on the video of their classroom practice, whilst the interview was concerned with reflections on how they felt they had progressed even though they did talk about classroom practice in both. Also the teachers used *learn* more frequently in the interviews, which also add to the picture of them doing things in the meetings and then concentrating on what they and their students had learnt in the interviews.

4.12 Summary of the data

Table 4.14 shows an overview of the dominant themes that emerged by subject.

Table 4.14: an overview of the themes

	Greta	David	Rose	Marceline	Martha	Instrument
New Classroom method	3	4	3	5		Log
Teaching objectives achieved	3	4	5	3		Log
Student interest in subject	3	4	1	4		Log
Lesson timing	3	2	3	1		Log
Student group work positive	4	4	4	4		Log
Lesson preparation	7	4	8	8	7	Meetings
Computers Available	4	-	4	6	11	Meetings
Student group work positive	1	6	7	6	7	Meetings
Computer application problems	1	3	6	4	3	Meetings
Student difficulties	-	5	6	9	10	Meetings

Other teachers	3	9	37	32	20	Interview
Group work	7	14	18	1	8	Interview
Change	3	16	9	20	18	Interview
Constructivist learning students –	3	5	6	6	7	Interview

Each instrument was utilised at different stages of the research and yielded different themes, which ranged from teaching objectives to new pedagogy (constructivist learning) which had been implemented in the classroom.

The logs were utilised while the classroom activity was being carried out. Therefore the focus was primarily on the students and how they were reacting to the exercise (reflection on action). While the transcription of the meetings showed how new practices were identified, issues related to new pedagogical practices – such as how to prepare the lesson – were discussed, and computer application problems were highlighted (reflection towards action). Finally, during the interview, reflection occurred on how learning had taken place (retrospective reflection) and, therefore, how themes such as change and constructivist practice had emerged.

One theme which was prevalent in all instruments was the issue of group work. In the initial questionnaire, only David and Rose had used group work within their classrooms. During the meetings and the final interviews, all the five teachers talked about the positive influence group work had had in the classroom. The Romany software was designed to utilise group work and its introduction represented a challenge for the teacher who had not used this approach before. The fact that their experience was positive is important to note; whether this was in part due to the enquiry group process will be considered later.

4.13 The factors that influenced the teachers

A dominant theme that emerged was 'other teachers', that is, the influence of the enquiry group on their practice. Table 4.15 represents the influences on individual teacher development collected in the last interview held with the teachers, where they reflected upon what had happened and what had influenced them throughout the process. I had prepared a diagram made up of concentric circles these were a visual representation of the themes, asking the teachers to place the most important aspect at the centre. They were then asked to use numbers 1 to 10 to rate the influence of each on their developing understanding of their classroom practice. Using this approach to reflect during the final interview allowed the teachers to focus specifically on the issue being discussed. It also allowed me to compare one discussion item in all the interviews. The Table below summarises the results.

Although other factors were a greater influence on their development, I had been the one to instigate the process. They did mention that the teaching ideas I had put forward at the beginning had influenced them. However, I believe these were useful as a launching pad for their reflections on how to integrate ICT within their pedagogical practices. Rightly so, the children and the other teachers were listed as the main factors that had influenced their development. The Table below represents the direct results of the numeric value the teachers allocated to the concentric circles.

Table 4.15: Teachers' perceptions of the relative Influence on their professional development during the research (data from the interview).

	Greta	David	Martha	Rose	Marceline	Average
Teaching ideas – Romany materials	8	7	8	8	6	7.4
The children	10	8	4	6	8	7.2
Enquiry group teachers	-	10	6	7	10	6.6
Website	6	6	10	-	4	5.2
Michelle	4	2	-	10	2	3.6
Trying something new	-	-	-	6	5	2.2
The classroom facilitator	8	-	-	-	-	1.6
The theme -- the Roma	-	-	2	-	-	0.4

The above were the main factors quoted by the teachers. Their pedagogical perceptions (Loveless, 2001) on how ICT (Chapter 3) should be used in the classroom and their IT skills were not mentioned at all. Yet one of the teachers, Marceline, asked a lot of procedural questions throughout the enquiry group meetings. This was because she felt unsure of her ICT capabilities, as highlighted in the Table in Section 4.1. She had never used ICT within the classroom as she felt she needed more hands-on experience in using IT within the classroom in order to be more confident in its use. My interpretation of her behaviour is that she was able to view her pedagogical experience and confidence as something quite separate from her use of ICT. When she realised that the other teachers were completing pedagogic tasks that she could do, she was able to use ICT in her classroom. Despite this, after the exercise she still did not feel confident using ICT. Yet she was in fact very pleased with the work she had completed. The following excerpts are from her interview at the end of the implementation exercise:

'yes, yes, um.. the main problem as I told you last time was I am not a computer teacher I mean normally I do not go with them in the (computer) classroom, so that for me, I think, that was a disadvantage because' (line 8, Marceline Int.)

'..you know I was not so confident like when I am teaching in the classroom I lacked confidence that was what I felt.' (line 10, Marceline Int.)

'I know myself I feel like for example I am confident in the classroom, ok, there's a problem most of the time, I can't say you know I can handle it I know what I am teaching where there's a problem I know how to answer you know. But when it comes to using the computer you know it is different since you're not there all the time you find it hard' (line 73, Marceline Int.)

In this instance Marceline was referring to the fact that when the children were working on ICT, they were working with another teacher, yet she felt that it was:

(Marceline) 'positive especially the children worked well after two or three lessons they were more confident and they loved the work, the computer is something new, something you know that never ends, so they could do

everything. I mean that's that's very good for the children and they used their thinking skills they they worked together you know' (line 14, Marceline Int.)

The enquiry group had challenged her perception of ICT usage and her perception of the skills required for successful integration had changed from being merely technical to pedagogic. She completed the work in a very creative manner with the support of her peers. The Romany materials were the catalyst for pedagogical change, as ICT had been a major barrier for her. The enquiry group provided an empowering environment for Marceline to change her teaching practices. The focus was the pedagogy within the enquiry, to which she could relate.

The evolution of the teacher's role when constructing a supportive environment for learning with ICT within the classroom has also been noted in other recent research which involved the international study of technology innovation in 28 countries (Kozma, 2003). It has meant that the teacher's role has shifted from one of instruction to one of advising, structuring, guiding and assessing. In the SITES (Secondary Information Technology in Education Study) project it was found that the school cultures were supportive when managing the changing interactions within and outside the classroom. In this study it was not the school support which helped to effect change, but the teachers themselves in the enquiry group allowing them to transform their role in the classroom. The teachers did not act as instructors but as advisors on how to use the Roma site. It was this enquiry group that helped the teachers to talk about the challenges they had faced and the way they had overcome them.

4.14 Conclusion

The aim of this research was to find out the ways an enquiry group could support the introduction of ICT into the classrooms and the role reflective practice had within this process.

I looked for information about changes to practice; this was not taken from classroom observation because it is difficult to understand practice from a snapshot of a classroom. Therefore I decided to explore the enquiry group process by using videos of the teachers' classroom practices and their explanations and discussions of these to reveal their developing understanding of practice. The premise was that the ways their language might change would be an indication of their changing understanding of pedagogy and their classroom practice.

This chapter has provided an analysis of the data collected within the enquiry group study using the three approaches: coding, conversational analysis and concordancing. This analysis set out firstly to explore the nature of the discourse within the enquiry group and also to see how this had changed. This will be developed further in Chapter 5.

In this research the concern was how the teacher played a critical role in her/his own development. Through the data collected it was possible to frame this development within three reflection modes: the teacher's log, the meetings and the final interview.

The results showed that these provided three different ways of working:

- (a) Teachers' logs – *reflection on action*.
- (b) Meeting – *reflection towards action*
- (c) Interview – *retrospective reflection*. Here they compared their present pedagogical practices to previous methods and discussed what had influenced their change.

The different methods of collecting data did indeed provide different results. The tool used reflected the pedagogical process the teacher was experiencing during the research. For example after the class, completion of the log allowed time for reflection on action.

The analysis set out to explore whether the pedagogic language the teachers used had changed (Chapter 2). By utilising concordancing and grouping discourse used in themes and coding to reflect these themes, I was able to show which lexical items were used, the amount of times they were used, and the patterns that were occurring during the enquiry group.

The data analysis showed that the language and the themes they used varied over time. At the beginning of the enquiry group process, they were focusing on procedural issues and 'the students', and by the end the focus had changed to 'how it was being carried out', the methodology that was being used within the classrooms, and the skills the students were learning.

An integral part of the whole organisation of the implementation of the training was the organisation of the physical structure of the meetings, who was going to talk next, and what was happening in their lives at the time. Yet, contrary to expectations, the actual social/administrative discourse did not take up chunks of their meeting time – it never exceeded 13 minutes of the hourly meeting.

In conclusion, the data showed the reflections the teachers made while the physical integration of ICT was occurring within the classroom, and the way their discourse focus changed over the period of time during which this project took place. Hennesy et al. (2005) call these Technology-integrated Instructional Conversations, or TIC. During these conversations, strategies were devised in response to the shifting socio-cultural system which framed the classroom activity and pedagogical

reflections. New methods were tried out by teachers, which resulted in themes being discussed and reflections on their own personal development occurring.

- In Chapter 2, I outlined the following research question: *what might influence the changes in classroom practice?*

The enquiry group was set up as an alternative to more traditional approaches to supporting the use of ICT in the classroom, which had been shown to have little impact. The interview data revealed that the teachers valued most highly the teaching ideas in the Romany materials, the reactions of the students to the work, and the enquiry group in relation to influencing their professional development during the research.

The next Chapter presents further analysis of the data to explore in detail how the enquiry group influenced classroom practice and the professional development of the teachers.

Chapter 5 The change in the teachers' classroom practices

5.1 Introduction

In Chapter 4 the results of the transcripts of the meetings, logs and interviews were analysed through coding, conversational analysis and concordancing. This chapter provides a further discussion of that data in order to examine the influence of the enquiry group process on the teachers' professional development. To this end, this chapter will examine the change in practice and pedagogic understanding that occurred during the research by looking at:

- 5.2 The changes in the teachers' classrooms
- 5.3 The value of the enquiry group approach compared to the other CPD models
- 5.4.1 The evidence of change in understanding of effective classroom practices – changes in discourse
- 5.4.2 Reflections on the analysis of the data
- 5.4.3 Language use
- 5.4.4 Increase in use of meanings of the same word – group work
- 5.4.5 Creativity
- 5.4.6 Co-construction of knowledge
- 5.5 Critical incidents
- 5.6 Reflections and enquiry group meetings.

As discussed in Chapter 4, there is evidence that a major influence on practice in this research is the enquiry group itself. Difference and diversity dichotomise individuals and groups into self and other, us and them. Homogenous as a group may appear to be from either an insider or outsider position, there will be distinctions that matter. Some types of individual distinctiveness were valued within this group; the access to ICT was one such difference in addition to teaching experience. The participating teachers accommodated each other, working with these individual differences within the group.

Each of the teachers was distinctively different in how she/he used the S.A.I.L. web resource within the classroom, and each individual played a critical role in how she/he chose to work on integrating the Romany software materials, and on structuring, sequencing, monitoring and assessing learning. As a result of this, each teacher's classroom practice was different, and further details are discussed in Section 5.4. An overview of Lesson Content compiled from the teachers' logs and researcher's journal is depicted below in the Table 5.1.

Table 5.1: The teachers' development of practice.

	Lesson1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Marceline (students age 8 -9)	Students browsed in the Roma website; familiarization and to look for information which was discussed.	Again students browsed through website looking for information. This time more on their own.	Discussion first. Then children wrote up different types of exercises like; jumbled sent. Number codes etc. They went on Power point and started blank presentations	Continuation of last lesson. Children experimented with fonts and layouts of texts. They were able to work more on their own.	Children entered each other's files to work out the exercises. They engaged themselves in solving the puzzles and working together.
David (students age 9 -10)	Reading; to select the most important characteristics on the Roma	Students presenting a point they had read upon through puppets, chants and poetry	Setting up of a newspaper. Pages distributed out.	Researching topics and investigating areas dealing with the Roma.	Putting together a newspaper aimed at a Roma audience.
Rose (students age 9 -10)	Using print shop students wrote letters to Muscha including hieroglyphics text.	Presentation of poetry via students. Then students worked on a comprehension and free writing activity	A power point presentation re news in a school magazine is read to students then they replied via email,	Created a role play. Then different groups organized an act, dance or mime.	Students prepared an animated power point presentation on an imaginary conversation held with Muscha.

		using word.			
Martha (students age 9 -10)	A game; a form of a comprehension were they had to relay information.	Writing of a Thank you to the Emperor who received the Roma with dignity.	Copy and Paste taught; working on poetry	Creation of own rhyme schemes after last lesson	Brainstorming about the Roma and presentation, via charts.
Greta (students age 9 -10)	Research work through internet; awareness of diversities in our societies; given comprehension questions.	Sentence construction. They wrote letters to their mayors re the Roma situation.	Poetry; creativity through rhyming.	Development of poetry; reading each other's work on ICT	Development of a power point presentation

5.2 The changes in the teachers' classrooms

Despite the ICT resource limitations that some had (for example, Martha had just one computer for her class of seventeen boys – she did not have access to the computer lab for her classes), the teachers all managed to integrate ICT within their classroom practice.

The ways their practice changed with regard to ICT usage within the classroom is described below. The following information is taken from the baseline questionnaire and from classroom observations.

Greta was the most experienced ICT user in this group of teachers. She used the computer for English reading texts and also taught some ICT skills. Students would sit on the individual machines and work in isolation on the exercise she had set them. During this research she tried new formats within the classroom, utilising group work and pair work. Students completed poetry together on one computer. This was not a methodology she had used previously. As she felt that it had had a

successful outcome, she intends to continue working in this manner and to also work in a more creative way when using ICT.

Before starting this exercise, David used ICT to reinforce work carried out in his Mathematics classes. Again this was done in an individual manner, whereby students were allocated specific times to carry out exercises. After listening to his peers in the enquiry group, his students digitally created a newspaper which was circulated around the school. Eight students worked together on various creative aspects, from designing the format and layout of the newspaper, collecting content, and creating the text and the graphic design of the work. This resulted in David wishing to integrate more ICT in his English classes. He also found that it was possible to use group work successfully with the students.

Rose felt wary of ICT before starting out on this research exercise. The computers were used by the facilitators when they came to her classes and the students used to play games on them during their break time. With the support and encouragement of her peers in the enquiry group, she created a digital book. The students worked in groups of three to four students. She felt that the outcome had been very positive and is keen to work with students on computers for research purposes and creative writing activities.

Marceline felt so insecure at the beginning of the research. She asked several questions and was unsure of what she was meant to do. She integrated ICT usage within her class by allowing the students to create their own reading exercises with codes. Students created a passage on the Roma which was then encrypted, and their friends had to find out what they had written. They worked in groups of three to four students. They conducted research, emailed their work to each other, and created Power Point presentations. Marceline found that she could use ICT more than she had already perceived and believes it has to be included within the

curriculum and not as a separate subject. She will also be using group work when working with computers in the future.

Martha had not previously used computers with her students. She was in the rather difficult position of not having access to ICT with her class. During this research exercise she convinced her head of school to allow her to use one computer with 17 of her students. She carried out a text reordering exercise and a comprehension which was developed into a chart. Students took it in turns to access the computer to find information.

The teachers worked together in the enquiry group, helping each other construct their knowledge about pedagogic practice. The individual contribution made to the group by each teacher is evidenced by the large number of questions they asked of each other – an average of 15.8 per person per enquiry group meeting (see Chapter 4, Table 4.9). In addition to this, the themes they discussed in these meetings ranged from topics such as the computer layout; the way they developed their practice through lesson preparation, student difficulties they faced, and the amount of ICT available in the classrooms (see Chapter 4, Table 4.9). This was in total contrast to the teachers' log data, where they wrote about the actual practice they had carried out in the classroom, focusing on how the lesson had progressed (see Chapter 4, Table 4.6).

In the enquiry group, David talked about the difference between the class based approach and a partial IT based approach:

262 'The problem is that of the children on each computer, if I send two children on the computer there is only 8. That means that there are 22 children and they still have to use paper. The advantage we have is that we have that monitor, although when using it you have to give your back to the children and I don't like doing that, the way the class is built. However when you have a class based approach it is ok.'

Meanwhile, in his teacher's log he wrote about the students' perspectives towards the activities, and not his own thoughts as the above.

The following Section explores the enquiry group process and provides some evidence for the ways it supported change and for the actual changes in pedagogic understanding that occurred. It presents evidence for the fact that the enquiry group provided the setting for a discourse about practice and change in understanding of pedagogical practice to occur, something that does not seem to be naturally facilitated in schools.

5.3 The value of the enquiry group approach compared to other CPD models

Constructing knowledge through the sharing of practice in the staff room and in school settings has its limitations. The teachers were indeed aware that in the world outside the classroom ICT is of importance; however, its importance within the classroom is another issue (Cuban, 2001). For example, after studying the technology uses of 78 K-12 teachers, Cuban reported that 80% of teachers used computers primarily for e-mail. Additionally, 65% never used computers for the individual enrichment of advanced students, and 95% never used computers to facilitate student-to-student interaction.

Furthermore, the fact that student teachers and new teachers are often segregated within schools (Hargreaves, 2001) impedes the discussion of new approaches and methods. In the case of Malta, new teachers are perceived by the more mature teachers as not knowing enough, whilst the student teachers view the older teachers as having fossilised in the work place (Bezzina, 2000). My experience has shown me that because of the political and hierarchical nature of Maltese schools, most of the time the conversation that occurs in the staff room is either based on individual

students or on functional issues such as when exams are taking place, as these are 'safe' topics.

This research provided a new impetus towards a culture of change. It took the teachers out of the classroom and gave them the opportunity to discuss and exchange their opinions and fears. There was no one to report back to the school, and it became a place where teachers were able to air their grievances. It was a space where teachers could talk about anything that concerned them – a secure zone, as Putnam and Borko (2000) mentioned; a place in and outside their school where optimal learning can take place, as argued in Chapter 2. Therefore the enquiry group was an authentic area of discussion. As trainers we have to create space for change, 'allowing' it to occur.

This 'space' that developed allowed a relationship to form between the teachers where they trusted and empathised with each other about the difficulties they faced, reflected on what was happening in each other's classrooms and learnt from this experience.

The teachers' focus was on what was happening within their classrooms whilst they were implementing ICT practices. The enquiry group allowed them to do this as it allowed them to explore issues with other classroom teachers who were facing similar problems. The language used during the enquiry group meetings was indeed the site of pedagogical development.

As Martha said during the last interview:

'First we had this whole group of teachers and then it became us five. For us it was better, maybe it wasn't good for you but for us it was good in the sense it was informal, it was not you and me it was us, we shared and talked about what we were doing in the classroom.' (Martha, Interview, 183)

This indicates that somehow Martha perceived that since they were allowed to relax within the group and it was not so effective for me as a trainer. During her interview

Rose also commented on how the enquiry group affected her, and how she included this in her professional development programme (in Malta it is required that teachers attend an in-service training programme once every two years, and records of their professional development are kept):

‘Yes, and I wanted to tell you as well, with regard to this project that it was important that we did it out of school in fact I put it down in my development programme, as I felt that I got a lot out of it.’ (Rose, Interview, 16)

This support helped the teachers not only to share their personal issues but also to reflect upon their practice, supporting them in taking risks within their classrooms to develop and change:

‘That is it, we shared ideas eh, we shared our difficulties which we encountered in our lessons and at some times, I mean for myself I learnt from other people’s experiences and difficulties and maybe in the future lessons you can say to yourself well I’ll adapt to the lesson for example that way the teacher and eh some, you know, you took up. Some of each other’s ideas.’ (Rose, Interview, 82)

My observations led me to believe that the main factor that had allowed for change to occur within their professional practice with regard to ICT was in fact this sense of trust and exchange that had developed within the group, due to the fact that they had the space to develop it. They knew that they could say ‘I do not know how to do it’ without being criticised for not having the skills or experience, and someone in the group would suggest a possible method or solution. They were constructing their knowledge together from their individual experiences. This ‘secure zone’, as I have labelled it, is an area which was set up where they could exchange ideas and talk about their classroom practice, within which no one was going to pass judgement on a lack of knowledge or skill. In Marceline’s interview below, she talks about how she could confide in the others her difficulties and build up her ICT literacy skills through the confidence she developed within the group:

246 'ok the why because I mean this year I was in a little of a fix, so I took ideas from others and I saw even the others when they weren't all of them really knowing what they were doing'

252 'But we were trying to help each other out'

Sometimes there were issues which were not even discussed but were recognised and teachers empathised with each other, an example of this was the element of anxiety (discussed above) during the third enquiry group, when Rose turned round to Marceline and said 'even I, like you, was worried how to go about it'. Yet Marceline had not specifically talked about her insecurities, but had just questioned a lot during the first two meetings, asking 42 questions in total (Chapter 4, Table 4.5.1).

In fact their 'externalisations became objectivated' (Butt, 2004); the sharing of practice in the enquiry group left traces within each of these teachers, which were then integrated within their classroom practices. An example of this happening is revealed within an enquiry group session when Rose talks about how she adapts Greta's ideas:

87 'and over here what I asked them to do, two of them managed to do it, I asked them in groups, but I didn't imagine that they actually knew how to operate the Microsoft Paint and this is what they did, and I forgot to tell you, I prepared the questions, the same questions of the comprehension (Greta's). I saved it on a floppy and then put them on each computer and there were spaces for the answers, the answers were multiple choice and they loved them.' (Enquiry Group Meeting 3).

In her interview, whilst reflecting on practice, she further acknowledges where this idea came from:

'That is it, we shared ideas eh, we shared our difficulties which we encountered in our lessons and at some times,I mean for myself I learnt from other people's experiences and difficulties and maybe in the future lessons you can say to yourself well I'll adapt to the lesson for example that way the teacher and eh some of you know took up some of each other's ideas.....And some of us they took other ideas and adapted them to their class.' (Rose 82 – 84, Interview)

In fact, the five teachers had different forms of 'performance anxiety' (Butt, 2004); in Martha's case this was that she had never used ICT within the class; Greta had never done group work with ICT; David had hardly ever used computers within his classroom; and Rose usually let the peripatetic teachers take charge of ICT within the classroom, while she carried on marking her students' scripts (Chapter 4, Section 2).

This all changed during the research as, unlike in formal training, here they worked as a group within the enquiry group meetings and then as isolated individuals in the classroom. These teachers knew that although they were working on their own within the confines of their classrooms, they were doing it in collaboration with others. As they reflected upon their practice, they spoke about these reflections in the group. In this research, the teachers had a professional trusting relationship with the other teachers: if they felt hesitant in a situation in class, they would imagine how their colleagues would tackle the issue, giving them the impetus to solve the situation, thereby overcoming performance anxiety.

The anxiety associated with using the tool is a barrier to ICT implementation. As a tool for educational purposes this needs to be overcome through some successful and personal experience of implementation. They need to use the tool to learn how it works. The 'working in a group' through the enquiry group structure allowed for reflection towards action, which helped to overcome this barrier (referred to 6.6 times in Table 4.15). If we are going to change the teachers' perception of ICT and the role it has in the classroom, the first step is to get the teachers to 'tinker' (Hargreaves, 2001) with the computers in class with their students.

Working in the enquiry group allowed this group of teachers to reflect on each other's practices and learn from them, as the data in Chapter 4 shows. Where the teachers talked about the factor that had influenced them most, they mentioned each other after the materials. On re-examining the Laurillard and Pask model of learning

(Chapter 2), where they concentrate on the understanding and feedback of learning, I would venture to add the element of 'tinkering' with knowledge to this model.

An important facet of such an approach is the building of a cohesive group, as it provides the psychological support needed. These teachers came from a variety of backgrounds and did not know each other. At first, the communication within such a group may be stilted and awkward if not handled sensitively. The role of the facilitator is to provide clear communication and direction of the group – this was the role that I assumed.

The analysis of the Loveless model of teacher perception and how it changes with time (Chapter 2) reveals that it is based on the individual and how the community of practice affects the individual. Loveless's study (2001) showed that the community affects the individual teacher through:

- the ethos of the school;
- the links with the wider community;
- the network of pupils and peers in and out of the school; and
- the curriculum planning process.

This research has shown that a community enquiry with a specific focus on ICT implementation (which is voluntary) is a model for continuous professional development that promotes change. The space for discourse affects the teachers. The teachers took more control of their training and were more comfortable with making the decision to take risks in the classroom (and in sharing practice), trying new practices and confiding in each other within an outside space.

This research started with the idea of working as a community of practice, whereby teachers were working together on the integration of ICT within the classroom, and then it developed. It became an enquiry group with its own identity; in this case it

was working together to integrate information on the Roma within their classrooms. It was the teachers who influenced and 'controlled' this enquiry group.

Of course, there are several factors that affect the individual when participating within that group; these include age, past educational experiences, gender, personalities and expectations. But the differences within this group were directed positively towards change: 'such a social context provides a continuum of learning opportunities and support for community members with different expertise' (Whipp et al., 2005, p. 40). They treated each other equally so that there was no division between the novices and the more expert users. This way, each teacher was not only able to assist colleagues to find their own areas of competency, but also found assistance to overcome her/his own 'zones of proximal development' (Whipp et al., 2005, p. 40). Evidence of this was the fact that they changed their practices within their classrooms regarding the integration of ICT within their pedagogy.

Teachers are practical by nature, and effective communication within the classroom is a key skill. Their focus is mostly directed at how they can take the theory presented and turn it into an activity within their classrooms. The teachers in this study did not originally have the support to do this. They had been presented with theory during previous in-service training sessions, as discussed in Chapter 1, Section 4.2.

The effort of working in isolation, not sharing ideas and problems, and not reflecting about your colleagues' practice can result in a fossilisation of practice (Ehman and Bonk, 2003; Maloy et al., 2003; Swan et al., 2002). Chapter 2, Section 3.6. provides further discussion on this situative perspective, Below are two examples of teachers mentioning the benefits of working within this enquiry group, indicating its role in supporting change. In fact, below Martha is talking about how the group inspired her classroom practice:

260 (Martha) 'So I, I got myself in a fix about what to do and spending an hour before sleeping thinking I have to come to the meeting and have to see what the others are doing, I will take ideas. I will tell them I am using them and I will do it.' (Interview)

In the final interview, David answers the following question: *in what way and how did they influence you?* He also remarks on the verbalisation of the process the other teachers were going through and how it helped him: 'hearing the other teachers talking about the way they go about it was better' (Interview: 109).

Hargreaves and Fullan (1992) observe that elementary teachers often concentrate on short-term planning in their own classrooms. The teachers did indeed initially focus on short term planning; in fact, in their individual logs they concentrated on three themes, which were summarised in Chapter 4, Table 5, below is a closer look at them.

Theme 1: The new method they were using

Below Marceline is talking about her integration of ICT into her pedagogy. Marceline had never integrated computers into her classes earlier:

32 'Before we started the lesson on computer we had a discussion about the info found by each group. We decided that they use it to write up different type of exercises like jumbled set, number codes, etc. They agreed which exercise to work on the computer. They went on Power Point and started on blank presentations. I think this lesson went really well as all the groups succeeded in completing an exercise they saved it to work on it next time by changing fonts, inserting numbers, etc.' (Martha, Lesson 3)

Theme 2: Whether or not their teaching objectives had been achieved and the time it took to complete them in the classes they held.

An example of this is given below where Greta highlights the fact that she did not manage to complete what she had planned during her class:

15 'It went smoothly but I managed to do less work than what was planned' (Greta, Lesson1).

Theme 3: The students, their interests, how they worked on the materials, and the positive manner in which they worked in the group.

Below, Rose is rather pleased that the students did know how to use Microsoft Paint, and that they worked so well as they all collaborated and produced great work:

87 'I asked them in groups, but I didn't imagine that they actually knew how to operate the Microsoft Paint and this is what they did.' (Rose, Enquiry Group Meeting 2)

These are reflections on presentisms, such as the preparation of lessons and what happened during the lessons. I have termed this *reflection on action* (Chapter 2). These reflections did not allow them to get an overview of the whole situation, but looked at what they had achieved within the parameters of their classrooms during that single lesson. The teachers examined their classrooms, their resources and their students, that is, their situation at that stage from an individual and instrumental perspective.

When they shared their experiences with others, this opened up new possibilities amongst which were, of course, the possibility of criticism and judgement as mentioned by Hargreaves and Fullan (1992). Despite this possible negative aspect, the atmosphere the group operated in provided a positive surrounding for them to 'reflect towards action' (Chapter 4, Section 12) collectively and understand the role of ICT within their classrooms. This discussion through the enquiry group allowed them not only to concentrate on the functional role of achieving a product (that is, using the computer to teach), but also to question 'the process' (Chapter 2, Section 3) of integration of ICT within their classrooms and to understand its benefits for the students.

The Section above has discussed the value of the enquiry group in supporting change in practice. The next Section explores the ways the discourse around the

practice changed. This is presented as evidence of change in the teachers' understanding of classroom practice.

5.4.1 Evidence of change in understanding of effective classroom practice – changes in discourse

As part of the on-going research, the teachers met up to discuss their classroom practice. During the five enquiry group meetings their language was recorded and transcribed so that it could be analysed. The methodology used to analyse the content is discussed in Chapter 3 Section 8.

There were a few challenges during this exercise, as the problem of interpreting semantic discourse as a whole is that it becomes too vague and generic, because meaning is often coded in such a way that an outsider would have a problem interpreting it. To overcome this, the meaning of specific discourse items was compared from one person to another, allowing a greater insight into how meaning was being conveyed.

My observations whilst the enquiry group meetings were occurring led me to believe that interpreting the ways ICT could be used in the classroom may present new possibilities for the 'traditional' approach to ICT activity. For example, Martha's first exercise using ICT was in the form of a comprehension format, which is a traditional approach to using ICT. She had some information on the computer and students had to read pieces of information and then relate them to their colleagues. They were ready once they had all the answers. After a few classes with her students, in her third lesson she realised that students had greater IT skills (indeed one of them had designed a website), so she then allowed them to browse and create charts out of the information that they found.

In coming to know their new pedagogic knowledge, teachers may not always relate to old pedagogic knowledge, and it is only in retrospect through reflection that they recognise that they have learnt new methods and notice how they differ from the old ones (Borg, 2005), a process which I have labelled retrospective reflection. The teachers created their own new personal concepts about how to integrate ICT within their respective classrooms whilst discussing their practice together in the enquiry group, they reflected towards action. This exchange provided new ICT approaches for them as individuals.

The popularity of the use of the interactive whiteboard (IWB) to support teacher directed activities is an example of teacher conservatism. Teachers were able to relate this to their previous whiteboard:

‘The ability of the technology to adapt to existing pedagogy at this stage in the implementation cycle suggests that judging any distinctive contribution that IWBs can make to pupil learning will be a long-term process dependent on on-going exploration of what the technology can best be used for.’ (Moss et al., 2007; p. 9)

This adoption of technologies into current and familiar practice may be seen to be important, as it can develop teacher confidence for potential future changes in pedagogic practice. As Joyes (2006) points out, this potential for change is something that has been overlooked in the research literature that is critical of the more traditional pedagogies associated with the uptake of new technologies by teachers.

Research indicates globally:

‘that ICT has not had the widespread effect in classrooms that was hoped. The difference in the quality of experience in using ICT seems to be related to the understanding that the teacher has about the nature of the ways in which children learn and the nature of the area of the curriculum which is being

addressed. Putting word processors on every child's desk will not necessarily make them good writers.' (Loveless, 2003; p. 20).

There needs to be interplay of activities and practice within the classrooms. It is difficult for teachers to make that transition point from theory to practice whilst integrating ICT, possibly because of the practical element of not knowing what is suitable for the classroom and the educational value that ICT brings along with it.

The enquiry group allowed for new viewpoints to be accessed. Language use took place, providing an exchange of ideas and allowing the teachers to share opinions and integrate ICT within their classrooms. The use of language can be demonstrated to be important in developing new understandings. For example, if a person was used to just one variant of the colour red, and is then presented with 20 objects which were of various tones of red, and asked to distinguish between them, she/he would find a way to do this. Language 'can motivate the formation of a concept by drawing one's attention to features that diverse entities in the world have in common' (Bloom and Keil, 2001; p. 362).

The teachers' language reflected this change as they reflected on what they had carried out in their classrooms. The teachers used different language at different stages. Through the use of their language, observations can be made about this transition from the tried out exercises that they were used to, to the experimental ones which they did for the first time during this research. Examples of language use that indicate the process of this reflection occurring are seen in Table 5.2. The use of the word *knowledge* is one example. During the first two Sections this word is hardly used, but during their reflections in the interview the teachers acknowledge the changes that occurred during this research and consequently talk about the 'knowledge' they acquired:

	Martha	Greta	Rose	Marceline	David
From the teachers' logs (Reflection on action)	Did not complete logs	I (9) Children (12) Computer (3) Knowledge (0) Influence (0)	I (9) Children (6) Computer (1) Knowledge (0) Influence (0)	I (12) Children (19) Computer (8) Knowledge (0) Influence (0)	I (9) Children (15) Computer (4) Knowledge (1) Influence (0)
Taken from the meeting they contributed most in (Reflection towards action)	I (194) Children (14) Computer (36) Knowledge (2) Know (41) Influence (0)	I (168) Children (21) Computer (49) Knowledge (0) Know (33) Influence (0)	I (167) Children (10) Computer (18) Knowledge (0) Know (23) Influence (0)	I (212) Children (24) Computer (45) Knowledge (0) Know (53) Influence (4)	I (116) Children (10) Computer (13) Knowledge (0) Know (14) Influence (0)
Data collected from the interview transcripts (Retrospection)	I (344) Children (35) Computer (19) Knowledge (4) Know (100) Influence (7)	I (83) Children (18) Computer (21) Knowledge (41) Know (0) Influence (6)	I (187) Children (24) Computer (23) Knowledge (2) Know (36) Influence (4)	I (90) Children (17) Computer (22) Knowledge (1) Know (46) Influence (3)	I (104) Children (22) Computer (14) Knowledge (5) Know (1) Influence (13)

Table 5.2: Examples of change of language use

This change of language use could be highlighted due to the nature of the instruments themselves and when they were utilised. The instruments provided a data set that covered the full set of issues of concern to the research:

- Teachers' logs – reflection on action.
- Meeting – reflection towards action
- Interview – retrospective reflection

Consequently, this research was able to identify words as in Table 5.2, which showed the ways the teachers were focusing on different aspects of practice during this research. In their reflections on their classroom practice in their logs, they focused on the children and how they were doing during the lesson. During the enquiry group meetings, their discussions tended to orientate towards their experiences and the children's participation. At the end, during the interview, they focused on pedagogic knowledge and who/what influenced them.

An example of this pattern can be observed by looking at the way David uses "I", the term varies from 9 times in the classroom logs to 116 times in the discussion – he is looking at what he has done in his classes and giving his opinion during the enquiry group – and 104 in the interview where he is reflecting on what has influenced him. On the other hand, the use of *children* remains quite constant during the whole research; for example in Marceline's case this was 19 times during the logs, 24 in the enquiry group, and 17 times in the interview at the end.

This data is as one would expect the focus of the discourse to shift between the logs, discussions and interviews. It also verifies that the teachers did indeed shift their focus from one form of reflective exercise to another. In the first enquiry group meeting they talked about themes such as student difficulties. In the last interview they moved on to issues such as their own difficulties, the changes that had occurred, group work, and time needed.

Another specific example is when Martha discussed how she had adopted and then adapted one of Greta's ideas. She started by talking about the fact that she did not have computers in her classroom; this was followed throughout the meetings with other issues such as discipline, until during the last meeting she started discussing the importance of computers within the educational system. She was typical of most of the teachers, as they had all started out by talking about computer application

problems, on average 3.4 times in the first meeting, then moved on to talking about the issues in their classrooms. Martha began with a focus on how the computer was used within the classroom (mentioned 11 times, Table 4.14), whilst at the end she spoke about issues related to how students learn (7 times, Table 4.14).

The teachers' use of language changed through the research, which reflected their developing pedagogic practice and understanding. First the teachers talked about *what they knew* (teachers logs and initial meetings). When they were in association with other teachers they exchanged views on *how to improve practice* (meetings), and at the end they talked about their *new practices* (interview) and the language they used reflected these changes. This is further highlighted in Table 4.14, which shows the themes the teachers were talking about and compares them from the beginning, through the teachers' logs, to the interview at the end of this research exercise.

During the enquiry group meetings it was the teachers who chose what to talk about, and it is interesting to note that the teachers' use of language started with the teaching objectives attained within their classrooms as recorded in their logs, followed by the various activities completed in the enquiry group, and finally the benefits of working with ICT within their classrooms through student group work, during the interview.

5.4.2 Reflections on the analysis of data

The concepts of reliability and validity of the analysis are important criteria in establishing and assessing the quality of research for the quantitative researcher (Bryman, 2004). Credibility parallels internal validity. This research was carried out in accordance with the canons of good practice and represented fairly so that informants may see the data as it truly emerged. The practice of data collection and analysis is described in detail in Chapter 4. All data was recorded by video, which

was subsequently transcribed three times to ensure a correct representation of what was being heard and seen. This was corroborated by the personal journals which were recording the outcomes and the researcher's viewpoint.

Although the systematic generalisation of the findings to wider populations was not the goal of this study, it was still important to produce findings that were relevant beyond the immediate context being studied. I knew their practice had changed as I had seen their classroom practice, and made notes in my personal journal. I had been present during the meetings and instinctively felt that change was occurring, and this was being reflected in how the teachers approached the subject of ICT within their classroom. The question that predominantly needed answering was *what was happening and how could this be described?* Detailed and rich data emerged through the lesson logs, the transcripts of the enquiry meetings, and the interview. These were then collated in various tables to see whether a pattern emerged (Chapter 4). The teachers' initial beliefs provided a background whilst the classroom outcomes showed that the teachers had integrated ICT practices within their classrooms.

The focus on language use and critical incidents during the research however provided a more objective measure of these changes that could be triangulated against the teachers' actual classroom practice. The themes that emerged provided some evidence that the teachers' focus in their classrooms moved from teacher-centred to student-centred. This has been referred to as the new classroom method and group work throughout the research. The teachers' logs highlight this change and more on this is may be found in Section 4.5.1. In the logs the teachers started to identify the themes that were important to them; amongst these was this new classroom method, whereby the students took on more responsibility of learning. This was further discussed during the enquiry groups where the teachers highlighted the positive effects of the students working together in this student-centred approach

(Table 4.7). Finally it was also addressed in their final interview, whereby they talked about the change in the classroom (Table 4.9).

Change in the classroom occurred when activities which were predominantly teacher-based became student-based. In fact, during the final interview the teachers highlighted the importance of this aspect and how they would be utilising it in their future activities (Table 4.9).

Pedagogic concepts were passed on from one member to another via the enquiry group; these were reflected in the words used. They conveyed the lexical meaning of the pedagogical developments that the teachers were going through. Whilst they talked about what was happening in their classrooms, they were changing their perceptions of their classroom practice.

The three categories of analysis in relation to the words that arose as most important to these teachers are:

- words adopted by others;
- increase in semantic use of the same word; and
- indirect conveyance of language use.

These categories were one way of considering word usage and change, but they may in themselves reflect something about the words themselves and their users. Words linked to specific incidents allow for more insight to occur.

5.4.3 Language use

The teachers did not use words like *excited* or *motivated*, but instead used words which concentrated on the themes of group work, such as *creativity* and *co-construction of knowledge*.

One of the benefits of the enquiry group meetings was the sharing of real classroom practice that supported experimentation with the intention that practice would improve in classrooms. This change in practice could be evidenced by the activities being carried out, their growing confidence in their practice, and the pedagogic language that they were using. They were reflecting on action.

Through concordancing of an individual lexical item and the various ways it was used, I could follow the focus of the discussion. Further analysis of this method is discussed in Chapter 4, Section 11. The teachers were distinguishing what they meant by certain words and their interpretations of these, an example of this being the use of *work*. Below are some examples of how the word changed meaning according to the context used:

185 'on, they can't save any of their work, that's why in the'
186 'year they lost a lot of the work they were working on.'

(1st meeting) Focus was on ICT usage.

4 'to paint to work'
6 'trial run, they still have to work on it.'
104 'work on their own'

(2nd meeting) Production of work

81 'fact you are doing a lot of work when you are doing that,'
88 'you see that they will be working when they are making'
94 'they are at a point, they are working at table, they are so'

(3rd meeting) The process of work being the emphasis here

78 'children would have prepared work much better'
89 'of six as a team then they worked one for every two, this'

(4th meeting) Students working together

130 'this time around they worked hard on their own'

134 'some of them felt at a loss at first, they said I do not know therefore I am not going to do anything, I told him you do nothing. I mean the other three groups are working and I did not help them.'

150 'they were pleased with their work and I was pleased, now'

154 'creativity, their ability to work together, and mainly'

(5th meeting) Group work, creativity and how the student worked.

Teachers showed a deeper understanding of classroom practice. This was reflected in their practice and was revealed by their language use in the enquiry group meetings. As previously mentioned, the teachers were the ones who controlled the enquiry group meetings, and it was there that they talked about their classroom practice and the changes that were happening. These changes in language use can be categorised as below. Examples and evidence of these are further discussed in Chapter 5 Sections 5.4.3, 5.4.4 and 5.4.5:

- (a) Increase in semantic use. A word can have different meanings according to the context in which it is used, where teachers first attributed one meaning to a word but added other meanings over time. In this instance the word *group* was used for the first time within their classrooms whilst working with ICT. As a result of this, the way they used the term *group* highlighted the changes that were occurring within their classrooms.
- (b) Words adopted by others. One of the participants would introduce a new word or a new use of the word within the group; this word would then be taken up by the others. An example of this is how they introduced the word *creativity* within their discussions.
- (c) Indirect conveyance of language use. This entails the way teachers used language to convey a notion which was not specified directly. They would refer to the semantic meaning of the lexical item/s. An example of this is the way they talked about the students co-constructing their knowledge. The students collaborated on a task to produce outcomes. The process was central to their development, to their building of knowledge.

The way the evidence was collected was through the concordancing of a lexical root of a word such as *creat-* for *creative*, for which I was able to get a list of all the times it was used. However this was not satisfactory as an approach, as it just showed the lexical item without the semantic meaning of the word. It was only by reading the surrounding use of language for each lexical item that I could develop an understanding of the way language was being used to reveal the changes that were happening within the respective teacher's classroom.

Transcribing and then coding into themes allowed me to analyse the way the teachers were referring to group work, creativity and the way the students were working over time. This provided a complete picture of word usage. An example of this method of analysis is shown below with the lexical item *teach*. In the fourth enquiry group meeting, concordancing of the word *teach* produced the following:

6 'that you have done the teachers' logs and everything'
58 'Your experiences from other teachers/(Greta) Last time'
62 'I know that this other teacher's doing something'
110 'up/(Michelle) The peripatetic teacher/(Rose) No no whenever'
189 'And now it became, once these teachers come, we HAVE to stay'
200 'want uh?/(Greta) When the teacher of PE takes the'
209 'really/(Greta) So you may teach English or Maths, he'
220 'to swop/(Greta) I am not teaching them History any more'
222 'now we have the history teacher leaving, he can turn'
254 'for two years just for the teacher, as no-one used to use'
275 'Exactly you end up teaching rubbish/(David) But'
278 'listen if you take the teacher's book, and look at it'
315 'careful what you are going to teach, you know, it's not just'
317 'be placed in a learning and teaching situation. There has'
334 'As you have the computer teacher/(Michelle) There was a'
366 'last lessons, I mean I am not teaching them anything new, I'
395 'on the computer or the teacher explaining things,'
422 'today we had the activity teachers who came, they love'

This gave the word count of the lexical root *teach* and showed whether it was used within the session or not. Then, grouping the data together through coding – as seen below, where an example of the whole text is given – revealed the meaning they

were giving to the lexical item *teach*, conveying more about what was happening within the classroom:

315 (Marceline) 'However you need continuous evaluation, computer-based learning materials should be, all the time, if you have computer in the classroom, you have to be careful what you are going to teach, you know, it's not just eh, letting them get information, because, like that just, uh, getting information, you know, or delivering instructions'

Here above, *teach* is referring to the content that is going to be conveyed in the classroom:

317 (Marceline) 'They, they're not not going to learn anything new, basically on the computers. It's not just giving instructions. It has to be placed in a learning and teaching situation. There has to be preparation before, not just giving instructions'

In the above, situation *teaching* is being used in reference to the pedagogy of integrating ICT within the classroom:

366 (David) 'This year I knew what sort of depending on the experience from last year, I was more, um, I knew what I had to do better, em, then once we started, the children were so enthusiastic about it, they just carried on, on their work, almost doing the last lessons, I mean I am not teaching them anything new, I just showed them what I wanted, what I had in mind, they chose their own topic, their own, their own method of working, I just divided them into groups or rather they chose the groups they wanted to be in and they just carried on, and I am helping them, when they encounter a problem but otherwise'

This again is a different use of *teaching* where David is stating that he was not teaching them new materials but that his role as a teacher was different.

In all instances, just concordancing the word *teach* in isolation would have not truly reflected the usage of the word. The pattern of use of the item *teach* was similar to that of *group work*, in that at the beginning there was one meaning associated with it, and then there was an increase in the variation of semantic use of the word as the research progressed. Table 5.3 presents three examples, one for each of the three categories of change in language use. An overview of the three examples is first presented and the following Sections provide a more detailed analysis.

Category of changing language use	An example of each category	Description of change that occurred
Increase in semantic use	<i>group work</i>	<p>During the enquiry group meetings, group work was discussed as a positive contributing factor to their students' development, and on average was mentioned 5.4 times (Table 4.9 , Chapter 4)</p> <p>During the interview the teachers mentioned issues they had dealt with, such as group management and motivation (Table 4.9, Chapter 4). This was one of the improvements in classroom practice referred to by all the teachers, mentioned 9.6 times.</p>
Words adopted by others	<i>creativity</i>	<p>In the enquiry group meetings the teachers presented the work their students had produced, and mentioned how pleased they were with the students' creativity. For example Greta brought a couple of poems that students had completed and Rose brought a couple of students' letters using pictograms.</p> <p>In the interview they all talked about the aspect of creativity, and that this new classroom practice was allowing them to do different work with their students. This was evidenced by general statements e.g. Marceline 'Creative work is good for the children'; and more specific statements such as Martha's 'freer activities on ICT to paper based approach' (Table 4.9, Chapter 4)</p>
Indirect conveyance of language use.	<i>Co-construction of knowledge</i>	<p>The teachers talked about the students' difficulties in the enquiry group meetings , mentioned an average of 9.4 (Table 4.9, Chapter 4)</p> <p>During the interview this changed to positive perceptions of how the students constructed their learning with statements such as 'students came up with the materials on their own, the teacher's role to guide them' (David), mentioned 5.4 times (Table 4.9 Chapter 4)</p>

Table 5.3: Examples of the three categories of changing language use

In summary, there is evidence of all three categories of changing language use occurring: words adopted by others, increase in the use of meanings of a word, and

words used indirectly to convey a notion whilst the teachers reflected on action. The next Section explores in detail the ways the pedagogic language changed over the five enquiry group meetings, using the examples of *group work*, *creativity* and *co-construction of knowledge*.

5.4.4 Increase in use of meanings of the same word – ‘group work’

The main change that occurred within this research was the move from teacher-directed ICT activities to more learner-centred ones. Greta, Rose and Martha all started with a teacher-based activity and moved to group activities which allowed for more learner control. Their use of language throughout the research reflected this change in focus. Table 5.4 describes each teacher’s classroom activities – each teacher implementing a lesson a week for five weeks.

	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Greta Task	They used the S.A.I.L .website to answer comprehension questions	‘Imagine being a Roma during the 14th – 16th centuries. Write a message to the ruler of the country.’	Used Microsoft word to list their ideas, to write their poem, to change words	Students created a poem	Students downloaded images from the Internet to illustrate their poems
Organisation	Pair work -- one of the students looked up information and the other wrote about it	Pair work	Students worked in a group of three	Students worked in the same groups of three	Students worked in the same groups of three
David Task	Divided class into groups of 8 students and each group was allocated a research task	Students presented the results of their research in various creative ways – using puppets, poems, etc.	Design of Roma newspaper started. Each student was given a section to work on	Students researched information on internet, both at home and in class. Then worked on the preparation of materials for the newspaper	Creative writing of materials complete.
Organisation	They stayed in the same groups right through the research exercise	Same groups worked together	Same groups worked together	Same groups worked together	Worked in groups and one of the students presented the newspaper to the class

Rose Task	The teacher read the Muscha story and comprehension was held – alone. Then started group work on a puzzle letter	Role play of an interview between a reporter and a Roma. Then students drew a Roma girl on PCs	Students had to answer a questionnaire by email	Students wrote down conversations between two Roma people	Students worked on a Power Point presentation, putting together what they had learnt on the Roma
Organisation	Children worked in 6 groups of 4 students	Same groups, with one student working on the PC	Pair work	Group work of 4 students in the same group as at the beginning	Group work again in the same groups of 4
Marceline Task	Students browsed the S.A.I.L. website. Looking up information on the Roma	Similar to the last lesson, as children needed more time to go over the information	Discussion on information collected. Then students worked on the creation of different types of exercises	Students continued working on their exercises	Students exchanged exercises. The students discussed how to work them and resolve them
Organisation	Students were grouped in threes	Students stayed in the same groups	Students stayed in the same groups	Students stayed in the same groups	Students stayed in the same groups
Martha Task	Set up computer, and task was given to students to read the text and to pass on the information to their peers	Students finished comprehension and worked on a presentation	Started to put together information re. the Roma for a chart	Continued working on the task, researching materials via internet	Presentation of charts to the rest of the class
Organisation	Group work in two groups of 7 and 8 respectively	Alone and in groups	Students worked in groups of three	Students worked in the same groups of three	Students worked in the same groups of three

Table 5.4: The teacher's weekly classroom activities based on the Roma resources.

During this research exercise the teachers formed a new perspective on the role of ICT within the classroom, one which allowed for group work (Chapter 4, Table 10). There are many sound educational reasons for carrying out group work, from the cognitive and social development of the children to the flexibility in organisation for the teacher. The importance of group work in the development of cooperative and collaborative learning has been recognised by many researchers such as Pollard and Tan (1993), and it has been included in the Report of the Ministry of Education (2002) on the National Minimum Curriculum Review.

Log	Enquiry groups	Interview
The new method of working and how the teaching objectives were being met. Students' interest in subject as they worked in groups	Lesson preparation and how this was being achieved in groups Computers available and the logistics of working on the computer Students' difficulties and the task allocation within the groups	Student difficulties Student group work Constructive learning experience

Table 5.5: The ways the teachers talked about group work during the research

The teachers talked about group work in various ways in the different parts of this research, as displayed in Table 5.5. For example, in the logs they talked about the new method, teaching objectives and students' interest in the subject; then moved on during the enquiry group meetings to issues dealing with lesson preparation and students' difficulties; and finally in the interview they talked about creativity, the influence of other teachers on their work, change, and constructive learning within their group work.

The use of the word *group* also changed meaning over the enquiry group meetings.

This was because group work was not established practice within their classrooms:

- 36 'And it's the first time they worked in groups, even last year they worked in pairs, it was the first time that I divided them into six groups,' (Greta, Interview)
- 24 'I would have preferred if the children, have been trained to work in groups before, because it's sort of a logistical problem that keeps um, pulling you back sort of concentrating on the learning proper' (David, Interview).

That they had changed their pedagogic perspective about the use of ICT was verified in the use of their language during the enquiry group meetings. Initially the teachers focused on what they were doing and subsequently moved on to what the

students were achieving. The teachers utilised different language to reflect on their practices.

They had chosen to meet regularly to discuss what was going on in their classrooms (Chapter 2), and they were controlling what they discussed and consequently the conclusions reached within these enquiry group meetings. As a result of this, the language they were using was a direct reflection of the pedagogical changes that they were making. Below is an example of such a comment that was made about their experiences in using group work, where Martha talks about how the students were taking on the responsibility of learning within their groups:

138 (Martha) 'I mean one even said I didn't know that Gypsies even existed, so then, um, then, I said, now look you are on, I divided them into two groups I left it to them, to them look seven here and eight there. So decide, they divided themselves, and now you are going to come up with anything that you want to present on a chart, you can use one chart, two charts, three... it's up to you, you can get anything, printouts from internet, but they can not do that at school. Printouts you can write a poem yourself, get some information and change it round, pictures, anything design how you want it, it's up to you, but you are going to get the things and do them in class. And-uh and so there, at first they were at a loss and I let them to tell you the truth, but then someone would come up with an idea from a boy....'

(Martha, meeting, Enquiry Group Meeting 5)

Table 5.6 below shows the way the teachers talked about groups throughout the enquiry group meetings.

Enquiry group meeting 1	Enquiry group meeting 2	Enquiry group meeting 3	Enquiry group meeting 4	Enquiry group meeting 5
Greta presented; Martha, David, Rose and Marceline attended	Rose presented; Martha, David and Marceline attended	David presented; Rose, Greta and Marceline attended	Marceline presented; Rose, Greta and David attended	Martha presented; Rose, Greta, David and Marceline attended
It is used in a functional manner; how to divide the groups	It is about how the group could work together	Here the exchange is about how the group worked together	Discussion begins on how the group functions and then moves on to the	Discussion covers classroom management in addition to how the group took

It is used by Greta throughout	I use the word initially and followed by Rose and then Marceline	Rose, Greta, David, and Marceline used the word	individuals' responsibilities within that group Discussed by Rose, Greta and Marceline	on responsibility for the work Discussed by Marceline, Martha, Greta and Rose
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Table 5.6: Use of group work

In addition, Table 5.7 shows the interweaving of the use of the word throughout the enquiry group meetings, displaying when and how it was used. This is illustrated by first showing which enquiry group meeting it was used in, for example 1 (149) is Enquiry Group Meeting 1 and line 149 of the transcript. Sometimes a word is used more than once in a line, and this is repeated in the analysis as appropriate.

In Table 5.7:

- Organisation refers to the way the groups were organised so that the students could engage with computers. The way the groups were organised directed the focus of the activity of integrating the Roma software within the classrooms.
- Interaction refers to the way the students 'talked' in any manner whilst doing the activity
- Roles a student took on whilst in the group
- Learner autonomy entails the responsibility for learning a student took upon himself/herself

	Organisation	Roles	Interaction	Learner Autonomy
Greta	1 (149) 1 (210) 4 (350) 4 (352) 5 (89)			
David	2 (158) 2 (166) 2 (207) 2 (234) 2 (272)	2 (200) 2 (211) 2 (211)	4 (310) 4 (408)	4 (366)
Rose	2 (105)	2 (162)	4 (166)	

	2 (106) 4 (87)	4 (173) 4 (230) 5 (345)	4 (228)	
Marceline	1 (260) 1 (260) 5 (136)	1 (276) 3 (136) 5 (136)	4 (415)	4 (406)
Martha	5 (42) 5 (49) 5 (51) 5 (114) 2 (248)	5 (29) 5 (42) 5 (46) 5 (114)	5 (46) 5(89)	5 (46) 5(134)

Table 5.7: Meaning of *group work* in the enquiry group meetings

From the above Table it is possible to form a picture of the way the teachers interacted and how they viewed the lexical item *group*. Coding of the data (Chapter 4) revealed that the meaning of the word *group* was not only conveyed by the use of the lexical item, but by other lexical items associated with the word group which conveyed the same meaning, for example *together*, as in the example below where Marceline is talking to the enquiry group about her experiences:

154 (Marceline) 'and the first time they were, I mean distracted, they weren't really concentrating on, I mean the first time maybe because of the, we took a long time to log in and the children are impatient, you know, when on the computer, em, I was scared of the creativity, their ability to work together, and mainly, this time my assistant.' (Enquiry Group Meeting 3)

Greta found the aspect of organisation of the groups to be of predominant importance as she concentrated on the way the students worked around one computer. She talked about how the students were organised in the class:

350 (Greta) 'No they didn't get them from the site, they went, they had to go into Microsoft, so, uh, you know how we divided the class into group'. (Enquiry Group Meeting 4 – Organisation)

She never talked about the students' process of learning within the enquiry group meetings, but concentrated on the setting up of the task.

On the other hand, David, who also found this way of working in groups totally new to him, spent up to Enquiry Group Meeting 2 establishing how to set up the groups in

his classroom and deciding the allocation of various roles to the students. He then moved on to talking about learner autonomy and the interactions that were occurring between/among his students in Enquiry Group Meetings 4 and 5. The following are examples of his talking about the organisation of the group and the roles within it:

158 (David) 'Before this I showed them how to log in and log out. Also how to register. Then we read Muscha's story. Then we were alright. They could open it in windows. I chose the main words, for example: India, travelling and we played a game. I divided them into five groups. One group went out. Then a child had to come in and narrate all he knows about Roma, and when he mentions specific words he gains points.' (Enquiry Group Meeting 2 – Organisation)

In Enquiry Group Meeting 4 he reflected on the process the students were going through. For example, in line 408 below he discusses the way the students played games, and in line 366 he explains how they were responsible for the work they produced:

408 (David) 'Even if we are just playing games in a group instead of individually' (Enquiry Group Meeting 4 – Organisation)

366 (David) 'This year I knew what sort of depending on the experience from last year, I was more, um, I knew what I had to do better, em, then once we started, the children were so enthusiastic about it, they just carried on, on their (own), they're almost doing the last lessons, I mean I am not teaching them anything new, I just showed them what I wanted, what I had in mind, they chose their own topic, their own, their own method of working, I just divided them into groups or rather they chose the groups they wanted to be in and they just carried on, and I am helping them, when they encounter a problem but otherwise' (Enquiry Group Meeting 4 – Learner Autonomy)

Rose, who is an experienced teacher but not a qualified one, identified the way a group has to work and recognised the interactions that they were making. However, unlike David, she did not move to talking about the learning process that the students were going through:

87 (Rose) 'and over here what I asked them to do, two of them managed to do it, I asked them in groups, but I didn't imagine that they actually knew how to operate the Microsoft Paint and this is what they did, and I forgot to tell you, I prepared the questions, the same questions of the comprehension. I saved it

on a floppy and then put them on each computer and there were spaces for the answers, the answers were multiple choice and they loved them, and nowadays they are mixing things up. Yesterday I gave them a comprehension, and the text asked two questions a and b and they asked me, Miss do we have to choose? So I had to explain, as they got mixed up. and this it. The flag we could not print it, listen to them madness.' (referring to the noise) (Enquiry Group Meeting 2 – Organisation)

162 (Rose) 'How they fight to have a go on the computer, did you see that group, they fought about when they finished a sentence' (Enquiry Group Meeting 4 – Interaction)

173 (Rose)'They keep on turning to see what the others are doing on the computer' (working roles) (Enquiry Group Meeting 4 – Motivation)

Marceline, who did not have any previous experience of using ICT with her students (Chapter 1), concentrated on the setting up of the group from the initial enquiry group meeting to the last one. She referred to organisational aspects and the setting up of roles in both Enquiry Group Meetings 1 and 5. She then moved on to talk about the process of learning in Enquiry Group Meeting 5, as seen in the examples below:

276 'They did not manage to get though last time not all of the computers. I was doing the first lesson, em, I gave them the website, I explained then they were in groups for example this group is going to find, find about costumes, they were going to sort of look in to see what they find and the next time they were going to write some notes so that we do, sort of a slide show. That what I was planning but' (Enquiry Group Meeting 1 – Organisation)

415 (Marceline) 'Dominic was telling me, when we did the group work; this noise, now he is the noisiest of them all, because he shouts, the highest pitch' (Enquiry Group Meeting 4) – Interaction.

The students talked very loudly once they were working in groups and not quietly as individual units. This was not chaos but students discussing their work. Below Marceline evaluates the work carried out from the first time she used ICT to the last time:

154 (Marceline) 'and the first time there were, I mean distracted, they weren't really concentrating on, I mean the first time maybe because of the, we took a long time to log in and the children are impatient, you know, when on the computer, em, I was scared of the creativity, their ability to work together, and mainly, this time my assistant. I was less involved, em, they were involved in the management of their own learning, and they ah, also learned with

engagement of a particular task the thing that I like most was their creativity,'
(Interview)

Martha, who had 17 children at a time working on one computer, had a different way of working in the classroom with her children. It was extremely challenging for her to take up this exercise, as her school did not have the facilities for her to work with, as mentioned in Chapter 2. As a result of this, she did not contribute in Enquiry Group Meetings 1, 2, 3 and 4 (except for a singular reference in 2), but when she presented in Enquiry Group Meeting 5, she covered aspects of group work when she described her experiences with her students. In the first class with the students she had worked with them individually and then divided them into groups. After that students worked in groups of three. This was carried out over a period of six weeks; below is a reference to this way of working:

134 'some of them felt at a loss at first, they said I do not know therefore I am not going to do anything, I told him you do nothing. I mean the other three groups are working and I did not help them. So then they went and tried to spy' (Enquiry group meeting 5)

In the example below, a problem arose with a student who came back to Martha for help to communicate with his peers, so she went to the group to help out with the social dynamics of the group:

114 (Marceline) 'I had one who just went off, he left, he said I am not going to take part in this part. Ok sit down and then he came after a few weeks and he told me; Miss, can I change group, I told him no, I don't think you should you know why don't we go and try to ask them to apologise. He didn't say no, but he didn't say yes. We were already willing sort of and I said now go, think about it, and he went and I went to the group and I said do you think you should get another chance you know and he said Oh come on this is the first thing you're doing this kind of work together and... Yes they told me and they ended up meeting literally, half way in the classroom, and it was as if nothing had happened and they continued, ok, so even that is something, that's not usual eh?' (Enquiry Group Meeting 5).

In addition the comments which the teachers wrote in their logs provide further evidence of how the notion of group work became central to their pedagogical

development during this time. In the below is Greta sharing her thoughts on the organisational aspect of the groups:

'they were able to work in groups, teacher and facilitator had to keep going around especially when it came to saving their work' (Teachers' log 4).

'Again. They worked in their usual groups as they had to follow on their own previous work'(Teachers' log 5)

David below moved from talking about the organisational aspect to focusing on the children's roles and the social dynamics of his class:

'I would have done something to prevent that the work the children did together is presented by the 'leader' in the group. Some children preferred to just leave it in the hands of the others.' (Teachers' log 2)

'They're doing the write-up in pairs/ small groups rather than individually' (Teachers' log 3)

'the children are now working better in groups' (Teachers' logs 4 and 5)

While Rose's logs reflected on the organisational aspect and the roles and interactions of the students:

'I would have divided the children into more groups because they were crowded and it was rather difficult to include all and which to include in their work.' (Teachers' log 4)

'I was pleased with the low achievers because they gave their contribution to their group.'(Teachers' log 5)

Marceline focused on the way the children worked, both from an organisational and interactional aspect:

'The children worked in a more organised manner. They helped each other and shared information.' (Teachers' log 2)

'their aim was to work together by helping each other in the best way to get a good result' (Teachers' log 4)

Martha, as mentioned previously, did not complete her logs.

Different instruments reflected the same progression in language use in relation to groups. The teachers moved on from looking at the exercise from an organisational viewpoint – except Greta who got to this point much later – to one which analysed what the students were doing within their classrooms. This was established through the analysis of the language through concordancing and coding of the enquiry group meetings and the logs. By looking at the same lexical item through these various instruments, it is possible to establish a holistic view of the pedagogical changes that occurred within the enquiry group. Table 5.8 confirms the pattern of progression as a summary of the above data by comparing Enquiry Group Meetings 1 and 2 with 4 and 5. This data was extracted from both the interview and the teacher log data.

	Greta	David	Rose	Marceline	Martha
Enquiry group meetings 1 and 2	Organisation (enquiry group meeting)	Organisation (enquiry group meeting)	Organisation roles (enquiry group meeting)	Organisation roles (enquiry group meeting)	
Enquiry group meetings 4 and 5	Talked about how the children took on creative roles within the group (Interview)	Talked about how the children worked and their roles and interactions (Interview)	Interactions (Teachers' logs)	Organisation Roles Interaction Learner Autonomy (Teachers' logs)	Organisation Roles Interaction Learner Autonomy (Interview)

Table 5.8: Summary of the changing use of the term *group work*

5.4.5 Creativity

The particular way the teachers used *creativity* differed from how they used *group work*. In the latter instance the teachers' use of the word changed as their pedagogic concerns and perspectives changed. In this instance the teachers used the word as it had been introduced during the first enquiry group meeting by Rose, and then it was picked up by the other teachers. The word was not 'translated' into other words, that is, when the teachers wanted to talk about the way their students had done something new or original, they talked about it using the lexical root *creat-*. In the

transcripts there were no other words which conveyed the same meaning. A Thesaurus search revealed similar terms and examples of words and phrases that were also concordanced: *new, original, coming from the students*. None of these were present. The words that were concordanced and produced results were *create, created, creativity* and *creative*:

- 72. 'Yes we did some creative work'
(Greta, Enquiry Group Meeting 1)
- 74. 'I created a hyperlink to the *brimba* site and if you click on it you can find information, as they love drawing, and I don't mind them drawing.' (Rose, Enquiry Group Meeting 2)
- 154 'the thing that I like most was their creativity, I always look for that'
(Marceline, Enquiry Group Meeting 4)

In order to fully convey how they were talking about creativity, concordancing the verb form of this lexical item allowed for more flexibility of use, as Table 5.9 indicates. When referring to innateness of creativity in Table 5.9, I wish to portray the notion of an intrinsic form of creativity, and not one which concentrates on the product but coming from within the student.

	Enquiry group meeting 1	Enquiry group meeting 2	Enquiry group meeting 3	Enquiry group meeting 4	Enquiry group meeting 5
Meeting/ Organisation	Greta presented and talked about a hyperlink she had created. Martha, David, Rose and Marceline attended	Rose presented. Martha, David and Marceline attended	David presented. Rose, Greta, and Marceline attended	Marceline presented. Rose, Greta and David attended	Martha presented. Rose, Greta, David and Marceline attended

Use of Creativity	<i>Creativity</i> was introduced by the teachers through the concept of originality	Created as in to <i>make</i> , <i>originality</i> and <i>creativity</i>	Continued use of <i>make</i> and <i>originality</i>	Continued use of <i>make</i> and <i>originality</i> and also <i>invent</i> . The new facet of creativity in students work was introduced here	A singular instance of use to depict innateness for creativity
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Table 5.9: The use of the word *creativity* over the enquiry group meetings

Furthermore, in Table 5.10, the number indicates the enquiry group meeting during which the word *creativity* was used, whilst the number in parentheses indicates the line number. Sometimes a word is used more than once in a line, and this is repeated in the analysis as appropriate. For example Greta has one instance in Enquiry Group Meeting 5 where she talks about creativity and originality.

	Student Originality	Creative Writing	Creative Products	Innateness for Creativity
Greta	5 (123)			5 (123)
David	3 (207) 3 (252) 3 (254)		3 (232) 3 (234)	
Rose		2 (168)	1 (241) 2 (74)	
Marceline	3 (216)		2 (243) 4 (141) 4 (150)	4 (154) 4 (156)
Martha				

Table 5.10: Results of concordancing of *creativity*

From the concordancing results of the word *creativity* it might be expected that the teachers whose classroom practice had changed the most would be David and Marceline. This was reflected in reality in their classrooms as they were the most innovative with ICT pedagogical practices. This is extremely interesting as Marceline had never used computers within the classroom and rarely used a computer at home

(seen in Chapter 4.1). Martha, Greta and Rose had a variation of a comprehension exercise within their lesson plans, Marceline and David utilised a different approach.

David created a newspaper, which he describes below, using the word *created*:

252 'after the infections we created new things, like a newspaper about'
254 'of ideas, last year we had created puppets, so this year'

(Enquiry Group Meeting 3 -- David)

David recognised the fact that the students were able to create their own way of working after the second enquiry group meeting; he refers to this progression in his interview. He seemed sure that these activities would allow for creativity, and therefore adapted ICT to fit in with his pedagogic approach:

140 'I did because um, first they chose what they wanted, I mean we started with the topic Gypsies so, there was some control, but then they chose what they would like to find out, things like music or art, or, so they decided, I mean they discussed it among themselves and even the type of articles they chose from the newspaper they decided whether they wanted to do a crossword or they want to do, eh, a quiz, or an article, they were totally creative in what they wanted' (David, Interview)

He identified with the students: it was no longer me and them, it was 'we' who completed the exercise. His focus moved from being content based -- which he had worked on in Enquiry Group Meetings 1 and 2 -- to letting the students create their own materials.

Marceline would have not worked in the manner she did with her group, if she had not heard the other teachers talking about their classroom experiences. In contrast, David had already used groups in his classroom. However, he did not recognise how ICTs could support this before Marceline came up with the idea of letting the students create their own exercises. The students created summaries of the research they had done on the Roma. For example, one group created a text that had every fourth letter missing, while another worked on a system of codes. These

were all invented solely by the students. During the enquiry group meetings she was wary of their 'creativity' as indicated in line 154 (Enquiry Group Meeting 4):

141 'they took out points and created sentences on the'
150 'to check the spelling, em, created the exercise, inserted'
154 'em, I was scared of the creativity, their ability to'
(Enquiry Group Meeting 4 -- Marceline)

However in her interview it was exactly this 'innateness for creativity' which she appreciated and felt that she had allowed space for:

81 'will be really great for us, creative work is good for'
83 'looking for new things to create new things and the'
83 'have got such a playful creative minds, better than'
91 'they do them, it is not as creative as this work we did'
(Interview – Marceline)

In the results in Table 5.10, a predominant factor is that Martha does not talk about creativity at all. Her classroom practice was rather limited by the fact that she just had one PC, and as a result of this her students produced paper-based materials. Although these could be considered as being creative, she might have understood creativity to be something innovative using IT, and consequently did not use the lexical item. Her language use reflected her pedagogical development; as she was not creative in her use of the software, she did not use the lexical term. In fact she did not use *creativity* in her last interview either.

Rose refers mainly to creativity in the form of creative writing and making something new:

241 'question?/Yes we did some creative work/(Rose) It's good'
(Enquiry Group Meeting 1)
168 'boy/(Rose) it (jokingly) is creative writing, it is creative writing, it is creative writing....' (Enquiry Group Meeting 2)

In her final reflections during the interview it was this aspect of creativity which she discussed - their ability to carry out creative writing:

54 'they can um do creative writing, they can do'
(Interview – Rose)

In the last Enquiry Group Meeting Greta refers to the aspect of innateness of creativity (almost inbuilt creativity). During the other Enquiry Group Meetings she does not talk about her work being creative, yet her students wrote a letter to the ruler of the country and carried out creative writing, and also produced poems. It is almost as if she did not consider this to be an important aspect of the project, but then realised that the students benefited from it. In fact, she picks this point up further in her interview, where she talks about how the students had created their own poems, and how they had come up with their own ideas:

52 'our aim, but we included some creativity. Since the'
141 'up with, they can be really creative, even in their poems.'
183 'another time you know do a creative work and poetry, we'
(Interview – Greta)

In addition, below are some comments which the teachers wrote in their teachers' logs. It is interesting to note that these concur with the above pedagogical developments. In their teaching logs the teachers referred to creativity using other lexical items which portrayed the idea of originality and creativity:

Greta – 'Children remembered what they had to do so we used Microsoft Word and after some discussion they did creative work' (Teachers' log 2)

'Children came up with different ideas' (Teachers' log 3)

'they were pleased as the subject interests them and the fact that they are producing their own original poems.' (Teachers' log 4)

Original and innateness of creativity

David – ‘as yet the children have had no time to research the topic and be creative’ (Teachers’ log 1)
‘the variety and originality of the children’s presentation’ (Teachers’ log 2)
‘they just continued the creative writing on the computer and worked as a whole group’ (Teachers’ log 4 and 5)

Original and creative writing

Rose – ‘some managed to invent their own situations’ (Teachers’ log 1)

Original

Marceline -- ‘the children worked on sentences creating ways to make the exercise interesting’ (Teachers’ log 3)

‘I was pleased with their ability to create sentences and finding a way to form an exercise’
(Teachers’ log 4)

Make and original

As mentioned previously, Martha did not complete her logs.

Initially, Greta was the most confident ICT user within the group. She was able to start discussions about her pedagogical practices and introduced new forms of ICT practices, such as hyperlink. It was only at the end that her focus became the students and their creativity. By contrast, Marceline and David considered these facets earlier on in the enquiry group meetings. Table 5.11 shows an overview of the teachers’ pedagogic concerns and perspectives as revealed by the use of the lexical item *creativity*.

	Greta	David	Rose	Marceline	Martha
Enquiry group meetings 1 and 2		<i>Original Creative Writing Make</i> (Teachers' log)	<i>Make Creative Writing Original</i> (Enquiry group)	<i>Original Make</i> (Enquiry group)	
Enquiry group meetings 4 and 5	<i>Original Creative writing</i> (Teachers' log + Enquiry group)	<i>Original Creative Writing Make</i> (Teachers' log)		<i>Innateness-innermost creativity</i> (Teachers' log)	

Table 5.11: Summary of use of *creativity*

The roles often adopted by teachers with pupils working with ICT are usually ones of demonstrator, tutor, guide, consultant, questioner and fellow learner. Creativity needs a different approach in the classroom (De Bono, 1999). It needs the teacher to first of all recognise that the students need space to be able to think and to come up with their own ideas. The strategy of learning to 'step back and observe' (Loveless, 2003) was one that was adopted in these enquiry group meetings by myself, in contrast to standing at the front of the group in a prescriptive manner. This in turn may have influenced the teachers to be more creative with their students. It might be that the positive changes in the students' willingness to work together (group work) and attitude towards their classroom tasks are related to the teacher's change in attitude, role and style of interaction within the enquiry group as compared to the more traditional CPD approaches they were used to. In the part of the interview featured below, David talks about how he worked in the enquiry group, and then shortly after talks about how the students worked in the classroom:

- 61 (Michelle) 'Ok um, um How did you feel in the, in the meeting with others, in the sense of, did you get a chance to feel that you had sort of formed a group with them?'
- 62 (David) 'Yes we formed a group, I think, Em, and we helped each other even by adopting ideas from one another'

Then later on David goes on to talk about how the group work in the classroom worked, and he mentions the sharing of ideas again.

154 (David) 'using group work as well but this way they are putting they are sharing ideas as well, I mean when I used to do games for example, they would discuss it amongst themselves and come up with the answers sort of but in this way they're collaborating to produce a piece of writing for example or something on the computer'

5.4.6 Co-construction of knowledge

Collaborative learning is often characterised as a process of constructing shared knowledge in which people converge on a shared meaning and representation of the materials. Van Boxtel et al. (2000) suggested that in a collaborative learning environment, elaborating the process of concepts is reflected in talk about relations, reasoning, giving elaborated answers and elaboration of conflicts.

Hoyles and Sutherland (1989) noted the importance of the quality of the interaction between children and the teacher whilst working with Lego. In their research, the interaction and intervention strategies adopted by the teacher were far more subtle than originally thought. In this research it is interesting to note the subtle way the language use of the group of teachers changed as they discussed what was happening within their classrooms and as they reflected on their experiences.

This 'standing back' allowed for discussion to occur, which was not controlled by the teacher trainer, but by the teachers. The way they discussed the pupil construction of learning is a clear example of how the teachers were talking about a subject indirectly; they were using 'their' language. I concordanced the lexical items: Knowledge, Collaboration, Influence, Role and Student/Pupil. This revealed either none or very low usage, as can be seen in Table 5.12, yet I knew that these were key issues from my observations of their classrooms.

	Enquiry group meeting 1	Enquiry group meeting 2	Enquiry group meeting 3	Enquiry group meeting 4	Enquiry group meeting 5
Meeting/ Organisation	Greta presented. Martha, David, Rose and Marceline attended	Rose presented. Martha, David and Marceline attended	David presented. Rose, Greta, and Marceline attended	Marceline presented. Rose, Greta and David attended	Martha presented. Rose, Greta, David and Marceline attended
Knowledge	Not used	Not used	Not used	Not used	David (1) Marceline (1) with reference to ICT knowledge
Collaboration	Not used	Not used	Not used	Not used	Not used
Influence	Not used	Not used	Not used	Michelle (2) Rose (1) with reference to what influenced them	Not used
Role	Not used	Not used	Not used	Not used	Not used
Student/Pupil	Not used	Rose (3) Martha (1)	Rose (1) David (1)	David (2) Marceline (2) Rose (1) Greta (1)	Martha (1) David (1)

Table 5.12: The use of lexical items directly to convey knowledge

It was when I concordanced '*they*' that the whole picture was formed. Although *they* is a third person plural pronoun and does not depict knowledge construction, the language that was used around it did. When the teachers used 'they' there were referring to the knowledge the students were acquiring, the activities they were completing and how they were behaving in class. An example of this may be seen in Appendix 7, through the concordancing of the word 'they' in Rose's meeting. The teachers did not use the language that I was expecting: they were using their own language to convey the meaning of co-construction of knowledge, as in 'sometimes they give you ideas' (Greta, 375, in Enquiry Group Meeting 4).

The difficulty with a lexical item such as *they* is that as a pronoun its use is interchangeable -- it could be referring to any subject. Therefore the concordanced

data had to be read through to identify when the teachers were using it to refer to the students and their ways of working, table 5.13. This at times overlapped with their discussion of group work. However, the data portrayed here, strictly depicts when their discussion referred to the notion of co-construction of knowledge; when teachers reflected on how the students together constructed their knowledge.

	Students provided information	Change of role – not teacher-centred	Students' collaboration – recognition of work carried out
Greta	1 (8) 1 (202) 2 (317)	1 (202)	1 (208)
David	2 (207) 4 (366)	2 (211) 4 (366) 5 (111) 5 (113) 5 (184)	2 (292) 4 (366) 5 (138)
Rose	3 (87) 3 (97)	3 (69) 3 (228) 4 (343)	3 (163)
Marceline	4 (141) 4 (313) 5 (191)	4 (144) 4 (146) 4 (154) 4 (154) 4 (395) 5 (130)	4 (150)
Martha	5 (60)	5 (42) 5 (46) 5 (98) 5 (110) 5 (134)	5 (38) 5 (92)

Table 5.13: Instances of when the notion of co-construction of knowledge was discussed around the use of *they*

The teachers tended to talk about the construction of knowledge when they were presenting their work during the Enquiry Group Meetings, except for David, who discussed the notion of students co-constructing their knowledge in Meetings 2, 4 and 5. The teachers never used the words *students co-constructing their knowledge*. What they discussed was what was happening within their classrooms. They talked about their students' practices and in doing so constructed their own pedagogical knowledge. They built up their classroom practices through listening to each other's

experiences, similar to their students who were also building up their knowledge working together in groups.

For example, Greta talks about how:

8 'They came up with a lot of information' (Enquiry Group Meeting 1)

And as a result of this, the teachers' role changed to one where she recorded the output:

10 'I wrote some points of whatever they come up with' (Enquiry Group Meeting 1)

David voices more of this notion of the students constructing their own knowledge as he talks about how the students' collaborated:

366 'This year I knew what sort of depending on the experience from last once we started I find that they, they learned a lot especially when it came to sharing of ideas, collaboration I mean social aspects of it all' (Enquiry Group Meeting 4)

Rose focused on how the students knew how to operate ICT, how they brought information to the classroom, and how they enjoyed collaborating to build up their tasks. As a result of this, she felt that her role had changed to one of facilitating classroom activities. Below is how she described them using Microsoft Paint:

87 'and over here what I asked them to do, two of them managed to do it, I asked them in groups, but I didn't imagine that they actually knew how to operate the Microsoft Paint and this is what they did, and I forgot to tell you, I prepared the questions, the same questions of the comprehension. I saved it on a floppy and then put them on each computer and there were spaces for the answers, the answers were multiple choices and they loved them, and nowadays they are mixing things up. Yesterday I gave them a comprehension, and the text asked two questions a and b and they asked me, Miss Do we have to choose? so I had to explain, as they got mixed up. The flag we could not print it, listen to them madness'
(Enquiry Group Meeting 3)

163 'The fact that I arranged the desks in a different manner they enjoyed it, my class is always noisy when they are writing it is different otherwise when they come to working on computers'
(Enquiry Group Meeting 3)

The noise in the above example is evidence of the students interacting and collaborating.

Similar to Rose, Marceline talks about the students' management of their own learning, and how they decided what materials should be presented. She does this whilst talking about how they worked together and how at first they were not really collaborating well, but once they were engaged in a task, creating their own exercises, things changed and the students took on their own responsibility for the task at hand:

20 'uh-huh I gave them some examples, ideas but no they decided em so they went on Power Point and on blank presentation, and they started with the sentences, they gave each other, because they are three on each computer. I was less involved, em, they were involved in the management of their own learning, and they ah, also learned with engagement of a particular task the thing that I like most was their creativity' (Enquiry Group Meeting 4)

Martha, who had previously never done any ICT work with her students, had to deal with issues such as logging in and familiarisation with the keyboard. Once they were confident with using IT, the students were able to collaborate and come up with their own ideas, as indicated in line 42 below:

42 'So they decide, they divided themselves, and (decided between them) now you are going to come up with anything that you want to present on a chart, you can use one chart, two charts, three....' (Enquiry Group Meeting 5)

Table 5.14 below presents a comparative overview of the different facets of co-construction of knowledge.

	Greta	David	Rose	Marceline	Martha
Enquiry group meetings 1 and 2	Children came up with their own ideas (Enquiry group)	Change of teachers' role. Less control from the teacher (Enquiry group)	The difference of input from the students (Teachers' log)	Children worked in an organised manner (Teachers' log)	
Enquiry group meetings 4 and 5	Student constructing (Teachers' log)	Knowledge acquired by students. The difference of input from the students (Teachers' log)	Change of teachers' role (Teachers' log)	Students working together to construct knowledge (Teachers' log)	Students working together to construct knowledge (Enquiry group)

Table 5.14: Summary of the facets of co-construction of knowledge discussed by the teachers

The teachers shared the commitment within the enquiry group of using the S.A.I.L. software. Their initial focus was on how the students were working to achieve the objective. Their own reflections and the discussions within the group revealed that their perspective of their classrooms had become one where students constructed their own knowledge using ICT. The teachers had volunteered to introduce the Roma software and had to focus on the organisational aspects of their classroom and their activities. The focus then moved on to looking at how the students were learning and the children's participation within this process. Their language use throughout the enquiry group meetings reflected this change.

There were several other words which I analysed through concordancing and coding that were related to co-construction. These words were chosen from the word list which I made for each of the meetings. I chose words which were used frequently or directly related to pedagogy (Section 11 in Chapter 4 discusses the concordancing carried out). Examples of such words are *student* and *learn*. For the lexical item *student* concordancing revealed that the teachers were looking at the way the students worked within the class and how their learning process had changed, but

the use of the word did not change during the research as in the example of *creativity* discussed above.

The students' engagement was evident as the teachers used the word *learn* concordanced with *they*. However, I would have thought that the words *students* and *learn* would have shown more data than it actually did. For example, the use of *keen* by Rose in Enquiry Group Meeting 5 shows how engaged the students were in the process of learning; yet this was not reflected through the concordancing of *learn*. The only instance it was used in appears below:

124 (Rose) 'Yes they are really keen, they even ask for Michelle, when is she coming' (Enquiry Group Meeting 4)

In fact, to search for student involvement I also concordanced the word *they*, in order to try to find out how the teachers referred to the students. This was further discussed in Chapter 4.

The language they used within the enquiry group was a vehicle for discussion and reflection to occur. The lexical items are a reflection of what the teachers were thinking about and developing.

5.5 Critical incidents

This section sets out to illuminate some of the points in the research where practice changed, or points that were critical in changing practice. This provides supporting evidence that the changes in language reflect changes in classroom practice. The aim is to try to understand the enquiry group process better.

At the beginning of this research the teachers were interested in knowing more about how to integrate the software within their classrooms. Yet they were used to certain patterns of working, what Tripp refers to as habits:

'Indeed, our routines often become such well-established habits that we often cannot say why we did one thing rather than another, but tend to put it down to some kind of mystery such as 'professional intuition' or simply 'knowing'.' (Tripp, 1993, p. 17).

Critical incidents for Tripp are quite routine aspects of teacher behaviour that have been unproblematised. However, in this research teachers were being asked to be innovative and engage in unfamiliar behaviour. In this context, critical incidents occurred when new behaviours were being explored; such incidents are often termed 'aha' moments (Cunliffe, 2004). For this research, critical incidents refer to incidents that mark a realisation of the value of a pedagogic action after a moment of difficulty the teachers had faced. These moments may not be recognised unless reflected upon. They may not occur every day, but the act of reflection may be needed to allow them to surface.

The Enquiry Group Meetings provided the opportunities for critical incidents to occur through the discussion of their classroom practice, and helped to support the teachers in their new practices. The teachers questioned their everyday classroom practices and how they viewed the learning process whilst exchanging their views and ideas with others.

A critical incident is that moment that starts teachers thinking about what they have done in the classroom and building upon it (Cunliffe, 2004). In the classroom these teachers did not realise they were changing their practices; it is the reflection on these practices that revealed the critical incidents. The moment of realisation pulls an incident apart; something previously considered normal and taken for granted now is being examined. An incident can appear 'to be 'typical' rather than 'critical' at first sight, but is rendered critical through analysis' (Tripp, 1993). These moments that the teachers experienced required them to move out of their 'normal practices', whereupon they consequently reflected on what had happened in their enquiry group and had an 'aha moment' which then influenced their pedagogical practices.

Critical incidents by their nature are very personal, and I can only depict the ones voiced through triangulating all the utterances of the teachers within the meetings together with the interview at the end, where they talked about what influenced them. I did this by creating a digital profile of the teachers which contained all the interactions they contributed to the meetings, which allowed me to follow their process of development and any critical incidents which had occurred. For example in the third meeting, whilst discussing his work David talks about how each group had its own identity, as they had clear ideas about what they wanted to do within this activity. One of the girls within the group had brought a violin with her as she had decided that this was the best way to convey what the Roma were about, and in another group they created the layout of the newspaper according to how they envisaged it should be:

234 (David) 'I created different time frames for different groups as they had different activities.'

237 (David) 'This one got a violin with her, but then she started to play twinkle twinkle little star, God it was a surprise'

287 (Rose) 'That idea of the newspaper is really good David.'

289 (David) 'yes, they might email it, they are thinking of their two pages to design on the computer, everything they are doing on the computer, I do not know how it is going to work, but...'

292 (David) 'but they already have a concept in their heads on how they want it, they want to see it as a website'

294 (David) 'They are going to do it! even the interview, they are going to pretend to interview.'

(Third enquiry group meeting)

When during the interview he talks about what he has learnt, David picks up on this learner autonomy point and mentions that this was what he has learned from this experience.

12 'Well, um, some things were absolutely new'

14 'like for example um. When, the group has to collaborate and give chance for the others to work and they have to sort of um, permit others to express their opinions as well, which is difficult in some cases, um, some children tend to lead the way while others um, stay in the shadows, sort of. Yes, so, you have

to balance things out, because otherwise um some some, children tend to do everything by themselves while other prefer to stay away from it, um, and with regards to teaching, um something I learned from the S.A.I.L, um integration of the S.A.I.L. project was that um it's much more beneficial to, to give the students the chance to choose what they want to learn, hmmm.'

- 16 'Well, well this is extra curriculum, so we didn't have strict boundaries.'
(David – Interview)

Greta experienced a critical incident when she realised that her students had to work on their own in Lesson 3, as they had not saved their previous work, and she had to come up with a new idea for her lesson. She got the students to work on words, which would then become poems about the Roma. It was at this moment that she realised the potential that ICT could have to motivate students to be creative:

315 (Greta) 'they wrote lots of poems'

- 317 (Greta) 'Look what they did.. during the last lesson they did this, now how am I going to correct this? Look at the features they introduced all on their own, I did not interfere. If you came in to record me in this lesson I would have been blank.'
(Third enquiry group meeting)

In her interview she talks about how this affected her:

- 52 (Greta) 'Yes it did, for me poetry mainly because that was our aim, but we included some creativity. Since the projector wasn't working and the server didn't work as well, so we just used Microsoft Word'
141 (Greta) 'I think the children worked well in groups helping each other, you know in groups helping each you other. You know you are sometimes you would be amazed with the things they came up with, they can be really creative, even in their poems.'

Martha realised that ICT pedagogical practice was not beyond her when Greta shared her comprehension idea during the first enquiry group meeting. She recognised that she was in a similar situation to her students, who were also using ICT with her for the first time; in fact this was the first time she had used ICT in a classroom.

- 132 (Martha) 'this one was uh, I had fifteen children over there and one computer, by the way, that's the problem of it all one computer, everyone wants to work on it, because the children are not used, although we have another room, exactly underneath it with computers, but all they do is they have the CD. Put it in and start the game, so the only typing they do is maybe their name type in your name and that's all so even to show for them to know what is shift, a formatted letter, they knew nothing of that. I never used computers in class before. So I decided one day to work comprehension on computer, what I did

was, I took introduction and surprise why I got the idea from Greta by the way, so I took her idea and I printed,' (Enquiry Group Meeting 5)

In her interview she talked about how the enquiry group meetings supported her in this change:

185 (Martha) 'The you and me, the you there and me, turned into us.'

187 (Martha) 'Yes we did, Yes we got ideas from each other. We didn't mind, I didn't mind saying listen I did this lesson getting the idea from Greta and thank God for her that time as I was stuck, I mean'

189 (Martha) 'I don't know, if this has anything to do with it, but we came as a voluntary group, you know'

Marceline was the most hesitant to use the S.A.I.L. software as she was not a confident IT user, as she herself admitted:

67 (Marceline) 'I have a very basic knowledge um you have to be more confident in you know for example I entered file and upload it. But when it comes to going onto the Internet, get the information, and when you're in the classroom and someone is calling you from here and the other one is calling you, you know you find it hard to I mean since I do not have that practice you know' (Interview, Marceline).

As a result of this, there were several new facets for her: the fact that she was using ICT with her students; that she was using the S.A.I.L. software: and that the children were working in groups.

108 (Marceline) 'and the first time they were, I mean distracted, they weren't really concentrating on, I mean the first time maybe because of the, we took a long time to log in and the children are impatient, you know, when on the computer, em, I was scared of the creativity, their ability to work together, and mainly, this time my assistant. I was less involved, em, they were involved in the management of their own learning, and they ah, also learned with engagement of a particular task that there should there be punctuation here? that I liked most was their innermost creativity, I always look for that, you know I like to leave things into their hands, and new ideas, and eh, ah, I know, I know, they want to know more and to do more, so that's a good thing and that I think that we managed to do it with this project.'
(4th enquiry group meeting)

Yet she found that despite her initial difficulties, whilst facing the idea of working in this manner, she 'found this year to be much better, better' (Marceline, Interview: 28)

A critical incident occurred during the third lesson, when she realised that she could get the students to create their exercises rather than have them use ICT just for research purposes. In line 139, she talks about her negative experiences before the third lesson, whilst in line 313 she talks about how these changed. In this conversation there is a marked change in teacher attitude too:

139 (Marceline) 'Ok, so, the background let me just tell you what the children have been doing and what happened to me, em, first of all I was a little bit sceptical about this thing, I wasn't so sure that it's going to, you know, to succeed. Anyway and eh, so I thought because what I explained to them what the project is about because I always like to explain everything that we were going to do, whatever we are going to do, and I ask them to find some information at home about Roma, and em that I am going to give them a website, it's for them to look up Roma for information, so that's what we did the first time, the first lesson, which wasn't a success at all, so the first lesson was then transferred to the next week, because of the difficulty of logging in, and when we registered in anyway, and the second lesson, I gave them and I gave them the website, so that they will find some information I have them different topics, they were in different groups, for example I give them the topics about history, their home, the caravan, music, costumes, daily work and about religion and each group had to find information from the website and anyway it took them some time'

313 (Marceline) 'Anyway, the exercises, once they are finished, I did not get a copy as we are going to get them at the end, we are going to produce a sort of finished booklet. Next lesson they are going to work on each other's exercises. But the outcome is that they have these exercises. I enjoyed myself and the children as well, the result was good and they had fun. It was good for them, em, like I said, I think that computers should be in the classroom'
(Fifth enquiry group meeting)

Rose had a critical incident in her first class when she could not use Microsoft Paint and asked one of the boys to help her:

53 (Rose) 'Yes, for example I did not know how to use Microsoft-paint, in fact I asked Sergio to show the others because some people have computers at home and had their parents help them ah to, to use it, I learn and I teach the children how to learn this way so'
(Rose Interview)

She raised this issue in Enquiry Group Meeting 5 when she said that:

343 (Rose) 'and sometimes, uh, some children they help you indirectly'

As a result of these incidents real change in classroom activities did happen on several levels. For the first time the students in:

- Greta's class downloaded pictures off the Internet;
- Rose's class sent emails;
- David's class used the computer for research work and creative writing;
- Marceline's class created exercises and carried out language work;
- Martha's class used the computer for research and comprehension purposes.

These real classroom changes were also evidenced by the language used in the Enquiry Group Meetings which reflected a change in pedagogic understanding that occurred for the teachers as they:

- worked in a creative manner using the S.A.I.L. software;
- allowed their students to take on more task responsibility;
- took more risks with their students, letting them choose what they wanted to research; and
- discussed their difficulties with their peers.

Teachers did not utilise the discourse of blame (Joyes, 2006). The teachers volunteered for this exercise and, words such as *results* and *performance* did not show up at all in the word lists. They concentrated on the discourse of learning and student development.

5.6 Reflections and enquiry group meetings

During this research, I did not have a direct input into the Enquiry Group Meetings. The impetus of change came from the S.A.I.L. materials and the teachers wanting to implement these materials successfully. S.A.I.L. challenged the ways the teachers normally worked in their classrooms. It appears from this research that to change their classroom behaviour and understanding effectively they had to have the resource, realistic expectations, and a training method which allowed them a reflective collaborative space -- the enquiry group. The enquiry group left space for reflection towards action.

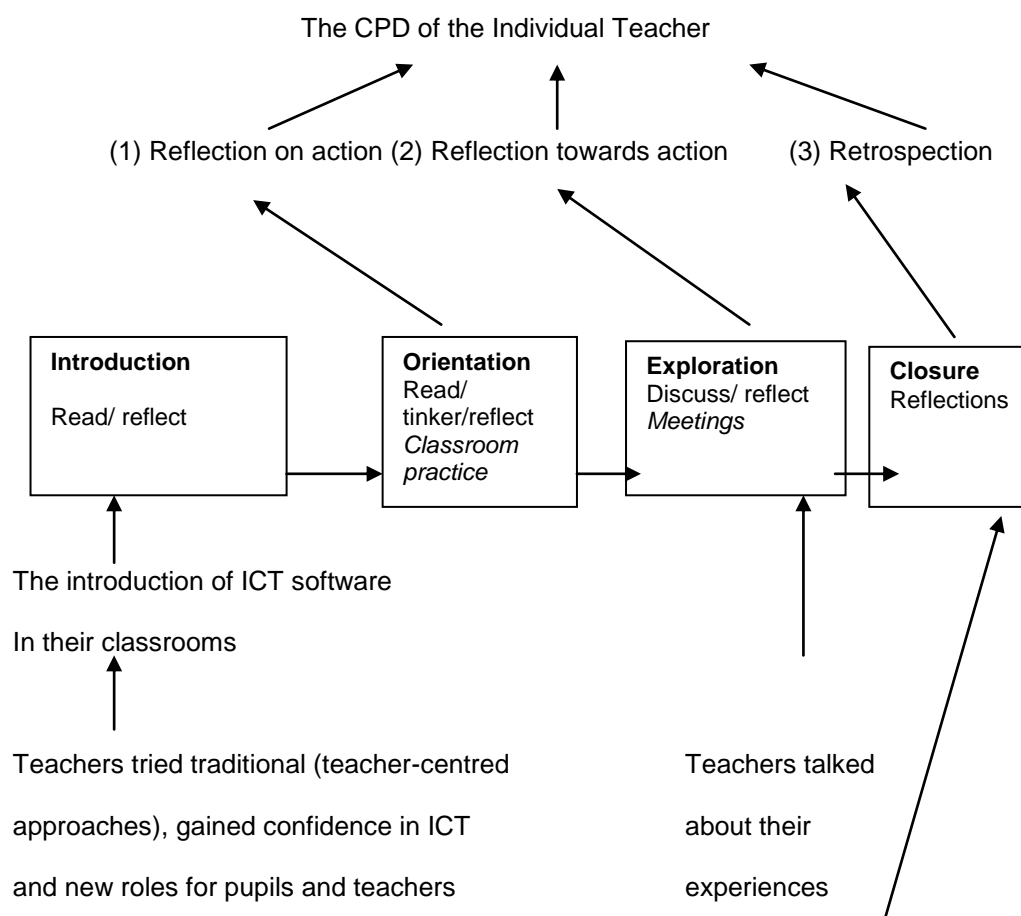
The analysis of content discourse within online communities provides a useful example of the way language changes and in some cases acts as a virtual form of the enquiry group organised in this research. Goodyear et al. (2006) looked at networked learning between teachers and their students, tutoring and learning activity through the time their research was being conducted. This study was an online collaborative group working on a common task and is similar to this research as they explored some of the complexities of emergent role development and group awareness among participants. They used content analysis to provide participant profiles for learning and tutoring processes within a group of collaborating professionals. This research showed the importance of group process awareness. They found that it was at its highest during the middle phase of activities, where the focus was also drawn towards working on the task and facilitation of group processes, reflection towards action. In the initial phase they showed elements of working on the task and setting up a group structure to support this (facilitated by the teacher). During the closing phase there was a relative increase of reflection on the task and a focus on facilitation and instructional design to coordinate the final phase of their collaboration. This concurred with the results of the enquiry group research and is evidenced by what affected the teachers' development most, these being the students, the group and the teaching ideas (Chapter 4, Section 4.13).

Whilst training teachers, trainers may remark that teachers have ‘an emic view of classroom actions and reactions’ (Rankin and Becker, 2006; p. 368). The nature of the teaching profession is very practical and hands-on. Teachers are expected to perform in the classroom and achieve the best they can against the backdrop of their own beliefs and cultures. Therefore, they rarely have the time to read the theory and analyse how they can integrate it within their classrooms. This results in their trying out an activity in the classroom and reflecting on it in isolation.

In Malta teachers have been provided with the pedagogical theory. In fact teacher engagement with computers in the classroom in Malta has been poor, with many only being used by peripatetic teachers (Borg, 2003). More widely:

‘The motivational effects of ICT and their obvious importance for learning ‘about’ technology is broadly recognised. However, much has still to be done towards achieving the promises of learning ‘with’ or ‘through’ technology and for identifying what are the pre-requisites to achieving such promises, from both an educational and organisational perspectives.’ (European Commission, 2003; p. 33).

The enquiry group affected the individual as it allowed for reflection towards action through presentation of their classroom activities to the groups and a constructive discourse around this practice. The final interview allowed for retrospective reflections on the whole process and highlighted the critical incidents that had occurred. It also allowed for some closure on the research activity as the participants reflected and put together their thoughts on what they had been through via retrospection. The process of the individual through her/his various reflections through this research is depicted in Figure 5.1:



Here they used language to explore the 'new' context for learning.

Figure 5.1: The teachers' process of development.

5.7 Conclusion

This research provided evidence for the enquiry group supporting the process of change. Teaching materials alone do not affect change. Materials do not create opportunities for teachers to move from the known to the unknown. It needs to be both the materials and the experience; without these factors the S.A.I.L. enquiry group would not have been as effective.

S.A.I.L. provided a set of activities designed for group work. The enquiry group supported the teachers in developing an understanding of how to use them and their value. It is the pedagogic design of the materials that challenges the teachers' practice and it is the enquiry group that supports the teachers through this.

This research has shown that voluntary participation in an enquiry group with a specific focus on ICT implementation can contribute to change within the classroom. The implications of this will be further considered in the next chapter, where the Loveless CPD model (2001) is adapted to include an enquiry group.

The conclusion has been evidenced by changes in classroom behaviour through critical incidents as well as the nature of the language used by the teachers in describing their classroom practice. Of course, there were other influencing factors beyond the enquiry group, such as the perceptions of the teachers before they started the activity, as seen in Chapter 4, Tables 4.3 and 4.5; their engagement with computers; and their own pedagogic beliefs and how these were conveyed in their classrooms.

The most interesting part of this research is the point where the teacher moves from the known into the unknown, and the critical incidents that occur as a result of this change -- the move from the habitual approach involving individual or small group use of the computer on isolated tasks to engagement of the whole class in an activity. Teachers needed the security to take risks: they found this in the enquiry group where they had a safe space within which they could talk about their experiences, hear their peers' reactions and advice, and then go back to the classroom. They were not judged but aided in the integration of ICT within their classrooms through the enquiry group.

Forming the enquiry group learning community did take time for soliciting perceptions, collecting data, allowing for different opinions, sharing input, thoughtful

considerations and discussions. The concept of training teachers within such a community can be successful only if this time is allocated to allow for tinkering and playing with the resource – time to sit back.

Chapter 6 will summarise the important findings of this research and its contributions to knowledge about teacher change, in particular the importance of teachers' use of pedagogic language around their practice. Chapter 6 will also address the implications of the research and consider how to best integrate an enquiry group training method within continuing professional development courses held for teachers.

Chapter 6 Outcome of Research

6.1 Introduction to Chapter

This chapter will look at the outcomes of the research and its implications for continuous pedagogical professional development and for further research. It will discuss:

- 6.2 The research question and the claims for knowledge, by looking at the ways the enquiry group influenced teachers practice in this research
- 6.3 Change and the CPD model
- 6.4 Reflections on the research methodology
- 6.5 Limitations of the design
- 6.6. Implications of this research
- 6.7 Suggestions for further research
- 6.8 Conclusion.

This study was built from my wish to understand the process of developing practice which is supported by a community of teachers. The research question that was addressed in this research was *how do teachers collaborate within an enquiry group when introducing a new ICT package?* Consequently, the questions that needed to be addressed were:

- a) How is meaning of practice being conveyed?
- b) What is happening in the classrooms?
- c) What are they talking about?

These issues were explored whilst the teachers were working together in an enquiry group (Chapters 4 and 5). The teachers *reflected on* their practices at various stages:

- (1) reflection on – in the teachers log
- (2) reflection towards – in the inquiry group
- (3) retrospective reflection – in the interview

Analysing these reflections helped to identify the *critical moments* the teachers experienced. There was a change in the way they used *lexical items*. This was divided into three categories:

- (i) increase in semantic use;
- (ii) words adopted by others;
- (iii) indirect conveyance of language use.

The focus of the research was the teachers' developing classroom practice and pedagogic understanding as evidenced by their developing use of pedagogic language and observations of classroom practice. The teachers did change their practice and the analysis revealed key factors involved in the process.

6.2 Factors that influenced change in this research

6.2.1 Personal

The teachers embarked on an exercise that was new for them. This in itself was a challenge. Yet there were other issues which they also had to address.

The first issue that was addressed was: what did the teachers expect computers to achieve within their classrooms and what were their roles? As seen in Chapter 4, Table 4.9, computer application problems were mentioned fifteen times during their meetings. There are many teachers who are using computers imaginatively and successfully. But for some teachers, the presence of the computer remains a puzzle. Computers are occasionally being used to provide 'light relief' to the serious business of teaching and learning. Sometimes they are seen as a useful alternative means of keeping the less able and the disruptive occupied.

This was also found by the Deaney, Ruthven and Hennessy (2002) study, where they examined pupil perspectives towards ICT use in the classroom. The subject teachers they interviewed were well-disposed towards ICT integration, however:

'the process of accommodating ICT into classroom practice may lead teachers towards assuming different – and sometimes unaccustomed – ways of working; interim periods of adjustment maybe uncomfortable for teachers and pupils alike.' (p.18)

I wanted computers to be used during this research project in a positive manner in order to develop sound pedagogical work in the classroom, and so as to ensure that the teachers' perceptions of their use were as positive as possible. To achieve this, I started out by believing that 'each teacher is different and therefore has a different style of teaching and will take on ICT differently' (personal journal entry, 13th March 2004). This would empower them and make them feel that they were in control of the resource and not vice versa.

This group of teachers feared the tool and talked about it for an average of 3.4 times in their enquiry group sessions (Table 4.9). They had often worked with an ICT specialist whilst integrating ICT before S.A.I.L., but this time they were on their own. They had to overcome this fear to be able to integrate the Roma materials within their classrooms.

Once they developed their confidence through the realisation that they were the experts in the classroom and that they were able to support and collaborate with each other, their fear started to diminish. Chapter 5.5 looked at the critical incidents which helped them effect this change. As Windschitl and Sahl (2002) noted in their study:

'such relationships play a key role in conjunction with professional development opportunities, and may play a key role in sustaining growth in instructional sophistication and technology use.' (p. 203)

6.2.2 The practical issues of integrating the materials within the syllabus and time allocation

Often the teachers assumed that they had to find a special time to carry out the work involved in S.A.I.L. In fact time was allocated during the project slot, which was available on Wednesday afternoons. However, in time the teachers found that the work that was being carried out was work they had to complete within other spheres of the syllabi. Therefore, they felt more confident using other time allocations to complete tasks. In a number of instances, exercises that had started in the project work were completed in other classes. For example, this happened to Greta and David when they started work in the allocated session and ended it in the English class -- when Greta's students finished writing their poetry and David's students finished their articles on the Roma.

The importance of group work increased during the research exercise. It was mentioned 5.4 times during the meetings (Table 4.9, Chapter 4), and 9.6 times during the interviews (Table 4.9, Chapter 4). Teacher preparedness also increased during the research as the teachers realised that the focus was not on the computer application, but on the pedagogical issues that they were overcoming.

At certain points the teachers mentioned that they were having problems in organising the groups within their classrooms (Chapter 4, Section 5). These problems were mainly due to personality issues that arose within the groups of children. For example, one of the students might dominate the group work or another might not do the task assigned to her/him. This type of problem required teacher intervention and negotiation with the group so that the children could see that they all had to contribute to reach the end objective. However, ICT helped to introduce group work in these classes and, on the whole it was perceived as something positive (Chapter 4, Table 4.6).

The teachers felt that ICT enhanced the variety and appeal of classroom activity, and claimed they would continue to use ICT within their classrooms (Table 4.9). One of the ways in which this was viewed as positive was the manner the students constructed their own learning, as it fostered pupil independence and peer support. At times it even allowed students to help each other overcome difficulties. The quotations below are included at this stage of the thesis to reinforce the point being made here: the positive attitude with which the teachers viewed the success of the integration of ICT. Marceline was the teacher who had never used computers before this research exercise:

- 11 (Marceline) 'positive especially the children worked well after 2 or 3 lessons they were more confident and they loved the work, the computer is something new, something you know that never ends, so they could do everything. I mean that's that's very good for the children and they used their thinking skills they they worked together you know'
(Michelle) 'hmm'
- 13 (Marceline) 'even the fact that this time it was not so teacher based, they worked on their own, although I always gave them some instructions you know what we are going to do, we spoke about the topic, and what type of you know project were going to do like for example to get to the actual topic'
(Marceline Interview)

In addition, the teachers noted that group work involved a lot of teacher preparation – this was mentioned on average 20.2 times in the teachers' reflections (Table 4.10). Although they did not specifically talk about learner motivation, they mentioned that the students enjoyed the work carried out, and all the students' logs collected from all the classes mentioned that the children had enjoyed the work.

Whilst the teachers had a very positive reaction to the research exercise, they also had some reservations. These were mainly:

- (a) The length of time these types of lessons would take. This concern was raised 1.8 times during the follow up interview (Table 4.10);
- (b) That the aims of the syllabus were not the integration of ICT, and that it was not specifically catered for – mentioned 1.2 times during the interview (Table 4.10).

6.2.3 Teachers' perspectives on ICT use within the classroom

Before the research had taken place, teachers felt that students viewed the computer as a means to play games. Indeed, games, adventures and simulations do enable children to participate in activities that can represent a world of wealth for exploration, from rainforests to racing tracks (Loveless, 2003), and are also an effective teaching tool. Yet, the S.A.I.L. project was based on developing skills and strategies of research using the programme and also the World Wide Web. Consequently, the skills it concentrated on were different to those of games, whereby it worked on helping pupils interpret and synthesise information in order to construct and communicate new knowledge with the teacher in the role of a facilitator for this process. In fact, after implementing S.A.I.L., all the teachers noted that change had occurred within their classrooms, as seen from the data portrayed in Table 4.9, Chapter 4, where the teachers mentioned this change in student attitude in their reflections, reaching an average of 13.2 times.

Jean Underwood (1994) has described the advantages of using ICT in data handling, these being that it allows rapid and increasingly complex manipulations of data; offers the opportunity for children to collate and interrogate their own material from the environment; and reduces the amount of work required that is not actually part of the learning process.

During this research, the teachers collectively managed to put together a newspaper, several innovative exercises, Power Point presentations and poetry, as seen in Table 5.4. The novelty for the teachers was that they were using computers as research tools and that the children were working in groups, just as they were.

6.2.4 My role

My role within this group was one of supplying ideas, creating the support structure which they could use in case of difficulty, and making sure the group kept on working. I felt very conscious of the fact that I did not want to interfere with their classroom practice and their way of teaching. Consequently, my aim was to encourage them to try and integrate ICT within their classroom practice and to organise the network for them to do this. I responded to requests for routine help with the software; the enquiry group discussed and shared pedagogical practices.

By allowing the teachers to take control of their learning and by my acting as facilitator, they realised that they could talk to each other and that it was 'ok' to make mistakes. Putnam and Borko (2000) refer to this process of experimentation as situative learning. This was an intentional part of my setting up the support structure, where my presence did not become central to the system but assumed the role of recording data and structuring the meetings and the teachers took on partial responsibility for the research. They were the experts in their respective classes and they knew what difficulties they were facing. This was the commonality which they shared within the group. I could only explain the S.A.I.L. package and give access to materials in such a situation while making sure the group kept on working cohesively as an educational case study for this research.

I ensured that the group did not fragment during the initial stages by giving the teachers a structure. This meant that I had created an environment where they moved, rather quickly, from a controlled environment to a freer one. At first teachers needed direction about what to do and what was expected of them. By giving them two articles, one on lesson ideas and the other on suggested lesson planning (Chapter 3), this was overcome. They read these and started to experiment with the Internet resources and the ideas. During the next stage, I went round the classes and started to videotape their practice. At first I noted that they carried out very traditional type exercises, such as a comprehension, almost in a paper-based

manner, although they were working on computers. For example, students would read the text and answer questions on the computer. This was because they were experimenting with the tool and needed to feel that they controlled the environment. They did this by using what they had already done and knew.

In her interview, Marceline said that 'before a new project you have to start with something you know'. They moved on to creating poetry and designing newspapers once they felt more in control of ICT as a tool within their class. The result was that they enjoyed what they had achieved, both on a personal level and within the class. As Marceline said in her interview, 'the fourth and fifth lessons were really good' (these were the last lessons of the research exercise which were all ICT-based).

The research exercise enabled the teachers to meet out of the classroom, provided an opportunity to 'stand back' (Chapter 5), and offered the challenge to integrate new software within the classroom, thus allowing them the space and providing the tool to implement change.

6.3 Change and the CPD model

6.3.1 Change

Whilst reflecting on their experience in the final interviews, the teachers cited the following factors that influenced their professional development:

(a) Michelle (the researcher). I put forward teaching ideas, went round videoing their classes and helped to organise their meetings. I did not actively contribute to the meetings but just gave them the space and consequently the opportunity to view themselves as the experts and to discuss issues between them. They asked an average of 15.8 questions per session. This space allowed them to internalise the 'rules' (methods) of ICT integration by hearing each other's answers and then choosing what they wanted to do within their own classrooms.

(b) Other teachers (the enquiry group). Between them they talked about their students and their personal life; they narrated their classroom experiences and discussed technical issues and the factors of time and skills. All this was carried out in a relaxed manner, sharing a sense of humour. Indeed, at several points there was laughter, as in the following example: 'I went to the hairdresser before' (Martha, David's session). This element of socialisation allowed for familiarity to develop; hence the sense of trust.

(c) Website (the S.A.I.L. material). This provided materials for both the teachers and students to access and use in class. It also provided a social context for the teachers to frame their development.

(d) Children (the teachers' classrooms). The teachers felt that what they were doing was effective for the children as they were motivated to produce end products. These products were an important part of the discussions, as the teachers brought in samples of work and displayed to each other what the students had produced in class.

I had not expected this, as my focus was on the process the teachers and the students were going through. The teachers validated their work by what the students had completed; the end product of the students was as important to them as the process. In fact, Greta rated the children as being the most influential factor in her personal development (Chapter 4, Table 4.15).

(e) ICT and the classroom pedagogy. The teachers in general concurred that the computer was a tool for children to use whilst writing and analysing data (Chapter 4 p. 137 - 138, interview). They also believed that it engendered motivation as it allowed the teachers to make the subject more interesting, thereby increasing their enthusiasm to use the tool as an aid.

In addition to the way computers were viewed as a tool, all the teachers agreed that using the computer involved much more time on tasks, as mentioned by the Means and Olson (1995) research in Chapter 2. My suggestion is that what actually happened was that the teacher actually worked together constructively solving problems. By using the 'teachers' language', a teacher is able to actually understand what the task is and reflect upon it, rather than just reproduce what the trainer has said for some immediate positive reinforcement (Nunan, 1993). The reinforcement did indeed happen: it was evidenced by the students' attitude towards the teachers' pedagogical practices and the materials they produced. This was valuable as they felt that they had achieved something tangible and did not merely reiterate what the trainer had said.

The teachers often discussed different items to those a trainer would introduce in a session when they were working in collaboration, reflecting towards action. Among these conditions for creating innovative practice, trainers have to also recognise that the teachers are human and need to interact on a social as well as a professional level, and recognise the situations the teachers are faced with including the students.

Included among the factors which contributed to effective communication was the time that teachers spent on socialisation and administrative discourse. Consequently, if one had to determine the conditions for continuous professional development within an enquiry group, the following facets would have to be present:

(a) *The element of socialisation.* Teachers volunteered to take part in this research, so I felt that I could not really make demands on their time and behaviour. The organisation and social discourse was of paramount importance, as it meant that the sessions progressed smoothly and in an informal manner.

(b) *The friendly atmosphere that developed.* This may seem a strange factor to consider, but the atmosphere in Enquiry Group Meetings 4 and 5 was one which allowed teachers to share a sense of humour. There were instances when they made fun of themselves. On seeing the videos, they said things like 'look, David is wearing the same clothes' (Rose, David session) and 'I went to the hairdresser before' (Martha, David session). The reason why sharing a sense of humour is important in this group is that it tells of a shared social world. They constructed a world which had the quality of reality around it. It simultaneously supported and facilitated them.

(c) *The element of internalisation of the 'rules' of ICT.* This the teachers did through the discussion of the content of the materials covered. Often they asked questions to each other such as how did you do that and what happened? (Table 4.9). After hearing each other's answers they acted upon what they heard, and there was evidence of them internalising new practices of ICT within the classroom.

(d) *The framework: the website and the 'world of the Roma'.* This provided the social context within which the teachers could frame their development. It provided the content which they implemented in the classrooms and which was then discussed.

(e) *The product.* The results were an important part of the discussions as the teachers brought in samples of work and displayed to each other what the students had produced in class. I had not expected this as my focus was on the process the teachers and the students were going through.

(f) *The Enquiry Group.* As already indicated in Chapter 2 through research such as that carried out by Becker and Ravitz (1999), Windschitl and Sahl (2002), and Hughes and Ooms (2004), enquiry groups help to foster an atmosphere of exchange and collaboration. The teachers did not indicate that they wanted to replicate

complete activities that were carried out by their colleagues. However, they were influenced by what they heard as it encouraged them to try out what they knew. They needed to consider how they would apply what they had heard in the context of their own classrooms. The group also gave them impetus to work on their own (Chapter 5, Section 3).

(g) *Reflection*. My perception of what influenced change was in fact the enquiry group and the reflection that occurred before (reflection on action), during (reflection towards action) and after the meetings took place (retrospective reflection). Using a situative perspective on knowledge, thinking and learning, Putnam and Borko (2000) have suggested that pedagogical practices are affected by the physical or social context within which learning is situated; the kinds of discourse communities support; and the accessible persons. According to them this optimal learning environment, or as I have called it 'space' (above), fosters opportunities for collaboration, discussion and reflection.

In addition, teachers reflecting on their own beliefs and having access to other practices indicate a valuable learning experience (Putnam and Borko, 2000; Snoeyink and Ertmer, 2002). In this research it has fostered reflection which has been intrinsic to their continuous professional development. Section 5.6 gave an overview of the process of the individual teachers' development.

6.3.2 CPD model

This research looked at how a group of teachers worked together and integrated ICT within their classrooms. This was the first time these teachers had worked in this manner, and for some it was the first time that they were using ICT.

Integrating ICT within the classroom can bring about a change of pedagogical practice, but this needs to be supported. A peer support system whereby teachers

are given time to work on the computers and then support each other – either through a virtual network support or one within the school system – would help overcome this barrier.

This research supports the view that reflection is an integral part of CPD. The Loveless Model (2001) in Figure 2.2, Chapter 2 has been adapted to include the facet of peer support, time and reflection which this research found integral to the CPD of the group of teachers who took part in the study, (the new additions have been included in the model in Figure 6.1).

Loveless's model acknowledged the role of the community and support group when evaluating teachers' perceptions towards the integration of ICT. For new pedagogical practice to be rooted within the individual, the teacher has to be encouraged to make it their own belief. This needs time for reflection and the support of their peers, as seen from this research.

It would seem that with regard to ICT, teachers are no different from the average person when learning how to use a computer for the first time. They have to both experiment with using the tool and make mistakes. Teachers may face additional barriers which are idiosyncratic to teaching, such as performance anxiety in the classroom. There is evidence from this research that the psychological support offered by this group helped them to overcome these barriers (Chapter 5.5). The enquiry group provided the safety net that the teachers recognised that they needed. The students have each other in class, whereas the teacher furthering her/his development usually works in isolation.

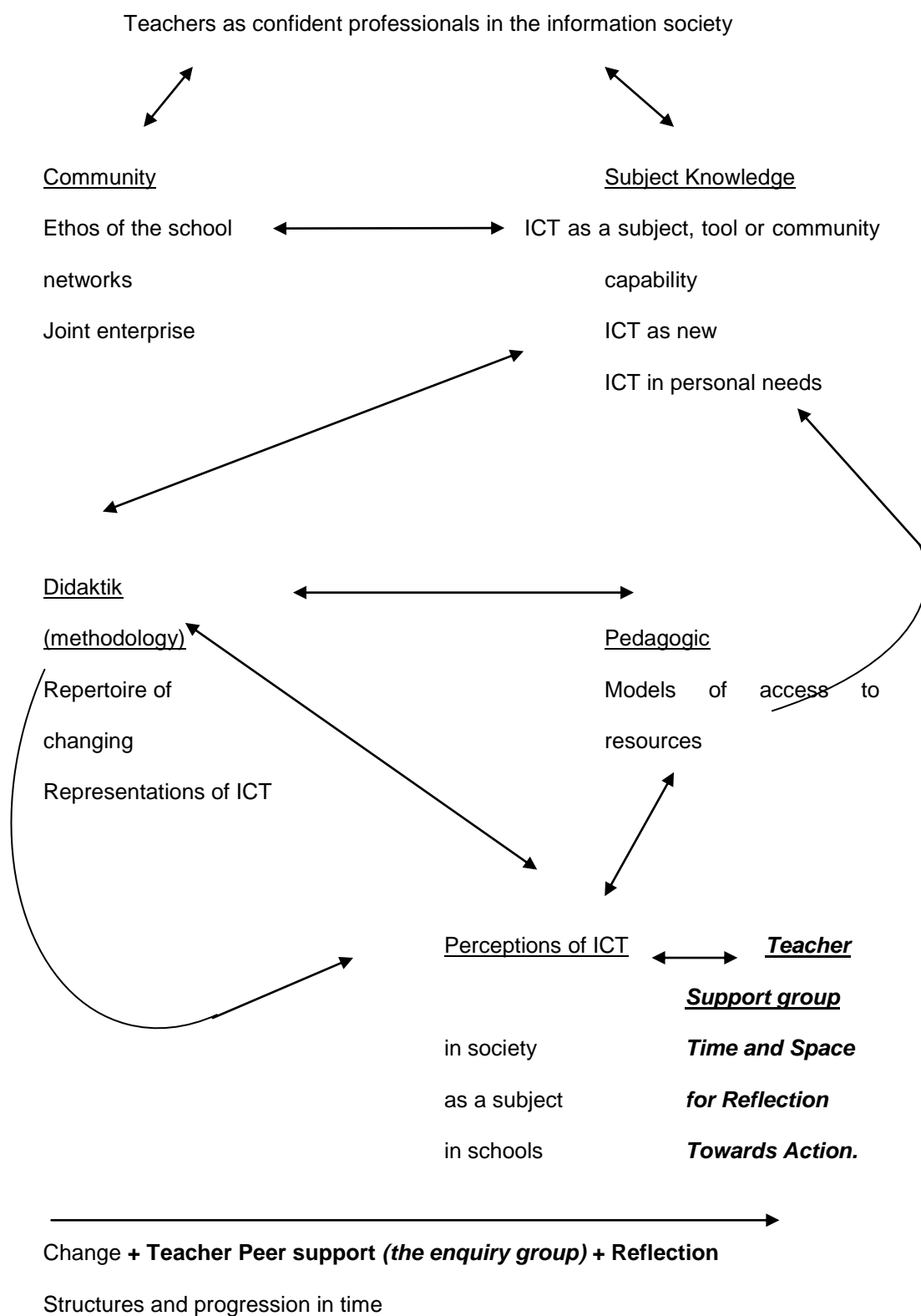


Figure 6.1: Loveless (2001) Continuous Professional Development Model adapted

It is important to analyse the role of the trainer in teacher training rather than being perceived as a trainer who imparts information for the teachers to try out in the classroom. This research has shown that the role of the trainer as a facilitator of training, whereby direction is given and space is allowed for discussion of ICT and new pedagogical practices, might prove to yield better results. Kirschner and Davis's (2003) article about the pedagogic benchmark for ICT in teacher education talks about the need for teachers to experiment with the resource themselves before going to class:

'If teacher educators want to prepare their students for working in environments where learning materials will often be designed and developed in teams, then it would be wise for them not only to 'talk the talk' of educational innovation but also to 'walk the walk'.' (p. 132)

Therefore the new sections in the Loveless model (2001) would allow time for the following to occur:

- (1) Confronting teachers' preconceptions, fears and expectations on computers
- (2) Presenting the computer as a tool for learning
- (3) Focusing the content of the learning towards aspects of computing that are relevant to real life – in this research we looked at the Roma
- (4) Fostering peer support within the group to reduce the isolating effect of teaching
- (5) Making sessions informal – the enquiry group
- (6) Centring the training on the teachers' knowledge and motivation
- (7) Helping teachers see their achievements – the video helped to do this
- (8) Providing sample lesson plans and schemes of work – the S.A.I.L. package did this
- (9) Reflection as an integral part of teacher training.

External support may also be provided in the form of locally based training. It is not enough to provide information on hardware and software during the training on ICT implementation within the classroom. Teachers need to feel that they have a support

structure within which they **can** ask questions when they find that what they have tried in class is not working out as expected. This forum creates a space which allows them not to worry about getting labelled in the process. Otherwise they will try an activity once and then abandon it if unsuccessful.

This model of training allows the teachers to be at the centre of their development. It overcomes factors such as variety of needs and discomfort of using ICT within the classroom due to various technological levels of usage. It also provides a network for them to turn to in case of need. This is done through the teachers' exchange of their classroom practice through narrating what it is they are doing and how they are doing it with the rest of the group. In this manner they also discuss and reflect on the difficulties that they have come across.

The Stein et al. model (1999), which places reflection and development at the core of professional development, is designed from the trainers' viewpoint, whereby the focus is on the design of the programme. This research has found that reflection is of paramount importance when considering CPD. The link between reflection and discussion suggests that the enquiry group method would facilitate that to occur. Although the Stein et al. model (1999) does not address the way the programme is delivered, an enquiry group methodology is a natural forum for this professional development model to be implemented.

6.4 Reflection on the research methodology

When I started out on this research, my own personal belief was that teachers who have been teaching for a number of years have developed their own style of teaching. So if I wanted to introduce a new pedagogy, I had to be aware of this and had to adapt the teacher training method accordingly. Consequently, I assumed that teachers would assimilate the new ideas I presented and would integrate them individually in their classrooms. This trainer-centred method was not considered to

be effective by the teachers and a small group chose to work in a teacher-centred enquiry group. This meant that the tools for classroom observation that I had designed were no longer relevant, as the focus had become the enquiry group meetings where they exchanged ideas and practices.

This was a positive factor, as teachers assimilated new theories as a group and worked on them in an individualistic manner within their classrooms. This helped develop their confidence more as they moved from known to unknown territory. What I had not understood when I had started planning the research design was the high risk the teacher would be taking in moving from familiar to unfamiliar methods, and their need of a support structure which they then found in each other. This research has shown that using an enquiry group as support to the integration of ICT, had an impact on pedagogic understanding. It was this enquiry group which provided the scaffolding that was required to make that transition, and that allowed them to feel secure when adapting materials and methods to their own requirements.

As seen in Chapter 5, a model for CPD (Figure 14, Chapter 5) which includes the elements of orientation and exploration allows for teacher experimentation, or as Hargreaves (2001) has called it, tinkering (Chapter 2). However, this method of carrying out research proved to be a challenge for me. As mentioned in Chapter 1, I had prepared tools for observation of classrooms (paper-based, not a video recorder) and was keen to collect structured data. Following the feedback from the pilot, the elements of an enquiry group and video recording were introduced (Chapter 3). Now with hindsight I appreciate the importance of the pilot.

Learning for this group of teachers was intrinsically a social and dynamic process during which they exchanged ideas and created their own forum of learning, which was not directly influenced by my agenda, they were part of an educational case study. Letting their personalities influence their practices and making the teacher the

centre of the training allowed for their personal growth and change to occur (Chapter 5).

The teachers were the ones in control and directed their own learning through their enquiry group. Their language use indicated the changes that were occurring within their reflections of what was happening (Chapter 5). Critical incidents highlighted some moments of change that occurred.

Teachers felt comfortable asking questions of each other in this research, no matter how simplistic these questions seemed. As reported in Chapter 5, as they became more skilled they discovered their own ways of integrating technology within their classroom practice; this was done according to their needs as individuals and not as a group. Thus they moved from a controlled environment situation to a freer one.

Such a teacher training model allows for the explicit provision of support on demand. The focus of this research model was upon developing pedagogic knowledge, rather than upon purely collecting methods and trying to implement them in the classroom. In addition, I found that this overcame the short-term planning syndrome as described by Hargreaves and Fullan (1992), since teachers developed an approach of sharing which they carried into the classroom and implemented within their pedagogical practice. By actually being part of a group activity they understood this better and could implement it more effectively.

The focus of their reflections changed as they integrated ICT within their classrooms. The teachers were taking risks within their classrooms and they were using the tools provided to reflect on them, as shown in Table 6.1. Reflection may be more effective in a group outside of school, as it gives the teachers the space for in-depth retrospective reflection. The enquiry group discussions allowed teachers to look at their practices and identify how to take on new practices, whilst reflection out of the training sphere allowed for retrospective self-analysis. A continuous professional

development model which allows for reflection after training has taken place, such as the one depicted in Figure 6.1, would allow space for retrospective reflections, recognising the moments in which change takes place.

Tool	Reflections	Language
Logs/ initial questionnaire	Reflection on action	Talked about what they knew from their classroom experience and tinkering with the ICT tool.
Meetings	Reflection towards action	They discussed issues and shared pedagogic approaches.
Last interview	Retrospective reflection	Talked about their new practices and what influenced them. In this research the teachers specifically highlighted the importance of the enquiry group in their pedagogical development.

Table 6.1: Overview of reflections and language used

This type of teacher training model requires the trainer to develop her/his role to support, guide and mediate teachers' interactions. It does not only provide access to knowledge but also allows for the development of this knowledge within the classroom. The teachers in this study could be seen as having 'undergone a perceptible but gradual process of pedagogical evolution' (Hennessy and Deaney, 2006). They built their experiences on their already existing pedagogical practices with the support of their peers.

6.5 Limitations of research design

The research method I used enabled me to examine the relative incidence of lexical items through concordancing. My focus was not on the length of utterances of talk but on the change of language content, and whether this reflected the changes that were occurring within the classroom and within the teachers. I felt that

concordancing showed how teachers were using key lexical items related to learning, and the amount of times these were being used.

The language the teachers used moved on from focusing on ICT to the pedagogical approaches that they were adopting in the various classrooms and how these influenced their practice. Language can be analytically processed and described in terms of complex wholes which consist of combinations of simple constituents. The approach to language in syntactic theory has been to divide sentences into smaller units or build them up from smaller units. Alongside this, however, most accounts now recognise an aspect of language-related processing that is not analytic. This includes prosodic aspects of language, including intonation and emotional colour.

Holistic processing of language (Wray, 1992) involves a very different approach to information, as it looks at how the language user utilises the language in its complete form. This research found that concordancing single units or chunks of language did not reveal what the teachers were thinking or how they were acquiring their knowledge and experiencing critical incidents. For example, Table 5.2 in Chapter 5 has shown that the teachers were thinking less of the 'children' during the teaching logs. But this seems unlikely because the whole activity was based on the children and that they were automatically presumed to be part of the activity, almost like a cataphoric reference. Consequently, it is through the whole description of language use that it is possible to analyse the change of practice, as seen in Table 5.2, Chapter 5. It is through my interpretation of the data that I was able to make a whole of the different parts indicated by concordancing and coding.

It was only by using a holistic approach that I was able to categorise more clearly the themes the teachers were discussing. Often they used different words to express what they and the students were doing. Although concordancing was useful to identify a trend of thought, it was only a close analysis through the coding of the data that highlighted the fact that teachers had implemented the concepts of group work

and were utilising ICT in a creative manner with the students, as seen by the use of the lexical item “create” (Table 5.11, Chapter 5).

Understanding collaborative activity and the creation of shared knowledge and understanding has many challenges. For example, there is the facet of previous experiences that the participants bring along with them. In my research these were not verbally present, yet they were likely to influence the ways in which the teachers changed their pedagogical practices (Table 5.1, Chapter 5). Using language as a means to chart change is not conclusive, as one can only record the utterances used in that specific instance of time. It does not allow one to delve into other areas such as what is happening in the teachers’ workplace and what happened prior to that. Language analysis enabled the recording of the common meaning that the teachers were creating together in their collaborative group, and reflects the changes that are presently occurring. In this research this meaning was ‘how’ they shared their classroom experiences and what they felt about them.

The video recorder was an invaluable help in capturing the reality of the situation without my bias. Yet the video presence might have altered the data collected, as teachers could have performed in front of the video camera. This was minimised by its constant use, when it almost became an appendage of part of my body; the teachers learnt that whenever I was around it was present too.

During this research, the human element was very present. As a result of this I could not calculate the exact moment when change occurred, as it was the moment when the teacher felt secure enough to try something new in the classroom. This precise moment was often not reflected in the talk, as she/he would try something out and then reflect about it after it had occurred, resulting in what I referred to as a critical incident. As Snyder (1995) argues on the basis of her studies, the successful combination of different methodologies depends on research being underpinned by a ‘sensitive, flexible theoretical framework’ for understanding the complexity of real

life events. I was extremely sensitive to the fact that the teachers were doing new things, so I tried to let them carry these out by giving them the space to experiment and adapting my research approaches accordingly.

The cumulative gathering of language evidence, including the teachers' logs, my personal journal, and the initial questionnaire, made it possible for me to provide evidence that an enquiry group can support teachers in changing their practice and some evidence of the important role discourse has in this process. The transcripts were able to link two kinds of data. This was done by showing the relative incidence of certain features of talk across the transcription of the data as a whole as well as the qualitative analysis of the themes and the patterns of interaction. In addition to this, there was the evidence the teachers themselves had provided by means of a narrative of what had happened during the research and what had influenced them.

The background to this research was to develop an understanding of how the enquiry group process worked. My time as a trainer was free of charge as I was conducting this research. Realistically, such projects do require a lot of time and effort to sustain. Hence the monetary considerations have to be analysed before embarking on such a scheme, in addition to incentives for teachers to partake in such activities.

6.6 Key implications of this research

This research has shown that introducing change to pedagogy and practice involves **time and support for reflection**. In this study this was carried out through the structure of the enquiry group. Critical incidents indicated the moment these changes occurred; such pivotal moments need time and support to occur. Reflections that were collected differed according to the stage of the development they were in, as depicted in Table 5.2, Chapter 5.

It would be ideal for this research to have a follow-up, allowing teachers to put their ideas across to other teachers through teachers' local forums. This would enable teachers to influence their peers. In Malta such forums do not exist. The only local teachers' association that comes close to such a role is the local teachers' union. A more formal but still locally based kind of support is provided by the Department of Education training teacher development programme, which teachers are obliged to attend every two years.

However, these programmes do not include the idea of setting up enquiry groups that sustain the teachers' development. It would be interesting to see how this research would work on a larger scale, where the diversity of the personalities of the participants and other logistical features would have to be considered. But this research has shown that the informality of the training within an enquiry group overcame barriers and allowed teachers to integrate ICT within their pedagogical practice. Possibly such an exercise would give rise to several other issues such as administrative and personal ones.

Furthermore, one of the teachers put down her training in her personal development plan – the CPD system in Malta (Chapter 1, Section 4.2) – which shows that she believed that she had received quality training which warranted it being recorded. Assessment of quality on training programmes might be quantified according to the desired teachers' output or performance on the courses. This research has shown that change has to be intrinsic and must be accessed through the teachers' thinking, interpretation, evaluation and discussion.

6.7 Suggestions for further research

My area of research has been the teachers' development through this collaborative exercise. This research has several implications for the nature of the skills we teach our students and how we evaluate them. For example, the teachers felt the need to produce a product which could be presented and assessed. Yet the process of

learning, where exchange had occurred and research tools had been created, was of paramount importance. The students were learning new skills but these skills were not being assessed. Despite this, I felt that in this Section I should focus on aspects of future research on teacher training:

(a) The role of the teacher trainer

What elements does a teacher trainer need to be able to implement such an approach, on a personal and pedagogical level? Research should be conducted on trainers and compared to the results achieved within such a collaborative setup.

(b) The group

Do the differences between the members of the enquiry group help or hinder learning? One implication of an awareness of difference is that it can generate stereotypes on the basis of research generalisations.

(c) The teacher

Possibly one could also examine the similarities and differences between different stages of a teacher's professional life.

(d) Psychological factors

In addition, to the way the teachers view the self, there is the issue of what motivates teachers to continue learning and how do they create identities within the group. The idea of control or authority (Hubscher-Younger and Narayann, 2003) within the group also makes for interesting research.

(e) Collaboration issues

Teachers found support in each other to overcome their fears and to realise the integration of ICT within their classrooms. Teachers require support to be able to handle complex IT tasks within their classrooms and they need 'tinkering' time (Hargreaves, 1999). During this research this issue was not addressed as it was

based on the selection of materials available on the net. Often teachers have to utilise resources on their own, so it would be interesting to see if they would choose more skill-based materials or creative ones, and how they would approach the tasks.

There is also the gender consideration. Does collaboration between women and men have the same results as a group made up of the same gender?

(f) Language

This research showed that the teachers followed a frame of discussion which was based on narrating what happened in their classrooms. Whilst this was happening teachers used discourse which reflected the changes that were happening. This use of language was analysed, and three patterns of change were identified, as discussed in Chapter 5.

Several further research questions arise such as: can this approach be adopted in different situations, and if so, is the language use the same? For example, can it be adopted by a human resource manager within a business company, and does the language used reflect change in the same manner as indicated in this research?

6.8 Conclusion

Technology should enhance both teaching and learning, increasing the students' exposure to materials and benefiting the less confident ones. The teacher does what the teacher does best, that is, teach and set up conditions for interaction and learning through task selection, monitoring, giving feedback, and so on. ICT pedagogy has given us the opportunity to look at how the teacher teaches afresh, and to examine the role of the teacher and the student once again. By using an enquiry group approach to training in this research to introduce the Roma software, whereby the focus is not on the trainer, teachers found that their role in the classroom changed. They relinquished some of their 'teacher power' and allowed for

individualism to occur within their pupils' groups, just like the trainer let the teachers take ownership of their training in the enquiry group.

This research looked at the way the teachers worked in an enquiry group, my research question being *how do teachers collaborate within an enquiry group when introducing a new ICT package?*. Working in an enquiry group narrowed the differences that existed between the teachers. Working at integrating ICT within the classroom allowed the teachers with ICT experience to appreciate the creativity of those who had not worked with computers within the classroom, whilst the latter benefited from the confidence of those who had.

Throughout the research the teachers used language to express their thoughts and their pedagogical practices. The language used to describe this change showed how teachers constructed knowledge from their interactions with each other and how they reflected whilst building up their new pedagogical frameworks. These research results provided insight into how teachers develop their pedagogical practice within an enquiry group. Teachers reflected after their lessons through their logs - reflection on action, about their practices in the enquiry group - reflection towards action and about what had happened during the interviews – retrospective reflection.

Through these reflections teachers used lexical items in three different ways over a period of time: words which change meaning; words which are taken up by others; and words which are not referred to directly (Chapter 5). These words reflected the critical incidents that were occurring through the discussions held in the enquiry group as an educational case study.

The teachers showed that mutual support was invaluable. Having peer support helps to overcome the fear they may face when taking on something new. The teachers that took part in this study had been practising teachers for several years, which meant that they knew what a classroom was like and were aware of the students'

expectations and needs. Still they needed each other's *support* to venture into new areas, building upon what they had already developed. It is clear that the enquiry group approach was valued because it respected the teacher as an individual with her/his own style of teaching, possibilities and circumstances. An enquiry group can take on its own persona, and the teachers – being members of this group -- can indeed be influenced by it, as they contribute to its growth.

Just as that teenager who has started to venture out into the world on her/his own finds their peers extremely influential, so do the teachers, who have been within a system for several years, need the collaboration of their peers to explore new terrains. The teachers' pedagogical practices need *space* for reflection towards action, if this is allowed, then this research has provided evidence that the interactions and experimentations associated with learning will happen within the enquiry group – through dialogue around sharing practice.

BIBLIOGRAPHY

Abbott, C. (2000). *ICT: Changing Education*. London: Falmer Routledge.

Andrews, D. and Lewis, M. (2002). The experience of a professional community: teachers developing a new image of themselves and their workplace. *Educational Research*, 3(44), pp. 237-254. Routledge.

Anghileri, J., Coltman, P. and Petyaeva, D. (2002). Scaffolding learning through meaningful tasks and adult interaction. *Early Years*, 22(1), pp. 39-49.

Bailey, K. and Celce-Murcia, M. (1979). Classroom skills for ESL teachers. In M. Celce-Murcia and L. McIntosh (Eds.), *Teaching English as a Second or Foreign Language*, pp. 315-330. Rowley, Mass: Newbury House.

Baker, C. (1997). Ethnomethodological Studies of Talk in Educational Settings. In Davies, B. and Corson, D. (Eds). *Encyclopedia of Language and Education*, (3): *Oral Discourse and Education* . The Hague: Kluwer.

Bartolo, S. and Saliba, J. (1999). *Teachers' attitudes towards computer use in State Senior Junior Lyceums in Malta*. B.Ed unpublished dissertation.

Bassey, M. (1999). *Case Study Research in educational Settings*. Maidenhead: Open University Press.

Bateson, G. (1985). *Steps to an Ecology of the Mind*. New York: Ballantine.

Becker, H.J. and Ravitz, J. (1999). The influence of Computer and Internet Use on Teachers' Pedagogical Practices and Perceptions. *Journal of Research on Computing in Education*, 31(40), pp.356–384.

BECTA (1998). *Multimedia Portables for Teachers' Pilot: Project Report*. Coventry: BECTA.

Bera (2004). Revised ethical guidelines for educational research (2004) <http://www.bera.ac.uk/files/guidelines/ethica1.pdf> (accessed 8 July 2010).

Bezzina, C. (2000). Improving the Quality of Schooling in Malta. *International Journal of Management*, 4(5), pp.194-202.

Bezzina, C. and Testa, S. (2005). Establishing schools as professional learning communities: perspectives from Malta. *European Journal of Teacher Education*, 2(28), pp.141-150.

Bloom, P. and Keil, F.C. (2001). Thinking through language. *Mind and Language* 3(16), pp.351–367. Oxford: Blackwell Publishers.

Bonk, C. J. and Cunningham, D. J. (1998). Chapter 2: Searching for learner-centered, constructivist, and sociocultural components of collaborative educational learning tools. In Bonk, C.J. and King, K.S. (Eds).. *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse: 25-50*. Mahwah, NJ: Erlbaum.

Bonk, C.J., Ehman, L., Hixon, E and Yamagata-Lynch, L. (2002). The pedagogical TICKIT: Web conferencing to promote communication and support during teacher professional development. *Journal of Technology and Teacher Education*, 10(2), pp. 205-233.

Borg, N. (2003). ICT: Constructivist elements in primary level software. In Gatt, S. and Vella, Y. (Eds). *Constructivist Teaching in Primary School*. Malta: Agenda.

Borg, S. (2005). Experience, knowledge about language, and classroom experience in teaching grammar. In Bartels, N. (Ed.) *Applied Linguistics and Language Teacher Education*. New York: Springer: pp.325-340.

Bruner, J. (1990). *Acts of Meaning*. Cambridge, MA: Harvard University Press.

Bryman, A. (2004). *Social Research Methods*. Oxford University Press.

Butt, T. (2004). *Understanding People*. Palgrave: Macmillan.

Carspecken, P.F. and MacGillivray, L. (1998). Raising Consciousness about Reflection, Validity, and Meaning, pp. 171-190 in *Being Reflexive in Critical Educational and Social Research*, Geoffrey Shacklock and John Smyth, eds. London:, Falmer Press.

Coffey, A., Holbrook, B. and Atkinson, P. (1996). Qualitative Data Analysis: Technologies and Representations. *Sociological Research Online*, 1(1), <http://www.socresonline.org.uk/socresonline/1/1/4.html> (accessed 12 December 2003).

Cohen, L., Manion, L. and Morrison, K. (2000). *Research Methods in Education*. London: Routledge/Falmer

Crockett, M.D. (2002). Inquiry as professional development: Creating dilemmas through teachers' work. *Teaching and Teacher education*, 5(18), pp.609 – 624.

Cuban, L. (1993). Computers meet classroom: Classroom wins. *Teachers College Record* 95(2), pp.185-210.

- Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.
- <http://www.hup.harvard.edu/pdf/CUBOVE.pdf> (accessed 14 July 2004).
- Cunliffe, A. L. (2004). On Becoming a Critically Reflexive Practitioner. *Journal of Management Education*, (28) Aug 2004, pp.407–426.
- Dawes, L. (1999). First connections: teachers and the National Grid for Learning. *Computers and Education*, 33(4), pp.235–252.
- De Bono, E. (1999). *Simplicity / Edward De Bono*. London: Penguin.
- Deaney, R., Ruthven, K. and Hennessy, S. (2002). Pupil Perspectives on the Contribution of Information and Communication Technology to Teaching and Learning in the Secondary School. *Research Papers in Education*, 18(2), pp.141-165.
- Delamont, S. (1984). *Readings on Interaction in the Classroom*. London: Methuen.
- Dewey, J. (1933). *How We Think. A restatement of the relation of reflective thinking to the educative process* (Revised edn.). Boston: D. C. Heath.
- Edwards, A. and D'Arcy C. (2004). Relational agency and disposition in sociocultural accounts of learning to teach. *Educational Review*, 2(56) Special Issue, pp.147-155.
- Edwards, D. (1997). *Discourse and Cognition*. London: Sage.
- Ehman, L. and Bonk, C. (2003). *Model of Teacher Professional Development to Support Technology Integration: Teacher Institute for Curriculum Knowledge about the Integration of Technology*. <http://www.indiana.edu/~ticket/> (accessed 15 June 2007).

European Commission, (2003). *Implementation of education and training 2010, work programme*. Progress report Directorate-General for Education and Culture.

EU Socrates, (2001). *Education and Training; Introduction to Minerva action* http://ec.europa.eu/education/transversal-programme/doc968_en.htm (Accessed 28 August 2006).

Fisher, R. (1996). *Stories for Thinking*. Oxford: Nash Pollock

Fisher, T., Higgins, C. and Loveless, A. (2006). *Teachers Learning with Digital Technologies: A Review of Research and Projects*. Bristol: *Futurelab*: www.futurelab.org.uk/litreviews (accessed 16th June 2008).

Gambin, A. (2001). *S.A.I.L Group Structure* <<http://www.studentlearningcentre.org>> (Accessed 26.7.2006).

Glaser, B. and Strauss, A. (1967). *The discovery of grounded theory*. Chicago: Aldine.

Goodyear, P., De Laat, M. and Lally, V. (2006). Using Pattern Languages to Mediate Theory-Praxis Conversations in Design for Networked Learning. *ALT-J, Research in Learning Technology*, 14(3), pp.211-223.

Greenwood, J. (1993). Reflective practice a critique of the work of Argyris & Schön. *Journal of Advanced Nursing* ,(19) pp.1183-1187

Grice, H. (1969). Utterer's Meaning and Intentions. *Philosophical Review*, (78), pp.147-77.

Habermas, J. (1979a). *What is Universal pragmatics?* In Habermas, 1979, *Communication and the Evolution of Society*. London: Heinemann.pp.1-68.

Hammersley, M. (1998). *Reading Ethnographic Research: Second Edition*. London and New York: Longman.

Hanks, W.F. (1991). Foreword. In Lave, J. and Wenger, E. *Situated Learning, Legitimate Peripheral Participation*. 9th Reprint, 2001. Cambridge: Cambridge University Press.

Hargreaves, A. (1999). Reinventing Professionalism: Teacher Education and Teacher Development for a Changing World. *Asia-Pacific Journal of Teacher Education and Development*, 2(1), pp.65-74.

Hargreaves, A. (2001). Classrooms, Colleagues, Communities and Change: The Sociology of Teaching at the Turn of the Century. *Asia-Pacific Journal of Teacher Education and Development*, 4(1), pp.101-129.

Hargreaves, A. and Fullan, M.G. (1992). *Understanding Teacher Development*. Teacher Development Series, Teachers College Press, New York.

Hennessy, S. and Murphy, P.F. (1999). The potential for collaborative problem solving in Design and Technology. *International Journal of Technology and Design Education*, 9(1), pp.1-36.

Hennessy, S., Ruthven, K. and Brindley, S. (2005). Teacher perspectives on integrating ICT into subject teaching: commitment, constraints, caution and change. *Journal of Curriculum Studies*, 37(2), pp.155-192.

Hennessy, S. and Deaney, D. (2006). *Sustainability and Evolution of ICT-Supported Classroom Practice*. Short report to Becta (2004) pp 701-732.

Heyman, R.A. (1986). Formulating topics in the classroom. *Discourse Process*, 9, pp. 37-55.

Hovermill, J. A. (2003). *Technology supported enquiry learning with Fathom: A professional development project*. Paper presented at the Society for Information Technology and Teacher Education, Albuquerque, NM.

Hoyles, C. and Sutherland, R. (1989). *Logo Mathematics in the Classroom*. London: Routledge.

Huberman, A. M. (1973). *Understanding Change in Education: An introduction*. Paris, United Nations Educational, Scientific and Cultural Organization.

Hubscher-Younger, T. and Narayanan, H. N. (2003). Authority and convergence in collaborative learning. Elsevier, *Computers and Education*, 41, 2003, pp.313–334.

Hughes, J. E., Kerr, S. P., Ooms, A. and Palmquist, T. (2002). *Providing Exemplary Professional Development through Subject-matter, Technology Enquiry Groups*. Paper presented at the Society for Information Technology and Teacher Education International Conference, Albuquerque, NM.

Hughes, J.E. and Ooms, A. (2004). Content-focused Technology Enquiry Groups: Preparing Urban Teachers to Integrate Technology to Transform Student learning. *Journal of Research on Technology in Education*, 36(4), pp.397-411.

Hunter, B. (2001). Against the odds: Professional development and innovation under less-than-ideal conditions. *Journal of Technology and Teacher Education*, 9(4), pp.473–496.

Issroff, K. (1999). Time-Based analysis of Students studying the Periodic Table. In Littleton, K. and Light, P. (Eds). *Learning with Computers: analysing productive interaction*. London: Routledge.

Jonassen, D. (1991). Objectivism vs. constructivism. *Educational Technology Research and Development*, 39(3), pp.5–14.

Joyes, G. (2006). *The new learning technologies 'revolution' within a culture of excellence*. Paper presented in Specialised Animated Interactive Learning. PEG.

Kasl, E. and Yorks, L. (2002). Collaborative enquiry for adult learning. In L. Yorks and E. Kasl (Eds). *Collaborative enquiry as a strategy for adult learning: Creating space for generative learning. New Directions for Adult and Continuing Education* no. 94. San Francisco, CA: Jossey-Bass.

Keller, J. B., Ehman, L. and Bonk, C. J.(2003). *Professional development that increases technology integration by K-12 teachers: Influence of the TICKIT program*. Paper presented at the Society for Information Technology and teacher Education (SITE), Albuquerque, NM.

Kelly, G. A. (1955). *The Psychology of Personal Constructs*. New York: Norton.

Kirschner, P.A and Davis, N.E. (2003). Pedagogic Benchmarks for Information and Communications Technology in Teacher Education. *Journal of Technology, Pedagogy and Education*, 1(12), pp.40-56.

Kommers, P. (2005). Lecture for the Malta Summer School. *International PhD Summer School on Educational Technology in a Cultural Context*. Media for Cultural HeRosege in Education. Qawra, Malta.

Kozma, R. (Ed.). (2003). Technology, innovation, and educational change. A global perspective. *A report of the Second Information Technology in Education Study*. Module 2. Amsterdam: International Association for the Evaluation of Educational Achievement.

Krashen, S. (1981). *Second Language Acquisition and Second Language Learning*. Pergamon Institute of English. Oxford: Pergamon Press.

Krogstie, B. R. (2009). A Model of Retrospective Reflection in Project Based Learning Utilizing Historical Data in Collaborative Tools., In Cress, U., Dimitrova, V., Specht, M. (Eds) *Learning in the Synergy of Multiple Disciplines*. Berlin/Heidelberg: Springer pp.418-432 i.

Ladson-Billings, G. and Gomez, M. (2001). Just showing up: Supporting early literacy through teachers' professional communities. *Phi Delta Kappan*, 82(9), pp.675-680.

Laurillard, D. (1993). *Rethinking University Teaching*. London: Routledge.

Lave, J. and Wenger, E. (1991). *Situated learning: legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Lincoln, Y. S. and Guba, E.G. (1985). *Naturalistic Enquiry*. Beverly Hills, CA: Sage.

Loveless, A. (2001). *The interaction between Primary Teachers' perceptions of Information and Communication Technology (ICT) and their pedagogy*. Unpublished PhD Thesis, University of Brighton.

Loveless, A. (2003) *The Role of ICT* 2nd Edition London:Continuum.

Maloy, R., Verock-O'Laughlin, R., Hart, D. and Oh, P. (2003). *E-teams: A collaborative approach to technology integration in the classroom*. Paper presented at the Society for Information Technology and Teacher Education (SITE), Albuquerque, NM.

Maltese National Strategy Report, 2004 – 2006. Ministry for Information and Investment, 2004.

McAdoo, M. (2001). The real digital divide: Quality not quantity. In Gordon, D. T. (Ed.). *The Digital Classroom*: pp.143-150. Cambridge, MA: Harvard Education Letter.

McKenzie, J. (2001). *Head of the class*. <http://www.electronic-school.com/> (accessed 22 January 2001).

Means, B. and Olson, K. (1995). Leadership for technology implementations. In *Technology's role in education reform: Findings from a national study of innovating schools*. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

Mehlinger, H. (1996). School reform in the information age. *Phi Delta Kappan*, 77, pp.400-407.

Mercer, N. (2000). *Words and Minds: How we use language to think together*. London: Routledge.

Mercer, N., Dawes, L., Wegerif, R. and Sams, C. (2004). Reasoning as a scientist: Ways of helping children to use language to learn science. *British Educational Research Journal*, 30(3), pp.367–85.

Minick, N. J. (1985). *Vygotsky and Soviet activity theory: New perspectives on the relationship between mind and society*. Unpublished doctoral dissertation, Northwestern University, Evanston, IL.

Ministry of Education. Malta. (2001). *National Curriculum on its Way: Report of the National Steering Committee on the Implementation of the National Minimum Curriculum*. March 2001.

Ministry of Education, Malta. (2002). *Report of the National Minimum Curriculum Review*.

Moseley, D., Higgins, S., Bramald, R., Hardman, F., Miller, J., Mroz, M., Tse, H., Newton, D., Thompson, I., Williamson, J., Halligan, J., Bramald, S., Newton, L., Tymms, P., Henderson, B. and Stout, J. (1999). *Ways forward with ICT: Effective pedagogy using Information and Communications Technology for Literacy and Numeracy in Primary Schools*, Newcastle: University of Newcastle.

Moss, G., Jewitt, C., Levañiç, R., Armstrong, V., Cardini, A. and Castle, F. (2007). *The Interactive Whiteboards, Pedagogy and Pupil Performance Evaluation: An Evaluation of the Schools Whiteboard Expansion (SWE) Project*: London Challenge. DfES Publications.

Naidu, B., Neeraja, K., Ramani, E., Shivakumar, J., and Viswanatha, V. (1992). Researching Heterogeneity: an account of teacher-initiated research into large classes. *English Language Teaching Journal*, 3(46), pp.252-263.

Nunan, D. (1990). *Collaborative language learning and Teaching*. Cambridge University Press.

Nunan, D. (1993). Task-based syllabus design: selecting, grading and sequencing tasks. In Crookes, G. and Gass, S. M. (Eds). *Tasks in a Pedagogical Context*. Cleveland, UK: Multilingual Matters, pp.55-66.

Pask, G. (1979). A conversation theoretic approach to social systems. In *Sociocybernetics*, Geyer, F. and der Zouwen, Jvan (Eds). Martin Nijhoff, Amsterdam, pp.15–26.

Pianfetti, E.S. (2001). Teachers and technology: digital literacy through professional development. *Language Arts*, 78(3), pp. 255-262.

Pollard, A. and Tann, S. (1993). *Reflective Teaching in the Primary School*. London: Cassell.

Putnam, R. T. and Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher*, 29(1), pp.4-15.

Rankin, J. and Becker, F. (2006). Does Reading the Research Make a Difference? A Case Study of Teacher Growth in FL German. *The Modern Language Journal*, 90(3), pp. 353-371.

Richards, J.C. and Lockhart, C. (1994). *Reflective Teaching in Second Language Classrooms*. Cambridge: Cambridge University Press.

Richardson, V. and Placier, P. (2001). Teacher Change. In V. Richardson (Ed.), *Handbook of Research on Teaching* (4th edition). American Educational Research Association, pp.905-947.

Riley, R., Holleman, F. and Roberts, L. (2000). *E-learning: Putting a world class education at the fingertips of all children. The national educational technology plan* (report). Washington, DC: U.S. Department of Education.

Rogers, C. (1975). The interpersonal relationship in the facilitation of learning. In Read, D. and Simon, S. (Eds). *Humanistic Education Sourcebook*. Englewood Cliffs, N.J.: Prentice-Hall.

Rogoff, B. and Gardner, W.P. (1984). Guidance in cognitive development: An examination of mother-child instruction. In Rogoff, B. and Lave, J. (Eds). *Everyday cognition: Its development in social contexts*. Cambridge: Harvard University Press, MA, pp.95-116.

Rosenthal, R. and Rubin, D.B. (1978). *An Overview of the Methodological Approach of Action Research*. Rory O'Brien Faculty of Information Studies, University of Toronto. <http://www.web.net/~robrien/papers/arfina.html> accessed 8th May 1992.

Sandholtz, J. H., Ringstaff, C. and Dwyer, D.C. (1990). *Teaching in High-Tech Environments: Classroom Management Revisited: First - Fourth Year Findings*. Cupertino, Apple Computer Inc. Scans report for America 2000. Washington, D.C.: U.S. Department of Labor, 1991.

Sant, A. (2006). Lack of uptake of ICT. *The Times of Malta*. 28th June 2006:14.

Schön, D. (1983). *The Reflective Practitioner: How Professionals Think in Action*.
New York: Basic Books

Schatz, M. (1992). Researching While Teaching: An Action Research approach in
Higher Education. *Studies in Higher Education*, 1(17), pp.81-95.

Scott, B. (2001). Gordon Pask's Conversation Theory: A Domain Independent
Constructivist Model of Human Knowing. *Foundation of Science. Special Issue on
The Impact of Radical Constructivism on Science*. Edited by Reiger, A. 4(6),
pp.343—360.

Scrimshaw, P. (1997). Computers and the teacher's role. In Somekh, B. and Davis,
N. (Eds). *Using Information Technology Effectively in Teaching and Learning*.
London: Routledge.

Sinclair, J. (1991). *Corpus, Concordance, Collocation*. Oxford: Oxford University
Press.

Slough, S.W. and Chamblee, G.E. (2000). Grades 4 and 5 teachers' perceptions of
technology implementation in mathematics instruction. In R. Robson (Ed.),
Mathematics/science education and technology annual, pp.363-369. Charlottesville,
VA: Association for the Advancement of Computing in Education.

Snoeyink, R. and Ertmer, P. A. (2002). Thrust into technology: how veteran teachers
respond. *Journal of Educational Technology Systems*, 30(1), pp.85-111.

Snyder, I. (1995). Multiple perspectives in literacy research: Integrating the
quantitative and qualitative. *Language and Education*, 9(1), pp.45-59.

Solomon, J. (1987). New thoughts on teacher education, *Oxford Review of Education*, 13(3), pp.267-274.

Stake, R.E. (1995) *The Art of Case Study Research*. London: Sage

Stein, M. K. and Brown, C. A. (1997). Teacher learning in a social context: Integrating collaborative and institutional processes with the study of teacher change. In Fennema, E. and Nelson, B. S. (Eds). *Mathematics teachers in transition*, pp.155-191. Mahwah, NJ: Lawrence Erlbaum Associates.

Stein, S. J., Campbell, J., Ginns, I. and Mc Robbie, C. (1999). *A Model for the Professional Development of Teachers in Design and Technology*. Paper accepted at the annual conference of the Australian Association for Research in Education.

Stenhouse, L. Case Study Methods in John P. Keeves (ed.). (1988). *Educational Research, Methodology, and Measurement: An International Handbook*, pp. 49-53, Oxford, England: Pergamon Press,

Stokoe, E. H. (2000). Constructing topicality in university students' small-group discussion: A conversation analytic approach. *Language and Education*, 14(3), pp.184-203.

Strauss, A. L. and Corbin. J. (1990). *Basics of Qualitative Research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.

Swann, J. (2001). Recording and transcribing talk in educational settings. In *English Language Teaching in its Social Context: A Reader*, Candlin, C.N., and Mercer, N. (Ed.) .London: Routledge, pp.323–344.

Swan, K., Holmes, A., Vargas, J. D., Jennings, S., Meier, E. and Rubenfeld, L. (2002). Situated professional development and technology integration: The Capital Area technology and enquiry in education (CATIE) mentoring program. *Journal of Technology and Teacher Education*, 10(2), pp. 169-190.

Tharp, R.G. and Gallimore, R. (1988). *Rousing Minds to Life: Teaching, Learning, and Schooling in Social Context*. Cambridge: Cambridge University Press.

Tripp, D. (1993). *Critical incidents in Teaching*. London: Routledge.

Underwood, J. (1994). *Computer based learning*. London: Fulton.

Underwood, J. and Underwood, G. (1999). Task Effects in Co-operative and Colloaborative Learning with Computers. in Littleton, K. and Light, P. (Eds). *Learning with Computers:analysing productive interaction*. London: Routledge.

Van Boxtel, C., Van der Linden, J. and Kanselaar, G. (2000). Collaborative Learning Tasks and the Elaboration of Conceptual Knowledge. *Learning and Instruction*, 10, pp. 311-330.

Van Manen, M. (1995). On the Epistemology of Reflective Practice. In *Teachers and Teaching: Theory and practice*, 1(1), pp.33-50.

Vygotsky, L. S. (1962). *Thought and Language*. New York: Wiley.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Watkins, C. and Mortimore, P. (1999). Pedagogy: What Do We Know? in Mortimore, P. (Ed.). *Understanding Pedagogy and its Impact on Learning*. London: Paul Chapman Publishing.

Watson, D. M. (Ed). (1993). *The Impact Report – An Evaluation of the Impact of Information Technology on Children’s Achievements in Primary and Secondary Schools*. London: King’s College.

Waxman, H.C. and Bright, G. (1993). *Approaches to research in teacher education and technology*. Charlottesville, VA: Association for the Advancement of Computer Education.

Whipp, J. L., Eckman, E. W. and Van den Kiebock, L. (2005). Using Sociocultural Theory to Guide Teacher Use and Integration of Instructional Technology in Two Professional Development Schools. *Journal of Computing in Teacher Education*, Fall 2005, pp.37-43.

Windschitl, M. and Sahl, K. (2002). Tracing Teachers’ Use of Technology in a Laptop Computer School: The Interplay of Teacher Beliefs, Social Dynamics and Institutional Culture. *American Educational Research Journal*, 39(1), pp.165-205

Wittgenstein, L. (1958). *Philosophical Investigations*. Translated by Anscombe, G.E.M. Oxford: Blackwell.

Wray, A. (1992). *The Focusing Hypothesis: The Theory of the Left Hemisphere Lateralised Language Re-examined*. Amsterdam: John Benjamins.

Yin, R. (1994). *Case study research: Design and methods* (2nd ed.). Beverly Hills, CA: Sage.

Zech, L.K., Gause-Vega, C.L., Bray, M.H., Secules, T. and Goldman, S.R. (2000).
Content-based collaborative enquiry: A professional development model for
sustaining education reform. *Educational Psychologist*, 35(3), pp.207-217.

APPENDIX 1

Lesson Plan

Date:

Subject:

Lesson Topic:

National Curriculum Objective:

Desired Learning Outcomes:

Duration:

Lesson Topic

Introduction:

Development of Lesson

Resources

Assessment Indicators/

Key questions

Closure

APPENDIX 2

Research Questions and Methodology	4	3	2	1
<p>1. How does the teacher handle the task?</p> <p><i>This will be conducted by classroom observation</i></p> <ul style="list-style-type: none"> • Can teachers relate the use of ICT to the projects; Contexts, aims and objectives of lessons? • Does the teacher use ICT in problem-solving strategies? 				
<p>2. What takes place in the class?</p> <p><i>This will be conducted by classroom observation</i></p> <ul style="list-style-type: none"> • How does the student spend his time on task? – Academic - Procedural –Waiting –Distracted (<i>this would be recorded and timed</i>) • Is there evidence that the project provides a context for the effective use of ICT? • Is there evidence of higher-order thinking skills (investigatory learning)? 				
<p>3. What is the impact on interaction in the classroom?</p> <p><i>This will be conducted by classroom observation</i></p> <ul style="list-style-type: none"> • Did the amount of teacher talking time decrease? • Did the students do any form of self-assessment activity – is there any evidence of distributed learning? 				
<p>4. How does ICT influence teacher's movement towards constructivist pedagogy?</p> <p><i>This information will be collected through semi-structured interviews</i></p> <ul style="list-style-type: none"> • Did the teacher discuss with colleagues what happened in the class? 				

<ul style="list-style-type: none"> • How did it feel to learn with the students rather than to appear knowledgeable about everything? • Did the teacher feel 'learning' took place in this collaborative manner – where skills are taught in context? 				
<p>5. How does the teacher feel after it is completed?</p> <p><i>This information will be collected through semi-structured interviews</i></p> <ul style="list-style-type: none"> • Can the teacher suggest when ICT might be used effectively? • Is there evidence of enthusiasm/pride in work/active participation in project? 				
<p>6. How does the teacher feel about changes that may have occurred?</p> <p><i>This information will be collected through semi-structured interviews</i></p> <ul style="list-style-type: none"> • Did the teacher take account of students needs with regards to the use of ICT? • Did the teacher feel that her/his instruction was focused on the understanding of complex ideas rather than fact? • Did the teacher feel intimidated by using ICT in the class? 				

APPENDIX 3

Name: _____ Date: _____

School: _____

Class you are presently teaching: _____

S.A.I.L. PROJECT

BASELINE TEACHER QUESTIONNAIRE

The purpose of this questionnaire is to gather initial information about your experience on ICT, at the time you joined the project. This information will help the project to develop in a more efficient manner. Thank you for completing this questionnaire.

• Section A; Practical issues associated with ICT.

1. Do you currently have a computer in your home that you use regularly?

Yes

No

2. If Yes, please indicate how you use the computer (tick as many boxes that apply):

Word processing

E-mail

Research or information gathering on the Internet

Games

Other (please specify) _____

3. The following questions are about your computer use and related activities either at home or at school (or elsewhere), please circle the answer you choose:

a) How often do you use a computer for any purpose?

Never	Less than Once a Month	1 – 3 times a month	About once a week	Several times a week	Almost daily
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b) How often do you use the Internet for purposes other than email?

Never	Less than Once a Month	1 – 3 times a month	About once a week	Several times a week	Almost daily
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4. Please circle the level of skill that is closest to your level for each of the following.

	No Experience	Beginner	Comfortable	Independent	Expert
a. Using computers For word processing	1	2	3	4	5
b. Using computers To produce graphics	1	2	3	4	5
c. Using computers For spreadsheets, data Collection.	1	2	3	4	5
d. Selecting software To match a particular Curriculum goal.	1	2	3	4	5
e. Integrating the use of The computer into Regular activities.	1	2	3	4	5
f. Using the internet To search or obtain Information	1	2	3	4	5

Section B: Beliefs about ICT in education.

1. Do you think teachers should use ICT in their teaching? Why/ why not

2. Please circle the response that indicates your level of agreement with each of the following statements.

	<u>Strongly</u> <u>Agree</u>	<u>Agree</u>	<u>Neutral</u> <u>Disagree</u>	<u>Strongly</u> <u>Disagree</u>	
a. Computers and other Technology can play an Important part in my Classroom.	5	4	3	2	1
b. Using computers in my Classroom can be disruptive To student learning and Social development.	5	4	3	2	1
c. Computers and other Technology can be used to Enhance the teaching of Important skills.	5	4	3	2	1
d. Computers in the Classroom are best used for drill, remedial work or reinforcement of facts.	5	4	3	2	1
e. Computers are best used in the Classroom to promote students' Analytical, creative and other 'higher order' thinking skills.	5	4	3	2	1

f. Computers and other tech. Can Be used in my classroom to provide Alternative routes of learning for Students with learning difficulties. 5 4 3 2 1

g. Using computers in the classroom Is an inappropriate activity for some Students. 5 4 3 2 1

h. Computers and other technology Can be used in my classroom to Make learning more interesting for All students. 5 4 3 2 1

3. Why do you think ICT is being given such importance over the past years?

4. What do you think schools and classrooms will look like in 10 years time?

Section C: Perceptions of ICT

1. How do you think ICT is being used in schools?

2. If you use computers in the classroom, in which of the following three ways do you use computers in the classroom. Please tick the ones that apply.

a. To introduce new material to students. Please give some examples.

- b. To review, reinforce, or practice material already introduced to students. Please give some examples.
- c. To explore enhance or enrich material already introduced to students. Please give some examples.

3. Are there any other ways you have been able to use ICT in the class?

4. This question is about the use of certain teaching approaches and activities, and whether or not you support them with technology. On average how often do you;

Never Occasionally 1-4 times/ 5 – 10 times/ Daily

a. Use small group-based Learning activities.	1	2	3	4	5
b. Use formal collaborative Learning techniques	1	2	3	4	5
c. Assign or encourage Students to help other Students	1	2	3	4	5
d. Have students synthesize Information from a variety of Sources.	1	2	3	4	5
e. Have students develop their Own projects	1	2	3	4	5
f. Exchange ideas about Teaching with other teachers	1	2	3	4	5
g. Have students develop Products using a computer.	1	2	3	4	5
h. Have small groups of students Working at a computer within					

Your classroom 1 2 3 4 5

i. Have students use the internet

For research or
communications.

1 2 3 4 5

5. Are there curriculum subjects which are more suitable for ICT use?

Section D: Staff development.

1. How long have you been teaching?

2. How old are you?

3. How do you view your professional development, that is how do you think it occurs?

Thank you for completing the questionnaire
Michelle Gialanze

APPENDIX 4

Teachers Log

- (A) How do you feel your lesson went?

- (B) What would you have done differently?

- (C) What were you particularly pleased with?

Classroom Evaluation

1. Did you reach your teaching objectives with all the children?

2. How are the children tackling the topic presented to them? Give concrete examples.

3. Is this the way they worked previously?
 - Yes
 - No
 - Expand

4. What do the children think of their work?

5. How did they use the material?

6. Did they use their own materials? Give examples if they did.

7. How did they work on the topic?

APPENDIX 5

Free writing activity

A piece of writing on:

- Your background in teaching
- What do you consider education to be?
- How would you like to teach?
- What are you doing (in class) at the moment?

Anything that could help in giving a background to the research that is taking place at the moment.

Thank you
Michelle

APPENDIX 6

A framework for interview questions at the end of the project.

1. After working with S.A.I.L in the suite and at home, what have been the key points that have arisen for you?
e.g. teaching, organization, management, children's work, planning, monitoring, assessing, technical support?

What has been positive – why?

What has been negative – why?

What has been new for you and/or the children?

What has changed for you/ and or the children?

How would like things to develop?

2. Could you describe an activity (or more!) using S.A.I.L which has gone well for you this year? Why?
3. Could you describe an activity (or more!) using S.A.I.L which did not go well for you this year? Why?
4. What is your opinion or attitude to the ways in which the S.A.I.L project carried out the training?
5. Do you think that the training held relates to the ways in which ICT is used in schools? Why?
6. What do you think a teacher needs to know in order to use ICT in their teaching?
7. How do you think ICT should be used in the classroom?
8. Could you please describe some examples of what you think is good practice and why you think they are good and what influenced your views.
9. Could you give some examples of poor practice and why you think it is poor?

10. How would you rate what influenced you the most this year:

Could you give them a measure 10 being the highest.

Readings on the subject,

Other S.A.I.L teachers

The children,

Michelle

The website

In what and how did they influence you?

11. Does influence in the above question mean facilitating what happened in the class or influence your practice?

12. Have you noticed any change in the pupils' skills and/or attitudes over the project?

Appendix 7

Rose Meeting

13 'did you like best, and if they want to be his friend,'
13 'Egyptian Alphabet, and eh, they liked it/(Marceline) a code'
15 'this and you were present and they enjoyed it, they tried to'
15 'present and they enjoyed it, they tried to invent as'
15 'invent as possible words that they can mix them up with'
15 'examples like um, er, years they used ears in the middle,'
15 'our school Sir Anthony Mamo they used an ant and then'
15 'an example of myself, but they managed just well because'
17 'from home/(Rose) No, no they used them from the print'
17 'you know the thing that they wrote at the bottom (in'
17 '(in the student log), what they didn't like eh certain'
17 'that, the only thing that they did not enjoy doing'
19 'myself how to get the flag, they typed in flag of Malta'
23 'It can be tricky/(Rose) They called me it vanished.'
25 'it, and I could see, that they tried hard to see words,'
25 'where to look up words, They could swap into pictures.'
25 'could swap into pictures. I they invented words, like dear'
25 'words, like dear Muscha, they printed out the animal.'
33 'one that was waving/(David) They ask me for the lady that'
34 'was filming last time/(Rose) They enjoy it uh'
39 'to tell you, three girls they dressed up as gypsies,'
54 (Martha) 'I hate it when they talk the children'
55 'talk the children/(Rose) but they understand more'
56 'don't understand at all, they don't know how to express'
57 'I found out in this lesson, they love the lesson, because'
57 'they love the lesson, because they LOVE computers but I'
57 'at the back of their mind they think it is a play time,'
59 'I have Claudia and Sergio they are good. They did the'
59 'and Sergio they are good. They did the flag and the'
61 'surprised sometimes you think they know something and then'
61 'and then you find out that they don't/(.) (making'
69 'good on camera/(.)/(Rose) they laughed a lot at me, the'
74 'you can find information, as they love drawing, and I don't'
74 'head she commented how come they drew, I told her I don't'
76 'it is good for them/(Marceline) They ask me can I draw, I'
77 'it, and in fact two students they drew, look I made a word'
82 'There are several options, they did not fit, I tried to'
85 'It is similar to what they are doing on the computer'
85 'on the computer but still they do not know what they are'
85 'still they do not know what they are doing, they keep on'
85 'not know what they are doing, they keep on turning to see'
87 'but I didn't imagine that they actually knew how to'
87 'paint and this is what they did, and I forgot to tell'
87 'were multiple choice and they loved them, and nowadays'
87 'they loved them, and nowadays they are mixing things up.'
87 'two questions a and b and they asked me, Miss do we have'
87 'so I had to explain, as they got mixed up. and this it'
88 (Michelle) 'don't you see that they will be working when they'
88 'they will be working when they are making noise'
92 'don't mind them talking, but they are a problem/(Rose) I'
94 'is different/(Martha) If they are at a point, they are'

94 'If they are at a point, they are working at table'
 94 'they are working at table, they are so out of hand'
 97 'me, I don't mind/(Martha) they know more/(Rose) I don't'
 102 'look at the flag that they did, that is a different'
 107 'and university level and they put together the magazine'
 107 'our school and as an award they offered the children.'
 107 'not exactly in Europe as they made a mistake, they'
 107 'as they made a mistake, they chose London, France,'
 107 'invented five locations where they go. In the presentation I'
 107 'my class after a long weekend they did not seem that'
 107 'did you like best and if they wanted to be chosen to go'
 107 'the subject. As the addresses they had mine and the head of'
 110 'which one do you think they chose? eh?/(.)/location'
 112 'they chose? eh?/(.)/location they choose Egypt because of'
 114 'They chose my address'
 115 'chose my address/(Michelle) they were sending everything'
 116 'to Rose/(Rose) and when they came to subject/(Rose) I'
 117 'laptop on to see the email. They enjoyed that of the email'
 117 'enjoyed that of the email, they were writing emails and'
 123 'related to the continent, but they could not understand it.'
 123 'not understand it. Sometimes they have a composition with a'
 123 'with a picture of a cat, and they have to write, sometimes'
 123 'they have to write, sometimes they ask you to invent the'
 125 '(Martha) ending/(Rose) they couldn't understand it'
 131 'written gypsies/(Rose)But they did not even write'
 141 'well if you thought that they had learnt how to send an'
 142 'how to send an email/(Rose) They didn't, not even the ones'
 146 'I have two or three they are always in the moon'
 147 'always in the moon/(Martha) they are on the planet some of'
 149 'uh, but in the last one they found recently'
 152 'to have the boots again, they start to scream, Miss'
 152 'get rid of the rubbish, then they told me to put brown'
 163 'desks in a different manner they enjoyed it, my class is'
 163 'class is always noisy. when they are writing it is'
 163 'is different otherwise when they come to working on'
 165 'think that it is a sign that they are working, do you agree'
 167 'it is different/(Martha) if they are doing circles, but'
 167 'but the noise is about what they are writing about the'
 171 'I love boys but they are terrible/(David) oh'
 177 'But yours are older/(Marceline) they always remain in the same'
 178 'in the same class/(Martha) they gave me a foolscap to'
 182 'a particular teacher, what do they care, after all, I mean I'
 184 'I don't know/(Rose) because they gang,/(Martha) but now'
 190 'I diplomatically told them, they told me doesn't your pay'
 190 'me doesn't your pay come. They then told me that they'
 190 'come. They then told me that they have a mental case in the'
 190 'my God what a reaction, they started to shout, and'
 192 '(Rose) 'I don't have, do they pay for the facilitator?'
 193 'facilitator?/(Martha) no they don't pay/(Rose) but'
 203 'really/(Martha) So they agreed that they would'
 203 'So they agreed that they would write down'
 211 'a child told me till 6th July they have, but officially we'
 211 'we have junior Lyceum, so they come with transport, does'
 212 'come at 8.30,/(Martha) ah they come early/(Rose) so'
 213 'ah they come early/(Rose) so they said they will ask their'
 213 'early/(Rose) so they said they will ask their father to'
 213 'father to get them so that they do not have to work'
 216 'you face/(Rose) The one that they would do, the final'
 217 'the final product or the way they got to it?'
 220 'because at the end of the day they are trying their answer'

224 'me about it/(Rose) In fact they didn't do it, what do you'
228 'neither I/(Rose) when they are in a group they pool'
228 'when they are in a group they pool in ideas, and they'
228 'group they pool in ideas, and they have lots/(Martha) when'
229 'have lots/(Martha) when they make most noise/(Rose) in'
230 'noise/(Rose) in each group they need somebody who is'
234 'whom/(Marceline) yes/(Rose) what they did not like in their'
234 'in their comments was that they had to wait and they did'
234 'was that they had to wait and they did not have enough time.'
234 'did not have enough time. But they loved it./(Marceline starts'
237 'cards, so after the computer, they were giving me the cards.'
238 'over,/the mothers whatever they do/(Martha) I have a'
240 'when I had children, whatever they did I loved it'
243 'during the computer class they did their own exercise,'
243 'own exercise, every word they created and then they'
243 'word they created and then they crossed out letters, and'
246 'you feel it/(Martha) when they work together, and they'
246 'when they work together, and they do not ask a lot of'
246 'I have already explained, they finish and go out.'
248 'a good indicator that they are enjoying it is when'
248 'the second group comes, and they say to that group you'
252 'other activities in the class they compare it to that one'
254 'and save them, and then they are going to exchange.'
255 'how do you know they are working/(Marceline) when'
256 'them what is this exercise they explained to me'
257 'me/(Marceline) you feel it when they work that it is going well'