A cybernetic view of teacher learning

Margaret J. Murray

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UNIVERSITY OF WOLLONGONG

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A Cybernetic View of Teacher Learning

Margaret Joy Murray
A Cybernetic View of Teacher Learning

Doctor of Philosophy

from

University of Wollongong

by

Margaret Joy Murray

Faculty of Education

2003
I, Margaret Joy Murray, declare that this thesis, submitted in partial fulfilment of the requirements for the award of Doctor of Philosophy, in the Faculty of Education, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged.

The document has not been submitted for qualifications at any other academic institution.

Margaret Joy Murray

September 2003
There are several people I want to acknowledge. First this thesis would not have happened had it not been for a conversation with Jan Turbill in which she suggested that I formalize my constant writing into a research project. Before that conversation such a thing would not have crossed my mind. Even then it may not have happened had it not been for a coffee shop meeting with Jan and Brian Cambourne in which Brian showed enthusiasm for the ideas that were consuming me at the time, and offered his support. Thank you Jan and Brian for having faith in me and giving me the shove I needed to send me along this path.

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Finally I must thank my family. Without their love nothing would have meaning.
Abstract

This study examines teacher learning through a cybernetic lens, exploring the questions: what is learning and why do people learn; why do people learn this and not something else; how does learning happen and what is the role of communications and the environment.

It investigates teacher learning in the context of the NSW Department of Education and Training’s Technology in Learning and Teaching (TILT) teacher development program. It takes as a starting point teacher learning in TILT evidenced by statewide research since 1995 and discusses this research and the on-going development of the program in the context of change theory and teacher development literature. According to this literature the program was developed on sound principles and could be said to have had ‘partial success’. However ‘partial success’ of the program in these terms indicates little about the nature of the learning of individual teachers.

To address this silence the research focuses on the learning of two TILT participants over a nineteen-month period. Their participation in a series of TILT workshops was video taped, they were interviewed after each workshop and visited in their schools. Data collected from interviews were transcribed and together with observations of the workshops and classroom visits provided a rich source of information for close analysis. Close analysis was conducted using a process of categorization of data into themes and issues. The picture emerging from this process, although interesting, revealed little new about teacher learning. However when viewed through a cybernetic lens a different picture emerged.

Following extensive reading in the literature dealing with cybernetics, emotion and cognition the data were then examined a second time using a cybernetics lens in order to answer the research questions. A theory of learning emerged out of this process that is grounded in the learning of two teachers. As well as providing answers to the research questions this grounded theory of learning has implications for program development and the ‘success’ of teacher learning.
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Chapter 1

Introduction
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Chapter 1:
Introduction

1.1 Purpose of the study

The purpose of this study is to develop a grounded theory of teacher learning. To realise the purpose of the study I aim to:

• examine in detail the participation and learning of two teachers in the Technology in Learning and Teaching (TILT) program; and

• apply a cybernetic lens through which to interpret the descriptions of their learning.

Through these two strategies I propose to develop a theory of teacher learning grounded in the real world of teacher professional development and classroom practice viewed through a cybernetic lens.

The following questions will guide and frame the study.

What is learning and why do people learn?

Why do they learn this (and not something else)?

How does learning happen and what is the role of communication and environment?

1.2 Focus of the study

This study seeks to understand teacher learning in a professional development context. In an effort to understand such a complex concept from a fresh perspective it applies a cybernetic lens to what an observer observes in a teacher development program, what teachers and facilitator discuss and do, and what teachers say they learn.
A focus on teacher learning leads me into the cybernetics literature to investigate what learning is and why learning happens to us. The ‘why’ of learning touches on evolution and survival. Discussion of how learning happens includes the role of the environment as living system and environment interact and change. Discussion of communication as the braiding together of ‘languaging and emotioning’ (Maturana, 1993) leads to a view of communication as part of the environment in which learning takes place, and emotion as integral to all learning.

Descriptions of what teachers learn in TILT are based on their accounts of what they learn, observation of their workshop participation and classroom practice at intervals over a nineteen-month period and analysis of the metaphors they use to discuss their learning. The question of why teachers learn this and not that requires an answer to questions such as: What is information, and why does something become information to someone (and not to another)?

The lens developed through exploration of the cybernetics literature is applied to empirical data collected, synthesized and analysed in a qualitative research framework to produce ‘grounded theory’ (see chapter four). This process is intended to lead to ways of thinking about learning that are not usually part of the mainstream teacher education debate.

The research context is one teacher development program, Technology in Learning and Teaching (TILT).

Although the study focuses on the learning of two individuals in TILT it is set against the background of the statewide TILT program (see website at: http://www.tdd.nsw.edu.au/tilt/index.asp), which has been operating in NSW government schools since 1995. The TILT program forms the context of the study (see chapter two parts two and three). The TILT research strategy provides: exit data on teacher opinions of, and suggested changes to, the program; data on participant characteristics on entering the program; and statewide changes in practice over time. It indicates that teachers are enthusiastic about the program with the vast majority not wanting to change anything about it (Lum Mow, 1997a & 1998). It also indicates that change is occurring over time, teachers are learning.
Set in the context of the ‘change theory’ literature it seems the program can probably be called a ‘partial success’ (Fullan, 1993a). It seems to be making a difference to teachers’ classroom and professional practice, albeit in some areas the difference is small. This reported learning of thousands of teachers undertaking the TILT program since 1995 is my starting point for a deeper look at the meaning of learning as my study moves from the large scale statewide program research to the learning of two individuals. After examining individual teacher learning through an iterative process of data categorization I apply a cybernetic lens in the hope of throwing new light on the meaning of learning.

A focus on learning is important because rapid changes are taking place in teacher professional development supported by rapid changes in technology. “In parallel with this workplace revolution,” say Downes et al:

we are now witnessing significant changes in our understanding of knowledge itself: how new knowledge is created, what is important to know, how new information is obtained, and how people learn.

(Downes, Fluck, Gibbons, Leonard, Matthews, Oliver, Vickers & Williams, 2001: 10)

This study is intended to add to the ‘changes in our understanding of . . . how people learn’. A better understanding of teacher learning is important in the design, development and delivery of training programs, including decisions about use of new communication and information technologies which constitute ‘this workplace revolution’.

1.3 Background and rationale

In 2000 it was estimated that 327 million people around the world had Internet access, with 25 countries where over 10 per cent of the population were Internet users, (Ryan, Scott, Freeman & Patel, 2000). The up beat rhetoric surrounding computer and information technology has aligned it with ‘progress’.

In the 1990s there was much talk of a ‘new paradigm’ (e.g. post industrial, knowledge era/society: Senge, 1990; Lepani, 1993; Tinkler, Lepani & Mitchell, 1996) and ‘the information age’ (e.g. Howard, 1997; Negroponte, 1995; and of course Bill Gates, 1999).
The rhetoric was picked up by governments wanting to be well placed in emerging global markets. One of the ways they responded was by addressing the demand for computer literate workers through teacher development and technology infrastructure (e.g. the NSW *Computers in Schools Program* (CISP); the UK’s *National Grid for Learning*; Singapore’s *Singapore One*). The argument seemed to be that we will need a technologically skilled workforce if we are to keep pace with technological change and position our country favourably in a world economy.

Governments invested large amounts of money in computer and information technology. For example NSW spent $184m on CISP in 1995-1999 and $566m to continue CISP 1999-2003; the Australian government spent $76m 2000-2003 for the *Quality Teacher Program* (QTP) one strand of which focused on technology; the UK pledged 220 million pounds in 1998 funded by the national lottery; and Singapore spent $2bn over 5 years on technological infrastructure and support. Driven by the information age rhetoric and a fear of missing out in the global economy more of the business of education was conducted using this technology.

In Australia, which is second in the world behind the USA in its per household use of personal computers (Lowery & Murray, 1997), one of the responses was to focus on creating in education and training a computer and information technology environment in which students and teachers become expert users of the technology. For example in the 2002 state budget in NSW $963m was committed for the provision of ICT in NSW government schools and TAFE colleges.

In their 1998 state budget Victoria committed $51.4m for “access to computers, Internet, on-line curriculum materials and technology training for teachers” (Australian College of Education, 1998:9); Tasmania provided all students living outside metropolitan areas with access to on-line training and education; Western Australia announced a computer initiative worth $100m over 4 years (NSW DET, 1998:17); Northern Territory installed PCs in all schools and throughout the Department.

These state education initiatives were supported nationally by publications such as *Learning for the knowledge society: An education and training action plan for the information economy* (Department of Education Training and Youth Affairs, 2000) and *Learning in an online world: School education action plan for the information economy* (Department of Education Training and Youth Affairs, 2000a).
Changes to education infrastructure “are changing the contexts in which teachers do their work in quite fundamental ways” (Downes, Fluck, Gibbons, Leonard, Matthews, Oliver, Vickers & Williams, 2001:12). For NSW DET the speed at which the context has changed (i.e. since the state Labor government was elected in 1995 and again in 1999) has meant a rapid move into, for example, CDROM, web based training, email support, video conferencing and on-line teacher learning, with senior officers questioning the continued use of print materials and face to face training and development. These new modes of delivery have arisen in the space of a few years and continue to expand with the introduction of the Internet Services and Provisions (ISP) strategy in 2002 providing 1.3 million school and TAFE staff and students with e-learning accounts and chat and bulletin board facilities at a cost of $82.3m over four years (1999-2003). In the wake of this investment there is an imperative to produce training and development programs and support that make use of these newly available features. This is so despite advice that:

neither ‘online learning communities’ nor ‘online professional development’ can provide quick fixes for the complexities of continuing professional development.

(Downes et al, 2001:79)

The literature on educational uses of computer and information technology tends to either demonise (e.g. Birketts, 1994; Postman, 1993) or glorify (e.g. Papert, 1993; Dwyer, 1995) the computer. The glorifiers talk of a paradigm shift in education which usually includes some or all of the following: from objective to constructed knowledge; from industrial to knowledge based society; from atoms to bits; from teaching and instruction to learning; from time and place bound to flexible delivery (Yocam & Witmore, 1994). Thus computer technology has become part of the paradigm that was to deliver change in pedagogy, both within the classroom and in teacher development programs (Sparks, 1998; DeWert & Cory, 1998; Loader, 1993; Dwyer, 1995) preparing teachers for the Third Millennium (Smith, 1996).

However it seems that rapid changes in teacher professional development have taken place without time to gain understanding of how these changes affect learning. As Sparks (2000) notes, there is little empirical evidence to support claims about the effectiveness of use of the media in professional development.
The Canadian based Commonwealth of Learning (1996) warns that increasingly remote delivery of courses has the potential to confuse and frustrate students, although Ryan et al (Ryan, Scott, Freeman and Patel, 2000:169) believe the use of new technologies will “improve the quality of teaching and learning and represent an efficient use of resources”. Rowntree (1995) in discussing the benefits and drawbacks of online learning mentions the need to communicate ideas and one’s own feelings in written text without the benefit of body language, expression and tone of voice. Myrdal (1994) also points to the absence of physical contact and body language as a potential drawback for some learners (more recently some of these drawbacks have been addressed by users themselves in the inventive creation of emoticons). She advocates building on the “pedagogy of distance education, in addition to educational theory in general” (Myrdal, 1994:49). Wild (1996) discusses the need to facilitate dialogue between learner and materials; learner and content author; learner and self in reflection. Chou and Sun (1996) add to this list ‘learner-learner’ interaction.

Evaluations of the NSW DET Log on to Literacy online program (Davies & Murray, 1998, 1999, 2000, 2001, 2002) have consistently shown the benefits to participant completion rates of a face-to-face workshop, and/or visit(s) from program personnel. In a survey conducted to evaluate CDROM based training in rural and remote Queensland, the authors concluded that ‘there is still a perceived need for some direct human interaction.’ (Gooley, Towers & Dekkers, 1993: 11). Just over a quarter of those surveyed felt that learning by CDROM was impersonal and nearly half felt the need for face-to-face assistance. McRae et al in a mapping of teacher professional development Australia-wide found similar attitudes to CDROM based learning (McRae, Ainsworth, Groves, Rowland, Zbar, 2001).

A survey of participants in an on-line web based course at Charles Sturt University revealed one fifth of distance education students felt there should be a residential school (i.e. face-to-face component) (Atkinson, Green & Spennemann, 1997). Unlike the CDROM users these students were supported by email access to a tutor and to other students. An evaluation of the facilitator led TILT program in Queanbeyan District found that 95% of a total of 58 respondents to a survey indicated that face to face encouragement and help from a tutor or facilitator was the most valuable part of the program and vital in their future technological development, (Page, 1998).
Following their review of teacher continuing professional development (CPD) and new technologies Downes et al conclude that it is likely:

that the use of appropriate media/technologies is but one of the many characteristics of effective CPD. Literature on effective ways to use ICTs in CPD is relatively scant

and,

the ICT specific CPD literature supports all of the major thrusts of the generic literature.

(Downes et al, 2001:21)

They go on to quote Brand’s (1997) review of the ICT specific teacher development literature that lists ten principles that should underpin programs if they are to be successful: provide time; account for varying needs; flexible opportunities; provide support; collaborative development; reward and recognize teacher learning; sustained development over time; pedagogical focus; intellectual and professional stimulation; and a clear administrative message and support. These could, as the authors point out, be applied to all professional development programs.

1.3.1 Recent changes in teacher development in NSW

Increasingly, in response to research on training effectiveness (e.g. Wood & Thompson, 1993; Turbill, 1993; Hargreaves, A., 1992; Hargreaves, D., 1992; Fullan, 1992, 1997) teacher development programs are becoming more flexible, workplace or home based; collegial, working with mentors and learning partners in self managed groups, instead of (or as well as) with expert group leaders; with workplace action research/action learning now a standard part of learning programs.

In response to the changing context materials, instead of in folders, are now likely to be delivered on CDROM or on the Internet. Use is made of satellite broadcast, teleconference and video-conference to provide expert input and discussion. Sometimes expert facilitators are also part of the model (see NSW Department of Education and Training (DET) Training and Development (T&D) policy, 1998a; Carter, 1999).
Although many of these changes are in response to research findings on training effectiveness there are other factors impinging on decisions concerning mode of training delivery and in particular the growing use of computer and information technology outlined above. One view is that the technology is being used simply ‘because it’s there’ and politically the investment in technological infrastructure must be seen to yield benefits to teachers. Another important consideration, identified by the NSW DET Director of Training and Development, Graham Dawson, in his report to the managers, (meeting, May 4, 1998) is the plea by teachers isolated by distance for greater access to training and development programs. For these teachers, even when funded, factors such as time away from home and lack of casual teachers make it impossible to attend a centrally held course. Distance Education (DE) and delivery mechanisms such as CDROM and Internet that allow for flexible access make participation possible (e.g. Log on to Literacy mentioned above). Not only is there a possibility that these teachers will be able to participate in training programs that others have taken for granted but it is also likely that with lower material and delivery costs a much greater array of training programs will become available.

The rapid expansion of technology infrastructure in the NSW government school system\(^1\) coinciding with a contraction of funding to schools for training and development\(^2\) gave added impetus to the search for new ways of providing access to teacher learning programs. In 1997 the Training and Development Directorate in addition to more traditional training provision, issued three training programs on CDROM and launched an online discussion group; in 1998 it issued a further two CDROMS and launched two Internet based programs.

Since then the range of programs available in a variety of technological media has

\(^1\) All schools were linked to the Internet in 1996 as part of the NSW state government’s Computers in Schools Policy (CISP). By 2000 all schools had networked Internet access. In 2002 work was begun on providing all students and teachers with email accounts, and bulletin board and discussion facilities through the ISP strategy.

\(^2\) In NSW $9m was cut from the schools’ Training and Development budget in the 1997 teacher wages settlement.
continued to expand. By 2002 all new programs at least included CDROM based resources and online discussion. Changes in teacher development are taking place ad hoc and for a variety of reasons (some no more elaborate than ‘because it’s possible’). As Downes et al (2001) point out there is need for more work to be done on identifying effective use of ICTs in teacher development but Downes et al also talk about our changing understanding of how people learn and link this to the new technological contexts in which teachers are working.

So although this study began as a comparison of teacher learning in one program in three modes of delivery (see below) it developed into a study about learning in one technology related professional development program. This happened not only for pragmatic reasons but also because I felt that until I understood some of the fundamentals about learning itself I could not speculate on the possible effects of delivery mode. Understanding how and why learning takes place is therefore the topic of this study. Such understanding will help in the development of programs that support learning and hopefully in future decisions about mode of delivery.

1.3.2 Context of the study: The technology in learning and teaching (TILT) program

The NSW Department of Education and Training’s (DET) Technology in Learning and Teaching (TILT) program was developed in 1995/6 as part of the NSW Computers in Schools Program (CISP). With it came some expectation that it would assist in delivering the paradigm shift referred to above (Murray, 2000). TILT was developed in 1995 as a facilitator led, workshop based and face-to-face course. In semester 1, 1998 work was begun on the development of a self paced TILT CDROM. The CDROM was piloted in 2000, supported by a trained facilitator and four hands-on workshops (the original program had six workshops). During 2000 the original TILT program was phased out and the CDROM based program phased in. The CDROM was further developed throughout 2000 on the basis of feedback for reissue in 2001 when the original TILT program ceased. Apart from two less workshops all support structures for TILT by CD remained the same as for TILT.

3 See chapter two for a full description of the program.
My role has been to manage the development, implementation and evaluation of the TILT program. I am therefore well placed to conduct this study, having not only corporate knowledge of the history of the TILT program (see chapter two) but also (with the approval of the then Director of Training and Development⁴) access to TILT files, participant profiles and evaluations to provide detailed background to the program and teachers’ accounts of their learning from the program. A concern for maximising teacher learning in the TILT program and improving the program regularly on the basis of feedback, has led me to an investigation of learning in general (what is it? how does it happen?) and teacher learning in the context of training and development in particular.

1.3.3 Learning: An objectivist paradigm

Views of how learning takes place are underpinned by views of reality. Where reality is seen as fixed and objective, waiting to be discovered, learning is about transmitting facts about this fixed and knowable universe from one head to another (using for example: face to face lectures; readings; and prescribed activities). It implies an hierarchy where someone has privileged access to the correct view and will transmit this to others who do not yet understand or ‘know’. This is objectivism, the epistemology of logical empiricism described by Brier:

- Meaning is based on ‘truth’ and reference; it concerns the relationship between symbols and things in the world.
- Biological species are natural kinds, defined by common essential properties.
- The mind is separate from, and independent of, the body.
- Grammar is a matter of pure form.

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Reason is transcendental, in that it transcends, goes beyond the way human beings, or any other kinds of beings, happen to think. It concerns the inferential relationships among all possible concepts in this universe or any other. Mathematics is a form of transcendental reason.

There is a correct, God's-eye view of the world, a single correct way of understanding what is and is not true.

All people think using the same conceptual system.

(Brier, 1999:171)

As Brier (1999:171) goes on to say, “[t]hese ideas have been part of the superstructure of Western intellectual life for two thousand years”. They presuppose information as representational and communicable (i.e. signs or words represent objects/truths and can be communicated without complication and loss or change of meaning). Learning is seen in the narrow context of the designated curriculum. Within this world view sits the transmission model of learning with roots in behaviorism, a term coined by J. B. Watson in 1913 and taken up by Skinner as a new way of explaining and predicting behaviour based on the notion of stimulus and response.

In teacher development programs this world view can be seen in apprenticeship models (Tickle, 1994) and handed down checklists, sets of skills and competencies and capabilities identified by writers for ingestion by novices (e.g. Armstrong, 1991). With recent recognition of the importance of emotion in learning within the last few years (Gibb, 1996; Cain & Cain, 1994; Sylwester, 1995) these checklists are now likely to include the affective domain (e.g. Kouzes & Posner, 1999). In training and development this understanding is behind drill and practice computer software and courses addressing narrow and specific learning outcomes (e.g. Microsoft applications tutorials; keyboard skills; the International Computer Driving Licence) which come to be used as checklists for skill development. It also shows up in checklists for implementing school change programs (Scott, 1999) or in checklists concerning the attributes of good leaders (see for example Williams, 1998).
Information processing models of learning use the computer metaphor for human information processing in which the brain has inputs, through puts and outputs (e.g. Gough, 1976). This is stimulus and response in the brain. Information enters the brain via receptors, is worked on in some way, compared to existing information, stored for future use, stimulating a response, which could be an action or a decision not to act. This has a non-problematic view of information and supposes that information can be ‘taken in’ by our senses something disputed in second order cybernetics (see below).

1.3.4 Learning: Reality as constructed

Piaget (1971) a zoologist and Bruner (1966), in the nineteen sixties and seventies were working on theories of learning based on cognitive development, and including theory of the nature of knowledge. Piaget studied cognitive development in children that he said occurred in successive stages. He identified processes of assimilation (as the child assimilated new knowledge with existing understanding from previous experiences) and accommodation as the child’s mental patterns were modified to fit with a newly discovered version of ‘reality’. Piaget’s work has been criticized for its failure to pay attention to the complex and powerful role of language in concept development (Donaldson, 1978) especially in light of Chomsky’s (1965) work in linguistics in the sixties and his proposition of a universal grammar.

Papert worked with Piaget for many years in Switzerland and was greatly influenced by him. He coined the term ‘constructionism’ for the process of the construction of knowledge outlined by Piaget. Constructionism acknowledges the individual’s broad based, idiosyncratic construction of knowledge. It differs from constructivism (knowledge is built by the learner) in its belief that knowledge construction happens idiosyncratically as the learner engages in for example, “the construction of something external or at least shareable . . . a sand castle, a machine, a computer program, a book” (Papert, 1993: 142). ‘Cognitive scaffolding’ (Ausubel, 1968) which gave rise to ‘concept mapping’ (Novak & Gowin, 1984) and a range of advance organizers (e.g. Morris & Stuart-Dore, 1984) is based on this theory.
Where reality is seen as constructed as we live in the world together, learning is about interactions in a context or milieu. Learning is seen in the broad context of change and survival in an individual living system, everything we do is about learning all the time. In education this includes not only the official society-sanctioned curriculum but also what is known as ‘the hidden curriculum’ (i.e. all transactions within and outside of the official society-sanctioned school curriculum every second of the day (Apple, 1975)). In this constructivist paradigm no-one has access to a privileged God’s-eye view of the world. There is no knowable absolute reality/environment. As Brier says, “[a]ll systems travel with their own environment” (Brier, 1999:182). This does not negate the idea of a universe (i.e. it does not necessarily imply a multiverse) but what we have access to is a universe constructed by our interactions as living systems in an environment over millennia:

a metaphysical construct made by theories produced in our scientific worlds. But these theories are again based on the cognitive skills we have developed in evolution which guarantee their survival value and thereby their ‘reality’... So the world might be a construct, but it is all we have, based on millions of years of perceptual experience.

(Brier, 1999:182)

As we describe this world we are always and already a part of it, we cannot see it objectively ‘from the outside’ but only ever from the subjective ‘inside’. Thus information can only be created ‘inside’ on the basis of the living system’s ontogeny and its interactions in an environment (which includes other living systems and all communication).

This does not necessarily mean there is such a thing as ‘constructivist teaching’. If one believes that we construct the world by living in it then we scavenge our construction materials out of whatever is available in whatever form it is presented (including oft useful checklists and drill and practice). What a teacher believes s/he is doing and the paradigm s/he is operating out of affects the learning that is going on between the environment and another living system only through the teacher’s contribution to the learning environment (including communication).
However if there are political, social or cultural imperatives for particular learning then environments can be constructed in which a living system is more likely to learn what another living system hopes s/he will learn (Cambourne’s (1988, 1995) conditions of learning support this for example). Environments can also be constructed in which people can roam and learn according to individual happenstance rather than learning specific ‘things’. Computer technology has provided such ‘worlds’ for school students (Papert, 1980; 1993; 1998), the multi-faceted, multi-genre entertainment industry is an example outside of formal education.

Within this view of a constructed reality are a number of positions. Constructivism is based on the understanding that knowledge is constructed by the learner as s/he interacts with the world. Von Glasersfeld’s (1988) radical constructivism says that there is a reality ‘out there’ but we can only ever know what it is not. We operate on hypotheses and only revise them when we bump up against ‘reality’ and our hypotheses do not fit. Maturana and Varela’s (1987) Bringing Forth paradigm says that we bring forth the world by living in it.

This study looks at how teachers change and learn as living systems interacting in an environment specifically constructed to support learning about and with information and communication technology (i.e. the TILT program). It takes a constructivist view of learning that has implications not only for the ‘what’ of the study (i.e. what is learning) but for the ‘how’ of the research itself (i.e. the theoretical framework and methodology). The study is based on the premise that reality is constructed as we live together in a milieu, that there is no ‘real’ reality out there but that we construct our world in ‘co-ontogenic structural drift’ (Maturana and Varela, 1987).

The study takes into account the idea that although I may believe that the world is so constructed this can only ever be a ‘belief’ and others will believe differently. The world I believe I am helping to construct will be interpreted by others out of their own belief of how the world works. But where does such a view sit with the professional development and school change literature?
1.3.5 Teacher professional development and school change

Much of current practice in teacher professional development dealing with effectiveness and change owes something to the practices of business management. For example all of the following papers from business and industry were distributed in 2000 as professional reading for the 40 NSW district Training and Development Coordinators: Mintzberg, 1990; Hock, 2000; Johnston, McAuley & Ogden, 2000; Irwin, 1996. The effective schools movement in the seventies and eighties gained some of its momentum from people like Deal & Kennedy (1982) and Deal (1985) who brought the language and symbolism of corporate culture to the field of education. Later education discovered Deming’s Total Quality Management movement that was influential in school systems across the world.

Since then Senge’s Fifth Discipline (1990) has drawn together a collection of what he calls ‘component technologies’ from a number of sources and has been influential in teacher development programs (e.g. NSW Dept of School Education, multi-phased teacher development program, Certificate of Teaching and Learning, 1995; NSW Dept of School Education discussion paper, Schools as Learning Communities, 1995). For example he includes “mental models” from Royal Dutch/Shell and “building a shared vision” from IBM, Polaroid and Apple, which he then applies to “the art and practice of collective learning” (p16). These he suggests are the tools needed to move from the rhetoric of ‘learning organisations’ to the large scale adoption of the practices which actually create ‘learning organisations’.

More recently drawing on the work of Margaret Wheatley (1992) who took the concepts and metaphors of what she called the New Science and applied them to leadership, a number of writers have produced school self help change facilitation manuals (Williams, 1998) to support whole school change.

Williams identifies a number of roles essential to successful change (e.g. the Architect, Coach, Producer, Conductor). He describes each role, ascribes skills and provides practical tools and an example of the role in action in a successful change program. Although American in origin the book has been ‘translated’ for Australian audiences and published in Australia. The book is practical and provides numerous checklists, blackline masters and helpful hints.
Senge’s writing greatly influenced the work of Fullan and to a lesser extent, Hargreaves up until the late nineties when they began questioning the ‘cerebral’ nature of the language of ‘learning organisations’ and instead began taking up the language and rhetoric of the ‘emotions’ literature (especially Goleman, 1996).

All of these writers seem to be commenting on a fixed and knowable world, where the notion of ‘cause and effect’ exists and recipes for change can be applied and adopted. Meanwhile both Senge and Fullan had a considerable influence on the NSW DET culminating with the publication in 1995 of *Schools as Learning Communities: A discussion paper* that drew heavily on their work. The paper was distributed to all schools as the recommended basis for a series of staff meetings.

### 1.3.6 Change theory

Fullan published his influential book on change theory in 1982, saying that 1982 was the beginning of the history of educational change, thus at the same time defining and claiming the territory in which he has been an acknowledged expert for the past two decades. In 1982 he described change as artefact imposed on reluctant teachers. Ten years later he suggested that the change process was a much messier business than he had first thought (Fullan, 1993a; Fullan, 1993b; Fullan 1994). In 1993 he talked about the “New Paradigm of Change” which begins “You Can’t Mandate What Matters” and goes on to talk of change as a “Journey not a Blueprint” with everyone rather than the chosen few acting as change agents (1993a:20).

This I believe demonstrates the influence of Senge and systems theory, and although the rhetoric is of new paradigms and learning journeys the underpinning philosophical framework is still grounded in an objective reality ‘out there’ and a god’s eye view of the observer commenting on that reality (see chapter two part one for a review of the work of Fullan and Hargreaves).

Based on the more recent work of Fullan and Hargreaves a new approach to educational change has sprung up. Scott (1999) in his book *Change Matters* (endorsed by Fullan) sets out to address the ‘how’ of change, He points out (as do Fullan and Hargreaves) that change is a process rather than an event and that it depends on “people, their values, beliefs, motives and relationship” (p xiii).
The book is organised around the role of motivation, values, evaluation and micropolitics that provide a framework for overall change management. It provides checklists drawn from current research of things like: questions to ask and address; typical errors; strategies that work; key requirements for effective implementation; characteristics of effective program evaluators; the stance of effective change leaders; the essential knowledge and skills and the way of thinking of effective change leaders. The book concludes that effective, sustainable change in education does not just happen but has to be led.

Stoll and Fink (1995) in their book Changing Schools (Series editor Andy Hargreaves and Ivor Goodson) likewise provide lists of points drawn from the educational change research as well as their own experiences in a major educational change program: obstructions to change; contextual factors; key change process issues. They conclude that a better metaphor for schools to replace the factory metaphor is one of the caring family. Caring families, they say, have

- high expectations for all their members; they build on and recognize individual strengths while providing mutual support; they compensate and help individual weaknesses; and they behave in ways based on mutual trust, respect, optimism and intentionality. Learning communities are caring families.

(Stoll & Fink, 1995:192)

Values, beliefs and emotions have become a focus, replacing policies and practices as the seat of change.

In one of his own articles in 1998 Hargreaves develops this theme writing about the emotional practice of teaching. He talks of teachers as emotional, passionate people, he discusses their feelings of guilt and self-sacrifice. He bemoans the fact that:

- emotions are virtually absent from the advocacy of the mainstream literature specifically concerned with educational change and reform.

(Hargreaves, 1998:837)

He discusses teachers' inner stream of experience ('teaching activates feelings') and outer stream of experience ('teaching activates feelings in others').
Although Hargreaves refers to the teacher’s inside ‘feelings’ and the teacher affecting the ‘feelings of others’, presumably while interacting in an environment, what is missing from all of these practical and theoretical writings is an explanation of ‘emotions’ and ‘feelings’ and how we influence ‘feelings of others’ and the link between our own feelings, our influence on the feelings of others, and learning (or teaching). How does someone else’s change program affect those that are deemed to be in need of changing? Why do people change (learn)? What clues do we have to what’s happening on the inside? While paying attention to systems theory in the living system’s environment attention has been diverted from the other important system – the living system operating in the milieu/context/environment of the system under examination.

The following section introduces cybernetics and the notion of living system in its environment. It provides ways of looking at the living system that will be used in this study.

1.3.7 Cybernetics

Like Senge, other writers in the field of change draw on the work done in cybernetics and systems theory (e.g. Shapiro & Lorenz, 2000; Fullan, 1994). Cybernetics emerged from the background of computer and communication technologies in the first half of the twentieth century. The term cybernetics was coined by Norbert Wiener in 1947 from the Greek kybernetes meaning steersman.

Cybernetics originally centered around communication between people and machines, where communication was seen as the:

transmission of a message, transferred unaltered from one actor-location (the clearly defined sender) to another (the clearly defined receiver) through a channel of communication via a pair of transceivers at each end of a channel, by means of some unambiguous and determined encodement.

(Glanville, 1995:47)
This idea of communication dealt with the conveying of information which needed to be measurable in order to be able to describe the cybernetic properties of the system or process (Murray, 1998). Thus Shannon (1949) developed a theory of communication which was concerned with describing an information source mathematically; that messages conveyed meanings was in Shannon’s view “irrelevant to the engineering problem” (1949:31). He saw the fundamental problem of communication as that of “reproducing at one point either exactly or approximately a message selected at another point” (Shannon, 1949:31). Information was to be conveyed as accurately as possible. Its purpose was to enable the ‘controller’ to compare “the actual with the desired, determine any difference and what to do about that difference” (Glanville, 1995:47) so that the behaviour of the controlled system could be “modified to suit the wishes of the controller” (Glanville, 1995:47). Cybernetics was concerned with the principles of how systems of all kinds are regulated. It assumed that the system could be objectively observed (Sluzki, 1985). Communication of information was seen as a negative feedback loop which enabled the system to maintain a desired state. It was underpinned by the central notion of circularity, which:

arises when effectors, say, a motor, an engine, our muscles, etc., are connected to a sensory organ which, in turn, acts with its signals upon the effectors.

(von Foerster, 1992:9)

This had implications for the notion of cause and effect which instead of being represented as a linear chain of events was now seen as a circular (feedback) process (Bateson, 1972, Glanville, 1997a). Later, what Sluzki refers to as ‘second wave’ cybernetics explored positive feedback and how systems changed their organisation. These feedback metaphors were later applied to all kinds of systems including business and education (Murray, 1998).

At about the same time the term ‘systems thinking’ seems to have been coined. It came from much the same background as cybernetics and drew on ideas emerging from systems theory proposed in the 1940s by the biologist Ludwig von Bertalanffy (Heylighen & Joslyn, 1995).
At the same time as systems theory was being applied in biology, psychology, ecology and quantum physics, (Capra, 1995) scientists at the Massachusetts Institute of Technology “working on the principle of feedback in electronics came to believe that it applied to other systems as well” (Asayesh, 1993:8). They began applying software developed for mapping electronic systems to other kinds of systems. They talked of single loop learning by the system (maintaining equilibrium through negative feedback) and double loop learning (change through positive feedback). This new field became known as 'systems thinking'. It used concepts such as single and double loop learning as metaphors to explore change in organisations. It looked at organisations in terms of the relationship of the parts to the whole and the interactions between the two. It too assumed that the system was something that could be objectively observed (Murray, 1998).

In the 1980s systems thinking, linking in to the Total Quality Management movement that also looked to system change as the basis of reform, began to be applied to schools as organisations. Asayesh (1993) identified the following principles:

- each individual is part of the whole and each individual’s actions have consequences for the whole;
- any changes to an organisation are dependent on changes to the system rather than simply to the parts (individuals); and
- effective change to the system is dependent on an understanding of how the system works not just at a technical level but also, and more importantly, in terms of organisational culture. It requires an examination of values, beliefs and underlying assumptions.

Systems thinking employed tools such as organisational story telling (Andersen, 1994), and feedback loop diagramming which helped people map out long and short term consequences of actions, (Asayesh, 1993). These tools were applied to schools as organisations and teacher professional development came to included teachers’ stories as a way of examining beliefs and values (Butt, Townsend & Raymond, 1990).
Over the past thirty five years thinkers in the field of cybernetics, such as von Foerster, Maturana, Varela, Glanville and von Glasersfeld, have introduced a new dimension to the debate and fundamentally changed the way systems can be viewed and the nature of communication within and between systems. This new direction, born, Glanville (1997a) says, between 1968 and 1975, came to be known as ‘second-order cybernetics’ (von Foerster, 1992) or ‘cybernetics of cybernetics’. Cybernetics and systems thinking assumed that the system (reality) could be objectively observed. Cybernetics was the study of ‘observed systems’. Second-order cybernetics includes the observer’s role in the construction of reality. Reality is no longer viewed as something ‘out there’ independent of the observer but as something that an observer describes in language. Unlike cybernetics that proposes an observer, outside of, and commenting on a knowable universe, second order cybernetics includes the observer in the observed. It recognises that there is always a larger system engulfing the observed system and including the observer. It is the study of ‘observing systems’. Glanville puts it this way:

Second order cybernetics teaches us several things. One of them is that the observer is in the system. That the observer matters. That the observer observes, and that what he observes - his observations – are his observations: they depend on him and they are his. Because he is himself and no one else, they are necessarily distinct and different, and, when they are ‘communicated’, what is communicated is not them but the opportunity to create, for another, his version of what we may later come to share as ‘them’ (as he understands them).

(Glanville,1997b:64)

Second-order cybernetics recognises that although objectivity can be a useful concept, in fact “everything said is said by someone” (Maturana & Varela, 1992:27) making it impossible for anyone to step outside of life (and their own history of interactions) and comment from a distance. It requires different ways of looking at living systems (e.g. humans), at systems made up of living systems (e.g. organisations such as a school) and, as Glanville points out above, at communication between living systems, which Maturana (seminar, 1993) describes as the “braiding together of languaging and emotioning”.

Maturana and Varela are concerned with the way in which living systems (e.g. people) and the medium in which they operate change congruently (or separate or disintegrate). They explain that the:

structure of the system determines its interactions by specifying which configurations of the environment can trigger structural changes in it.

(Maturana & Varela, 1987:135)

Efran and Lukens (1985) summarise Maturana and Varela’s main points, saying that living systems:

• determine their operation (it is not determined for them by the outside world, their structure determines their action in an environment, they are structure-determined systems);

• are informationally closed (they are autonomous and cannot be directly ‘caused’ or ‘instructed’ by anything outside);

• survive by fitting with the outside medium (which includes other living systems); disintegration is avoided as long as the medium and the living system ‘fit’ (Maturana and Varela call this ‘fit’ ‘structural coupling’); and

• drift in a medium (without purpose) and they and the medium change congruently (or separate or disintegrate) (Efran & Lukens, 1985).

To describe living systems Maturana and Varela (1987) coined the term ‘autopoietic’ (meaning self organising, self maintaining) as opposed to ‘allopoietic’ (meaning systems that can be controlled from the outside). They say:

their organization is such that their only product is themselves, with no separation between producer and product. The being and the doing of an autopoietic unity are inseparable, and this is their specific mode of organization.

(Maturana & Varela, 1987:48)
Second-order cybernetics like systems thinking and cybernetics relies on an observer to describe the world, however the difference in second-order cybernetics is an acknowledgment that we are all observers. And as observers we describe one domain of reality, however we are aware that there are many domains of reality (i.e. each observer describes a domain of reality). We are all observers, living systems, operating with other living systems in a medium. As observers we use language to explain our praxis of living to ourselves and each other. In doing so we create the medium that includes other living systems co-determining what is observed. There is no single ‘reality’, the observer and the mode of observation itself produce the observed. Human beings are living systems that distinguish and describe in language the medium, themselves and other systems (Murray, 1998).

Dell supports this view, saying:

*Structure-determined living systems automatically become organized into interactional systems.* Whenever two or more structurally plastic living systems interact they will begin to co-evolve a closed pattern of interaction. They will form a system . . . The system is the way that its components fit together. Consequently, there are no systemic processes which create, regulate, or maintain the system: all behaviour of the system derives directly from the interaction of its structure-determined components.

(italics in the original, Dell, 1985:13)

This view suggests that ideas about regulation, self regulation and system rules which are the foundation of systems thinking are merely the observer’s descriptions of the natural course of interactions of living systems in a medium. Change occurs spontaneously as we coexist. We are all observers using language to describe the world. An organisation such as a workshop group is as many different entities as there are people to describe it and each one is equally valid. There is no one ‘real’ system that can be described by an observer and then manipulated. There is no ‘real’ reality by which to compare others.
We each experience the system (e.g. workshop, classroom or family) differently and each person's experience of workshop or family\(^5\) is equally real. Our life histories - our histories of structural change in a medium - our ontogeny cannot be separated from the life histories of those around us or from the history of the environmental milieu in which we operate (Murray, 1998).

This study looks at teacher learning through professional development in terms of a living system in a milieu/environment (i.e. a participant in the NSW Department of Education and Training’s statewide Technology in Learning and Teaching (TILT) program). It discusses the living system from the inside (using what I have learned of learning and its connections to emotion, brain and body) as well as the outside (using what I have learned of the learning system through observation, group discussion and interview). It recognises that there is no such thing as objectivity; this is only one story told by me (‘everything said is said by someone’). Others would write it differently.

1.3.8 Communication and language

In this study Maturana’s (1993) definition of communication as ‘the braiding together of languaging and emotioning’ is used (see chapter three). The terms ‘languaging’ and ‘emotioning’ are used to convey the idea that we live in language and emotion and in language and emotion (i.e. in communicating) we construct our world by living in it. According to Fell and Russell:

> the term, languaging, does not merely refer to our use of words, or our discourse, it refers to the structured (patterned) flow of our behaviour.

(Fell & Russell, 1994a:220)

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5 This idea is well known and understood by many working in the field of family therapy where therapists realise that they are always dealing with more than one ‘family’, that one member’s view of the family is not a distortion of the ‘real’ family, but each view of the family is legitimate (Dell, 1985; Efran & Lukens, 1985). Therefore there are as many families as there are family members. This has obvious implications for schools or for classrooms where there would be thirty-one different classes (teacher plus each of thirty students). Each member of the class would be in a different class (Murray, 1998).
Both ‘emotioning’ and ‘languaging’ are expressed as verbs to indicate an ongoing process of constructing our world in communication or in conversation (which Maturana sometimes uses interchangeably) with ourselves and others. Language is part of the medium in which we operate, and communications trigger structural changes in us (e.g. changes in blood pressure), which make possible different conversations and so on (Kenny and Gardner, 1988); that is, the structure of the living system and the medium change congruently. Mendez, Coddou and Maturana say:

Languaging is not a means of transmitting knowledge or information. Languaging is a manner of coexistence, a manner of living together in recursive co-ordinations of consensual actions such that the structure of the participants changes in a manner contingent upon their participation in it.

(Mendez, Coddou & Maturana, 1988:154)

We can change a problem for example by changing the language that describes it making a whole different conversation possible. The ensuing interactions will trigger different structural changes that will make possible different interactions and so on. Cause and effect are also constituted in language. They are explanations we apply after the event to make sense of our experiences. In Maturana’s view life is a succession of structural couplings, our structures ‘fitting’ with the structures around us, and the way of our fitting is determined by our structure rather than caused by the medium. According to Maturana there is no such thing as cause and effect because there are no instructional interactions.

In life everything is connected to everything else so there are no beginnings and ends, no cause and effect, rather a web of interconnectivity stretching back through time and space. (This same view of interconnectivity is embodied in meteorology in Lorenz’s butterfly effect with the idea, described by Gleick, that the flap of a butterfly’s wings in Brazil could have consequences for the weather in Texas (Gleick, 1987)).

In his discussion of reasons for the failure of reform efforts Fullan draws several conclusions including the idea that:

unanticipated changes in the course of any plan or project are guaranteed. They are not abnormal intrusions but part and parcel of the dynamic complexity of present society.

(Fullan, 1993a:44)
Second-order cybernetics and the writings of biologists Maturana and Varela provide explanations for why this could not be otherwise. Without the assumption of cause and effect to act as a guide there is no way of predicting what will occur as a result of intervention. If living systems are informationally closed autonomous systems that cannot be instructed by anything outside then all change is part of the dynamics of living together and cannot be in any way ‘a mistake’ or an ‘abnormal intrusion’. A system such as a school cannot be manipulated as though it were an entity, neither can it cause people to act in particular ways. There is no standard intervention for standard situation, no objective knowledge and no linear causality (Hoffman, 1988).

Similarly, viewed through this lens, workshop facilitators cannot cause change (learning) in teachers, any changes that take place are determined by the structure of the living system (teacher). The medium (including colleagues and all acts of communication) acts as a trigger for change but cannot specify what the change will be. Just as change to a living system cannot be specified change to a larger system (made up of living systems) cannot be specified - hence the haphazard ‘success’ rate of change intervention strategies.

Teachers and facilitator will change congruently (rather than separate) if there is a fit between living system and medium (which includes all communication). It requires facilitators and program developers to take responsibility for creating an environment in which this can occur.

It seems to me that the closest previous work to my present study is Hargreaves’ and Fullan’s teacher learning/school change literature cited above which was influenced by systems theory and later the emotions literature. It is the closest because my own learning journey covers much the same ground (e.g. Murray, 1995, 1998, 1999, 2001). However neither of these two influential writers in the field of teacher development has taken the notion of living system in its environment and applied some of what is known about emotion and cognition mentioned above to change in a living system as it interacts in a teacher development context. This study therefore takes a new perspective on teacher development (teacher learning, teacher change) hoping that by doing so we will understand better how to support teachers through training and development programs.
1.4 Methodology

1.4.1 Development of the design of the study

This study was originally conceived as a comparison of teacher learning in one training and development program (TILT) offered to teachers in three different delivery modes (face to face workshops; CDROM; and distance education). Teacher engagement with the program was to have been measured by the amount of time participants spent thinking about and practising the skills covered in the program. Beepers were to have been employed so that teachers could be ‘beeped’ irregularly and asked to record their thoughts and actions at the time. Teachers were to have been asked about their emotional responses to their learning. Voice analysis software was to have been used in an attempt to uncover a part of what was going on ‘inside’ the participant [writing this five years later I feel like one of the research volunteers who scribbled in the margin of a transcription of one of her interviews that I had given to her for comment – ‘I can’t believe I said that!’].

Observation, semi-structured interview, open-ended interview with video prompts and analysis of training materials in the three delivery modes were to have been used. Data gathered in this way were to have been placed against a background of statewide program evaluations. The whole research program was conceived as a qualitative study, set against formal Department of Education and Training survey reports, out of which ‘grounded theory’ would emerge.

The eventual realisation that it was impossible to compare teacher learning in the three programs when the programs were at different stages of development and later one was discontinued, caused me to abandon the original design of the study. In addition I realised I would need to find some other way to investigate the emotioning side of communication because voice analysis software sensitive enough to detect emotional changes was not available outside of the Federal Police Service or ASIO! (and in any case I would still have needed to know what emotional changes actually meant in a learning context).
However, the TILT program itself still afforded a sound context for the exploration of teacher learning. Basing the research in this program alone I would be able to take up Fullan and Hargreaves’ interest in systems theory and emotions in teacher development and relate them to the learning of individual program participants. I could set this in the context of the DET data moving from large-scale program research mapping statewide teacher learning to the specific learning of two individual participants. Finally I would be able to examine the learning of two participants through a second order cybernetic lens. I hoped this would reveal something of the role of communication in learning and something about the construction of environments conducive to particular learning. It was only later that I began to understand that my original research concept was impossible without a deep understanding of learning itself.

My new focus would require an understanding of systems theory, which soon led me off into cybernetics, and current work on emotions which, through the course of the study led me to evolution, emotion and cognition and, unpredictably, to the placebo effect in medicine.

Living systems have evolved to survive in an environment, or as Brier (1999:181) quotes von Foerster as saying, environments have evolved “carved out of the physical universe” to support living systems. Either way there has been a co-evolution of living system and environment. The work on embodiment (e.g. Núñez, 1999) indicates that learning occurs in the body. The work on emotion indicates that emotion is a part of all learning (e.g. Sheets-Johnstone, 1999).

In addition the placebo effect in medicine indicates that the body/brain system responds to environments with chemical, somatic and emotional changes where the whole body learns and changes in response to the environment itself and anticipated change. The placebo research, it seemed, might be helpful in illuminating what may be happening to individuals in teacher learning programs.

I decided that I should draw on the tools of qualitative research (e.g. observation; semi-structured and informal interview; study of artefacts) and through an iterative process of data categorization develop a grounded theory of learning. My contribution to the better understanding of learning would be the application of a new lens to explain the data out of which the grounded theory would emerge.
To this end I: video taped a series of TILT workshops; interviewed a group of participants after each workshop; interviewed the facilitator after each workshop (she in fact recorded answers to my interview questions in a separate room at the same time as I interviewed participants so that the evening would not end too late); showed the videos to the group of participants and facilitator (separately) accompanied by informal interview; visited the participants' schools/classrooms during the course, six months after completion of the course and twelve months after completion of the course.

School visits provided case studies that added to my (subjective) understanding of the participants, their teaching and their learning. All writing, including conference papers and journal articles, was shared with the participants and their comments incorporated into the redrafting.

1.4.2 Participants in the study

The TILT facilitator and four volunteer TILT participants from the Chester district became the focus of my data gathering. Ultimately only two of the teachers and the facilitator were included in the detailed data analysis process.

The facilitator, Jenny, a local primary school teacher, had taken up the role of Chester district TILT facilitator towards the end of term three, 1998, standing in for the previous facilitator who moved on to a promotion position.

The study began in first semester 1999. Therefore at the time of the study Jenny had had no experience in conducting the first workshop. She had been allocated a total of 70 participants organised into seven groups of ten. She repeated each workshop seven times (once for each of her groups of participants) two to three weeks apart over one semester. The workshops in which the four research teachers participated were the first repeat of each workshop in the series (i.e. group 2).

All four teachers who agreed to participate in the research were part of the Chester district 1999 semester 1 group of TILT participants. Di and Cheryl taught at the same suburban primary school and traveled to and from the TILT workshops together. Di taught Year 3 and Cheryl taught Kindergarten. Di’s class was designated an ‘Opportunity Class’ for students considered to be talented.
Students came to her class from a number of schools in the area. Robyn H. taught languages in a central city girls’ high school and Robyn K. taught Year 6 at a suburban primary school. All four teachers said that they agreed to be part of the study because they saw it as an exciting study and were interested in how we learn, the role of emotions in learning, and how people communicate.

For practical reasons to do with time, access and the amount of available data Di and Robyn K. became the major focus of the study. Both were considered by their schools to be excellent and experienced teachers. However their teaching styles were entirely different. Their views of learning were different and their engagement in the TILT program was different. Thus although their selection from the group of four was a practical one it was to provide two very different case studies against which to test my developing understanding of learning.

However all four teachers and the facilitator were the initial focus of my data collection. The little bit that I came to know of their lives and learning in the context of the TILT program became the samples against which I tested my thinking about learning. Other major, although probably unwitting, participants in my study were those who gave me feedback on my writing on cybernetics (and therefore my developing understanding) over the same time period.

Lloyd Fell and David Russell published my first article (1994) on the work of Maturana and Varela and made me believe that I had something to contribute to the application of the field of cybernetics to life. Søren Brier, editor of the journal Cybernetics and Human Knowing, gave me a great deal of encouragement and generous feedback on my articles (1998, 1999, 2001, 2002a). Jan Turbill read my articles before I sent them to Søren Brier and forced me to think about the language of cybernetics and my role as interpreter. Ranulph Glanville, cybernetician and regular columnist in the journal Cybernetics and Human Knowing, gave me access to the central ideas of cybernetics through his uncluttered and beautiful writing. He also gave me the confidence to keep going in this field and provided friendship and a mental sounding board for my developing understanding.

As my understanding of cybernetics emerged to take its place in my study as the (unavoidable) lens through which I was observing and interpreting teacher learning in TILT, I came to appreciate just how much these people were contributing. They were true participants in my journey.
1.4.3 Locus of the study

All participants’ schools were in the same school district\(^6\) in a fairly middleclass affluent part of Sydney. The TILT workshops took place in one of the district schools that also housed District Office personnel including the TILT facilitator. This school was not far from my place of work making 4.00pm workshop attendance feasible. Participants were interviewed in a small room in the District Office for half an hour after each of the workshops except workshop one which I was unable to attend.

The school of one of the four volunteer teachers was within a five minute drive of my place of work and two were a fifteen-minute drive away. The fourth, Robyn H., was about a half hour drive towards the city.

Robyn H. was visited once for a full day’s classroom observation; Robyn K. whose school was not far from my place of work was paid two visits of a day’s duration; Cheryl (who team taught with another Kindergarten teacher) and Di were visited for classroom observations for two whole days, however most of each of the two days was spent with Di, while Cheryl was paid two fairly short visits to fit in with the Kindergarten day and the team teaching situation (see reports of all visits Appendix 1). Other visits were made to Di, and Cheryl and Robyn K.’s schools for informal and semi-structured interview. In addition Di and Cheryl spent one long evening with me at their school to view the workshop videos; and Robyn K. and Robyn H. spent a day with me at my place of work to view the workshop videos. Finally Robyn K. and Di spent one day together with me asking questions of each other and writing or drawing their ‘educational time lines’ (significant educational events in their lives). All visits took place between July 1999 and July 2000.

\(^6\) There are 40 school districts across the state.
1.5 Summary

This study began life as a comparison of teacher learning in one teacher development program (TILT) in three delivery modes (distance education, face-to-face and CDROM based). In particular it was to look at learning and the role of communication (defined as ‘emotioning and languaging’) in learning. It was thought to be an important study because of the global and local movement towards increasing use of information and communication technologies (ICT) in all aspects of life including teacher professional development, seemingly propelled by the ICT industry itself. In particular it was felt that little was known about the effects of different delivery modes (e.g. Internet) on teacher learning. This examination of teacher learning in a major technology change program was to be seen in the context of the change literature, in particular the work of Fullan and Hargreaves that had been influential in the NSW DET. It was also seen to be appropriate to set the work in this context because the change literature had been influenced by systems theory, which had roots in cybernetics, and was now taking an interest in the role of emotion in learning, which was to be a feature of this study.

Circumstances mitigated against a comparison of teacher learning in TILT in these three delivery modes. The study instead developed into a study of teacher learning set in the context of TILT by face-to-face workshop. It took as a starting point teacher learning in TILT evidenced by statewide research since 1995 then focused in on the learning of two participants. Following extensive reading in literature dealing with cybernetics, emotion and cognition the study then examined the learning of these two participants in the TILT program through a cybernetic lens including answers to the questions: what is learning and why do people learn; why do people learn this and not something else; how does learning happen and what is the role of communications and the environment in learning. The synthesis of data collected through teacher observation and interview and examined through a lens developed out of my reading, writing and discussion of cybernetics, emotion and cognition led to a ‘grounded theory’ of learning. This lens focused on living system and environment bringing into the picture my interest in communication as part of the environment. It is hoped that this explanation of learning will prove useful to development of teacher change programs.
Looking back over the study it is now obvious that a comparison of teacher learning in one program in three delivery modes would not have been possible without an understanding of learning in the first place.

1.6 Outline of the thesis

The thesis organisation reflects the development of the research study from the early days (1995/6) of development of the DET’s TILT research strategy in the context of the change literature through to the application of a new lens to the learning of two teachers in the context of the cybernetics literature. Chapter two focuses on the context of the study. Part one traces the work of Fullan and Hargreaves and the development of ‘change theory’ since 1982 identifying where the development and implementation of TILT sits with that work and where my current research fits in. Part two outlines the history and development of the TILT program in the context of the change theory literature. Part three is a description of the TILT research and evaluation strategy outlining the collection of statewide data for reporting against program aims and government promises. Analysis of the data shows transfer of TILT learning to the classroom but does not, and is not intended to, comment on the how, what and why of the learning of individual teachers.
Chapter three provides a review of the cybernetics literature that forms the theoretical framework for this current research study and for viewing teacher learning identified by the research process. In particular it discusses the living system/environment learning system that describes learning not as stuff stored in the brain but as a dynamic process of living system and environment interaction. The chapter explains learning as an integrated emotion/cognition learning system and communication as ‘languaging and emotioning’. To do this it draws on the emotions literature and some recent writing on the placebo effect in medicine. It includes reference to reflection (as ‘languaging’ with self) and the role of metaphor in concept building that will be used later to illuminate Di and Robyn’s learning through the metaphors they use over the course of the study. This section also illuminates the living system/environment learning system and the cybernetic notion that perturbations in the environment trigger, but cannot specify, changes in us. This is later applied to the learning of Di and Robyn. Chapter four provides the research design and the collection and analysis of data for this current research study. It describes a qualitative research paradigm and the iterative process of data categorisation to produce ‘grounded theory’.

Chapter five provides my detailed analysis of the TILT related learning of Di and Robyn over a nineteen month period (from the beginning of the workshops in 1999 until our final meeting in July, 2000). Part one provides the TILT workshop setting for Di and Robyn’s learning. It includes the physical location for the workshops, workshop processes such as discussion and hands on activities, a portrait of the facilitator and an account of the post workshop meetings. Part two presents the results of the observations and interviews with Di and Robyn as they appear through the process of categorization, which is the method employed to arrive at ‘grounded theory’. Chapter six looks again at the data this time through a cybernetic lens. It identifies the ‘what’ and ‘how’ of learning through this new lens. It shows how the work on metaphors can be helpful in tracing learning over time and can provide a bridge from which to catch a glimpse of the ‘inside’ learning of the participant over time. Chapter seven presents a discussion of the implications of the study for development of teacher learning programs.
This is not the usual structure and organization of a research report. The ‘review of the literature’ chapter is missing and chapter three provides a detailed look at where the eyes that I see by came from. However I think a great deal of literature is ‘reviewed’ in one way or another. Chapter two part one reviews the work of Fullan and Hargreaves, which serves as context as well as to indicate where I think my research fits with the growing body of knowledge around what makes good teacher professional development. Chapter three ‘reviews’ a range of literature important for my understanding of learning and chapter four ‘reviews’ some of the methodology literature. Including these latter ‘reviews’ is crucial, I think, to what I want to say about learning and how learning happens. We are all learners all the time. Our lifetime history of learning determines how we see and act in the world this instant in time and then the next and so on. Nothing I do in the course of this research study can be done without looking through these eyes of mine and acting out of this whole mind/body. The methodology of the research, the way I go about it, is part of the way I go about my life. Attempting to lay out what I believe about how the world works is my attempt to show some part of who I am so that you can better understand what I say. Without it much of my ‘methodology’ would remain hidden.

1.7 Biographical note

My role since 1995 has been to manage the development, implementation and evaluation of the TILT program. I am therefore well placed to conduct this study, having not only corporate knowledge of the history of the TILT program but also (with the approval of the then Director of Training and Development, Appendix 4) access to TILT files, participant profiles and evaluations. Before taking on this role I was responsible for the development of the Certificate of Teaching and Learning that included sections on Systems Thinking and during which time I was supported in my pursuit of an understanding of the work of Maturana and Varela. I attended a three-day Maturana seminar in St Kilda in 1993 and the following year assisted Lloyd Fell and David Russell in organizing a NSW three-day Maturana (1994) seminar. At that time I worked with colleagues at the Department of School Education, as it was then called, to have Maturana present a one-day seminar Language and Cognition for NSW educators (1994a). This was my introduction to the world of second order cybernetics. It took me some time to learn the language but the unfolding world made sense to me and fitted with what I already felt about how the world worked. Hence my driving interest in the area ever since.
1.8 Use of the term ‘cybernetic’

Glanville offers the following definition of cybernetic and second order cybernetic:

In first order cybernetics, the observer is outside the system, observing without affecting. In second order cybernetics, the observer is in the system - forming it - and therefore affecting it. … In terms of the second order, the first behaves as if it believed that there could be observation without there being an observer.

(Glanville, 1997c:6)

In a footnote to this definition he suggests that second order cybernetics is now accepted as the more general case but that the two are intertwined ‘almost as complementary facets of the same’. He refers to himself as a cybernetician and suggests that the term cybernetics can be used to embrace the whole field. I have adopted this position and therefore, except in my account of the history of development of the field of study, use the term cybernetic to refer to the whole field, recognizing second order cybernetics as the general case. I should also clarify my use of the phrase cybernetic lens. By this I mean my way of looking at the world which was in the first instance greatly influenced by Maturana and Varela’s (1987) book The Tree of Knowledge and then filtered through my reading of: articles by contributors to, and editorial panel members of, the journal Cybernetics and Human Knowing (in that journal and/or their contributions to other journals); articles or books suggested by reviewers of my own contributions to that journal; articles sent to me or recommended by other contributors to that journal (eg Lloyd Fell, Ranulph Glanville; Pille Bunnell) or the journal’s editor Søren Brier; items I have come across in searching the Internet for ‘second order cybernetics’. My way of looking at the world has also been shaped by attendance at: Maturana’s three day seminars (St Kilda, 1993 & Sydney, 1994); Systems conferences (Open University, UK, 1997 and University of Western Sydney, 1998); and the XV World Congress of Sociology, Brisbane, 2002. I notice that Brier (2000) separates out Maturana and Varela’s autopoiesis theory from second order cybernetics. However most of the ideas that I express in this research report I have had published over the past five years in various forms in the journal Cybernetics and Human Knowing which is edited by Brier. I therefore trust that I do not seriously misuse the term cybernetic lens. It may be that as time goes by I shall learn to focus it better.

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7 Page 6 of the copy emailed to me by the author as an attachment, August 2000.
Chapter 2

Context of the study: ‘change theory’ literature and political and educational contexts
The study at a glance

Chapter 2 Part 2: Socio-political context: TILT development and implementation

Chapter 3 Part 1: Systems
Co-ontogenic structural drift
Change and survival
System/environment thinking network

Chapter 3 Part 2: Languaging and emotioning

Chapter 4: Methodology

Chapter 5 Part 1: The TILT program setting

Chapter 5 Part 2: Di and Robyn's learning in TILT

Chapter 6: Di and Robyn's learning in TILT through a cybernetic lens

Chapter 7: Conclusions

Viewed through the lens of...

Chapter 1
Chapter 2
Chapter 3
Chapter 4
Chapter 5
Chapter 6
Chapter 7
Chapter 2:
Context of the study

This chapter situates the study in the context of the ‘change theory’ literature and also describes its political and educational context. It is divided into three parts. Part one examines the writings of Michael Fullan and Andy Hargreaves and ‘change theory’ as Fullan defined and described it over two decades. This section provides the professional development background against which *TILT* was developed, a background of reported failure of large scale change programs (see also Turbill, 1993). It also provides an indication of the general direction of change theory since *TILT* was implemented that fits with my own developing interests and this current research project.

Part two briefly describes the development, content, implementation and evaluation of the Technology in Learning and Teaching (*TILT*) program. It makes reference to the theoretical base of the program, which grew out of previous work conducted by myself and others (Murray, 1997) that began with the change theory literature and expanded to include an investigation of systems theory and then the work of Humberto Maturana (1993) and Maturana and Varela (1987). In explaining the evolutionary nature of the *TILT* program’s development since 1995 I hope to show that the theoretical framework outlined in chapter three for my research is a natural progression of my learning throughout this time. I hope that there is consistency between my beliefs outlined in chapter three and my management of the development, implementation, evaluation and support of the *TILT* program.

Part three of this chapter reports some of the findings of the *TILT* research strategy that indicate its apparent success in achieving teacher change over time. It was out of the *TILT* research, the purpose of which was to continually improve the program as well as to report to government on its achievements, that my current investigation grew. The program was obviously making a difference statewide for some teachers but the data could not tell us what, how and why teachers were learning (or not learning).
Part 1:
Change theory through the writings of Michael Fullan and Andy Hargreaves

2.1.1 Background

Part one of chapter two focuses on the work of Michael Fullan and Andy Hargreaves. I use these two prominent writers in the field of teacher professional development to show the development and shift in focus of the educational change literature over the past twenty years. In the educational change literature Fullan and Hargreaves have been chosen in particular because their work provided the background against which the TILT program was developed and because of their international influence in teacher development and more specifically, their influence within the NSW Department of Education and Training. In 1995, for example, Andy Hargreaves (1995a) conducted an interactive satellite workshop for the Australian Council for Educational Administration and the NSW Department of School Education (as it was then called).

The seminar, entitled *Changing Teachers, Changing Times: Leadership Strategies for a Changing Social World*, aimed to show participants “how change paradoxes” were “impacting on teaching, learning and leadership” (p3) and to introduce teachers to ‘organizational learning theory’ (p3). In 1998 Michael Fullan presented a seminar in Sydney for senior management of the DET. The objectives of the seminar were, among other things, to “go deeper into the purpose, passions and emotions of change” and “build learning communities within the school” (Fullan, 1998:i). This close relationship led to a study tour to Ontario in September 2001 for eighteen NSW DET *School Leadership Preparation Program* participants. The tour included seminars presented by Andy Hargreaves and Michael Fullan at the Ontario Institute for Studies in Education of the University of Toronto.
This review of the change literature is organised as a chronology of the major works of these two writers to show the development of their ideas over time. I have made comment on: how Fullan and Hargreaves have included ideas from other disciplines to explain how change operates; where the development of TILT fits into the chronology; and how I believe my research fits into the continuing development of ‘change theory’.

2.1.2 Introduction

My study is set in the context of a large-scale teacher professional development program that in turn is part of a statewide change program to embed the use of information and communication technologies (ICT) in teachers’ classroom and administrative practices. However it is ultimately about learning. Turbill (1993) after examining models and theories of ‘staff development’ and ‘learning’ suggests educators leave behind the term ‘staff development’ and instead adopt the term ‘teacher learning’. She justifies this by saying that as a profession of educators we are all in the business of learning. I agree with this and build on it concluding that all learning is change and all change is learning, as long as we live we change/learn, to cease learning and changing is to cease living (see chapter three for further discussion). Substituting the term ‘teacher learning’ for ‘teacher development’ therefore I see as appropriate for my research. The interchangeable nature of the terms ‘learning’ and ‘change’ in the context of my research, I hope will become clear in chapter three.

2.1.3 Educational change

Fullan (1982) says in his book The Meaning of Educational Change that in 1982 the education academy was at the beginning of the history of educational change, and that the criterion of progress would be serious attempts at large scale implementation of new innovations. He believed there had been attempts at such implementation before 1982 with varying degrees of success, but there was little, if any, understanding of why things turned out as they did.

His 1982 book was about redressing this and his, and his colleagues’ work in the two decades since then has been about developing change theories and explanations for why things turn out the way they do. My own study continues this search for explanations of change and therefore of teacher learning.
In his 1982 book, Fullan concentrated his attention on large-scale policy and program changes. He was concerned with the notion that ‘educational reform’ was imposed either out of opportunism (because funding was available, or for someone’s career advancement) or in order to solve a particular problem. Innovations, he claimed, were adopted for symbolic, political and personal reasons. He described change as an artefact to be imposed on the life of the teacher. He identified the source of this change as likely to have been a school district, a government or ‘experts’. He spoke of change as ‘development’, the prevailing metaphor was of ‘growth and progress’. As such its success was measured against goals, events and consequences. The direction that the change was coming from was reported as though it were outside and far away from teachers’ classrooms.

Fullan said that he aimed to discuss the ‘meaning of educational change’ objectively’ (i.e. “the objective reality of educational change” (p29)) in terms of its dimensions: change in teaching materials; new teaching approaches; change in beliefs. These dimensions he referred to as the “content of innovations” (p38). Fullan said “the objective reality of change lies in the recognition that there are new policies and programs ‘out there’” (p35), a phrase he returned to several years later, and that “they may be more or less specific in terms of what they imply for changes in materials, teaching practices, and beliefs” (p35).

Implementation of change, he said, was the implementation of one or more of these dimensions. The ‘fidelity approach’ he suggested, required teachers to take on board the innovation that existed as an entity (i.e. this would constitute a successful change program). The ‘evolutionary approach’ on the other hand, saw change as a result of adaptations made by users as they worked with new programs and policies, the user determining the outcome.

Fullan used the juxtaposition of subjective (teacher) reality and objective (change program) reality to explain the vast range of implementation ‘failure’ and ‘success’ stories. He recognised that change ultimately resides in the individual, a theme that he went on to develop over the following years.
Much of the reporting on change, he said, had concentrated on the initiation of change programs (product development, policy change) because it was much easier to identify and pin down than the implementation, which involved individuals who are “more unpredictable and difficult to deal with than things” (p54). Fullan here described educational change as “a learning experience for the adults involved” (italics in original, p55), implementation he said was, “a social process, not a delivery date” (p60), a theme that he and Hargreaves later explored in more depth.

Fullan provided a chart that brought together the major categories of factors that, he said, influenced implementation. He called this a “way of thinking about change, and an organizing framework rather than a detailed blueprint.” (p78). Again Fullan emphasised that it is individuals who have to develop new meaning, and

these *individuals* are insignificant parts of a gigantic, loosely organized, complex, messy social system which contains myriad different subjective worlds.

(italics in original, Fullan, 1982:79)

The penultimate chapter of the book was given over to teacher professional development, which he defined as “learning new things thought to be desirable” (p264), a definition that, I think, leaves open the question ‘thought to be desirable by whom?’ and hence the notion of imposed learning. In this chapter change was seen as teacher learning and conditions for teacher learning related to the intended change were discussed.

Fullan said that if change is about learning how to do something new then teacher development was crucial to success. He said that approaches to in-service training have been based on “weak conceptions of how learning occurs” (p263) although in this book he did not actually discuss how learning occurs rather the conditions under which a specific learning can occur.
He summarised the reasons for failure of in-service education thus: one-shot workshops are widespread but ineffective; workshop topics are selected by people other than those for whom the in-service is intended and rarely address individual needs; there is little follow-up support for ideas and practices introduced in in-service programs; the majority of programs involve teachers from different schools and/or districts and disregard implementation issues associated with local contexts; there is a lack of any conceptual basis in the planning and implementing of in-service programs to ensure their effectiveness (p263).

Successful teacher development, Fullan said, involved changes in thinking (new beliefs, theories) and acting (new skills, strategies). For this to occur, he believed, teachers must have the opportunity to interact. He referred to workshops as the ‘formal’ aspect of in-service and to sharing ideas with colleagues as the ‘informal’ (p264) and concluded that effective change programs must include professional development for teachers.

In the final chapter Fullan pulled together nine themes from the book that illustrated the underlying tensions and competing priorities of so called ‘change initiatives’ and educational change in practice. He concluded that there needed to be a move from:

- cognitive to social-development goals of education;
- fidelity to variation in change programs;
- privatism (individual teachers working in isolation behind classroom doors) to collegial professional development;
- implementing specific change initiatives to developing a generic capacity for change;
- finding time for change to innovation as part of the role;
- leadership as managerial to leadership for change;
- grand plan to incremental change;
- external change programs to individual meaning; and
- the isolation of schools to an understanding of a wider social/political context.
His conclusion stated that:

optimum implementation consists in maximising interaction, planning change in
a way such that groups of people must interact and make choices, and such
that individuals influence and are influenced by the group.

(Fullan, 1982:291)

2.1.3.1 Comment

Although Fullan indicates concern about the lived world of teachers, their ‘multiple
phenomenologies’ and ‘existing realities’ change in individual teachers is not the
book’s focus. Change as artefact is the focus. This change is external to people, a
disembodied program or policy that can be imposed. Fullan warns teachers to ask
questions about who will benefit from the change, what values are involved, and
how appropriate the change is for the teacher/school’s own context. He is
concerned that people recognise that innovations cannot be neutral in their effect.
Nevertheless he seems to imply in his warnings that change can, and will, be
imposed from outside if teachers are not vigilant.

The notion that change can be ‘imposed’ from the outside not only says something
about the writer’s 1982 concept of ‘change’ but also his concept of ‘learning’. The
ability to impose change implies a transmission view of learning (unless ‘change’ is
not seen as learning but as something to be put on like a coat and later taken off
when the moment of need has passed). Over the following twenty years Fullan
pursues the ideas of change as outside artefact and change as personal to the
teacher. Over time he moves further away from the outside artefact view of change
and closer to the inside learning of the individual teacher. It is obvious in his later
writing that Fullan’s interests lay in the messiness of individual learning. However in
1982 Fullan sees successful change in terms of “attaining more and better
implementation than in the past and reducing the number of wasted and ill-advised
attempts” (p104). Fullan, at this stage seems to believe in an objective reality ‘out
there’ (change; blueprint; successful implementation) which he can describe as an
observer, at the same time acknowledging the subjective reality of individuals as
they experience ‘the change’ imposed from ‘out there’.
Fullan's explanation of change and the change process, the description of successful teacher development and the nine themes from the book have been enormously influential in education systems, universities and schools all over the world. As Fullan himself said, this book was the first attempt to sort out what was going wrong (or right) in educational change programs, how educators should understand them and what could be done to implement successful programs and prevent further waste of funds.

Those of us who worked in the NSW DET Training and Development Directorate, like many other teacher educators, were aware of Fullan’s ‘reasons for failure of in-service education’ as we developed TILT. It could be said that we used many of Fullan's ideas as a blueprint for what we aimed to develop. We ensured, for example, that we had a series of workshops spread over time (not one-shot workshops); we ensured the model provided enough flexibility to enable people to address their individual learning needs; we provided follow-up support in teachers’ own schools; we built into the model a research strategy so that we could keep in touch with teacher feedback.

Fullan’s book was also used as a major reference for the NSW DET’s Faculty Leadership for Educational Change program. Its usefulness was not impeded by the description of change as artefact and the confusion, evident sometimes, of change as process and change as program. Fullan had opened up a new area to be explored and had provided some guidelines for the journey.

2.1.4 Change theory ten years on

In 1991 some ten years after writing the Meaning of Educational Change, Michael Fullan teamed with Susan Stiegelbauer to write The New Meaning of Educational Change. In the introduction they claimed,

Ten years ago we ‘studied innovations’; today we are ‘doing reform.’

(Fullan with Stiegelbauer, 1991:xiii)
Ten years on Fullan and Stiegelbauer said, “change is everywhere, progress is not” (p345). They lamented the squandering of good intentions and resources. This book was basically a second edition of the book written ten years before. As such there were new change program examples and some additions and subtractions from the original version, however as a second edition rather than a new book it could not represent a fundamental shift in position. It is not surprising then that in this ‘new’ book change was still viewed as artefact to be dissected and examined, the section on objectivity was still included. However it was in the additional sections dotted throughout the book that the language of change itself changed considerably. In 1982 Fullan had described professional development as “learning new things thought to be desirable” (p264). In the 1991 book Fullan and Stiegelbauer defined professional development as the “sum total of formal and informal learning experiences throughout one’s career” (p326). They also referred to the concept of ‘lifelong learning’ that was becoming known from the learning communities literature (e.g. Senge, 1990, 1990a; Senge and Lannon-Kim, 1991).

Fullan and Stiegelbauer talked of setting out on a journey to achieve change not knowing in detail how we might get there and what arrival would be like. While the journey metaphor was probably closer to systems thinking than was the growth and development metaphor of ten years earlier, the journey was to achieve change rather than being indivisible from change itself (as it would be if change is learning and learning is the process of living). We can’t avoid change, said Fullan and Stiegelbauer, therefore it is pragmatic to seek ways of strengthening the good features of change. Advice provided by them in the final chapter (pp345-354) can be summarised as follows: don’t try to avoid change, meet it head on; exploit change, don’t be its victim; change will be an ally not an adversary if it’s confronted. All of which indicates that change was still being viewed by the writers as a disembodied and impersonal something invading the individual from outside and far away (and sent by persons unknown). Thus although some of the language in this book had changed since 1982 the underlying concepts appeared to be the same.

The writers outlined six themes that they argued need to be considered in order to cope with and turn change to advantage and thus move from an old to a new mindset. Some are close to the earlier themes.
They suggested:

- moving from negative to positive politics;
- from the situation where change is forced from above and resisted from below to a situation where we determine and pursue what is valuable;
- moving from the monolithic change initiative to alternative school level solutions allowing for variations that will shape the innovations (in reality we have to “cope with multiple innovations simultaneously” (p349); we cope by reducing the multiplicity by prioritising and synthesising, “selectivity and synergy replace ad hoc-ism” (p349)); and
- collaboration and interaction with colleagues forming alliances between individuals and institutions.

Fullan and Stiegelbauer suggested that there needed to be a move from neglect of the importance of an understanding of change to a deeper appreciation of the change process. They recognised change as a complex process full of paradoxes and dilemmas. They argued that one needs:

- vision and an open mind;
- to take the initiative and to empower others;
- to support and to apply pressure; and
- to start small and to think big.

While seeking common patterns in successful change programs, they said that educators needed to be prepared for uniqueness. They argued that learning to love change is central to the new paradigm.

The writers also pointed out that educators would need to move from external control to taking responsibility for the initiation and support of change. Taking personal responsibility while working with others is the key to system change, they claimed, “[s]ystems do not change by themselves. People change systems through their actions” (p352).
The message of the 1991 book seemed to be that the workplace is the key to change. As individuals, Fullan and Stiegelbauer claimed, educators cannot rely on policy decisions to bring about changes, they must all “get into the change business” (p353). Furthermore it was argued that individuals must take power and with others become the experts influencing and being influenced by continuous change. They suggested that this would bring about individual and institutional renewal.

2.1.4.1 Comment

Although Fullan and Stiegelbauer have replaced some of the earlier examples of change initiatives with more recent examples there are many similarities with the earlier book. For example, they seem to have retained the notion that the response to ‘actual implementation of the change’ can still be a yes or no answer (i.e. yes/no the change has actually been/not been implemented). And teachers can still be “on the receiving end of change” (p27) which, the writers said, most of us are. Claims such as this indicate to me that the writers still view the change initiative or program as ‘out there’ even though they acknowledge that change happens in individuals as they seek to make sense of the program. The early section in the book on Objective Reality has remained unchanged (pp36-37) which seems to me to be at odds with the latter part of the book discussed above where it seems Fullan and Stiegelbauer believe that change is subjective and is about teachers’ lives.

Nonetheless this book has been enormously influential. The notion of a ‘learning journey’ references to ‘life long learning’ and ‘taking responsibility for change’ and the idea that ‘people change systems’ for example were included in the NSW Department of School Education’s publication Schools as Learning Communities, a discussion paper distributed to all schools in 1995.

In building the TILT program we ensured that their were opportunities for colleagues to work together and that some of the program would take place in teachers’ own schools and that teachers would make decisions about what they needed to learn. Indeed this book by Fullan and Stiegelbauer was part of the Training and Development Directorate’s professional library and those of us who worked in the area of professional development at the time were expected to have read it. In addition it was a major text referred to by academics such as Neville Johnson (University of Melbourne) in the NSW Department of School Education’s School Leadership Excellence Seminars (1997/1998).
However the earlier contradictions (change as artefact/learning as messy and personal) are still apparent, made even more obvious by the addition of the ‘learning communities’ language influenced by systems thinking. Turbill also detects a similar contradiction in Fullan’s 1992 publication. She quotes Fullan’s use of a mechanical cog metaphor (Fullan, 1992:108) to:

> demonstrate and explain the relationships between and among the principal components in classroom and school improvement.

*(Turbill, 1993:80)*

Turbill argues that although his model is holistic in intent:

> It tries to depict a holistic dynamic system . . . [and] attempts to encapsulate a very complex set of concepts. However, the metaphor chosen is deterministic and depicts a clockwork lock-step process . . . [which] thus belongs to a rationalistic paradigm.

*(Turbill, 1993:85)*

In spite of the Fullan and Stiegelbauer claim that the 1991 book represents the ‘new paradigm’ or ‘mind shift’ it is difficult to clearly identify such a fundamental shift although there is use of the language of a new paradigm.

### 2.1.5 Teacher development, teacher learning

In their 1992 co-edited book, *Understanding Teacher Development*, Hargreaves and Fullan (1992) pulled together work from a range of researchers and writers under the headings of teacher development as: knowledge and skill development; self-understanding; and ecological change. In their introduction (pp1-19), they took up the theme of change as lived experience and addressed school improvement in terms of teacher development. They suggested that skill development was the most frequent form of professional development on offer to teachers. It is often, Hargreaves and Fullan said, packaged, delivered and imposed by experts in a top-down and costly model and justified by ‘educational’ research. Further they said, it is often underpinned by a dominant white, western, male discourse and a Newtonian model of the world as mechanical and controllable while the New Science of chaos and complexity points to a more fluid, less predictable world of constructed realities.
Hargreaves and Fullan detected a confusion between the process of change and ‘the change’ itself and a tension between what they called, ‘vision and voice’ (expert wisdom and practical wisdom). They also introduced the theme of a supportive workplace culture as a necessary ingredient of a successful teacher development program, a theme they picked up and developed strongly over the next several years and which inevitably took them into the area of leadership.

In the section on change as self-understanding chapters addressed teacher development as personal development, “changing the person the teacher is” (p7) (e.g. through teachers’ stories) rather than change in behaviour. This approach was critiqued by Hargreaves and Fullan as possibly “self indulgent navel gazing” and “top down control” disguised as therapy (“control masquerading as care” (p13)). An overemphasis on the person and her/his responsibility could let the context off the hook, they said. Hargreaves came back to this theme later and included in his critique what he called, the increasingly popular practice of ‘reflection’ and the:

‘storying’ and ‘restorying’ one’s life and career, in ways that can easily become pious, narcissistic and self-indulgent.

(Hargreaves, 1997b:53)

The importance of context was highlighted in the section on the ecological approach to change, which they said could determine the success or failure of a teacher development initiative. Context, Hargreaves and Fullan said, includes consideration of: resources; leadership; time; gender; and the culture of teaching (which they saw as the key focal point for change). Hargreaves’ own chapter (the last chapter in the book) was called *Cultures of Teaching: A Focus for Change*.

Hargreaves, in this chapter, defined teacher cultures as “relationships between teachers and their colleagues” (pp217-8) saying that different cultures evolve in different contexts. He separated culture into content and form. The content he described as:

attitudes, values, beliefs, habits, assumptions and ways of doing things that are shared with a particular teacher group or among the wider teacher community.

(Hargreaves, 1992:219)
These, he said, can be seen in what people think, say and do. Form he described as “characteristic patterns of relationships and forms of association between members” (italics in the original, p219). Changes in content Hargreaves saw as linked to changes in form. It was the forms of association he took up in the rest of the chapter. He categorised them as:

- **Individualism** (teacher isolated in classroom and teacher talk of tricks of the trade, news, student and parent stories);
- **Balkanisation** (teacher groups within a school often organised around status of different faculties);
- **Collaborative Culture** (based on a leadership of thoughtfulness, support, care – but time constraints and imposed, detailed curriculum providing little scope for local interpretation, hence collaboration, make this difficult to achieve); and
- **Contrived Collegiality** (structures imposed from outside that require teachers to work together – can be useful as a starting point for a collaborative culture but can destroy existing collaborative cultures if formalisation is seen by school leader(s) as a substitute).

It is these forms that Hargreaves saw as the ‘regulators’ of the development of teachers as teachers. Through the form the content of the culture, he said, is “reproduced or redefined” (p231). And, said Hargreaves, it is in the forms of culture that “much of the success or failure of teacher development and educational change is ultimately to be found” (p232). He recognised that:

> Teachers’ work is deeply embedded in teachers’ lives, in their pasts, in their biographies, in the cultures or traditions of teaching to which they have become committed.

(Hargreaves, 1992:233)

A respect for this, he suggested, and the blurring of boundaries between in-school and out-of-school life will therefore create a supportive change environment. However Hargreaves recognised that this kind of change process would be slow and unpredictable and therefore not attractive to administrators who are looking for control and a ‘quick fix’.
He suggested that educational administration is dominated by a masculine culture, the job of which is to control and supervise the work of mainly women who are attempting to develop collaborative (feminine) cultures. The challenge, he said, is to redistribute power so that women can share equally in the responsibility for ‘educational purpose’ and to accept the slower pace that comes with growth and development of teachers as people as well as teachers.

### 2.1.5.1 Comment

While this book has some inconsistencies its collection of perspectives was an exciting addition to the change literature. It brought together ideas from the ‘new sciences’ and ecology and opened up new areas for exploration. However even though this book acknowledges previous confusion between the process of change and ‘the change’ itself there still appears to be evidence of confusion. Hargreaves and Fullan say in the introduction that:

> Creative experimentation with instruction and improvement will be unlikely if changes are implemented from the outside by a heavy-handed administration.

(Hargreaves & Fullan, 1992a:13)

In a book that is trying to tease out the difference between the process of change and ‘the change’ itself this seems to me to be quite a misleading statement. In the writers’ terms (in this book at least) ‘the change’ is still an object to be implemented from ‘out there’ while at other points they refer to ‘change as lived experience’, a process that takes place within individuals. To the reader these statements appear to be contradictory. Hargreaves develops the theme of change as lived experience in the last chapter of the book. In this chapter can be seen, in my view, the beginnings of Hargreaves’ interest in the intersection of inside school and outside school; life and work; educational administration and teacher development. The chapter deals with relationships, contexts and teacher learning. It seems to leave behind the ‘change as artefact’ idea and has moved on to the learning of individuals in a context.
This seems to me to be very much a systems perspective of living system and environment. Again this writing was known to us as we deliberated on the TILT training model. We endeavoured to foster a collaborative culture starting with state and district office teams and through the work of a well trained and well supported facilitator we hoped that this would permeate the TILT workshops and inschool support. We agreed with Hargreaves that relationships and contexts are crucial to teacher learning and endeavoured to construct supportive contexts and model the kind of relationship we expected facilitators to forge with their participants.

2.1.6 The influence of systems thinking

The themes of the outside, real life context for education and, what Hargreaves came to refer to as, ‘women’s ways of knowing’ and ‘feminine discourses’ form the main threads of much of his later work. The notion of teacher in the school context and school in the context of the wider community is the idea of a system within a system, within a system… and so on. The evolutionary nature of the change process described by Hargreaves, drawing on Senge (1990) and the place of the individual teacher’s ontogeny in discussion of educational change seem to me to be part of a system perspective on life (the evolution of the living system in its environment).

Fullan also moved towards a systems perspective. In his 1993 work Change Forces, Fullan (1993a) drew on the work of Wheatley (1992) and Gleick (1987) and in particular, Senge (1990) and the concepts of systems theory and ‘the new science’. He made use of Senge’s notion of ‘detailed complexity’ (identifying all the variables in a given situation) and ‘dynamic complexity’ (cause/effect are not close in time and space and unplanned factors dynamically interfere) choosing ‘dynamic complexity’ as his preferred metaphor for educational change. In this book Fullan developed his themes of change as non-linear system, interrelationships, change as process rather than ‘thing’. He proposed eight ‘lessons’ of what he called the ‘New Paradigm of Change’ (which he repeated in his edited collection in 1997).

The Eight Basic Lessons of the New Paradigm of Change

Lesson One: You Can’t Mandate What Matters
(The more complex the change the less you can force it)
Lesson Two: Change is a Journey not a Blueprint
(Change is non-linear, loaded with uncertainty and excitement and sometimes perverse)

Lesson Three: Problems are Our Friends
(Problems are inevitable and you can’t learn without them)

Lesson Four: Vision and Strategic Planning Come Later
(Premature visions and planning blind)

Lesson Five: Individualism and Collectivism Must have Equal Power
(There are no one-sided solutions to isolation and groupthink)

Lesson Six: Neither Centralisation Nor Decentralisation Works
(Both top-down and bottom-up strategies are necessary)

Lesson Seven: Connection with the Wider Environment is Critical for Success
(The best organisations learn externally as well as internally)

Lesson Eight: Every Person is a Change Agent
(Change is too important to leave to the experts, personal mind set and mastery is the ultimate protection).

(Fullan, 1993a:36)

Fullan’s concern in this book was with creating learning organisations (or learning societies) because he said, schools are failing to address curriculum reform, and the development of collaborative cultures among teachers. He recognised that there was no such thing as ‘success’ in the implementation of a change program (unlike in earlier work where success was the faithful implementation of a change program). Since, he suggested, change is dynamic and relational and happens over time ‘faithful implementation’ to someone else’s idea of what the change is going to be is impossible. Fullan talked much of ‘moral purpose’ of teaching in this book, a theme he developed over his next several publications. He cited examples of ‘partial success’ in change programs quoting their ‘common ingredients’ (rather than recipes for change). Drawing again from Senge (1990) he quoted three capacities that leaders would need in the new paradigm for change: leader as designer (mentoring, coaching); leader as steward (seeking broad purpose and vision); leader as teacher (fostering learning for others). He said that educators needed to appreciate the relationship between learning organisations and their environments, because within schools dynamic changes are taking place but the school must also be responsive to its context.
In his chapter on the learning organisation and its environment Fullan revisited an earlier concept of ‘out there’ (e.g. ideas are ‘out there’; politics and partners are ‘out there’). He suggested ‘out there’ is a misnomer because:

learning organizations neither ignore nor attempt to dominate their environments. Rather they learn to live with them interactively.

(Fullan, 1993a:85)

Fullan concluded that we are all ‘out there’ (I’m not sure what he meant by this, unless perhaps, that we are all part of the educational context), that organisations are not stable entities, and that we all will ‘join’ several organisations ‘over our careers’. He made frequent references to Senge’s (1990; 1990a) ideas of “dynamic complexity” (e.g. p76, 82,83) “dynamic change forces” (e.g. p68) and society as “dynamically complex” (p66) and ‘systems thinking’ saying, after Senge, that the notion of things being separate is wrong, that everything is connected and that we create divisions, they don’t ‘exist’. We invent boundaries. In his chapter on the individual and the learning society Fullan draws considerably on the work of Csikszentmihalyi, (1990).

2.1.6.1 Comment

While suggesting that boundaries don’t exist, Fullan in Change Forces puts boundaries around ‘learning organizations’. Instead of the change being reified as in earlier work, it seems to me that the learning organisation is now becoming the reified entity. The learning organisation ‘sees’, ‘looks for’, ‘realises’, ‘picks and chooses’. Fullan talks of learning organisations ‘moving forward’ and of events in the environment ‘thwarting’ progress of the organisation.

Although Fullan seems to take a systems perspective of system/environment referring to mutual adaptation and evolution, he also talks of the environment ‘thwarting’ progress of a learning organisation and learning ‘to live with’ the environment. One could argue that neither statement appears to fit into a notion of dynamic, reciprocal interaction where both environment and living system learn and change in mutual adaptation.
Nonetheless drawing on Senge (1990) Fullan provides schools and teachers with new ways of conceptualising the forces at work in shaping teachers’ lives and the business of schools. Again this work has been influential particularly in the NSW DET where it was included in the late 1990s as a reference in the School Focused Training and Development Program, and the School Leadership Preparation Program. It was also used at the same time as a major reference in School Leadership Excellence seminars across the state. It provides useful and authoritative organisers for schools trying to support change. The apparent contradictions in the text do not seem to have detracted at all from its usefulness. The text has been part of the context and therefore part of the change process for many teachers.

2.1.7 Complexity and chaos

In the book The Challenge of School Change edited by Fullan in 1997 he wrote of the complex and chaotic nature of the change process (Fullan, 1997a). He again quoted Senge’s definitions of detailed and dynamic complexity and his view of non-linear cause and effect chains (distant in time and space) and feedback loops (Senge 1992 and 1994 were cited in the text but unfortunately not recorded in the book’s reference list).

He again included his list of eight lessons quoted above. He also quoted Stacey (1992) who takes the cause and effect discussion further saying we cannot trace cause and effect at all. Fullan concluded that change is the search for understanding, he suggested that there is no answer, but we can be reassured by the fact that patterns emerge as we journey on.

Hargreaves (1997b) drew on the business world for his application of chaos, complexity and paradox to educational settings. He quoted Handy (1994), Senge (1990) and Peters (1988) and mentioned his own and Fullan’s celebratory approach to paradox, chaos and complexity. However he pointed out that while it is all right for academics and others to talk about ‘thriving on chaos’ (Peters, 1988) it is a different story for teachers who are trying to work in it. He outlined some of the social and political changes that resulted in uncertainty and dislocation for teachers. He suggested that some chaos and complexity is manufactured to keep people on their toes.
In their 1998 book *What’s Worth Fighting for in Education*, Hargreaves and Fullan again make use of the language of chaos and complexity to describe the state of education. They point to the:

new science of complexity which says that the link between cause and effect is increasingly difficult to trace; that change (planned or otherwise) unfolds in non-linear ways; that paradoxes and contradictions abound; and that creative solutions arise out of diversity, uncertainty and chaos.

(Hargreaves & Fullan, 1998:22)

### 2.1.7.1 Comment

Although this is not stated it seems to me that Hargreaves in his contribution to *The Challenge of School Change* (1997b) is using *chaos* and *complexity* as metaphors rather than in any scientific sense. However, in using these terms Hargreaves offers possibilities for cross-disciplinary explorations that can often be fruitful and seem to me always worthwhile. To this end the book provides a scientific explanation of the terms *chaos* and *complexity* further on in a chapter by Gunter called *Chaotic Reflexivity* (1997:73-96).

Fullan (1993a) also uses the language of chaos and complexity (pp 135-147), when he talks about his view of reality as ‘fundamentally non-linear’ when under conditions of ‘dynamic complexity’. The meaning of this is unclear to me. Is ‘reality’ linear under conditions that are not dynamic and complex? What view of reality is there that is under non-dynamic and non-complex conditions? Does he mean that things do not really happen in linear cause/effect chains in dynamic, complex systems? If so this would seem to be not a comment on ‘reality’ but on how things happen in an already defined and accepted ‘real’ world.

It begs the basic ontological question of what is (and indeed if anything is) and ignores the dilemma of observer and observed. It places Fullan in the position of god’s eye view of the world/universe; the observer who can sit outside and comment on a fixed reality.
In 1997b Fullan (p217) proposes that “[s]ociety is more complex, more chaotic, more non-linear than ever before”. It is interesting to note that the author believes society to be more complex and chaotic and that cause and effect are ‘increasingly’ difficult to trace. This could be a reference to Fullan’s earlier examples of change programs (cause ‘out there’) and their ‘success’ or ‘failure’ (effect) and their (in retrospect) simplicity, which seems to me to be more a feature of the reporting than the change initiatives themselves. I believe there have been changes to our understanding of the change process, to which Fullan has contributed enormously, rather than there being changes in the nature of cause/effect links, which, if they are now viewed as non-linear or non-existent, I believe, must always have been that way.

Since *The Meaning of Educational Change* (1982) it seems that Fullan has taken a position of acknowledging a fixed and knowable reality in an objectively observable world (see Chart Appendix 2). However the discourse of systems theory and later the language of chaos and complexity that he adopts, imply either a reality that is non knowable (we can only know what it is not) or a reality constructed as we live in the world (laying down a path in walking). Both of which acknowledge the subjective nature of knowing as a process of living. This fundamental contradiction seems to me to be at the root of the difficulties I find with Fullan’s work.

Both Fullan and Hargreaves use the terms *chaos* and *complexity* as metaphors for teaching and education. However occasionally they indicate a more ‘scientific’ use of the terms that does not seem to be substantiated in the text. Again, for me, this leads to confusion. Nonetheless their work picked up and extended the excitement generated by Wheatley (1992) who interpreted the ‘new science’ for education audiences. References to *chaos* and *complexity* became common place in education texts and influenced my own reading and that of others in the NSW DET at that time as we sought to understand the implications of the ‘new science’ for our work.
2.1.8 Emotions and learning

In a later chapter of his 1997 edited collection, *The Challenge of School Change*, Fullan (1997b) reminded readers of his earlier argument that the emotional side of change has been “ignored or miscast” (p205). He said that educators need to go deeper to motivate discouraged teachers (‘deeper’ and ‘wider’ are the themes of other of his writing around this time, see below). He cast educational change as a ‘lost cause’ then called this a ‘liberating view of the world’ enabling us to take a new look at the real meaning of change which this time seems to be linked to the Goleman (1996) understanding of emotions. Smart people, he said, sometimes do dumb things and “people of modest intelligence are quite successful” (p208) (which seems to me to suggest an encultured white, middle class, male view of intelligence as a singular endowed property – possibly even measured by an ‘intelligence test’). The difference he argued, is Emotional Intelligence (Goleman, 1996) which he defined, after Goleman, as ‘self control and empathy’.

Fullan also quoted Damasio (1996) saying that emotions are indispensable for rational decisions. Cognitive intelligence and emotional maturity (i.e. Goleman’s view of emotional maturity which is being able to read our own and others’ emotions and knowing how to respond in order to get a desired result) were regarded, in Fullan’s opinion, as an advantageous combination. He drew on the work of Gardner (1995) who described 11 leading minds and on Csikszentmihalyi (1990) who described 91 creative individuals.

Using these models as inspiration he said as educators we need to use intuition and emotion and to have hope and not be overwhelmed by the seeming impossibility of the reform task. Fullan said that educators have to dig deeper into the “roles of emotion and hope in interpersonal relationships” (p213) by which I understood him to mean that the best way to deal with (imposed, disembodied, reified) change is to improve relationships although he acknowledged that you can’t mandate relationships.
2.1.8.1 Comment

Goleman’s idea of ‘emotional intelligence’ is an encultured view. There is a whole range of ways of dealing with and talking about emotions (see for example, Plutchik’s review of the literature, 1994) that is ignored in his work. Goleman deals only with a particular, narrow, middle class, Western notion that is valuable in helping to understand how a particular society works but says nothing about the fundamental role of emotions in learning and communication (see Boler, 1999, pp58-78 for a critique of Goleman’s work in which, she says, “analysis is entirely dehistoricized and does not discuss cultural differences or social hierarchies that account for the particularities of our emotional responses” p63).

In 1982 Fullan saw change as objective artefact (and cause) and change success as faithful acceptance of artefact (effect) while acknowledging the subjective reality of teachers. Having accepted the systems view of cause and effect (i.e. a non-linear web of interconnectedness) and with it ideas of chaos and complexity, and subsequently realising the important place of emotions in cognition (based on the work of Damasio and the writing of Goleman) fifteen years later Fullan arrives back at the same subject/object, inside/outside dilemma (i.e. the outside change ‘thing’ that somebody wants to mandate and the intra/interpersonal relationships of the teacher’s lived experience which cannot be mandated).

2.1.8.2 Wider and deeper

Concerned with relationships within schools, “cultures of teaching should be a prime focus for educational change” (p3). Hargreaves (1997a) extended this by saying that teachers need to build collaboration beyond the school walls. He argued that schools have to open their doors because they cannot ignore the outside world of students’ lives – poverty, family structures, migration, anonymity, loss of community. To Hargreaves this meant a challenge for schools and teachers to build partnerships with the outside world. This Hargreaves (1997a) called going “wider in our change efforts” (italics in the original, p12). But he also said we, as teachers, must go “deeper and examine the moral grounds and emotional texture of our practice” (p12). He elaborated on this, saying that good teaching is ‘emotional work’. He talked of affection, care, love for students, and passion for teaching.

To support his argument Hargreaves (1997) quoted research undertaken with 32 Year 7 & 8 teachers from which he concluded that planning is emotional work not rational (i.e. rational, as implied by outcomes based education) teachers begin with knowledge of their students and work back to the outcomes. Yet, he said, teachers’ work is dominated by the discourse of strategic planning, problem-solving and organisational learning (Senge, 1990) which do not allow for emotional ‘non-linear responses’.

Hargreaves (1997a) acknowledged Fullan’s 1991 ‘definitive’ writing (with Stiegelbauer) in the area of non-rational emotional aspects of educational change and the subjective meaning of change, which he, Hargreaves, called “a second discourse of educational change” (p13). He explained that this new discourse had come about because of the growing distrust of science and technology as ways of knowing and controlling the world (i.e. white, male, middleclass discourses). He embraced what he called ‘women’s ways of knowing’ and the emotional aspects of life experiences. He said that educational reform has to acknowledge teachers’ resistance to imposed change agendas and address more personal career and life stage needs.

Hargreaves (1997a) took issue with the fact that only ‘safe’ emotions have been acknowledged in the literature (supportiveness, satisfaction) while strong emotions have been ignored or treated as dangerous. He proposed that educators need Goleman’s ‘emotional intelligence’ (i.e. ‘to manage and moderate’ our emotions effectively).
Hargreaves talked of teachers showing emotions that they may not feel in order to gain some desired result in the classroom. He also suggested that perhaps teachers need to lose control sometimes when interacting with colleagues to demonstrate their vulnerability and honesty and to show that they are not trying to impose change by stealth through manipulation. Hargreaves concluded that change “must fully engage our hearts as well as our minds” (p21).

2.1.8.3 Comment

Hargreaves seems to imply that teachers should make a decision to lose control so that they can be seen as honest, which to me seems somewhat dishonest. This is a dilemma embedded in Goleman’s culture bound discussion of emotions and what he terms ‘emotional intelligence’ which implies cognitive control over our own emotions and the manipulation of the emotions of others (Boler, 1999). Like all kinds of intelligence it is defined and described through the life history of someone (in this case, Goleman).

Hargreaves also refers to Damasio (1996) and Sacks (1996) pointing out (like Fullan) that emotion is integral to reason, not separate and optional. This seems to me to indicate a basic confusion: on the one hand emotions are integral to reason and on the other we are exhorted to engage hearts and minds as separate (and presumably optional) items; on the one hand emotions can, and should, be controlled for particular ends and on the other they are integral to the very reason that will be applied to ‘control’ them.

Despite discussion of ‘strong emotions’ Hargreaves’ view of emotions generally seems to be about feelings such as affection, care, love and passion. If ‘good teaching is emotional work’ there is an implication that these are the ‘good emotions’. Hence his use of the terms ‘emotions’ and ‘emotional’ seems to me to stand for this narrow range of affection, care, love and passion (for teaching). Coupled with his juxtaposition of references to ‘womens’ ways of knowing’ and ‘emotional aspects of life experiences’ he gives the impression that his view of women’s emotions is a white, Western, male, middleclass idea of the emotional life of a white, Western, middle class female.
Certainly he does not give the impression that he is thinking of the stereotypical notion of the emotional life of an Argentinian tango dancer for example, or a Russian cosmonaut.

Hargreaves suggests, thinking about ‘students’ is emotional work (presumably involving love, care, affection); thinking about learning outcomes is not emotional work (it’s seen as cognitive). This again, in my view, limits the range of permissible emotions and isolates them from the rest of the process of living as identifiable and discrete events. It seems to indicate that teachers cannot be emotionally engaged in strategic planning, problem-solving etc. This view of emotions does not place teachers in a dynamic relationship with the environment, changing it and being changed by it in a co-evolutionary process.

Nevertheless Hargreaves has once again opened up a whole area for educational debate that might otherwise have been confined to either the neuroscientific community (Damasio) or the popular science of airport bookstands (Goleman). The reception extended to Hargreaves and his inclusion of emotions on the education agenda at the October 1999 NSW Principals’ Conference held at Darling Harbour, Sydney, indicates the importance of this work.

This study (my study) hopes to take Hargreaves’ beginning point and expand it into the realm indicated by Maturana (1993) who talked of communication as the braiding together of emotioning and languaging. He saw ‘emotioning’ as a part of the process of living, part of the constant stream of communication with self and others.

### 2.1.8.4 Relationships

Hargreaves (1997b) in referring to the different kinds of school cultures (e.g. collaborative, balkanised) defined and described earlier, said that the ‘where’ and ‘how’ of a teacher’s teaching affects the kind of teacher s/he becomes. Hargreaves’ said that his mission was to have:

> educational policy-makers and administrators recognise how important the quality and character of human relationships among teachers are for the quality of their classroom work and to help them see the damage that can be done to these vital relationships when mandated reforms are oblivious to them.

(Hargreaves, 1997b:63)
In the 1998 book *What’s Worth Fighting for in Education* co-authored by Hargreaves and Fullan, the authors focussed on the task of teachers and schools fighting for what matters in education. The emphasis was on individuals and communities rather than governments and bureaucracies. The language was of the emotions (hope, love, caring, serving) rather than, what they saw as, the more cognitive language of goals, programs, policies and strategic planning. Everything about this book talked of the individual and emotions.

The foreword to Hargreaves and Fullan’s 1998 book said that rather than government, “If you are looking for hope, you must turn instead to yourselves” (p viii) and hope lies “not in what governments will do to teachers or for them but in what teachers can do for themselves” (p x).

They talked of training and development as collegial meetings for discussion of educationally important issues but said that this had been disrupted by the need for schools to compete for students in the kinds of structures imposed by government. In Fullan’s 1982 book the structures imposed by government would have been the focus – the change program – perhaps a poor quality program badly implemented. The analysis of success and failure would probably have been at the level of goals of the program. In 1998 teacher change was seen by Hargreaves and Fullan as taking place within teachers while (political) structural changes raged around outside.

While acknowledging that reform efforts talked about:

- standards and targets; about packing the curriculum with more science and mathematics; about ranking students competitively in league tables of academic performance; or about repeatedly inspecting them to check that they are up to the mark,

(Hargreaves & Fullan, 1998:31)

Hargreaves and Fullan felt that it was unclear how this connected with teacher and pupil relationships and learning (an echo of Fullan’s 1982 position of external change program and lasting ‘internal’ teacher change).
They believed the purpose of school was to demonstrate and to teach others to love, care, serve, empower and learn and that relationships were at the heart of educational reform. Reform was about forging new teacher/teacher and teacher/student relationships, they said. The authors quoted Goleman and Damasio in support of their attitude to the role of emotions in learning. For change to take place, they suggested, educators need: to involve students in discussion on why education isn’t working for them; to provide early childhood intervention programs; caring teaching; teacher/parent relationships based on learning and caring; and school structures to “support the purpose of care” (Hargreaves & Fullan, 1998:42).

The idea of schools as communities introduced briefly in 1991 was prominent in this book. The authors said that we build a community to support children and teachers and society’s ideals. The moral purpose of school was discussed and, they said, the values of the school were evident in the official and hidden curriculum. If we want a democratic community, they suggested, then democracy must begin in the classroom with the “moral basics of caring, serving, empowering, and learning” (p49). This seems to me to be a very different language from the earlier books.

On the subject of professional learning the authors said that it must become integral to teaching, it must become the basic professional obligation of teachers, not add-on workshops, not courses, but learning from each other and community. “To love, to serve, to empower and to learn” (p54), without these said the authors, educational change would collapse “into faddism and opportunism” (p55).

Hargreaves and Fullan (1998) stressed that as educators, we need to understand the emotional nature of teaching and pointed out that emotional stress can adversely affect the immune system. The authors pointed out that “[e]motions are virtually absent from the literature and advocacy of educational change” (p59). They seemed to be giving permission for educators to discuss and consider emotions in ‘rational’ discussions of teaching.

In one of his own articles in 1998 Hargreaves developed this theme, writing about the emotional practice of teaching. He talked of teachers as emotional, passionate people, he discussed their feelings of guilt and self-sacrifice and their sense of loss for things they once valued in “contexts of rapid, imposed and highly rationalized educational reform” (p837).
He bemoaned the fact that:

emotions are virtually absent from the advocacy of the mainstream literature specifically concerned with educational change and reform.

(Hargreaves, 1998:837)

Even, said Hargreaves,

the idea of organizational learning which is on the very cutting edge of change theory, is almost exclusively cerebral in its emphasis.

(Hargreaves, 1998:837)

He discussed teachers’ inner stream of experience (teaching activates feelings) and outer stream of experience (teaching activates feelings in others). This led to the emotions involved in interpreting the actions of others that Hargreaves said could be either a cognitive step-by-step process or an emotional at-a-glance process.

2.1.8.5 Comment

Although Hargreave’s text was not intended as an explanation of a cybernetic view of the world his reference to relationships and the making of ‘teacher’ comes close to a second order cybernetic view of living system and environment.

It implies a view of learning as living in communication in a milieu. It seems to imply that the manner of living in dynamic relationship with the environment and other living systems (as part of environment) becomes the learning and changing of living system(s) and environment. Building on this an explanation of why and how relationships are fundamental to learning is something that my study will pursue through the second order cybernetics literature.

The work on emotions by Damasio, (1996) suggests that emotions are not discrete and a matter of choice, but that all of us all the time interact emotionally with the world. A split second later we might decorate our emotional response with language, which has a generative effect (Bar On, 1999) and so, in an endless feedback loop, influence our ongoing emotioning. Hargreaves discusses the inside/outside issues: teaching activates feelings; and teaching activates feelings in others. It is exactly these two areas – the inside outside explanation of learning – that I want to pursue.
2.1.9 Summary

Over a twenty-year period Fullan and Hargreaves have developed a theory of change that education systems, teachers and schools have found enormously useful. In developing their theory they have incorporated ideas from areas such as systems theory, chaos and complexity, and the emotions literature, that have generated excitement in the education community and opened up cross-disciplinary avenues for exploration. Although their work sometimes displays contradictions these have not diminished the work’s usefulness. Their work has been part of the change process for education as a whole.

The TILT program was developed in the context of Fullan’s early work on change and continued to evolve as ideas about change themselves changed over time.

My own research builds on Fullan and Hargreaves’ body of work. It uses a second order cybernetic framework to provide an explanation for some of the ideas picked up by Fullan and Hargreaves but not fully explained. In particular it looks towards an explanation for Hargreaves’ statement that ‘teaching activates feelings in others’ and ‘teaching activates feelings’.

Chapter three outlines the theoretical framework in which I believe the implications of these statements can be examined.

Part two of chapter two describes the TILT program. It is included here because it situates the research. It also illustrates the enacting of my developing theory of learning as the TILT program changed over time. As such it plays a part in the development of this research study.

Part three of chapter two looks at the success of the TILT program in terms of the change literature, identifying system wide change over time for reporting to government.
Part 2

The technology in learning and teaching (TILT) program

This description of TILT is included here for three main reasons. Firstly it situates the research. Secondly the TILT program for me is about enacting my developing theory of learning, including lessons learned from change theory, and so has a part in the development of this research study. Thirdly there is a cybernetic circularity in the ongoing development of the program through participant feedback followed by feedback to participants of the improvements made on the basis of feedback and so on that has built the program’s reputation and now is part of the context in which the participants for this study are found. The TILT program carries its reputation along with it and in doing so, in interaction with new participants, also builds it (see for example in chapter five Di’s sense of privilege at being allowed to participate). Di and Robyn thus become part of the process as well as participants in a context developed by this process over time.

2.2.1 History

2.2.1.1 Context

TILT was developed following the New South Wales Labor Party’s success in the 1995 NSW state election. It was part of an overall whole of government strategy to upgrade technological infrastructure and make the increasing use of information and communication technologies (ICT) a priority across all government departments. In particular TILT was part of the government’s Computers in Schools Program (CISP) which included: providing all schools with an Internet machine and if necessary an additional telephone line; linking all schools to the Internet; providing advice on the use of ICT in the primary school classroom and in each secondary school learning area; the rollout of computers to schools to achieve a ratio of at least one computer to 14 students; and the creation of a Department of Education and Training (DET) web site to include online curriculum based activities for students as well as information and on line development programs for teachers.
The election promise was to provide a 30 hour technology training course to ‘kick start’ teachers who were not already using technology in the classroom. This 30 hour technology training program, later to be called TILT was to train 15,000 teachers, approximately one third of every school’s teaching staff. Each teacher was to have two days relief from face to face teaching (later to become three days at the insistence of the NSW Teachers’ Federation), the Internet was to feature prominently and teachers were to be introduced to touch typing. The challenge for us, the developers, if we really wanted to make a difference, was to convey enough enthusiasm to make a 30-hour course last a lifetime.

2.2.1.2 Aims and achievements

TILT dealt with the development of teacher skills in the use of information and communication technologies (ICT). Its aim was to give teachers the confidence and skills to begin using computer technology for administrative purposes, professional purposes (such as research and lesson preparation) and in the classroom.

It was designed to accommodate the needs of teachers Kindergarten to Year 12 and across all subject areas providing transferable skills and an understanding of underlying concepts. It included suggestions on how to incorporate computer technology into classroom life and support for teachers in using ICT for administrative and research purposes. It was hoped that TILT would give teachers the enthusiasm to continue learning about and with ICT.

Underpinning this view was the notion that the use of computers and information technology would support a paradigm shift in education from knowledge as objective facts to knowledge as constructed by the knower; from teacher centered to learner centered classrooms; from teaching and instruction to learning; from time and place bound to flexible access (e.g. Papert, 1993; Dwyer, 1995). TILT was seen by some as a lever to bring about system wide changes in teaching and learning.

By the end of 1999, over 150 teachers had been trained as TILT facilitators and 17,130 teachers had participated in the TILT program. These TILT participants comprised approximately 30% of the 50,975 teaching staff in schools in a workforce of 63,000 employees.
The program was declared a success\(^1\) and some individual teachers reported a fundamental change in pedagogy (Lum Mow, 1997a, 1998, 2000). On the basis of its popularity with teachers (according to exit surveys) and its perceived success, in 1999 funding was provided by the re-elected state Labor government to train a further 10,000 teachers.

### 2.2.1.3 Development and implementation

The development of \textit{TILT} began with consultation with representatives of stakeholder groups and the involvement of a wide range of people bringing a broad knowledge base to the course development. My role was to chair these meetings and manage the development of the subsequent program. In all about 30 people attended a two-day planning meeting in July 1995. The meeting produced a set of principles, influenced by the change theory literature, that would underpin the program (flexible delivery; school based learning; individual learning pathways; learning partners; negotiated assessment) a set of desired outcomes for teachers and for students, and a map of the content to be covered.

To a great extent the processes employed in this two-day meeting were reflected in the product. The set of principles respected the learner, the outcomes for teachers and students supported the learner and the content to be covered both satisfied the needs of government and allowed for diversity of participant needs and interests. Systems theory provided us with a theoretical framework for a non-hierarchical networked structure in which the program would operate.

\(^1\) In 1998, \textit{TILT} was Highly Commended in the New South Wales Premier’s Public Sector Awards. In 1999 it was awarded Gold in the Twelfth Government Technology Productivity Awards at the national level. \textit{TILT} is used under licence in Papua New Guinea and Wales, UK. More funding for \textit{TILT} was an election promise when the Labor Government went to the polls in 1999. Labor was re-elected and funding was provided to continue and expand the program.
We worked towards Banathy’s (1988) idea of systems which he described as “open to and coevolving with their environments” (p29) fluid enough, and responsive enough, to allow for changes to take place and Bawden’s view that:

successful organisations - as communities-of-learners, learn to co-evolve along with their environments, rather than simply reacting to the environmental changes forced upon them.

(Bawden, 1994:7)

Concurrently work was continuing on an evaluation strategy and a Principals’ Briefing package that would inform principals of the program, give advice on identification of participants and ways in which participants could be supported.

The program that emerged from the above process consisted of six one hour interactive satellite broadcasts (now videos), six small group hands on workshops and three days’ in-school follow up activities (see below). The first satellite broadcast and the first two workshops were piloted in semester two, 1995 with approximately 130 participants from 66 schools in two metropolitan and two rural regions. These pilot workshops were three hours long rather than two hours, the third hour being a participant feedback session. At the same time a base data survey was trialed as part of the evaluation strategy. This was reissued each semester and is still in use. It seeks Equal Employment Opportunity (EEO) statistics and information on previous experience with, and use of, computer technology both in the classroom and at home.

Towards the end of 1995 the TILT facilitators, together with a small number of participants, principals and representatives from the original working group and materials developers came together for two days to evaluate the pilot. As a result of this feedback changes were made to the content of the materials and the sequence of components. The original two days relief was raised to three days for each participating teacher in response to a NSW Teachers Federation agreement.

TILT was further trialed in semester one 1996 with approximately 400 participants from the same 66 schools. The five remaining satellite broadcasts were developed and broadcast at two to three week intervals throughout the semester.
Course materials were written for the remaining four workshops. Meanwhile hardware and software was purchased to support implementation. The Principals’ Briefing interactive satellite broadcast was trialed together with a support document. At the end of semester one, 1996, a further feedback meeting was held and further adjustments made to materials, sequence and structure.

In semester two, 1996, the participant group was increased to approximately 800 teachers in 16 districts. New facilitators were trained by the state office TILT team and existing facilitators. The training was also attended by district Technology Advisers and Training and Development/Curriculum Coordinators to facilitate district team building and planning. In 1997 the program was implemented in all 40 NSW school districts. Changes continued to be made in response to participant comments invited at the end of each semester. These changes were reported to schools twice a year in the TILTed Newsletter. It was considered important that facilitators and participants knew that their comments were taken seriously and acted on wherever possible.

2.2.2 Resources and support

The TILT program was based on the assumption that teachers have different needs at different times and bring different skills and knowledge to any learning situation. Even with a selection criterion of teachers who are not currently using technology in the classroom it was evident that there was a whole range of expertise in any group of participants. In developing TILT this factor was taken into account and a range of activities and resources was provided from which to choose. Teachers could access the materials in their own time, progress at their own pace and work with friends and colleagues from their own school or across schools. A trained facilitator provided the ongoing support needed for the teachers.

2.2.2.1 Materials

The program consisted of a TILT folder, six satellite broadcasts, six hands-on workshops and in-school follow-up supported by a facilitator. Table 1 summarises the program content, materials and means of access by participants together with explanatory comments.
## Table 1: TILT program content, materials and means of access by participants

<table>
<thead>
<tr>
<th></th>
<th>Content</th>
<th>Access</th>
<th>Comment</th>
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<tbody>
<tr>
<td><strong>TILT folder</strong></td>
<td>• Six booklets, each included: a basic workshop (presented by the facilitator) prompts for reflection; follow up activities; classroom activities; two or three self paced extension activities (designed for participants already familiar with the basic workshop who chose to follow an extension activity in workshop time); and readings</td>
<td>Participants either worked with the group through the basic workshop material led by the facilitator or negotiated a different activity based on their own needs and abilities.</td>
<td>Feedback from participants indicated that the TILT folders were well received. According to teacher feedback the inclusion of self-paced extension activities made the folders a valued resource. (Lum Mow, 1997a, 1998, 2000)</td>
</tr>
<tr>
<td><strong>6 satellite broadcasts</strong></td>
<td>• Examples from a range of schools where teachers and students were using technology in the classroom.</td>
<td>Shown in semesters one and two 1996, two to three weeks apart. In 1997 the broadcasts were provided on video for loan to schools. In 1997 the broadcasts were also shown as 30 minute programs free to air on SBS television as part of the national broadcaster’s tvED series.</td>
<td>These set the context for the following workshop and allowed space for addressing government priorities as well as priorities identified by the development team.</td>
</tr>
<tr>
<td><strong>6 hands-on workshop</strong></td>
<td>The workshop consisted of: afternoon tea discussion of issues raised by the broadcast sharing of between workshop activities hands-on work at the computer or other items of hardware, such as a digital camera.</td>
<td>The broadcast was followed within two weeks by a hands-on workshop. Workshops were conducted locally either in participants’ own schools or at a nearby school or technology center in small groups of between 10 and 12 participants.</td>
<td>The emphasis was on creating a non-threatening learning environment in which participants were able to work at their own pace with individual support.</td>
</tr>
<tr>
<td><strong>In-school follow up activities</strong></td>
<td>The time could be used for: visiting other teachers team teaching exploring software or hardware practising skills preparing a unit of work participating in an additional workshop one to one session with the facilitator.</td>
<td>Facilitator was available to support follow up work in participant’s own school at any time during the semester. Each participant was allocated 3 relief days to be spent according to the participant’s learning needs.</td>
<td>This gave TILT its flexibility, allowing for multiple entry points, pathways, learning needs and styles. Teacher said breakthroughs occurred during follow up time. (Lum Mow, 1997a, 1998, 2000)</td>
</tr>
</tbody>
</table>
2.2.2.2 **TILT facilitators**

Critical to the success of the *TILT* program were the trained facilitators. Facilitators were classroom teachers chosen for their people skills, technological know-how and enthusiastic classroom use of computer and information technologies. Their role was to impart the enthusiasm and confidence needed by participants to continue learning after the program had finished.

Facilitators worked for a semester across a school district. Each full time facilitator was allocated 70 participants. The participants were organised into workshop groups of approximately 10 people. The role of the facilitator was to conduct workshops, and provide individual or small group support by request as participants took up their three relief days to extend their learning.

New facilitators received two three-day residential training programs conducted by experienced facilitators and members of the state office *TILT* team. The training programs were approximately six weeks apart to allow time for facilitators to work with participants before coming back together again to discuss issues arising from experience. As part of their training facilitators participated in sessions on presentation skills, adult learning and reflective journal writing. A wide range of national and international guest speakers addressed global perspectives opening discussion around economic, political, cultural, social and equity issues.

Each facilitator had the use of a *TILT* kit containing: music keyboards, concept keyboards, digital cameras, computer controlled Lego kit, scanner, data projection equipment and an extensive range of software, all of which was available for loan to participants. Two lap top computers were also provided, one for use by the facilitator and one for lending out to participants.

Most facilitators were provided with a station wagon for travel around the district. In country districts these vehicles covered hundreds of kilometers each week, as facilitators traveled to isolated schools to provide workshops and in-school follow up support.
A major element of facilitators’ ongoing support was what became known as the *leaners’* listserv of which all of us (the *TILT* team) were members. Questions or cries for help had a response sometimes within minutes of posting. As we gradually built up a pool of expertise, experienced facilitators monitored the listserv and offered practical advice to new-comers. We monitored the listserv and together with the facilitators made up policy as they, and we, encountered new situations and needed to solve new problems. Access to communications technology provided by the new infrastructure that was part of the Computers in Schools Program (CISP) became an integral and essential element of our community building. It enabled facilitators to become part of the *TILT* team and feel that we were all in it together and together we could ‘make it up as we went along’.

### 2.2.2.3 Accreditation

Certificates were awarded to *TILT* graduates provided they had: attended all workshops (or five out of six with a negotiated equivalent workshop activity for the sixth if necessary); and spent three relief days engaged in *TILT* related activities negotiated with, and supported by, the facilitator (or two relief days with an equivalent period of time spent in *TILT* related activities out of school hours if necessary). *TILT* facilitators used their professional judgment in discussion with participants in cases where there were variations to the criteria. Districts held certificate presentation ceremonies as a way of celebrating completion of the program and congratulating graduates. *TILT* certificates have currency at several universities where participants may gain accreditation towards a Masters program.

### 2.2.3 Program evaluation strategies

‘Making it up together as we went along’ was not a vain claim. The program itself developed out of a collaborative process that brought together people from across the state. During the development phase we consulted primary and secondary parents’ associations, primary and secondary principals’ associations, teacher professional associations, tertiary institutions, country schools and city schools, regional computer education consultants and state office directorates.
After a year of piloting and trialing we consulted again. We also implemented two major research strategies: a participant profile (base data survey) and a TILT exit evaluation. (These were used until the program ended in June 2003, they collected data from participants on the basis of which we made changes to the program each semester.)

The base data survey, issued at the beginning of each semester on entry to the program, asked teachers about: their teaching background and experience; their current teaching practices, knowledge and understanding; and their own and their students’ access to ICT. The survey monitored participation of equity groups and success in reaching the target group. Profile data have been analysed each semester for seven years\(^2\) (except semester one 1997) mapping changes in participant group, access to computer technology in school and at home and pre-
TILT classroom uses of technology.

The exit evaluation was completed at the end of each semester. Participants evaluated the content, structure, delivery, support and organisation of the program, suggested improvements, described the impact of the TILT program on their classroom practice and administrative use, and identified follow-up needs. Participant feedback was reviewed each semester and changes made to the program based on teacher suggestions. The reports\(^3\) provided data for senior officers in the Department of Education and Training and government. We also kept a database of every participant in the program and every facilitator trained across the state.

To find out to what extent we had succeeded in our ambitious aim to make the semester-long training last for ever a longitudinal survey was piloted in 1998. The survey was extended in 1999. It sought data on changes to teachers' classroom and professional uses of ICT that they attributed to their participation in the TILT program (Lum Mow, 1998, 2000).


It was then possible to compare entry characteristics reported through the base data participant surveys with results of the longitudinal survey, and speculate on teacher change over time (keeping in mind that respondents were not matched). In the 1999 survey we also asked teachers to cast their minds back and remember their opinion of the components of the program (e.g. workshops, follow up) at the time of participation and to comment on their importance in retrospect, hoping to uncover if, after some time had elapsed, they still felt that TILT had been important in their learning. Responses to this part of the survey were analysed against what teachers said they were doing with technology in the classroom. TILT evaluation results are reported in part three of this chapter.

2.2.4 Conclusion

Part two of this chapter has outlined the development, implementation and evaluation of the TILT program to provide an understanding of the context for this research project. This section has also provided an indication of the context in which the learning of the two key participants in this study, Di and Robyn, occurred. Knowledge of the program, its reputation and achievements provided part of the environment in which the program was enacted each semester for participants.

The section indicates the perceived success of the program. The data referred to above were used in reporting to the NSW Department of Education and Training and to government on statewide achievements. A brief look at some of the results of this research is found in part three of this chapter. My research has grown out of my own need to understand what these statewide data were saying about individual learning. I felt there was an impenetrable gap between the reported high percentage of teachers who enthusiastically supported the program in exit surveys declaring that they had learned a great deal and the limited ‘success’ of the program according to the longitudinal surveys. In the understanding that successful project management is about engaging in an hermeneutic process of continually cycling through examination of the big picture and the detail I wanted to examine the detail of teacher learning.
Part 3:
Statewide data

2.3.1 Introduction

Part three of this chapter provides evidence that the TILT program has had some ‘partial success’ (Fullan, 1993a) as an innovation in terms of the change theory outlined in part one. Our evaluations indicate that some change did occur across the system. Part three provides a synopsis of TILT base data material and the 1998 and 1999 longitudinal evaluations which indicate teacher change over time. The audience for this research was government and the NSW Department of Education and Training (including the TILT team and teachers). One of the purposes was to inform the program designers of changes that needed to be made to the program, however the major purpose was to report on government commitments and provide data for strategic and policy decisions.

This section also includes an attempt to estimate the importance that teachers attached to their TILT learning some time after completing the program and the difference that their estimation of the importance of TILT made to their classroom uses of technology. This is included because the ways in which teachers remember and discuss the program, and the benefits to their classroom teaching, will affect the reputation of the program and hence the context in which teachers, including the research teachers, participate each semester. Part three concludes with a look at the achievements of TILT in the context of educational change literature and current understanding of what makes for successful training and development programs.

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4 A separate part of the TILT research strategy provided participant evaluations on which we based program improvements.
Much of part three is based on a paper written by Lum Mow and Murray (2001) for a Conference held by the International Congress for School Effectiveness and Improvement (ICSEI) in Canada, January, 2001.

2.3.2 Base data and longitudinal surveys

The TILT research strategy provided data for program improvement and data on the basis of which to make policy decisions about, for example, target group and levels of support. It also provided government and the DET with evidence that TILT was effecting change in teacher professional and classroom uses of ICT.

The TILT research strategy also provided data for reporting against government promises. It attempted to answer, among others, the government ‘promise’ in Labor’s plans for school education (Carr, 1995:10) that:

A 30-hour course is estimated to be sufficient to ‘kick start’ computer learning for teachers, if they can continue to practise what they have learnt.

(Carr, 1995:10)

In terms of program evaluation it was important to know, for example, if teachers credited TILT with ‘kick starting’ their learning and with their willingness and ability to continue learning. Such data provided an indication of success in achieving our aim to embed the learning from TILT into everyday practice.

Valuing of TILT at the time of participation and over time provides an indication of the kind of reputation that the program enjoyed. This reputation was part of the milieu in which the program operated and new teachers participated. In terms of my research it provided a part of the context of the research volunteers’ engagement with the program.

2.3.2.1 Base data survey

Four thousand one hundred and forty two of the 19,924 participants (21%) returned their base data survey mid 1995-end 2000. Although all types of schools were represented amongst the respondents, the majority of respondents were primary teachers.
The data revealed that:

- since the commencement of the program, the proportions of participating teachers to school executives increased;
- older teachers were accessing the TILT program in proportions similar to their representation in the teaching service;
- about 80% of respondents 1995-1999 were female;
- the program was reaching its target group (respondents who had been teaching for more than 15 years and who did not receive any training in computer technology in their initial pre-service education);
- access to computers in the classroom had increased by about 20%;
- access to a computer room had increased by almost 40%; and
- home ownership had increased by about 30% and home access to a modem increased from 1% in 1996 to 59% in 2000 (Lum Mow, 2002).

As data accumulated and provided interesting state-wide information ‘research findings’ became a regular column in the TILTed Newsletter sent to all schools each semester. It also became part of the agenda for all facilitator training and demonstrated the importance of their role and the value that was placed on their work.

The base data survey also provided information on what teachers reported that they were already doing with computer technology for professional purposes and in the classroom pre- TILT. For example, it asked if they were using a word-processor, databases, spreadsheets, email and the Internet or multi-media presentations.

This information was later used to indicate change over time when compared with information on teachers’ post- TILT uses of technology from the longitudinal surveys.
2.3.2.2 Synthesis of longitudinal and base data

Teachers’ growing use of computer technology to enhance learning was demonstrated by a comparison of results of the base data survey and 1998 & 1999 longitudinal data. These findings (Figures 2 & 3) are presented as trends only as the teacher samples were not matched and response rates for some phases of the program were relatively low.

Nevertheless the data revealed some interesting, if somewhat predictable, trends. The most significant and regular use of computer technology for professional purposes, such as lesson preparation and student assessment, reported by respondents was use of a word processor with only 3% of respondents never using one. The most significant changes in classroom practices from learning and skills acquired through *TILT* were locating information on the Internet, communicating by email and using a word processor (Figures 2 & 3). Some moderate gains in the number and frequency of respondents using spreadsheets, digital cameras and touch sensitive pads was also found (Lum Mow & Murray, 2001). The data also revealed that there was still a long way to go before use of ICT was embedded in classroom practice by the majority of teachers.

These questions were about whether or not teachers were making use of course content. They were questions through a change theory lens that might indicate the success or failure of the program. What these data could not show (and were not designed to show) was whether or not these changes in practice reflected deeper changes to do with values, pedagogy, learning, or classroom management.
Figure 2: Growing use of computer technology to enhance learning: average pre and post course ratings by 1995/96 respondents

(Lum Mow & Murray, 2001)
2.3.2.3 Teacher valuing of the program and transfer of learning to the classroom

As well as asking teachers what changes they had made to classroom and professional practice the longitudinal survey sought teachers’ views on which components of the TILT program they remembered as important for their learning at the time of the course and still viewed as important in retrospect. This question sought to uncover the ongoing value of elements of the program in the minds of teachers (did they remember the course and if so, in retrospect, how important was it to their learning). Responses to these questions were analysed in conjunction with teacher-reported student uses of technology.

Respondents’ highest ratings were given to the TILT workshops, folders (i.e. workshop booklets, disks/CDROM and participant journal) and inschool facilitator support (Figure 4). Over 90% of respondents said that the TILT workshops and folders were important at the time of the course and about 80% still held this view in retrospect (Lum Mow & Murray, 2001).

As time progressed, respondents generally gave a lower rating of importance to the various elements of the course except in the case of the TILT website. About 1-2% of respondents who rated the TILT components as not important at the time of the course increased their rating in retrospect.

In the context of the change theory literature these questions again emphasised the view of change as artefact.

**Figure 4:** Respondents’ average ratings on the importance of TILT components

![Graph showing respondents' average ratings on the importance of TILT components](image-url)
2.3.2.4 Linking respondents’ views on TILT to their classroom practice

Teachers’ views on the importance of the various TILT components were compared with the extent to which the learning and skills acquired through TILT transferred to their students’ use in the classroom. Respondents were grouped according to their responses on the importance of each TILT component. The first sub-groups comprised all respondents who indicated that the TILT component was not important both at the time of the course and in retrospect. The second subgroups comprised all respondents who indicated that the TILT components were important both at the time of the course and in retrospect. The responses of each subgroup were compared to analyse whether students in one or more of their classes were using learning technologies in their class work at differential rates (Lum Mow & Murray, 2001).

Respondents who thought the TILT workshops and materials and in school followup were important both at the time of the course and in retrospect generally reported more frequent use of basic learning technologies by their students than did respondents who were negative about the TILT workshops and in school followup (Figures 5-6) (Lum Mow & Murray, 2001).

Respondents who rated the TILT website as important both at the time of the course and in retrospect reported more frequent use of all forms of learning technologies by their students than did respondents who were negative about the TILT website (Figure 7).

It would seem that those participants who felt positively towards the program, in some cases after several years had elapsed, (i.e. in retrospect they still credited particular elements of the program as having been important for their learning) were more likely to transfer their learning to the classroom. We would like to think that the rich and rewarding training experience that we aimed for, was achieved, did provide the enthusiasm to go on learning, and had a positive link to student classroom experiences. However this broad brush picture could not divulge the detail. It could only give us more information on the components of the change program as artefact but not the change itself.
Figure 5: Comparison of respondents attaching low and high importance to the TILT workshops with their students’ use of learning technologies

Notes: The Low Importance Group comprised 22 respondents who thought the TILT workshops were not important both at the time of the course and in retrospect. The High Importance Group comprised 737 respondents who thought the TILT workshops were important both at the time of the course and in retrospect.

Figure 6: Comparison of respondents attaching low and high importance to the TILT in school follow-up with their students’ use of learning technologies
Figure 7: Comparison of respondents attaching low and high importance to the TILT website with their students’ use of learning technologies

Notes: The Low Importance Group comprised 441 respondents who thought the TILT website was not important both at the time of the course and in retrospect. The High Importance Group comprised 240 respondents who thought the TILT website was important both at the time of the course and in retrospect. (Figures from: Lum Mow & Murray, 2001).
2.3.3 Criteria for success

2.3.3.1 TILT data in the context of government promises and program aims

This statewide information has proved useful for the ongoing development of the program and its off shoots. It presented a picture of change across the state and possibly indicated that something lasting was achieved for many participants. This information about statewide teacher change over time was important to government in reporting to parliament on their Computers in Schools Program.

Perhaps the data also showed that the facilitators had been able to impart the enthusiasm to go on learning for many of their participants. If teachers were using ICT in the classroom and if they, in retrospect, still rated the TILT program highly in their learning then, we reasoned, teachers were likely to speak well of the program and add to its reputation in a positive way. This was of importance to the TILT team because it revealed something of the context in which each semester’s program operated.

The figures quoted above provide one view of the TILT program through the statewide research strategy providing data for government and the DET. Below the data are looked at in the context of educational change literature and teacher development literature providing other lenses through which to view the program.

2.3.3.2 TILT data in the context of educational change literature

In his edited collection The Challenge of School Change Fullan (1997) reiterates his Eight Basic Lessons of the New Paradigm of Change from his 1993 publication (1993a:36). Although Fullan was talking about school change by this time rather than system change (1982) or organizational change (1993a) most of his ‘lessons’ can be applied to the TILT program.

5 In 1999 the government provided funding for TILT Plus which has become an umbrella term for a collection of over 30 specialised and advanced programs.
Lesson One: You Can’t Mandate What Matters
(The more complex the change the less you can force it)

The above data show a range of things that ‘matter’ to different teachers. The government would have liked to have mandated, for example, that “Every student [should] learn to touch type on a key board by Year 7” (Labor’s plans for school education (Carr, 1995:8). However keyboarding skills did not rate a mention in the areas most appreciated by teachers (see Figures 2&3 above). Having built into the program the flexibility that good teacher development demands (see below) it would have been difficult to have mandated any part of the materials as compulsory learning. In a complex change program such as appropriate computer technology use for all teachers K-12 and across all subject areas mandating some aspect of that change would always have been inappropriate for some teachers.

Lesson Two: Change is a Journey not a Blueprint
(Change is non-linear, loaded with uncertainty and excitement and sometimes perverse)

Although the government provided a ‘blueprint’ for what they wanted to see in terms of technology training (Carr, 1995) it left room to build a flexible program in which teachers could find their own learning pathway (see chapter two part two). The different starting points as well as end points, illustrated above, indicate the need for this flexibility and the impossibility of implementing change as a ‘blueprint’.

Lesson Three: Problems are Our Friends
(Problems are inevitable and you can’t learn without them)

During the three relief days participants worked on an individual ‘problem’ either something they needed to learn or something students needed to learn. Most considered this aspect of TILT a valuable learning experience (see for example Lum Mow, 1997a).

Lessons four and five refer to school planning processes and are not applicable here.

Lesson Six: Neither Centralisation Nor Decentralisation Works
(Both top-down and bottom-up strategies are necessary)
This can be applied to the TILT program itself. The top down aspect is the centrally provided program; the bottom up aspect is the built in flexible learning pathways including workshop extension activities and the three relief days in which teachers can pursue individual learning programs.

Lesson Seven: Connection with the Wider Environment is Critical for Success
(The best organisations learn externally as well as internally)

Teachers say that they appreciate meeting other teachers through the TILT workshops. They also appreciate the expertise and support of the TILT facilitator, and the TILT videos that showed uses of technology in business and industry, health and agriculture (Lum Mow, 1997a).

Lesson Eight: Every Person is a Change Agent
(Change is too important to leave to the experts, personal mind set and mastery is the ultimate protection)

Although every NSW government school has an allocation of computer coordinator time this has not translated into computer use for all teachers. In most cases the ‘experts’ do not have time to manage the school’s network (which is often what the job entails) and provide curriculum and teaching support for teachers. Access to computer technology (reported above) is likely to be only partly due to increased computer technology in schools. Some is likely to be because TILT participants, having acquired skills, expect to be able to use them to assist students. TILT graduates reported feeling more knowledgeable about using computer technology and were able to provide more computer access for their students (Lum Mow, 1997a).

2.3.3.3 TILT data in the context of teacher development literature

Research on training effectiveness (e.g. Turbill, 1993; Hargreaves, 1992; Fullan, 1992, 1997; Hargreaves and Fullan, 1998) which provided the background against which TILT was developed (1995-1999) suggests that teacher development programs need to be flexible, workplace or home based; collegial, working with mentors and learning partners in self managed groups, instead of (or as well as) with expert group leaders; and with some workplace action research/action learning involved.
One of TILT's strengths was in its flexibility to cater for a wide range of individual needs through the basic workshop and extension material available in the workshops. This can be seen in the wide range of workshop items that different teachers felt were 'the most valuable' part of their learning (Lum Mow, 1997a).

TILT was workplace or home based to some extent. The relief days were able to be taken at school or at home or some other convenient location depending on negotiations with the principal and facilitator and availability of facilities. Teachers were able to take up whatever aspects of the training they needed. According to the 1997 teacher evaluation report (Lum Mow, 1997a) the flexibility offered by the three days suited all types of learners and respondents stressed the importance of being able to explore and master the technology within their own school and classroom.

In the 1997 evaluation TILT was recognised as a collegial program where participants could work with others and with an expert facilitator. This was the second most highly rated feature of the program (Lum Mow, 1997a). The teachers appreciated the assistance and support given by facilitators and colleagues during the practical activities. They also valued the opportunity for meeting people, sharing good ideas and resources and the discussions with other teachers.

TILT did not include action research opportunities. However many teachers did complete a project as part of their TILT program. TILT plus programs all had an action research or action learning component.

### 2.3.4 Comment

In terms of a large scale change program measured against the criterion of change in teacher practice over time TILT seems to have had some success in a number of areas (e.g. word processing, Internet, email). Measured against Fullan’s (1993a, 1997a) *Eight Basic Lessons* TILT seems again to have had some success in building in these lessons to the structure of the program.

Turbill, (1993) Hargreaves, (1992) and Fullan’s, (1992; 1997b) research on what makes good teacher development were considered in constructing the TILT program. In many cases the program incorporated the recommended features, and teachers seemed to appreciate them.
Even so, any program can only ever be an *invitation* to change. It can expand options for classroom practice. How individual teachers take up this invitation and how they expand their teaching options remains hidden in these broad brush data. The data presented above say something about system change and allow for policy and strategic implementation decisions to be made. They remain silent however on how, why and what people learn. Case studies present a way of getting beneath these data to find out what happens to individuals, what issues occupy their thoughts and what they value in the learning opportunities offered to them.

Having met Maturana in 1993 I became engrossed in his and Varela’s (1987) explanation of how a living system co-evolves with its environment, and what this says about learning. I felt there were important messages for us in their work. I was also drawn to Maturana’s (1993) definition of communication as ‘the braiding together of languaging and emotioning’.

My search came to be a search for an understanding of teacher learning in the context of *TILT*. The ‘living system’ became the teacher; the ‘environment’ was the *TILT* program with all that it entailed including communication which I took to be the stream of languaging and emotioning going on constantly between any combination of self, facilitator, participants and artefacts.

While the operation of the program was being viewed in the DET through a conventional program evaluation lens in the context of the literature on change theory and professional development I was pursuing the possibility of applying another lens. I wanted to examine teacher learning in the program through a cybernetic perspective (Murray, 2002). The data we were collecting was decontextualised and indicated nothing of the excitement and challenge of learning or whether or not participants felt that their practice had improved and that students were benefiting. I felt I really needed to know about the individuals hidden within the statewide statistics.
The following chapter presents an overview of the cybernetic literature that was occupying my thoughts as I sought to understand teacher learning. It provides for me, satisfying explanations for the questions that frame this study: what is learning and why do people learn; why do people learn this and not something else; and, how does learning happen and what is the role of communication and the environment. It also draws on some of the reading I had done prior to taking on the development of TILT. It should therefore be possible to detect influences of my reading on the development of TILT explained in part one of this chapter.

Chapter three is an attempt to account for the eyes that I look through and the tools that I apply later as I try to understand from a new perspective the data I have collected. In addressing the questions: what is learning and why do people learn, this section strips the questions back to the fundamental human concern with survival. It includes: a view of reality; my understanding of the living system in the environment; the meaning of co-ontogenic structural drift; learning, information, change and the role of environment; and the living system and environment learning system.

This section also addresses the questions of how learning happens and the role of communication and the environment. In explaining how I believe learning happens I draw on work on the emotion/cognition brain/body connection. In order to discuss the role of communication in learning this chapter takes Maturana’s notion of communication as the braiding together of languaging and emotioning and develops an explanation of each term. As part of the explanation of emotioning and as an illustration of the role of environment in learning some recent research on the placebo effect in medicine is referred to.
Chapter 3

A theoretical framework in which to examine teacher learning
Chapter 3:
A theoretical framework in which to examine teacher learning

This chapter provides some answers for the questions that frame this study:

- What is learning and why do people learn?
- Why do they learn this (and not something else)?
- How does learning happen and what is the role of communication and environment?

The substance of this chapter makes up the theoretical framework out of which I live and learn. It also provides an indication of the lens through which I view data gathered in the research process.

The chapter first presents my reading in, and analysis of, the literature of cybernetics as I sought to understand ‘system’, ‘environment’, ‘learning’ and ‘communication’. It also outlines some of my struggle to develop an understanding of the relationship between systems theory/systems thinking, aspects of which I thought I was reasonably familiar with through the change literature, and cybernetics. In learning to understand the terms ‘system’ (as opposed to ‘systems theory’) ‘environment’, ‘learning’ and ‘communication’ I was learning what was for me, a new language – the language of cybernetics. As I began to review this literature I found I was also gathering a repertoire of ideas that appealed to me and that I began to apply in other areas of my life and work including the ongoing development of TILT. Throughout this text I have indicated the implications that I see for teacher development programs including the TILT program and for the conduct of this current research project.
The chapter next presents an investigation of the meaning of ‘learning’ and Maturana’s definition of communication as ‘languaging and emotioning’. In the course of developing this understanding this section takes up the argument for an integrated emotion/cognition brain/body learning system. The following flow chart (Figure 8) may help to explain the organization of this chapter.

**Figure 8:** Organisation of chapter three showing the development of my understanding of systems and cybernetics and the emergence of my research questions

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**SYSTEM**
- Parts & whole
- System/environment web
  - Objective observer
  - Observer constructed system/environment

**CYBERNETICS:** describing one domain of reality and bringing into being system and environment
- Change, learning, living in co-ontogenic structural drift
- Information and survival
- Take in information through our senses (outside in)
- What becomes information depends on life history (inside out)

**System/environment learning/thinking network (structural coupling)**

**COMMUNICATION**
- Coupling with the environment through communication
  - Communication as ‘jointly actualized meaning’ (Brier, 1992: 3) (second order cybernetics)
  - Sender and receiver: (cybernetics)

**Languaging**
- With self in reflection (Schon)

**Emotioning**
- Through metaphor with others
  - Neuroscience: emotions and the brain
    - Emotions and cognition
      - Emotions and action
  - Emotions
Part 1:
Second order cybernetics

Chapter three describes my search for a framework to help me understand teacher learning, in particular the answers to my questions: how does learning happen, what is learning and why do people learn. It is also a framework that fits comfortably with my view of the world developed over a lifetime and one that I feel I have always tacitly in some way ‘known’. Discovering the world of cybernetics first through meeting Humberto Maturana in 1993 and then through the journal *Cybernetics and Human Knowing*, and in particular through Glanville’s regular column and Brier’s articles in this journal, I felt I had found a language to talk about my ‘theory of living’. In doing so I also found a new language that has became part of me and my theory of learning/ living as it has continued to evolve.

Chapter three also explores second order cybernetics for possible ways of conceptualising knowledge, learning and change that might help in understanding the learning of the key participants in my study, Di and Robyn.

Returning to the chapter after some time I have had to make decisions about what, of my earlier deliberations, to leave in and what to cut out. I have decided to cut a section on Actor Network Theory because in the end it seemed to allow nothing more than a similar discussion but from within a sociological paradigm rather than a cybernetic one. I have also cut most of my ponderings on chaos and complexity because I am not a scientist and my understandings could at best have been used as metaphors in an education context. I have left in parts of an early discussion on ‘systems thinking’ that reveals my attempt to link systems theory, referred to in the work of Fullan and Hargreaves, with the second order cybernetics readings I was later engaged in (Murray, 1995).
3.1.1 Introduction

In building a framework for identifying and describing a living system and its environment, in this case a teacher in the TILT program, I became interested in the cybernetics of biologists Maturana and Varela (1987) who discuss the living organism in its environment. I also became interested in the writings of Glanville, a cybernetician who writes of cybernetics and its many and various applications to life, be they useful, beautiful or both (eg. 1996; 1997a; 1997b; 1997c; 1997d; 2001) and Bateson (1972) who played a foundational role in the development of cybernetics as an area for study and whose work on cybernetics seems to be generally admired (Thompson, 1987).

Prominent thinkers and writers in this field, including Brier (e.g. 1992; 1993); von Foerster (e.g. 1992); von Glasersfeld (e.g. 1992; 1995); and in Australia, Fell & Russell (e.g. 1993; 1994) talk about relationships, communication, learning and our evolution with each other, our technologies and our natural environments. Consistent with the way in which I believe these writers view knowledge and learning my personal understanding of what I have read of these people’s work has emerged out of my own history of interactions over a lifetime.

The view from cybernetics brings with it particular ways of describing knowledge and learning. So a second purpose of this chapter is to identify some of the implications of cybernetics for how we come to know and the view of reality this process of knowing implies. I am hoping that this will shed light on what happens in teacher development programs and why things happen the way they do that might differ from what we have learned from traditional research and writings on professional development as outlined in the previous chapter. However my first task is to discuss my understanding of ‘system’ and ‘systems thinking’, two of the terms used by Fullan and Hargreaves in quoting the work of Senge referred to in chapter two part one. After that I want to outline my understanding of the difference between systems thinking and cybernetics.
3.1.2 Systems thinking

According to Asayesh (1993) ‘Systems thinking’ emerged from the Massachusetts Institute of Technology in the late forties and early fifties where scientists began applying software developed for mapping electronic systems to other kinds of systems (Asayesh, 1993). This field of study, Asayesh says, used single and double loop learning as metaphors to explore change in organisations, which those working in the field of organisational change viewed in terms of the relationship of the parts to the whole and the interactions between the two. It assumed that the system could be objectively observed. In the 1980s systems thinking began to be applied to schools as organisations. It employed such tools as ‘organisational storytelling’ to generate a feeling of shared knowledge and values (Andersen, 1994) and ‘feedback loop diagramming’ to help people map out long and short term consequences of their actions (Asayesh, 1993). Teacher development programs began to include teachers’ stories as a way of examining shared knowledge and values (Murray, 1995). It is this storytelling approach that was critiqued by Hargreaves and Fullan (1992a:13) as possibly “self indulgent navel gazing” and “top down control” disguised as therapy (see chapter two part one).

The whole area of applying systems thinking to organisations was further advanced by Senge, in his book *The Fifth Discipline: The Art and Practice of the Learning Organization* (1990) where ‘systems thinking’ was in fact Senge’s ‘fifth discipline’. It is this book in particular that influenced the work of Fullan and Hargreaves. The book was also referred to frequently in NSW Department of School Education’s training and development materials throughout the 1990s (see chapter two part one) and in the two major seminars conducted for the Department by Hargreaves (1995a) and Fullan (1998). My understanding of ‘systems thinking’ gained from the writers referred to above was my starting point for investigating the meaning of ‘system’ below, and later the connection between ‘systems thinking’ ‘system’ and ‘cybernetics’.
3.1.3 System and environment: the parts and the whole or a web of relationships?

The literature seems to discuss two major ways of conceptualising non-living, living and social systems. The first is to consider a system in terms of a whole and its parts which can also be expressed as a ‘building blocks’ metaphor; the second is to consider a system in its environment, which can be expressed, for example, as: system surrounded or engulfed by environment (a circle within a circle); a system side by side with its environment; or a system at the centre of a web of connections.

3.1.3.1 Parts and whole

According to Paetau (1999:47) Kant in 1790 was the first to write about systems in terms of wholes and parts. For Kant nothing was without intentionality, which was set by the whole organism, subordinating the intentions of individual elements (parts) under the intentions of the whole.

A parts/whole perspective implies an hierarchy: parts within a whole and also of course parts can be wholes which have parts within an ever receding system. Or as Glanville (2001: 14) says, “a part is a whole in a role”. In addition hierarchical organisation assumes that at each ‘level’ of complexity the ‘level’ below (i.e. a system operating on a smaller spatial and shorter temporal scale) provides the set of possibilities that may emerge at the higher ‘level’ (particles interact to form atoms which form molecules which form . . . and eventually to ecosystems) (Lemke, 1998).

This upward causation is the basis for the view that a phenomenon can be accounted for by an analysis of its parts. It apparently works well for non-living systems. But, as Glanville (1999:4) points out: “Such hierarchy is not, of course, out there, but is a personal construct. In this universe, the world is not hierarchical”.

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The parts/whole view has caused major problems for the study of living systems that have to be dead in order to be studied in this way (i.e. in order for the parts to be examined). It was Maturana and Varela (1987) who first began to study living as a process, defining life as the ability to go on living. They proposed “that living beings are characterised in that, literally, they are continually self-producing” (Maturana & Varela, 1992:43). Maturana & Varela called this process ‘autopoiesis’.

3.1.3.2 Living system and environment (or milieu, medium)

The shift from a parts/whole perspective to viewing systems in terms of relationships is accredited to biologists Bertalanffy (1968) and Maturana and Varela (1987) who used instead the distinction between system and environment as an explanatory mechanism. In this new way of thinking parts of a living system (or ‘levels’ of a system) are understood only in the context of the whole. In his review of this shift Capra refers to systems thinking as ‘contextual’ thinking or ‘environmental’ thinking (1996:36-37). What we call a part, he says, “is merely a pattern in an inseparable web of relationships” in which no “part is more fundamental than the others” (1996:39).

In this relational system/environment world the notion of hierarchy disappears because no level is more fundamental than the others. A system/environment perspective is non-hierarchical and system and environment are seen as an interacting whole. Bertalanffy (1968) referred to living systems as ‘open systems’ because they depend on a flow of energy and resources from their environment. He characterised them as networks of relationships rather than wholes to be dissected into parts. This new way of conceptualising systems brought new possibilities (see for example Lewin’s (1992) idea of ’order for free at the edge of chaos’ and the work of the Santa Fe Institute (Gell-Mann, 1994) which applies the concept to various social, economic and political systems).

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2 Capra (1996:43) cites the work of a Russian medical researcher, Alexander Bogdanov, who developed a sophisticated systems theory 20-30 years before Bertalanffy published his first paper on his ‘general systems theory.’
3.1.3.3 Comment

One possible way to describe a teacher development program could be within a system and environment framework rather than parts and whole. When dissecting the ‘parts’ of a program it would be shown that TILT, for example, was made up of CDROM, video, audio, print and Internet resources but it would say nothing about the relationships built in workshops and school visits that teachers say make the difference to their learning (Lum Mow, 1997a, 1998, 2000); or the history of program development; or the changing ‘pool’ of participants over the life of the program. A system/environment perspective has the potential for viewing the program as organic and dynamic rather than fixed and static; a process to be lived in rather than artefact to be adopted. If programs were viewed this way, it may seem that many more programs were deemed successful. Viewed through this lens it is possible that more participants would be viewed as adopters of new learning and less as resisters.

With respect to TILT a system/environment lens may well demonstrate that every part of the TILT environment is linked in a web of relationships that cannot be changed without changing everything.

3.1.4 System and environment: the observer and the observed and questions of reality

As I read further into the literature I realised that not only did ‘system’ itself have a number of interpretations but ‘system and environment’ also had a number of possible manifestations. To talk about describing a system and its environment could be: a description of a living system in an environment such as a single cell organism or a single cell in a multicellular organism; or a non-living system such as an atom or a bicycle; or it could be a description of a system made up of both living and non-living systems such as an ecosystem or an organisation or social system. It presupposes that there are such things as systems and that they are significant (to something or someone - an observer, who could be me) as they act and interact in an environment.
3.1.4.1 An observer constructed reality

Maturana (2002:32) whose central theme “as a biologist (and philosopher) became the explanation of the experience of cognition rather than reality” sees “reality as an explanatory notion invented to explain the experience of cognition” (Maturana, 2002:32). Nevertheless my exploration of system and environment has led me into a discussion of reality. When talking of a system I have arrived at the position through my reading (elaborated below) that the particular system and the particular environment do not have an existence as system and environment but that I, the observer, distinguish and define them. My observing of a system cannot be done without me and at the same time it is mine only. As I describe, through my life history, what I observe, my observations become my construction of reality. I agree with Glanville when he says,

I cannot talk of a world that is outside or detached from my experience. What I have is my experience, and that is all I have, regardless of whether or not there is some world existing independently of that experience. (Glanville, 2001:7).

This, it can be argued, is a constructivist position and is different from the idea of ‘constructivism’ found in some education materials, including teacher education materials, which seems to mean ‘students construct their own individual meaning or learning if they are allowed to participate in problem solving activities’ (i.e. otherwise they don’t!). The theoretical position behind such materials does not seem to address the question of a discovered or constructed reality. The view of a constructed reality is, it seems to me, a crucial difference between ‘systems thinking’ and ‘second order cybernetics’. ‘Systems thinking’ as expressed by Senge, Hargreaves and Fullan, I believe, assumes the system (reality) can be objectively observed. Second order cybernetics includes the observer’s role in the construction of reality. In my reading of the literature of second order cybernetics I have come to the understanding that both the observer and language are at the same time the phenomena to be studied and the instruments by which to study them.

3 Page number in emailed attachment, August, 2000.
3.1.4.2 Comment

My position as observer has significant implications. It means that I acknowledge that I can only describe, analyse and interpret out of my own personal history, which in turn entails my social, cultural being. Someone else might draw the system/environment boundary somewhere else and perhaps draw a different kind of boundary for example, solid, dotted or fuzzy and label a different conglomeration of particles as 'system' and another as 'environment'. Of course, others might see the world in a way that does not involve the language or concepts of systems and environments at all. This being the case I can only say that currently I find satisfaction in the idea of system and environment and recognise that I can only ask of that system and environment the questions I ask and in the way that I ask them. Heisenberg, quoted by Capra (1996:40), says, “What we observe is not nature itself, but nature exposed to our method of questioning”. My ‘method of questioning’ will not reveal reality but instead will construct one.

3.1.4.3 The observer's dilemma

As an observer I am part of an evolving system and at the same time I am part of the environment of other living systems. The observer's dilemma is how to be able to report on a system and milieu at a particular instant and as though an outsider to it.

It seems that describing a difference and so constructing a reality by bringing into being system and environment requires a third entity, the observer, a requirement that in turn changes the observed. Circling around this dilemma for some time has brought me to Glanville (1997c; 2001) who approaches it from a philosophical perspective.

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4 While researching TILT I’ve been told by teachers that this [i.e. the research] is excellent professional development. What this does to the professional development program I’m supposed to be observing who can say.
He says:

The act of observing involves circularity. Being based in observing, for there to be an I to do the observing, I must observe myself. Yet there is no observing without the I to do it: so the circularity exists between the I and the observing. Equally, when I observe what I come to think of as ‘it’, the observing is between the I and the it, making of the act of observing a whole that includes the I and the it within.

(Glanville, 2001:65)

The dilemma is referred to in systems theory as the ‘blind spot’ of a system or ‘paradox’ that according to Ort and Peter (1999) Glanville resolves by regarding system and environment not as a binary system and environment distinction but as a process of becoming. Thus the distinctions I make in the process of my study, the systems and environments that I put boundaries around I recognise as temporary and expedient metaphors for an ever-changing process of living/becoming.

3.1.4.4 Role of the observer

My role as observer in this research project is to communicate the distinctions I make while at the same time acknowledging the dilemma of observer and observed and recognising that the distinctions I make are associated with my own “interests and values, personal history, emotions and cognitive capacity, among other things” (italics in the original, Parra & Yano, 2002:80). Ort and Peter (1999:45) describe the notion of ‘communication’ in systems theory as “the processing of distinctions of operation and observation”. For example in researching and writing this study I am communicating (processing distinctions) and hence am part of the milieu of other living systems creating and in turn being created by what Maturana and Varela (1987) refer to as ‘our co-ontogenic structural drift’ (see following).

5 Page number in emailed attachment, August, 2000.
Continuing with this example then I can only report on the ‘becoming of system and environment’ at a particular time and place from out of a singular life history. As Maturana (1993) emphasised during his three day seminar at St Kilda: ‘everything said is said by someone’ and as Glanville (2001:6) says, “there can be no observing without an observer”. There are as many realities as there are explanations that an observer can bring to a phenomenon out of her or his praxis of living. And by reporting I change the milieu.

I take the second order cybernetic perspective that human beings are living systems who distinguish and describe in language the medium, themselves and other systems. In taking such a view I believe it follows that until distinguished from the background and described in language nothing exists (the word ‘exist’ originally meant ‘to stand out from’ or ‘arise’). Furthermore what I describe in language is a product of the activity of my own nervous system. Thus there is no such thing as objectivity (Efran & Lukens, 1985; Glanville, 1999). As von Foerster observes:

  objectivity is a subject’s delusion that observing can be done without him.
  Invoking objectivity is abrogating responsibility; hence its popularity.

  (in Fell & Russell, 1993:15)

However once distinguished and described, the system and environment I describe become objects in my conversations (which might be only my conversations with myself) and part of the environment of myself, and possibly others, as if they exist (Glanville, 2001) so contributing to the building of worlds. For example changing the view of a system such as family - maybe through therapy - changes the world I inhabit because it is now as if this new and different family ‘exists’ which has different consequences for the ways I can be in it (Dell, 1985; Efran & Lukens, 1985; Efran, Lukens & Lukens, 1990).
Second-order cybernetics like systems thinking and cybernetics relies on an observer to describe the world, however I believe the difference in second-order cybernetics is an acknowledgement that we are all observers (see for example: von Foerster, 1992; Maturana & Varela, 1987; Glanville, 2001). And as observers we describe one domain of reality while being aware that there are many domains of reality (i.e. each observer describes a domain of reality\(^7\)). In this paradigm there is no one ‘right’ view of the world, no possibility of objective commentary on a fixed, existing, reality. Likewise there is no one system but as many systems as there are people describing a system (e.g. as many different ‘families’ as there are family members (Maturana & Varela, 1987; Dell, 1985; Efran & Lukens, 1985; Efran, Lukens & Lukens, 1990)).

3.1.4.5 Comment

This has important implications for my observations for this study. For example:

- I must recognise that the story I tell is my own story;
- it is a story of myself and others, each with particular roles and intentions; and
- the story I tell of our encounters will become an artefact in our constructed environment, and so make a difference to whatever teacher learning is taking place.

If my story is one that resonates in some way with the teachers concerned it may provide a (distorting?) mirror through which they see another view of themselves.

This I believe is a great responsibility as a researcher and as a teacher educator.

\(^7\) An acknowledgement that there are other explanations possible in other domains is what distinguishes this position from solipsism in which the self is the only knowable or the only existent thing (see von Foerster, 1992). Glanville (2001:10) explains that “if all is my invention, I invent you. But if you can converse with me, you have invented me. So who invented whom first? Thus, there can be no primary inventor.”
It also means that as living systems we are interacting with the natural and constructed environment each out of a personal life history. Each of us will construct personal and different learning from the teacher learning environment in which we are operating. This has consequences for my expectations of program outcomes that must inevitably be different for each teacher and which cannot be pre-determined as each teacher is likely to follow a distinct and different life trajectory. My understanding of just how and why individual living systems construct personal and different learning is expanded below.

3.1.5 Change, learning and living

As living system and environment interact over time change occurs to both system and environment. This change enables the living system to go on living. Maturana and Varela (1987) suggest that this is learning.

3.1.5.1 Co-ontogenic structural drift

Maturana and Varela (1987) claim that we, like all living systems, are structurally determined systems. By this they mean that the way in which we respond to perturbations in our environment is determined by our structure. But the medium is also a structurally determined system. Recurrent interactions of both living system and medium will result in structural changes in both system and medium. What is true for the single cell, they say, is true for the multi-cellular unity. Who we, as living systems, are at this instant and the medium we find ourselves in mutually specify each other so that each contributes to creating the world of the next instant, and so on, creating the world by living in it. This process Maturana and Varela call co-ontogenic structural drift. In co-ontogenic structural drift the system does not adapt to the environment as in the classical system-environment model (Krohn, Kuppers, Novotny, 1990:9) but both change over time; either they ‘fit’ or separate or disintegrate. Maturana and Varela propose that the:

structure of the system determines its interactions by specifying which configurations of the environment can trigger structural changes in it.

(Maturana & Varela, 1987:135; see also: Dell, 1985; Fischbach, 1992; Kandel & Hawkins, 1992)
Moreover, they argue evolution and adaptation, which Maturana and Varela (1987) say is the term used by an observer to describe co-ontogenic structural drift, are not things that happen in multi-millennium leaps, they happen to individuals nanosecond by nanosecond over lifetimes and generations.

The structural changes triggered in the interactions of a structure determined system arise moment after moment also as determined by its structure, but they follow a course that is generated moment after moment by the succession of encounters with the medium in which the system participates. The same applies to the medium as a structure determined system that changes following a course that arises in the interplay of its own structural dynamics and the structural changes triggered in it by the systems that interact with it.

(Maturana, 2002:16)

As Fell and Russell (1993:35) say, “[t]his means that everything we have ever done together in this world could be a part of who we are and what we do today” and:

We cannot know what the future holds, but we can know that everything we do (or say) contributes significantly to it . . . This awesome responsibility is what we regard as the biological basis of our human ethics.

(Fell & Russell, 1993:35; see also von Foerster, 1992 on cybernetics and ethics)

3.1.5.2 Comment

Researchers agree that the importance of an ethical research design, processes and product is unquestionable; the biology of human ethics outlined above provides an explanation for why this is fundamentally important to humanity. It is also fundamental to a teacher professional development program. The ethics of development of training and development programs cannot be separated from the content being addressed by the training or its implementation model. All are entwined. The ongoing development of TILT outlined in chapter two was based on this premise.
Fullan and Hargreaves argue that teachers will judge a program by how it positions them as learners, what relationships it supports and in turn what they feel they can use as a result of the experience. However it seems that effective programs should provide more. Von Foerster (1992) argues, in his writing on ethics, that we should always work towards increasing options. If this is applied to professional development then good professional development should be judged in part by how it contributes towards increasing teacher options. More importantly the implication of co-ontogenic structural drift demonstrates the need for a diverse environment so that a wide range of living systems (participants) are able to find ‘configurations of the environment’ that can trigger structural changes in them. In other words, learning will happen as learners interact in the environment but that learning may or may not be directly related to the intentions of the program. It is possible that by viewing teacher development programs only in terms of the achievement of predetermined outcomes professional developers have missed identifying key learning that has occurred.

Having considered how and why individual living systems construct personal and different learning, and introduced Maturana and Varela’s concept of co-ontogenic structural drift, the next question seems to be: what determines which ‘configurations of the environment’ will fit and therefore what each learner will learn and why.

### 3.1.5.3 Information, change and survival

Moser says that,

> In order to perceive a certain feature of the world and to enact it as a socially meaningful concept we have to distinguish it from other phenomena.

(Moser, 2002:45)

In this way it becomes ‘information’ to us, or what Bateson (1972:381) calls “a difference which makes a difference”. In Maturana and Varela’s view the structure of the living system determines what is distinguished (what becomes information) and the particular impact that perturbations from the environment can have on the system as system and environment drift together without purpose over time in ‘co-ontogenic structural drift’.
Because each living system is structurally different each living system will distinguish different ‘perturbations’ in the environment as significant. Brier says, for:

something to be perceived as information it has to be of relevance for the survival and self-organization of a living system.

Brier (1999:178)

He also points out that it must therefore be “anticipated to some degree”. (1999:178). In other words learning is about survival; and we can only recognise in the environment and take from the environment as information, something that we in some way already anticipate through our whole body’s structure.

Reinforcing this view of relevance and anticipation Skarda says that:

Nothing takes place within the organism that is not always already related to what goes on outside of its skin.

Skarda (1999:80)

If we view living as learning then Brier’s ‘anticipations’ are the same as Bale’s reference, in an education context, to “self-stabilizing patterns” that have “succeeded, over time, in allowing the ‘individual’ to ‘fit’ within the context of a learning environment” (Bale, 2000:2).

These writers suggest that we living systems anticipate out of what our bodies already know and our anticipations allow us to ‘fit’ or ‘not fit’ with the environment.

This view of learning as the recognition, as information, of something in the environment that is anticipated and relevant to survival, has consequences for the traditional view of what constitutes learning and how learning takes place. Again quoting Maturana and Varela:

It is important to realize that we tend to consider learning and memory as phenomena of changing conduct related to ‘taking in’ or receiving something from the environment. This presupposes that the nervous system functions with representations.

(Maturana & Varela,1992:172)
However, they argue, learning takes place not by taking in information from the environment but by going on living in the environment, mutually adapting and changing (“to live is to know”, Maturana & Varela, 1987:174). Learning is:

an expression of structural coupling, which always maintains compatibility between the operations of the organism and its environment. When we as observers look at a sequence of perturbations, for which the nervous system compensates in one of many possible ways, it seems to us that it internalizes something of the environment.

(Maturana & Varela, 1992:172; see also: Jarvilehto, 1999; Varela discussed in Fell & Russell, 1993:65; Fell, 1993; Glanville, 1997c)

Maturana and Varela (1987:176) propose that this is what we call ‘learning’. They suggest that learning means new possibilities for action in an environment (‘new dimensions of structural coupling’). They provide a definition of knowing as “effective (or adequate) behaviour in a given context” (Maturana and Varela, 1992:174) or in Jarvilheto’s words “the possibility of acting in the environment appropriately” (1999:6). Maturana and Varela (1987) suggest that to go on living is to go on learning and as long as we are learning we are also living. In co-ontogenic structural drift, they say, we either live/learn together or we part company or we die. In Maturana and Varela’s terms therefore learning is surviving in one’s environment.

3.1.5.4 Comment

The notion of learning discussed above has important implications for professional development programs. It implies that we can only hope to create environments in which participants can find ways to ‘fit’. In ‘fitting’ with the environment (which includes other participants) both participant and environment will change. In the view expressed above such change in the participant is called ‘learning’. That this learning is what we who constructed the environment hope for or expect will depend on the kinds of connections participants make with the environment that we think we have constructed. It will be different for every individual because each will be in a different environment and each will make connections out of a particular life history.
The environment will hold different potential information for each individual participant according to each individual way of ‘fitting’ with the environment. In the present research into the learning of participants in the TILT program this means that Di and Robyn will learn different things from the program and their learning will be dependent on their life histories (i.e. they will ‘fit’ with different bits of the program and in different ways). Flexibility was built into the TILT program with this in mind. The program was not constructed with an expectation that teachers would ‘take in’ the content and then ‘know’ it.

The above discussion has addressed the question ‘what is learning’ and concluded that learning is change or learning is living, as living system and environment mutually change in co-ontogenic structural drift. It has addressed the question ‘why do people learn’ and ‘why do people learn this and not something else’ in discussing learning as surviving in an environment as each individual learner finds ways to ‘fit’. I am now left with the question of how learning happens to us as we become coupled with the environment.

### 3.1.5.5 System/environment thinking network

From his extensive observation of living systems Bateson (1972), like Jarvilehto (1999) believed that “mental characteristics of the system are immanent, not in some part, but in the system as a whole.” (italics in original, Bateson, 1972:316) and that “large parts of the thinking network are located outside the body.” (italics in original: 320). Rosanne Allucquere Stone (1995) talks of technology as prosthesis, asking where does the body start and end? Freeman and Núñez (1999:xiv) say that the “mind is not restricted to the brain or body but extends out into the world” and, “the mind is a seamless fabric of inner and outer experience”. In this way they argue, learners incorporate the world into their being through experience rather than through the processing of information and production of internal representations.

This idea of mind, body and world can be described as a total organism-environment system (Jarvilehto, 1999; Brier, 1993 & 1995; Bateson, 1972; Maturana & Varela, 1987; Winn & Windschitl, 2001) in which living organism and environment together form one learning system. In this view knowledge is not formed by the senses taking information in from the environment but as a whole body changing in dynamic reciprocal interaction in a milieu (i.e. in co-ontogenic structural drift).
The placebo literature illustrates this organism-environment learning system well. The ‘patient’ is ill; the body already holds the potential for wellness (as it must if a placebo is to ‘work’) but needs to interact with the medical environment in order for structural change (in this case, wellness) to occur in the living system.

Structural change releases the ‘patient’s’ internal pharmacopoeia (Brody, 1997) and the ‘patient’ gets well. Wellness did not exist in the ‘patient’, it did not exist in the environment either (not even in the sense of the potential of a pill to ‘cure’ since the placebo had no known direct effect on the patient’s illness). Wellness arose in the ‘patient’ as the whole environment and living system interacted. The subjective experience of illness and wellness would be different for every ‘patient’ and would depend in part on each individual’s ‘internal pharmacopoeia’ brought about by a particular life history.

(Murray, 2002a:111)

Maturana and Varela (1987), Brier (1999, 2000) and Jarvilehto (1999) say that the environment can only act as a non-specific trigger – triggering changes in us. Maturana and Varela (1987) say we are modified by every experience, every interaction has consequences for the operation of the nervous system although we are unaware of much of the stream of change, it enables us to go on living.

In the placebo literature and in education it seems, learning involves the whole body and the environment in a dynamic learning system. Cognition and emotions are engaged as the whole body interacts with the environment. In the case of the placebo example if you remove the placebo label you are left with an intervention (Maturana and Varela’s ‘perturbation’?) in someone’s life, in a medical context, in a socio-cultural environment, in a particular time and place from which the someone’s whole body changes/learns. I believe that the placebo research shows clearly that the whole body learns in a living system/environment thinking/learning network. Furthermore Maturana and Varela (1987) and Jarvilehto (1999) indicate that learning happens to us all the time, it enables us to go on living.
3.1.5.6 Comment

In the context of this study this means that there will be system/environment thinking learning systems where learning is taking place that is clearly not about information stored somewhere in the brain but is dependant on interaction of the whole living system and environment. It will be apparent in processes from which new learning emerges rather than in the testing for knowledge directly associated with what, for example, the workshop facilitator has said or demonstrated. In observing Di and Robyn in the classroom I may see evidence of idiosyncratic understanding of, and adaptations of, program intentions rather than a faithful representation of workshop materials. This approach could provide insights into teacher learning that may have been missed in a traditional program evaluation model where intended outcomes are stated in the course materials, are specifically linked to program content and processes and are therefore expected to be discernable post-course and are the same for everyone.

The above discussion of living system in its environment identifies ways that may be useful to the professional development world for examining teacher learning in a professional development program (for example, a teacher in a program workshop). It indicates that educators may need to take into account the importance of:

- relationships as part of the environment;
- a learning environment, processes and content based on ethical considerations;
- a varied learning environment using a number of different media and providing room for individual choices to ensure that there are ‘configurations of the environment’ to ‘fit’ the needs of all learners; and
- opportunities to learn in communication with others where ‘thinking networks’ are constructed in multiple conversations within and between participants, texts, teachers and technologies.
3.1.6 Summary

In practical terms the above ideas can be translated into a framework within which I can observe, discuss and question.

For example, if I believe:

there is no objective reality, and that I distinguish and describe a reality out of my own life history which when described becomes an artefact in the environment which may or may not be useful, then I need to share this view of the world with program participants; I need to invite their comments on my descriptions and ask if the descriptions I make are useful to them;

system and environment can usefully be described as a non-hierarchical web of relationships (rather than parts making a whole), then I should describe the teacher development program in terms of patterns of relationships rather than components (artefacts, processes, personnel, outcomes). I need to ask participants what (about the program) is important to them (and why), what they do in the program and what (and who) supports them, how they feel about the program (how it positions them as learners);

living systems are structurally determined and that recurrent interactions in an environment result in changes to living system and environment, then I need to look for changes to participants and program over time and to describe the ethics underlying the program development, content and processes. I should ask questions about increases in teacher options afforded by their participation in the program, spin-off changes to teachers’ school environments;

8 In previous research I have drawn on the work of Eisner (1991) and Guba and Lincoln (1989) who sought to legitimise qualitative (naturalistic) research by providing a strong alternative framework. They talked of participant feedback on, and satisfaction with, the researcher’s descriptions; and the usefulness of the researcher’s descriptions to participants and others. Here I have sought to uncover for myself the principles underpinning their work and build my own structure from those principles. In the next chapter I return to the research literature and the work of Eisner and Guba and Lincoln.

9 More recently Stronach & MacLure (1997) have addressed the same questions from a post-modern perspective.
learning is ‘new possibilities for action in an environment’ (an expression of structural coupling), then I need to describe the range of media available to participants and the processes and opportunities for participant choices in relation to what is learnt, when and where (i.e. possibilities afforded by the environment) and look for teacher change over time (i.e. enacting possibilities);

‘large parts of the thinking networks are located outside the body’, then I need to ensure participant opportunities for interaction (multiple conversations) with materials, other people, technologies; I need to describe ways in which participants change over time in relation to interactions with materials, people and technologies;

an educational change program is not a process or product to adopt. It is a part of individual life trajectories as idiosyncratic bits of the learning environment ‘fit’ with participants’ existing knowledge of the world and become part of their world, then I need to observe participants’ classrooms over time in order to understand how learning from the program has been incorporated into their practice. I need to ask what brought them to the program, what was significant in the program for them and why; and

a professional development program exists in a wider context that changes and is changed by the program, I need to observe school organisation and structures over time and ask teachers about their own influence on school changes and the influence of the school context on how they make use of their learning. I also need to look at changes in teacher entry characteristics (in relation to the program) over time and their influence on changes to the program.

A base data survey has been issued to thousands of teachers entering the program since 1995. It is evident from the program that for example, teacher access to technology at home and at school has changed considerably since the program began. This information has brought about changes to the program.
3.1.7 Conclusion

From the discussion above it would seem that teacher development programs ‘work’ in the same way as the rest of life ‘works’. As long as we living systems go on living our living strategy is working. We learn different things in different environments but always and only those things that we are ‘set up’ to learn in that circumstance and instant in life. Also we each take distinct and different learning from the same learning environment. All of which implies that it may be impossible to predict teacher learning from a particular development program. Hence my curiosity about the learning of individuals in TILT.

The literature outlined above, together with the change literature, provides some of the background against which TILT was developed. It also provides possibilities for a framework within which to examine the learning of individual teachers within TILT. It provides ways of describing knowledge, learning or change that may help in understanding how teacher development programs work (or don’t work) for individual participants.

The notion of co-ontogenic structural drift, it seems, provides a biological basis for the necessity to construct varied and flexible learning environments so that diverse learners can find ways to fit. In becoming ‘coupled’ with the environment – in finding ways to ‘fit with the environment’ we living systems change it and are changed by it – this, according to the sources I have quoted above, is learning. It occurs in communication, seen by Maturana (1993) as ‘languaging and emotioning’. Communication according to Maturana and Varela (1987) not only constitutes living systems as particular interacting human beings but also creates the world in which living systems exist and learn. They explain:

> since we exist in language, the domains of discourse that we generate become part of our domain of existence and constitute part of the environment in which we conserve identity and adaptation.

(Maturana & Varela, 1992:234).

If learning is about survival then it seems communication, as our means of becoming coupled with the environment in co-ontogenic structural drift, is fundamental to learning and hence to survival.
Part 2:  
Communication and learning

3.2.1 Introduction

If learning happens to us as we become coupled with the environment in a system/environment thinking learning system and if, as Fell and Russell (1993:35) say, “everything we have ever done together in this world could be a part of who we are and what we do today” and “[w]e cannot know what the future holds, but we can know that everything we do (or say) contributes significantly to it” then communication is an enormously important part of the environment.

This section of chapter three addresses the meaning of communication using Maturana’s (1993) description of communication as “the braiding together of languaging and emotioning” as a starting point. In doing so I address my fourth question: what is the role [in learning] of communication and the environment?

In trying to unpack Maturana’s definition of communication since I first heard it in 1993 I have frequently dipped into the emotions literature. I have also taken note of the way in which ‘emotion’ has been used by Fullan and Hargreaves in their discussions of teacher learning and touch on the differences between my understanding of the term ‘emotion’ and the way in which it is used in some of the change literature. In doing so I look at the emotions literature for help in unpacking ‘emotioning’. I again refer to writing on the placebo effect in medicine, this time as a way to understand the role of emotion in learning.

Communication with self is examined through Schon’s work on reflection, and metaphor is discussed as a bridge between the outside and the inside of communication as it possibly affords a glimpse of the meaning within, which Glanville (1996:3) says, we make “in order to construct, and to further our own necessarily individual worlds” which do not “exist before their construction”. This section helps answer my question: what is the role of communication in learning”. It also further pursues the questions: how does learning happen and what is the role of the environment.
As above, where I first traced my own developing understanding of system and environment arriving eventually at second order cybernetics as a lens through which to view the world, here I shall first explain my search through cybernetics to second order cybernetics for a satisfying meaning of communication.

Having explored a second order cybernetic view of communication and the importance of communication for building worlds I look at communication with self, through reflection, and with others through metaphor.

### 3.2.2 Communication, cybernetics and second order cybernetics

In the early days of cybernetics, says Glanville, communication was seen as the transmission of a message, transferred unaltered from one actor-location (the clearly defined sender) to another (the clearly defined receiver) through a channel of communication via a pair of transceivers at each end of a channel, by means of some unambiguous and determined encodement.

(Glanville, 1995:47)

This idea of communication dealt with the conveying of information, which, according to Shannon (1949), was to be conveyed as accurately as possible. This presupposes, says Glanville, that “meanings can be communicated without ‘meaners’ to construct the meanings” (1995:49). In reading and writing my way to an understanding of the meaning of communication I came across metaphors that underlined this cybernetic view.

In this world the metaphors for communication invoke the idea of container. Signals carry information, messages contain information, we analyse the content of a broadcast. Such metaphors imply that ‘one can remove from a message only what had been put into it and that this would have to be the same for everyone.’ (Krippendorff, 1993:7). . . Container and conduit metaphors leave no room for negotiated meaning.

(Murray, 1998:45)
In second order cybernetics, I found, the hard technological metaphors gave way to a quite different language. As Brier (1992:3) says, “[c]ommunication of information” gave way to “jointly actualized meaning” where, Glanville (1995:48) suggests, we “give meanings to the utterances we perceive others to have made”. In second order cybernetics not only was communication seen as transactional but also as fundamental to our living together in social systems, and ultimately, in Maturana’s sense, it came to be seen as the basis of our going on living in the world.

Communication, according to Maturana and Varela (1987) is part of the medium in which we operate, and, they say, communications trigger structural changes in us (e.g. changes in blood pressure), which make possible different conversations and so on (Kenny & Gardner, 1988); that is, the structure of the living system and the medium (which includes communications) change congruently:

> Each coupling triggers the change which brings about the next possibilities, so the flow of behaviour and the flow of physiology are mutually modulating.

(Fell & Russell, 1994:7)

A second-order cybernetic understanding of communication is important because it provides a biological explanation for the idea that information cannot enter us from the outside world but is constituted by us. Rodney Donaldson, President of the American Society for Cybernetics 1992-94, writes of the importance of this work: “Once we grasp that, as Maturana phrases it, ‘there are no instructive interactions’ (that -- for example, in the case of human knowing -- we are not built such that some externality called ‘information’ can enter us without some operation on our part which in fact constitutes ‘information’ as ‘information’) -- once we recognise that perception is an activity and not a passivity -- the notions of ‘communication’ and ‘control’, as well as ‘information’ either require redefinition or become quite quietly obsolete” (Donaldson, 1992: 12). Communication in the original cybernetic sense described above cannot exist (Murray, 1998).

Instead, I believe, communication operates in a second order cybernetic sense as Brier (1992), Glanville (1995; 1996), Maturana and Varela (1987) and Fell and Russell (1994) indicate. Communication is part of the environment in which the living system exists and learns and is the means by which we become coupled with the environment.
Above I looked at system and environment as key to learning. Below I examine the two crucial elements of communication described by Maturana (1993) as ‘languaging’ and ‘emotioning’ that are part of the environment.

### 3.2.3 Languaging

My intention here is to explain what I understand by ‘languaging’ as the act of living ‘in language’. This includes reflection as communication with self, and metaphor as a language connection between the bodily grounded outside self and the reflecting, changing inside self. I also introduce metaphor as a clue to the relationship between bodily experience and cognition (Lakoff, 1993), a communication with self and others linking the outside bodily experiences with the inside concept building self.

Fell and Russell explain Maturana’s term ‘languaging’ as not merely our “use of words, or our discourse, [but]... the structured (patterned) flow of our behaviour” (1994a: 220). Lemke (1998) who has an interest in systems and environments and writes a great deal in the area of language and literacy also describes something similar when he says:

> In face-to-face communication, we not only speak to one another, we dance with one another: we move our bodies, from our eye-gaze and eye-blinks to our arm and hand movements, our body postures, our leanings towards and away from one another, in a complex interactional synchrony of which the speech sounds we make are one integral part.

(Lemke, 1994:38-39)

11 Lemke’s description of ‘communicating’ also seems to me to imply Maturana’s ‘emotioning’.
And Maturana (1993a) says that nothing that we do in language, consciously or unconsciously, is irrelevant “because what we become in our bodies is fundamentally entwined with our language”. In other words communication changes us in a physiological sense which in turn brings about changes to our on going communication and so to our environment of which language is a part (which affects our physiology which affects . . . ) building a social system which appears to the observer as a “remarkable congruence of a dance of co-ordinations” (Maturana & Varela, 1992:209; also Fell & Russell, 1994).

Maturana and Varela (1987) believe that language is what distinguishes us as human beings, it makes possible reflection and consciousness, they say, allowing us to describe ourselves and our circumstances. It makes possible the observer as a:

languaging entity; by operating in language with other observers, this entity generates the self and its circumstances as linguistic distinctions of its participation in a linguistic domain.

(Maturana & Varela, 1987: 210)

It is this sense of ‘languaging’ that I see in Schon’s (1983) work on reflection in action.

3.2.3.1 Reflection

According to Schon (1983), reflections in action are the tacit theories that guide the moves of practicing professionals in second by second decision making. They are, I think, akin to Glanville’s “meta- and subconversations that allow a conversation to take place in an agreed context and to be corrected ‘on the fly’” (1996:12) keeping up with the sense making as we go along. The ‘languaging’ is not just in words but in the flow of behaviour that can later be reconstructed in words in reflection with others if need be (Pakman, 2000). According to Bamberger (2000:12) Schon believed that rather than ‘reflection’ meaning taking time out to reflect “on an object, subject, or idea – a stop-and-think” we should talk of reflection ‘in action’.
Bamberger, writing of some of the issues tackled by herself and Schon says:

> We say that ‘actions speak louder than words,’ but because the active mind behind the moment’s actions doesn’t seem to speak at all, we feel uncomfortable attributing the results of these reflecting actions, this sense making, to ‘knowledge’.

(Bamberger, 2000:13; see also Sung-Chan, 2000)

The notion of gaining knowledge, or learning, through reflection in action, which I believe is akin to ‘languaging’, further emphasizes the pivotal role of communication in learning.

The languaging part of communication in a second order cybernetic paradigm is not, I believe, used to represent a fixed reality (see above). I believe it is used, instead, to organise experiences and engage in interaction with ourselves and others in the course of which our worlds are created. An important part of languaging credited with helping to create worlds, and hence reality, is the use of metaphor. Below I look at Jaynes (1976) explanation of metaphor and Schon’s and Krippendorff’s views on the role of metaphor in constructing our realities.

### 3.2.3.2 Metaphor

According to Jaynes (1976:51) abstract concepts are generated by concrete metaphor. He points out for example the verb ‘to be’ generated from the Sanskrit ‘bhu’ to grow or make grow; ‘am’ and ‘is’ from the Sanskrit ‘asmi’ meaning ‘to breath’. Jaynes says they gradually lose their concrete images over time and become new concepts on which further concepts can be constructed, creating through metaphor endless new possibilities for perception and understanding of the world.
Metaphor therefore plays an important role not only in language, by generating new concepts and new vocabulary as it is needed by a society growing in complexity, but also in generating the “subjective conscious mind” which is “built up with a vocabulary or lexical field whose terms are all metaphors or analogs of behaviour in the physical world” (Jaynes, 1976:55). Schon (1979) and Krippendorff (1993) also refer to the generative nature of metaphor in constructing our realities. Krippendorff (1993:5) says that “metaphors organize their users’ perceptions and, when acted upon, can create the realities experienced” (italics in original). He goes on to say they “are not mere poetic embellishments in language, they affect their users’ perceptions and actions”. Schon, according to Bamberger, also believes that the “generative metaphor” is “crucial to the process” of learning something new (2000:10).

Núñez (1999) discusses universal metaphors such as *time as motion through space* and says that projections from source (motion through space) to target domain (time passing) are motivated “by our bodily grounded experience, which is biologically constrained” (1999:45). He believes one of the reasons we are able to build shared understanding in human conversations is because of the “inter-individual inferential stability based on shared species-specific bodily grounded experiences” (1999:58).

Lakoff (1993) says that the relationship between bodily experience and cognition can be seen in a close examination of our metaphors (for example the universal metaphor of time as motion through space (Núñez, 1999)) which can reveal something of our way of seeing the world.

However, according to Maturana (1993) languaging is only one part of communication. Below I explore emotioning, which together with languaging, Maturana says, makes up communication. In exploring emotioning I also discuss *emotion* in the sense in which it is used in the work of Fullan and Hargreaves.

12 An ‘analog’ is a model which is “at every point generated by the thing it is an analog of. A map is a good example... it is constructed from something well known, if not completely known.” (Jaynes, 1976:54).
3.2.4 Emotioning

In examining the ‘emotions’ literature in order to explain the ‘emotioning’ part of communication I have come to view emotions as fundamental to learning and indivisible from cognition. Below I draw on this literature to illustrate the integrated nature of emotions and cognition and show that changes in emotions are also linked to somatic changes making all learning a whole body experience that is fundamentally about survival. As illustration of the mind/brain body link I refer again to the placebo literature, which also highlights that the body’s learning system is about survival. The understanding of ‘emotion’ that I develop here is not the named emotions, such as ‘anger’ or ‘joy’ but the idea of living in the stream of emotion - Maturana’s ‘emotioning’ (which we sometimes slice up and name, thus generating an ‘emotion’ as a culturally and socially constructed ‘thing’ that, once named, changes the environment and so on).

The education literature over the past few years has taken an interest in ‘emotions’ (see for example Csikszentmihalyi, 1990; Caine & Caine, 1994, 1995; Sylwester, 1995; LeDoux, 1994). In 1998 Hargreaves (p837) reported that “[e]motions are virtually absent from the literature and advocacy of educational change”. Earlier Fullan (1997b) and Hargreaves (1997a) drew on Goleman’s (1996) work to define emotional intelligence which, they say, we need ‘to manage and moderate’ our emotions effectively. However Goleman deals only with a particular, middle class, western, male notion of control over emotions that are defined by a particular culture. Although it seems to be this aspect of ‘emotion’ that is currently being taken up in the education literature it is not the meaning of ‘emotion’ that I want to pursue. I want to develop a broader more basic view that illustrates the concept of ‘emotioning’ as part of our evolution and as fundamental to survival.

The part played by emotions in guiding behaviour for self-preservation and preservation of the species has long been considered important. Darwin’s work on emotions was published in 1872. According to Plutchik (1994:150) Darwin mapped a series of facial expressions that denoted a range of emotions. He theorised that complex facial muscles evolved to increase the effectiveness of communication.
Certain facial expressions can be found across cultures, in blind as well as sighted people, in the young and old and in some primates. These expressions can be identified with certain emotions by people from all cultural groups (Murray, 1999). Wimmer (1995:39) also sees emotions in evolutionary terms and writes of the need to recognise the integration of “cognitive and emotional phenomena”. And Buck says:

A great part of human communication is emotional communication, involving minute signals of affect, attention, approach and avoidance, and dominance and submission, that convey information of central importance to human social organization.

(Buck, 1984:3)

Similarly Lutz and White (1986:423) in their synthesis of the emotion research conclude that “no aspect of language is immune from appropriation by the semiotic of emotion”. And in Maturana’s (1993a) view we exist not only in the flow of language but also in the flow of emotions. He says that:

we learn as children the emotioning of the community in which we live, and transform or conserve it through the particular flow of emotioning that we happen to live in our singular individual lives.

(Maturana, 1993a:3)

### 3.2.4.1 Emotions and the brain

A discussion of emotions should, I think, acknowledge the world of neuroscience. According to neuroscientific research translated for education audiences by Caine and Caine (1994, 1995) and Sylwester (1995) emotions belong to the limbic system, more specifically to the amygdala. In research with people in whom the connections between the emotional brain and the neocortex had been severed because of damage to the brain Damasio (1996) discovered the importance of the emotion/cognition connection to how we live our lives. His research volunteers could not make decisions because they didn’t know how they felt about their choices.
Cytowic (1993) after a lifetime study of synesthesia concludes that the limbic system, that is responsible for emotions and is inaccessible to self awareness, is really the area of the brain which decides what is important in life and what must be done. According to Cytowic the cortex merely employs language to describe in rational terms what we have already emotionally decided upon. He believes that learning through emotions is fundamental to our relationship with the world (Murray, 1999).

Brody (1997:85) discussing the brain/body connection in the placebo effect in medicine, notes that peptide receptors are clustered in the parts of the brain linked to emotions rather than the cerebral cortex and that:

> at least some placebo reactions are mediated by peptides; and the fact that brain cells, immune cells, and other body tissues all share receptors for these peptides hints at the outline of a psychosomatic information network which would allow us to make much more sense of placebo data than would any more simplistic, Cartesian-dualist model.

(Brody, 1997:85)

Brody concludes that we may well “come to know about the world in large part via our emotional reactions to what we perceive” (1997:86).

The importance of relationships, surroundings, and socio-cultural meanings (Fields & Price, 1997; Brody, 1997; Spiro, 1997) together with placebo stimulated endorphin production point to a major role for emotions in the body’s process of learning to feel better. If, as I have come to believe (Murray, 2002a), the body has just one brain/body learning system, be it for learning in a health, education or any other context, then this further underlines the integral role of emotions in learning and the emotion/cognition connection expanded below.

### 3.2.4.2 Emotions and cognition

Brody says that chemical neuroanatomy is giving access to the workings of the nervous system bringing together “behaviour and molecules” (1997:87). Research around the role of emotions and cognition in the placebo effect in medicine and the work on embodiment of cognition (Núñez, 1999) indicate a fundamental integration of emotions and cognition and mind and body (see also: Brody, 1997; Damasio, 1996; Sylwester, 1995).
Furthermore, neurology, philosophy, medicine, cybernetics, systems and education converge on the notion that the mind is not just in the head it is part of a brain body system linking physiology and mental function second by second (see for example: Harrington, 1997; Edelman, 1992; Maturana & Varela, 1987; Sheets-Johnstone, 1999; Clark, 1999; Iverson & Thelen, 1999). In a broad sense, it seems to me, our whole bodies learn all the time including the learning of the immune system (Steele, Lindley & Blanden, 1998) and our muscular system (Kandel & Hawkins, 1992).

The placebo literature seems to indicate that the whole body learns in a medical/health context and Maturana and Varela (1987) Reyes and Zarama (1998) Bateson (1979) Roth (1999) and Capra (1995) say that the whole body learns in an education/knowledge context. Both contexts implicate emotion and cognition in learning, many of the writers above also suggest that the whole body is involved in learning.

### 3.2.4.3 Emotions and action

Sheets-Johnstone, (1999) while acknowledging that technological advances have made it possible to locate brain activity associated with certain emotional responses to stimuli maintains that this is not the whole story. She sees a far more complex interrelationship between brain and body. To omit the whole body dynamic is to miss the fact that emotion in an evolutionary sense is not there to communicate but “to motivate action” (p273). She concludes that “emotions are prime motivators” (p273).

Some of the ‘action’ arising from emotion can be language. Bar-On (1999) discusses the complications of expressing the “chaotic flow of feelings in digital, sequential words” (p98). He says, “[t]he production of words may in itself alter the stream, the nature of what we tried to capture with the words” (p105). He explores the possibility of a generative as well as an expressive relationship between language and emotion.

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13 The amygdala is said to ‘light up’ when we feel fear, stress, disgust or happiness (Hardcastle, 1999:237)
Our ability with words may in turn affect our flow of emotion and the ways in which others interpret our emotion – hence affecting relationships in the milieu of our lives. Language and emotions are inextricably entwined (see also for example: Reich, 1949; Lutz & White, 1986; Kovecses, 1990; Plutchik, 1994).

Sheets-Johnstone (1999) discusses the work of psychiatrist Nina Bull, which showed that “there is a generative as well as expressive relationship between movement and emotion” (p263). Bull used hypnosis to show that posture is vital to the feeling of an emotion. Having placed her subjects under hypnosis she told them that they would be asked to assume the natural outward behaviour of a given emotion and then afterwards describe what happened. Her experiment confirmed that “a certain neuromuscular attitude is necessary to, and coincident with, each particular emotion” (p263).

In a subsequent experiment hypnotised subjects were read one of their own descriptions of how they were moved, literally, by an emotion. They were then told that they were locked in this physical position. Unable to feel any new bodily sensations they were next asked to feel another, contrasting, emotion and describe it afterwards. The experiment showed that locked in the posture belonging to one emotion subjects were unable to feel the contrasting emotion which would have required a change in “postural set or bodily attitude” (pp263-264). From this study Sheets-Johnstone concludes that: “affective feelings and tactile-kinaesthetic feelings are experientially intertwined” (italics in the original 1999:264).

This is not a cause and effect sequence but an holistic and integrated experience. In other words emotion happens to us, the bodily readiness to act is a spontaneous, involuntary, happening, we feel an urge to do something. Sheets-Johnstone emphasises that emotion is not the action that follows such as embracing or running away, or naming an ‘emotion’ but the involuntary and momentary postural attitude, the movement of the body, the readiness to act, that allows for the subsequent action.

14 The descriptions matched familiar emotion/body associations such as: fear – jaws tightening; depression – feeling heavy; joy – feeling light and relaxed; triumph – chest expanding.
Sheets-Johnstone suggests that feelings of emotion and bodily feelings are only divisible on reflection after the event, she refers to this as “a way of being in the body” (p265). Sheets-Johnstone’s idea of emotions seems to me to come close to Maturana and Varela’s (1987) view of emotioning (Murray, 2001).

Sheets-Johnstone (1999) also discusses the work of Jacobson, a neuropsychiatrist working in the 1960s and 70s who also concluded that “neuromuscular tension is emotionally laden” (p261). Jacobson, according to Sheets-Johnstone, is credited with being the first to show that action potential of muscles varies in a predictable way according to mental activity, especially with feelings of tension. This is in contrast to the traditional view of brain exclusively as the site of mental activity. Jacobson’s work showed that muscle and brain work together. His research confirmed Darwin’s evolutionary studies in which he, Darwin, noted that movement and emotion go hand in hand.

3.2.5 Conclusion

It seems that learning happens throughout our body and our stream of emotioning has consequences for the way we are in the world, which becomes part of the lived world of ourselves and others. Emotioning is integral to cognising as Wimmer (1995:41) says, paraphrasing Kant “[e]motions without cognitions are blind and cognitions without emotions are empty”.

Emotioning has a generative as well as expressive relationship with action, which includes speech. Our lived stream of emotioning motivates our actions in the world. It is a part of all our communicating with self, artefacts and other living systems as one mind/body emotion/cognition learning system on which our survival depends.

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15 Sperry, before he became famous for his split-brain research, also spent many years researching perception and movement from which he concluded that “the brain is an organ that moves the muscles. It does many other things, but all of them secondary to making our bodies move.” (Carlson, 1992:214).
Furthermore it seems learning (to be well or to know/know about something) happens to us all the time as we live in the world. The discussion above indicates that a particular learning happens when there is a motive to learn, an appropriate learning environment and ‘information’ in the learning environment that is of significance to the learner (i.e. there is a ‘fit’ between learner and environment). Learning, it seems, is about structural change occurring in a living system in dynamic reciprocal relationship with its environment, which includes other living systems.

This reciprocal relationship, I believe, is sustained by the stream of communication that is part of the environment in which we learn and survive. The placebo literature documents the effect of environment, relationships and communication on the feeling of well being of the whole body and the roles of emotion and cognition in achieving wellness.

The emotions and placebo literature and cybernetic lens outlined in this chapter have the potential for providing researchers with a different framework to explore the learning of participants in any professional development program. I have tried to argue that such a framework may shed new light on both the program's development and the successful implementation of such programs that is quite different from those found in the traditional teacher development or change literature.

The emotions literature and the placebo literature illustrate the importance of the emotion/cognition learning connection. The second order cybernetic framework provides a way of understanding learning on the outside and the way in which people and artefacts interact to make a whole body/environment learning system in which the cognising, emotioning living system is part of the environment of other living systems and, by being so, changes their learning while at the same time being changed by it.
It seems, as closed, autonomous living systems interacting in an environment we construct our idiosyncratic meaning out of who we are and whatever communication is available to us. In communication as an observer with a research project to complete I describe the world that I construct in the context of the research from observation and interview (i.e. my communication with self, artefacts and other living systems). In doing so in languaging and emotioning I construct my own world and contribute to the environment of others. My quest is to understand more about ‘communication’ and ‘learning’ in co-ontogenic structural drift with program and participants.

Having discussed communication as integral to learning and survival I recognize that the process I adopt and the artefacts I produce in the course of this study are also part of the learning environment of participants, along with participant knowledge of, and participation in, statewide TILT evaluations.

Chapter four describes the research design and the collection and analysis of data. The design and methodology adopted here owe something to the theoretical framework described above as well as to the research literature. The research literature provides a language to talk about design, structure and processes as well as a collection of tools that have been created by researchers over generations of research projects. The theoretical framework developed in this chapter has contributed to the lens through which I interpret the research literature.
Chapter 4

Research methodology
The study at a glance

Chapter 2 Part 2: Socio-political context: TILT development and implementation

Chapter 2 Part 1: Research context: Change theory literature

Chapter 3 Part 1: Systems Co-ontogenic structural drift Change and survival System/environment thinking network

Chapter 3 Part 2: Langaging and emotioning

Chapter 4: Methodology

Chapter 5 Part 1: The TILT program setting

Chapter 5 Part 2: Di and Robyn’s learning in TILT

Chapter 6: Di and Robyn's learning in TILT through a cybernetic lens

Chapter 7: Conclusions

Viewed through the lens of...

Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7

Chapter Four
Chapter 4:
Research methodology

Chapter four looks at the research design and the collection and analysis of data. The design and methodology adopted here owe something to the theoretical framework described in chapter three as well as to the research literature. The research literature has provided a theoretical orientation, a collection of tools and a language to talk about design, structure and processes. The second order cybernetics theoretical framework developed in chapter three to examine the research data has also contributed to the lens through which I interpreted the research literature.

4.1 Introduction

This research project has evolved over time, building on reading begun over ten years ago. Its starting point was probably my reading of *The Tree of Knowledge* (Maturana & Varela, 1987) in 1990 and the idea that all communication is made up of the intertwined strands of ‘languaging and emotioning’ (Maturana, 1993). Below is an excerpt from my attempt (Appendix 3) to document the development of the research project.

I first heard of Maturana while driving home from Macquarie University in 1990. He was being interviewed on radio and I thought he was saying something important about education and love. While stopped at traffic lights I wrote the address of someone in Melbourne from whom I could obtain an authorised photocopy of the book *The Tree of Knowledge* for the cost of photocopying and postage. Maturana had authorised this method of distribution because the book was not available in Australia at the time. Several years later I bought a copy of the real thing.
I read the photocopied book several times late at night (trying to make sense of it) and fell asleep over it often. I can’t see now how difficult I found it at the time, but I know I did. Since then I have learned the language and the book is readable. However at the time, as the concepts unfolded (over my several readings) I knew that Maturana was saying things that I had tacitly believed about the way of the world since I was a child. As the world of second order cybernetics, into which I found later I had stepped, unfolded, I knew that this was the world I had always understood but hadn’t known existed. This was how I thought.

In 1993 I went to St Kilda to hear Maturana speak. I sat, listened and took notes for three days. I hardly understood what he was saying but I wrote everything down determined that I would understand it (and translate it into my own language) later. I bought a collection of photocopies of other Maturana articles. I met a number of people from Sydney and asked for help with my translations. They gave me encouragement and other things to read.

I wrote up my understanding of the three-day experience for my colleagues at work. I bought the video tapes of the seminar and lent them out. We talked about the ideas. I wrote them into a teacher development program that I was responsible for at the time. In 1994 a group of Sydney people asked me to join them in organising a Maturana seminar in Sydney. I did, and listened to another three days of lectures (by this time I felt I understood what was being said – I felt like an old hand). I invited Maturana to speak to a group of educators. We held a one-day seminar in a lecture hall at a large Sydney hotel. It was attended by about 50 educators from all over the state and from across the three education sectors. One participant from the Catholic Education Commission walked out after challenging a number of Maturana’s ideas about free will. Another participant (a cluster director in the NSW D of E) said it was the best professional development event she had ever experienced. Like me she said she wasn’t sure what it meant but recognised that it was important.

I published one or two articles in state journals and a chapter in a book to commemorate Maturana’s visit to NSW. I continued thinking and reading. It was after these publications that a friend suggested I turn my interest into a more formal study and I enrolled at the University of Wollongong.
4.1.1 Development of the focus of the study

Some of the original intentions of the study and strategies to be employed now seem naïve and faintly embarrassing. Had I not documented the evolution of the whole project I would have selectively forgotten some of the ‘bright ideas’ that occupied my thoughts from time to time. However the purpose of the study has always been to develop a grounded theory of teacher learning even though the path for achieving this purpose has changed several times. Guba and Lincoln (1981:275-276) refer to these changes as a normal process in research, calling it an “emergent design”. The purpose originated in a need for me to understand learning so that teachers could be well supported in the TILT program. It was also expected that a greater understanding of learning would benefit the development of a whole range of training and development programs no matter what the mode of delivery. While I acknowledge that there is already a range of research on teacher learning that can be found in the more traditional professional development literature, I have always felt that there was something lacking in these explanations. TILT was an extremely successful program according to the teachers’ exit evaluations, although not so successful in terms of classroom implementation of content over time according to the longitudinal surveys. So why and how did TILT impact on teachers' learning? What did they learn? And how did they learn? These were questions still needing an answer for me.

The research design was originally conceived as a comparison of teacher learning in a training and development program (TILT) that is offered to teachers in three different delivery modes (face to face workshops; CDROM; and distance education). It was felt that such a comparison would enable me to draw out important factors in the support of teacher learning.

Initially a small group of seven to ten participants in each delivery mode was to have been followed as they attended workshops (or engaged in CDROM or Distance Education learning sessions), practised their skills and implemented their new learning in classroom settings.
Teacher immersion in the learning was to have been measured by the amount of
time participants spent on thinking about and practising the skills covered in the
program. One way of accessing the teachers’ learning and feelings about that
learning once they had returned to school was to adopt a method used by
Csikszentmihalyi (1990). Csikszentmihalyi used ‘beepers’ to access workers’
feelings while at work. This method appealed to me. I planned for beepers to be
employed so that teachers could be ‘beeped’ irregularly during the day and asked to
record their thoughts, feelings and actions at the time. Workshops or learning
sessions were to have been video recorded and the recordings shown later to
workshop leader (of face to face workshops) and, on a separate occasion,
participants, as a memory prompt in an effort to uncover participant (and workshop
leader) emotions at the time of the workshop. In order to cross check emotional
responses, and uncover a part of what was going on ‘inside’ the participant, voice
analysis software (designed to detect emotions) was considered. In addition
participants were to have been interviewed following workshops or learning
sessions. Table 2 showing data collection tools and participant groups, formed part
of my original proposal.

**Table 2: Data collection tools and participant groups that formed part of the original research proposal**

<table>
<thead>
<tr>
<th>Group</th>
<th>Communication</th>
<th>Engagement</th>
<th>Teacher Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>video</td>
<td>observation</td>
<td>interview</td>
</tr>
<tr>
<td>facilit</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1 partic</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>student 4-6</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Tutor</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2 partic</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>student 4-6</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3 partic</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>student 4-6</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

(Groups 1 = face to face workshop; Group 2 = TILT be DE; Group 3 = TILT by CDROM)
I intended using observation, semi-structured interview, open-ended interview with video prompts and analysis of training materials in the three delivery modes. Large-scale statewide program evaluation (on completing the course and a random sample survey of participants across the state six months and twelve months later) was to have formed the background to the study. The whole research program was conceived as an ethnographic study, set against formal Department of Education and Training survey reports, out of which ‘grounded theory’ (Merriam, 1998; Denzin, 1998; Glaser & Strauss, 1967) would emerge.

Several difficulties with this plan emerged. The TILT program was recognised as a successful training program as evidenced by high participant evaluations and the winning of state and federal awards. Both TILT by Distance Education and TILT by CDROM were new and had not had time to evolve on the basis of participant feedback into well regarded, established programs. This would cloud any comparisons of teacher learning.

At the end of 1999 the TILT by Distance Education program conducted by Charles Sturt University was discontinued in a University restructure. The TILT by CD CDROM was delayed in production and when piloted in late 1999 was not technically stable enough for widespread participant use. The CD navigation and technicalities interfered with the learning so that no meaningful comparison of teacher learning from the materials and medium could take place. It would be another year before the CDROM technical and navigation problems were solved by which time the allotted research period would be almost over.

The supply of beepers to teachers was going to prove expensive. In addition the kind of voice analysis software sensitive enough to detect emotional changes was not available. I would need to find some other way to investigate the emotions of learning. It is interesting now to tease out some of the assumptions that underpinned these early deliberations.

For example that: the TILT program was an artefact the boundary of which could be identified in each of three modes; all teachers in the CDROM program would participate in the same CDROM program, likewise for the other two programs; teacher learning would occur as a result of inputs from the program; teachers would accurately describe their emotions when beeped; I would somehow be able to name emotions detected by voice analysis software; and I could expect a relationship between workshop attendance, skill practice and what was happening in the classroom (Figure 9).
4.1.2 Rationale for the new focus

Although the above difficulties caused me to abandon the original design of the study, the TILT program itself (face to face workshops) was stable, had been operating since 1995 and included twice yearly evaluation and base data (participant entry characteristics) reports and two longitudinal surveys of participant reported learning. As manager of the TILT program I was responsible for the evaluation research strategy. Although at one stage I considered comparing TILT with an online program (Log onto Literacy) I realised that basing the research in the TILT face-to-face program only would allow me to focus more closely on teacher learning. I could set this in the context of the DET statewide data. I hoped this would demonstrate the nature of the relationship between communication and learning and the way in which environments need to be constructed for particular learning to take place in living systems.
Throughout all my deliberations I was tentatively conducting observations in the hope that a focus would become clear as I began to engage in the research process and discuss my emerging ideas with teachers and colleagues.

### 4.2 Phases of the study

Partly because of this long gestation period my study seems to fall into three distinct phases. Throughout 1998 I observed two different TILT workshop groups and talked to facilitators and teachers, trying to identify what I wanted to know and how I could find it out. In 1999 I began again and video taped a whole new series of TILT workshops. In late 1999 and in 2000, having identified a focus for the study and enlisted the help of a small group of teachers, I followed up with school visits. Table 3 documents the three phases of development of the study.

**Table 3:** Three phases of development of the study

<table>
<thead>
<tr>
<th>Time frame</th>
<th>What?</th>
<th>How?</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1a: 1998</td>
<td>Pre-study observation of series of six workshops</td>
<td>Discussed research with TILT facilitator and negotiated access to workshops</td>
<td>• to help in formulating a research focus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Attended initial pre-workshop meeting of participants; explained research and sought approval to video tape workshops</td>
<td>• to test the feasibility of video taping workshops</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Video taped workshops</td>
<td>• to see what might be revealed by video tape</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• to become familiar with the workshops</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• to provide ideas for future interview questions</td>
</tr>
<tr>
<td>Phase 1b: 1998</td>
<td>Pre-study observation of series of six workshops in another district with a different TILT facilitator</td>
<td>As above</td>
<td>• to help in formulating a research focus</td>
</tr>
<tr>
<td>Phase 2: 1999</td>
<td>Observation of five workshops in first district but with a different facilitator</td>
<td>As above</td>
<td>• to see if it was possible to gain insight into emotions experienced by participants and facilitator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Issue research information sheets and participant consent forms</td>
<td>• to see what difference the TILT facilitator made to the learning context</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seek principals’ approval for classroom observations in preparation for Phase 3 (Appendix 4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seek DET approval to conduct research in government schools (March 1999)</td>
<td></td>
</tr>
<tr>
<td>Phase 3: 1999</td>
<td>Follow up school visits and interviews</td>
<td>Negotiate school visits with teachers and principals</td>
<td>Gain access to schools</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seek DET Doctoral support (1999 &amp; 2000)</td>
<td>Funds for audio tape transcriptions and teacher relief days for interviews</td>
</tr>
</tbody>
</table>
4.2.1 Phase one: pre-study observations

During phase one I spent a year following the progress of two different workshop groups in two different districts. I also accompanied the facilitator on school follow up visits on two occasions. The purpose of this phase was to try to identify a focus for the study and some possible ways of collecting appropriate data. I had a vague notion that I wanted to investigate communication (including the role of emotions) and learning but no idea how to go about it.

At the end of 1999 I had 24 hours of video-tapes, had discussed what I wanted to do with a number of enthusiastic teachers and facilitators, I felt that it was a worthwhile endeavor but only slightly better informed about how to do it. Meanwhile my reading, thinking and writing about cybernetics, emotions and learning (Murray, 1998, 1999) had carried on apace. At the time I hadn’t realised the significant role my reading was to play in the eventual shape of the study.

4.2.2 Phase two: workshop observations and post-workshop interviews

Phase two of the study was spent in video taping the series of workshops that was to become a subject of the research, and interviewing the research volunteers after each workshop. I had concluded from my two workshop groups in 1998 that the role of the facilitator did make a difference to the workshops but also that I was investigating the learning of individuals in a particular milieu. The TILT facilitator, whoever it was, would be part of the milieu affecting and being affected by whatever happened in the workshops. I would therefore need to include her as a research participant and provide descriptions of her work as part of the context in which the teachers were situated.

I sought approval from the local TILT facilitator to base my research around her workshops. This particular facilitator was chosen because she was interested in the research and I knew she would agree to my attending her workshops, and her workshops would be held close to my place of work, making it possible for me to get there by 4.00pm.
During the pre-workshop meeting for all 70 of the district’s participants I described my research and asked for volunteers for the project. Four people immediately responded and were scheduled by the facilitator into the same workshop group.

During this time I approached the principals of the volunteers’ schools for approval to observe in the classroom. I also sought approval from the DET to conduct research in government schools (Appendix 4).

4.2.3 Phase three: classroom visits and interviews

Phase three was devoted to school visits and follow-up interviews. At the beginning of phase three I applied for Doctoral Support from the DET Training and Development Directorate so that I would be able to offer the volunteer teachers some relief days to allow time for interviews. I also later used some of this support to pay someone to transcribe the audio recordings. Throughout the whole period of the research my reading and writing in the area of cybernetics, emotions and learning continued. Intensive reading of a particular area of the literature was followed by my attempt to make sense of my reading through writing and in many cases publishing of related articles (e.g. Murray, 1998, 1999, 2001, 2002a).

Figure 10 shows an excerpt from my research journal (Appendix 3) for May 1998 illustrating the integrated nature of reading, reflection, data gathering and writing throughout the whole study. It also shows one of the many titles I tried out along the way!
May, 27, 1998
2b Reading the Teacher in three modes of delivery
evaluation methodology

What significant things in your past have shaped your responses to TILT?

Edifice of program and program evolution that we all agree to - complicity
Ask about view of reality?

Observation, Semester 2, 1998: New series of Workshops

16/8/98
ask C.McC. what was your emotion at this point?
What do you think was the participant’s emotion?
Draw TILT; word association with TILT; what did you notice of the surrounding room? Intensity of the TILT experience? Flow?

31/5/98
Methodology – create the world by living in it.
The ‘bringing forth paradigm’ (Maturana & Varela). You are part of the milieu.

18/6/98
Methodology – post modern (Stranach & MacLure): What kind of stories can be told?

12/8/98
W’shop 1 H. School
Should I keep going with S. School or start again here? How do you read the teacher?

19/8/98
w’shop video viewing with C.McC. looking at body posture, shape. Ask what are you thinking now?

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Communication</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pask (1975 &amp; 1996) – conversation theory.</td>
<td>Language; words – constructed meaning; keeping up the words; building a house from the top floor down</td>
<td>Define a boundary of convenience. Life is passing the time between being born and dying. After the necessities all is entertainment</td>
</tr>
<tr>
<td>Energy – where is it from? Robinson (1972)</td>
<td>Paper accepted for C&amp;HK vol. 6, no. 1, 1999: Reading the Teacher: Teacher as multimedia text in the classroom communication milieu.</td>
<td></td>
</tr>
</tbody>
</table>
4.2.4 Ethical considerations

Throughout the three phases outlined above other tasks associated with formal study were being completed. The most important of these dealt with ethical considerations. They included:

- presentation of my research proposal to a University panel for approval to proceed;
- approval to conduct research from the University’s Human Research Ethics Committee;
- address to the whole district group of 70 TILT participants explaining the research;
- approval from the DET to conduct research in government schools;
- written permission from the TILT workshop group to video tape the workshops for research purposes;
- written consent to be part of the research from all volunteer teachers; and
- letter of introduction to the schools, with description of the project and University Ethics Committee and DET research approvals attached; and written request to observe in classrooms (see Appendix 4).

Informally there were other ethical considerations that I felt were important. I applied for tertiary studies assistance from the DET so that the research volunteers would receive relief days to compensate for their time spent talking to me and also for the time I spent in their classrooms. I felt this was important because teachers have little spare time. I also provided morning tea for the principal and staff whenever I made a school visit. This was greatly appreciated. I provided afternoon tea and dinner for research volunteers who spent several hours with me after school watching the workshop videos. These were a small but important recognition of the teachers’ generosity in spending time with me.
As the writing progressed I ensured that everything was shared with the research volunteers. I was anxious that the reading and responding was not an additional burden to them so provided relief days for meeting and discussing the work.

In transcripts of audio recordings the school names were changed for anonymity and teachers were identified by first name only. I suggested changing the names completely and did so in one of the early pieces of writing that I shared with the group. However the teachers wanted to revert to their own given names.

### 4.3 A qualitative research paradigm

The process described above in the development of my research project suggests a qualitative research paradigm in order to best explore learning with the purpose of developing a grounded theory. Furthermore the principles underpinning qualitative research are consistent with the principles embedded in a cybernetic view of the world. For example qualitative research allows for multiple realities and the interaction of players in the co-construction of realities. To quote Guba and Lincoln:

> we have come to appreciate the central feature of our paradigm is its ontological assumption that realities, certainly social/behavioral realities, are mental constructions. Thus we have elected to use the terms *constructivism* and *constructivist* to label the paradigm and the person engaged in carrying it out, respectively.

*(italics in the original, Guba & Lincoln, 1989:19)*

Within a qualitative research paradigm subjectivity is both acknowledged and discussed. This leads to a recognition that there are multiple realities and that the researcher’s task is to create a reality which represent to the satisfaction of all participants the phenomena being studied. Says Schwandt:

> Truth is a matter of the best-informed and most sophisticated construction on which there is a consensus at a given time.

*(Schwandt, 1998:243)*

Quality of the research will depend on mutual satisfaction and the usefulness of both process and product.
Eisner (1991) argues that there are six features of qualitative research. These are:

- it is field focused;
- it uses self as instrument;
- it is interpretive seeking to account for the phenomena reported on;
- it uses expressive language;
- it pays attention to particulars; and
- its criteria for success are its "coherence, insight, and instrumental utility" (italics in the original, Eisner, 1991:39).

These features, I believe, are evident in my data collection process and are discussed below in more detail.

### 4.3.1 ‘field focused’

This is referred to by Guba and Lincoln (1989) as ‘naturalistic’, that is, the research itself takes place in natural settings. The natural settings that I visited were: TILT workshops in the school library or classroom; teachers in their classrooms; students at work in the computer room; and participants in the school staff room. However being ‘field focused’ does not just refer to observations and interactions with people. It includes artefacts such as equipment, course materials, communications and organisation that are part of the natural business of the program to be studied. I had access, through my position as statewide manager of TILT, to all materials and documents involved in the TILT program.

### 4.3.2 ‘self as instrument’

Maturana and Varela make the deceptively simple statement that “everything said is said by someone” (1992:27) (see chapter three). It is a reminder that my descriptions arise out of my ontogeny. To bracket out one’s life history is not possible (either for participants or for researcher). In conducting this research I attempted to accommodate this by regular journal writing (Hutchinson, 1988) (Appendix 3) so that my values and some of the dilemmas faced in conducting this research would become ‘propositional knowledge’ rather than ‘tacit knowledge’ (Guba and Lincoln, 1989).
Eisner (1991:33) referring to “the self as an instrument” argues that:

> each person’s history, and hence world, is unlike anyone else’s. This means that the way in which we see and respond to a situation, and how we interpret what we see, will bear our own signature. This unique signature is not a liability but a way of providing individual insights into a situation.

(Eisner, 1991:34)

Denzin and Lincoln (1998) referring to the researcher as ‘bricoleur’ also discuss the shaping of research by personal history.

I believe that the research is not just shaped by my history it is part of my history. Whatever emerges from the research exists by virtue of being defined and given a boundary (or boundaries) by the research process itself, which is part of my life and includes me and everyone else who plays a role. In Bateson’s (1972:381) words it will become a “difference which makes a difference”, that is, it will become information for those involved and potential information for a wider audience. This fits with Maturana’s view that we create the world by living in it. By inhabiting spaces over time with the TILT participants who are part of this study we created a world together that would not otherwise have existed. A description of this world, a text that provides a symbolic presentation of my construction of this world, constitutes this research report.

**4.3.3 ‘interpretive, seeking to account for the phenomena reported on’**

Eisner (1991) says that ‘interpretive’ has two meanings. The first meaning, he says, is that “inquirers try to account for what they have given an account of” (italics in the original, p35). He suggests that sometimes this requires “the use of constructs from the social sciences. At other times it requires the creation of new theory” (p35). In the case of my research this has required constructs from second order cybernetics in order to take a fresh view of what I report on. The second meaning Eisner attributes to ‘interpretive’ is the pursuit of an understanding of what “meaning events have for those who experience them” (p35).
The notion of self as instrument, referred to above indicates that the reliability of the research rests on the reliability of the researcher (me) to act with integrity and with respect for the different realities of participants. In terms of ‘realities’ my research took a phenomenological approach attempting to understand what the systems, processes and phenomena mean to the participants. One of the strategies I employed to assist in this was for participants to write their own histories of significant learning since childhood (chapter five part two). I used these to help understand the learning that I observed during the nineteen months of the research project. Another was participant feedback on developing texts.

Stronach & McLure, in their postmodern approach to evaluation, suggest the use of a report and respond questionnaire that combines:

feedback based on preliminary interview and data analysis (a kind of potted case study) with an invitation to agree or disagree with the feedback, as well as add to it.

(Stronach & McLure, 1997:104)

This they believe can prompt teachers to defy the text and question findings as well as in some cases enter into extended conversation with the researcher and occasionally question methodology. They see it as one way to address the underlying unevenness in power between researcher and participants described by Miller (1992).

My data collection depended on ‘extended conversations’ with participants. These were usually conducted in informal settings and settings familiar to the participants; we shared meals while watching the workshop video clips and used informal language in email and fax correspondence. I requested feedback at all stages of the data analysis and informally reported back to indicate changes made on the basis of feedback. Guba and Lincoln (1989) refer to this process as ‘member checking’, which checks emerging interpretations of data with those from whom the data were collected. It is part of the hermeneutic process advocated by Guba and Lincoln (1989) as a means of quality control:

It is the immediate and continuing interplay of information that militates against the possibility of non-credible outcomes. It is difficult to maintain false fronts, or support deliberate deception when information is subject to continuous and multiple challenges from a variety of stakeholders.

(Guba & Lincoln, 1989:244)
I also attempted to address any feelings of discomfort my interviewing may have held for participants by inviting participants to interview each other as suggested by Glanville (informal conversation, Sydney, 12/5/1999). For example in the final interviews (July 7, 2000) with the two major participants in my study, Di and Robyn (see below) Di and Robyn asked each other the questions I had prepared instead of my asking the questions first of one and then the other. Both said they found this an interesting and enjoyable experience. The process left me free to take notes.

4.3.4 ‘uses expressive language’

Traditionally research reports have been written in the third person to imply ‘objectivity’. However in acknowledging ‘self as instrument’ I refer to myself in the first person throughout the text to remind the reader of the subjective nature of this report. Traditionally research reports have avoided language that conveys an emotional relationship with the content. My research is about providing satisfying explanations about learning (satisfying to me and to the teachers involved) therefore the language I use in expressing my understanding must be my voice and must speak to the participants in ways that resonate with them in some way.

The theoretical framework described in part one talks about Maturana’s (1993) notion of communication as the ‘braiding together of languaging and emotioning’. This means that we live ‘in language and emotion’, all texts, spoken, written or constructed in a multitude of media, have consequences for us as we live together in co-ontogenic structural drift. There is no escaping the emotioning of communication I have therefore endeavored to ensure that my use of language conveys as much as possible my relationship (as far as I can know it) with the message rather than one imposed by traditional notions of ‘doing research’. The whole point of my research in a cybernetic framework demands it.

4.3.5 ‘pays attention to particulars’

Qualitative research conserves the uniqueness of the particulars of the study and reports the distinctive features rather than transforming data into generalities. In my research this means that the teachers, their classrooms and their learning are not lost in abstractions. I describe them with the intention of rendering them recognisable to the teachers themselves and seek feedback on my writing to check that this is what I have indeed done.
Since my research is concerned with the uniqueness of the learning of each individual maintaining the particulars is fundamental to what I am doing.

### 4.3.6 ‘coherence, insight and instrumental utility’

Eisner (1991:39) says that “coherence, insight and instrumental utility” are the criteria for success. He suggests that:

> Qualitative inquiry, like conventional quantitative approaches to research, is ultimately a matter of persuasion, of seeing things in a way that satisfies, or is useful for the purposes we embrace.

(Eisner, 1991:39)

My research will have value if it produces ‘acceptable and satisfying’ explanations for stakeholders and theory useful to educators in future development of teacher training and development programs. According to Hutchinson (1988) “[a] good theory proposes a new and relevant way of seeing” (p138). This research seeks to provide a ‘new and relevant way of seeing’.

### 4.3.7 Grounded theory

Grounded theory or “theory that emerges from, or is ‘grounded’ in, the data” (Merriam, 1998:17) is explained by Merriam (1998) as substantive rather than formal theory, which she goes on to explain as theory that has a “specificity and hence usefulness to practice often lacking in theories that cover more global concerns” (p17).

She explains that “substantive theory consists of categories, properties, and hypotheses” (p18) where the properties are dimensions of the categories (or describe the categories) and hypotheses draw relationships among categories and properties. Categories are produced by constantly comparing one segment of the data with another for differences and similarities enabling data to be grouped under category headings that emerge from the process. The aim is to discover patterns in the data, which can then be arranged in relation to each other to build theory from the ground up.
Strauss and Corbin (1990) describe a grounded theory as:

one that is inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to the phenomenon.

(Strauss & Corbin, 1990:23)

In my research the grounded theory emerges from the process of categorising data collected in observation and interview over nineteen months of the study and applying a theoretical lens not usually applied in a teacher education context. In this way: my data collected through observation and interview; my analysis through an iterative (and seemingly never ending) categorisation process; and application of a cybernetic lens, developed through reading, writing and discussion, made up my grounded theory process. This accords with Strauss and Corbin’s (1990:23) idea of grounded theory where “data collection, analysis, and theory stand in reciprocal relationship with each other”.

4.4 Data collection

Denzin and Lincoln (1998:3) refer to qualitative research as ‘bricolage’ and say that the:

researcher-as-bricoleur uses the tools of his or her methodological trade, deploying whatever strategies, methods, or empirical materials as are at hand.

(italics in original, Denzin & Lincoln, 1998:3)

They (1998:3-4) suggest that the use of “multiple methods, or triangulation” reflects an “attempt to secure an in-depth understanding of the phenomenon in question”. They see triangulation as an alternative to validation, a “strategy that adds rigor, breadth, and depth to any investigation” (p4). As well as the three data collecting techniques of interviewing, document analysis and observation, they include “intensive self-reflection and introspection” (p4) among the diverse methods employed by the bricoleur/researcher.
Guba and Lincoln (1989) suggest that a better way than triangulation to establish credibility in qualitative research is ‘member checking’:

The process of testing hypotheses, data, preliminary categories, and interpretations with members of the stakeholding groups from which the original constructions were collected.

(Guba & Lincoln, 1989:238-239)

They make the distinction that member checking should be used to verify that:

the constructions collected are those that have been offered by respondents, while triangulation should be thought of as referring to cross-checking specific data items of a factual nature.

(Guba & Lincoln, 1989:241)

Maturana and Varela (1992) and Fell and Russell (1994a) use the concept of explanation which is acceptable to a group of people who share a criterion for validation by virtue of co-inhabiting a particular domain of existence. In terms of research this means creating a shared domain through communication in a shared milieu. Credibility arises from the transparency of the methods used (Lincoln & Guba, 1986) and frequent member checking and checking with the wider group (Stronach & McLure, 1997) to ensure mutual satisfaction with the growing body of information arising from the data.

In qualitative studies Merriam (1998:134) says, three data collection techniques are often used: “conducting interviews, observing and analyzing documents”. She goes on to say that qualitative studies in education often employ only one of these. Table 4 shows my data collection instruments and data sources that I hoped would convey something about communication and teacher change over time.
Table 4: Data collection instruments and data sources

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Data sources</th>
<th>Data to be collected</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participant/facilitator communications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| video recording | workshop group and facilitator | video footage showing communication inc. spoken language body language of participants and facilitator | • analyse spoken language & body language  
• memory prompt for questions about feelings (own and others') to reveal a version of the emotional subtext.  
• provide data on which to base interview questions |
| observation | workshop group and facilitator inschool follow up session | notes on communication (facilitator/participant participant/participant) | • provide data on which to base interview questions  
• gain insight into emotions experienced by participants and facilitator in the learning situation |
| Post workshop interview | 4 participants as a group and facilitator separately | answer to questions: what happened in the workshop; what did I learn; what was I thinking/feeling | • gain insight into participant and facilitator view of the workshop |
| emotions check list | workshop group and facilitator | feelings of workshop participants at beginning, middle and end of workshop | • insight into emotions experienced by workshop participants during the course of the workshop |
| **Participant learning (change)** | | | |
| Observation (during 6 workshops) | 10-12 workshop participants and facilitator | participant computer and technology skills | demonstrate change in skills over 1 semester |
| Classroom observation | 4 participants | qualitative data on  
• changes to classroom practice  
• changes to administration | gain insight into teacher learning (change) over time  
gain information on impact of TILT on teaching and learning; changes in teacher skills |
| follow up interview (after classroom observations) | 3-4 participants | perceptions of skills self reported change/learning | understand participant perceptions of changes to skill levels (self reported) and classroom practice; views on the program |
| Video recall (semi-structured interview) | 4 participants (2 groups of 2) facilitator (separately) | What they remember of the event on video; how they felt; what they learned | understand participant feelings and learning |
| Reciprocal interviews | 2 principal teacher participants | The program in retrospect, what they learnt, what they’ve changed ‘map’ of own life long education journey | gain insight into teacher’s own view of learning (change) over time  
understanding of how TILT learning might fit into life time of learning |
| Base data survey (TILT participant profile) | all workshop participants | use of and access to computer technology before undertaking TILT program | place participants in context of all TILT participants |
| Beliefs About Consciousness and Reality survey (Barus, 1990) | 4 participants and facilitator | Information about ‘notions of consciousness, beliefs about reality, the means of understanding reality and attitudes towards life.’ (Barus, 1990:1) | deeper understanding of participants’ beliefs and attitudes |
| Learning Style Inventory (Education Hawaii, 2000) | 4 participants | Information about ‘how you prefer to learn and process information’ | deeper understanding of participants’ approach to learning |
In the case of my research I have relied primarily on interviews and observation to collect the data. To establish credibility among those with a stake in my research I have regularly checked my writing with the research participants inviting their comments. I have tried always to produce explanations that are satisfying to myself and to participants recognising that my explanations become part of the milieu (the medium in which we operate) contributing to a shared view of the world which in turn changes the people, which changes the milieu, which changes the.... and so on, thereby creating a community (who share a criterion for validation).

4.4.1 Interviews

The five TILT workshops\(^1\) that were video recorded and used for this study were followed by a half hour tape-recorded interview with a group of four participants who had volunteered to be part of the research. At the same time the TILT facilitator recorded her answers to the same questions in another room (this was so that no-one was held up for more than thirty minutes after the close of the workshop). The purpose of the interviews was to uncover what, of everything covered in the workshops, was considered to be ‘information’ to the participants. The interviews were also an attempt to uncover the emotional aspect of participation. The discussion each week centered around the questions: What did you do (in the workshop); what did you learn; what were you thinking and feeling? Each session I posed each question and then allowed the conversation to run its course even though, to me, the conversation often seemed to be ‘off course’. When one question was exhausted I posed the next one. A draft report (Appendix 5) from these discussions was given to the four teachers for comment.

Two participants travelled home together after our meetings and volunteered after our first post-workshop meeting to record a further thirty-minute discussion in the car following the workshops. This occurred for workshops three, four and five.

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\(^1\) I was held up at work and missed the first workshop.
The six and a half hours of recordings were transcribed. The transcriptions recorded as much as possible of what was said. Record of the tone of voice was omitted but laughter was indicated as part of the spoken text. Hesitations and sections untranscribable because of noise or interference were noted on the transcription. When using the transcriptions later in the data analysis phase of the research I returned to the original tape whenever there was ambiguity or an omission in the transcribed text.

All classroom observations were followed by informal interview (see observations following).

In addition I spent a day, in July 2000, with the two principal research volunteers in which they questioned each other on their own learning journey through TILT. They discussed the highlights of the TILT program, what each thought the program was about, what values they thought underpinned it and any breakthrough moments in their learning. Each also constructed a ‘map’ of their educational milestones since childhood noting significant learning events.

These questions arose out of my ongoing reading in the cybernetics literature. I was interested to see how TILT fitted into each participant’s life time learning events, since I had begun talking of ‘life trajectories’. I wanted to understand their individual learning breakthroughs since I was discussing the idiosyncratic nature of learning. I wanted to know what each thought the program was about since I had started talking and writing about each of us being in a different environment.

Rubin and Rubin’s (1995) art of hearing data was helpful in achieving the kinds of conversations that gave rise to satisfying explanations. Interviews, they say, “seek out explanations of events and descriptions of processes” (p29). My informal interviews and the teachers’ recorded conversations provided the data which were ultimately to become the basis of the explanation of teacher learning over time.
4.4.2 Observation

Visits were made to classrooms of all four research volunteers. The purpose of the visits was to observe what, if anything, from the workshops was being implemented in the classroom. However I stressed that the teachers were not to do anything outside the normal classroom routine on the days of my visits and I believe that this was the case. My visits were also about ‘getting to know’ the teachers, something about their histories, beliefs, and values. Observation periods varied from one or two hours to a full day (see below for observation schedule). During the visit I sketched the classroom, noted the wall posters and art and craft works and wrote as much of the classroom dialogue as possible. Each observation visit was followed by informal conversation with the teacher. Each visit was written up as a case study and returned to the teacher for comment. Two of the teachers spontaneously shared their case studies with each other and commented on each other’s report. Here I am using the term ‘case study’ in Merriam’s (1998:26) sense of “case as a bounded system” (italics in the original), an entity bounded in time and space. In terms of my study it is one day (or part day) in the life of a classroom. The texts I produced provided a description of the day. The teachers said that they found them fascinating and willingly provided me with feedback on my writing. They wrote extensively in the margins of the page and visited me to discuss their comments (e.g. Robyn, Appendix 1). Their comments were used in editing and redrafting the texts. Although I produced texts for the initial visits to the classrooms of all four teachers, for pragmatic reasons to do with time and location I only paid a second visit to three of the teachers (two at the same school) and finally settled on just two for further interviews. Again the reason was pragmatic, I had by far the most data on these two teachers, found them interesting and very different, and they were enthusiastic supporters of the research itself, always willing to discuss aspects of it and keen for me to pass on readings about the theoretical framework. Because of their keen interest I did not feel I was intruding on their time.
4.4.3 Video recall

Marland and Edwards (1986:76) report using lesson videos to prompt student recall and provide access to “thinking during instruction”. They quote the long history of use of video recall in “research to study the mental functioning of people at work in various task environments” (p76).

Five two-hour TILT workshops were video-taped for use as memory prompts for later discussion with participants. The discussion centered around their learning, feelings and thoughts at the time of the workshop with conversation prompted by questions like: What were you thinking there? How did you feel when that happened? Ultimately only the tapes from workshops two, three and four were used for video recall. Video tapes from all workshops were used to supplement the field notes in producing a written record of the workshops (see Appendix 6 for samples).

Because the video was to be used as a prompt only and not as a record of the workshop, video-taping was done by setting up the video in one corner of the room and pointing it towards the group. Occasionally I moved the camera, for example, if the group broke up into smaller groups or worked individually at computers.

The four research participants spent four and a half hours in two groups of two viewing video clips of workshops two, three and four and commenting on what they could remember of the circumstances and their thoughts and feelings at the time. The TILT facilitator watched the same video clips in a separate interview. Video clips were chosen that showed the participant(s) engaged in listening, talking or doing something in the workshop. All conversation from the video recall sessions was audio-taped and later transcribed.

Table 5 provides an overview of all data collection events and a data collection time line.
### Table 5: Data collection instruments and timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Semester</th>
<th>Interview</th>
<th>Observation</th>
<th>Video recall</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>Semester 1</td>
<td>Post workshop (30mins) 4 research volunteers</td>
<td>Workshop 2 (the internet) (2hrs) observations plus video taping</td>
<td></td>
<td>Facilitator debrief: audio taped answers to post workshop questions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>March 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>March 30</td>
<td>Post workshop (30mins) 4 research volunteers</td>
<td>Workshop 3 (related technologies) (2hrs) observations plus video taping</td>
<td>Facilitator debrief: audio taped answers to post workshop questions Di &amp; Cheryl car conversation (30mins)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>May 4</td>
<td>Post workshop (30mins) 4 research volunteers</td>
<td>Workshop 4 (software) (2hrs) observations plus video taping</td>
<td>Facilitator debrief: audio taped answers to post workshop questions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>May 6</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>May 19</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>May 25</td>
<td>Post workshop (30mins) 4 research volunteers</td>
<td>Workshop 5 (How can I do this in my classroom?) (2hrs) observations plus video taping</td>
<td>Facilitator debrief: audio taped answers to post workshop questions Di &amp; Cheryl car conversation (30mins)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>June 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>June 15</td>
<td>Post workshop (30mins) 4 research volunteers</td>
<td>Workshop 6 (future directions: multimedia) (2hrs) observations plus video taping</td>
<td>Facilitator debrief: audio taped answers to post workshop questions</td>
</tr>
<tr>
<td>1999</td>
<td>Semester 2</td>
<td>Interview</td>
<td>Observation</td>
<td>Video recall</td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Di &amp; Cheryl Following observation (2hrs)</td>
<td>School visit: Di 4hrs Cheryl 1.5hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nov 1</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Nov 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nov 22</td>
<td>Post-observation (30mins)</td>
<td>School visit: Robyn K. (3hrs)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dec 2</td>
<td>Post-observation (30mins)</td>
<td>School visit: Robyn H. (4hrs)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dec 20</td>
<td></td>
<td>Facilitator (2hrs)</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Semester 1</td>
<td>Interview</td>
<td>Observation</td>
<td>Video recall</td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td></td>
<td>April 5</td>
<td>School visit: Di 3hrs Cheryl 1.5hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>May 22</td>
<td>School visit: Robyn K. 2hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>June 28</td>
<td>Robyn K. Post-observation (1hr)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Semester 2</td>
<td>Interview</td>
<td>Observation</td>
<td>Video recall</td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td></td>
<td>July 10</td>
<td>Di and Robyn K. reciprocal interviewing (2hrs)</td>
<td></td>
<td>Di &amp; Robyn K. personal reflections; educational time lines (2hrs)</td>
</tr>
</tbody>
</table>
4.4.4 Documentation

Field notes for all observations and interviews were made in individual booklets each with a cover bearing the details of the occasions (e.g. TILT RESEARCH SEMESTER 2, TERM 4, 1999 OBSERVATION School code/date, example Appendix 12). Visits and workshops were formally documented from these field notes as soon as possible after the event. A description of each workshop was written up using field notes and video as a record of what had occurred, what equipment was used and how the workshop was conducted (samples Appendix 6). Post workshop discussions were audio taped and simultaneously documented in an ‘interview schedule’ booklet (Appendix 12). The notes and audio recordings were used to write a paper for comment from the four teachers (Appendix 5). A description of each classroom visit was written up soon after the visit and given to the teacher for comment (Appendix 1). All field note data were collected in observation or interview schedule booklets dated and identified by event location and participants (e.g. video recall, Appendix 12).

The four research teachers filled in the TILT base data survey (Appendix7) at the beginning of 1999. This survey provides entry characteristics such as: gender, number of years teaching, school type and size, position in school; previous training in technology; current classroom and home use of computer technology; access to technology at home and at school; student access and use. It has been filled in by TILT participants since 1995 and reports have been written each semester. I was able to compare the base data of the four teachers with data from across the state for semester 1, 1999 and make some comparisons between entry characteristics of these teachers and the majority of TILT participants that semester.

The four teachers and the facilitator completed the survey Beliefs About Consciousness and Reality (Baruss, 1990) (Appendix 8). The results of the survey were given to the participants and discussed with interest over coffee at the beginning of workshop four. I originally thought the survey would give me some insight into the participants’ view of reality. I had considered this to be important at the time because my reading in cybernetics constantly raised issues about reality. I reported on the findings of this survey in Di and Robyn’s profiles (Appendix 9).
During each of workshops two to six I issued an ‘emotions chart’ to be filled in by all workshop participants and the facilitator (Appendix 10). Members of the workshop group were asked to tick which emotion(s) they were feeling, from a list of 21 given emotions, at the beginning, middle and end of the workshop. The list of emotions was constructed from Plutchik’s (1994) review of the emotions literature. I chose the common emotions that appeared on all of the emotion lists he had collected from a range of researchers and added to them emotions such as bored, challenged, confused and motivated that seemed appropriate to workshop participation. Using a Microsoft Excel spreadsheet I graphed the reported emotions, providing an ‘emotional profile’ of the workshop and distributed the graphs to workshop participants and facilitator for interest. Again, although the participants found the feedback interesting and the facilitator found it a useful tool in evaluating her workshops, I did not make a great deal of use of the data. As in my original research design, the assumption underpinning the use of this tool was that teachers would know and describe honestly their emotions. However it was difficult to know what it was indicating for, as Robyn commented,

I never ticked ‘isolated’ on the sheet I always ticked ‘happy’ and ‘confident’ and ‘pleased’ to be there and ‘enthusiastic’ but I thought ‘ah I’m glad there’s no more of this to worry about’

(3/11/99)

However all TILT facilitators now have access to the tool and can use it at their discretion to provide feedback on their workshops.

At the suggestion of Robyn K. she and Di filled in a Learning Style Inventory (Education Hawaii, 2000) that Robyn had been given at an inservice course on Educational Leadership. She had found it interesting and thought it would be useful for my understanding of their learning in the TILT program. The results of this were included in Di and Robyn’s profiles (Appendix 9).

Notes from the follow up meeting with Di and Robyn K. (10/7/00) were written in the ‘Follow up Question’ schedule and soon after the meeting combined with school observation data to form a ‘profile’ of each teacher. These profiles were shared with the teachers for feedback (Appendix 9).
4.5 Data analysis

To help keep track of the accumulating data and the process of analysis I used two large pieces of flip-chart paper to record: date, event, people involved, data collected and the status of the collected data (e.g. transcribed, written up, draft etc). Crossed out and updated from time to time, these charts decorated my wall for two years (Appendix 13). A sample is provided below (Table 6).

**Table 6: Excerpt from wall chart showing data collection and status**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>People</th>
<th>Data</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/11/99</td>
<td>Classroom visit S.P.S.</td>
<td>Di, Cheryl</td>
<td>1 observation 9.00am-1.00pm</td>
<td>1 written up</td>
</tr>
<tr>
<td></td>
<td>Follow-up interview</td>
<td>Di &amp; Cheryl</td>
<td>2 observation 1.30pm-3.00pm</td>
<td>2 written up</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 interview 2 hrs</td>
<td>3 transcribed</td>
</tr>
<tr>
<td>3/11/99</td>
<td>Video recall Robyn &amp; Robyn</td>
<td></td>
<td>Video &amp; discussion</td>
<td>Transcribed</td>
</tr>
<tr>
<td>22/11/99</td>
<td>Classroom visit D.P.S.</td>
<td>Robyn K.</td>
<td>Observation 9.00-12 noon</td>
<td>Written up</td>
</tr>
</tbody>
</table>

The volume of data and my tendency to write and re-write bits of the unfolding story as I went along made this chart invaluable in the whole data analysis process. It helped me to keep track of where I was up to in the process of examining each bit of the puzzle as well as exactly what I had collected and where the concentration of data lay. Later this helped in making the decision to concentrate on only two of the four teacher volunteers.

4.5.1 Selecting data for close analysis

After writing up the classroom case studies for all four volunteers (Di, Robyn K.; Robyn H. and Cheryl) I focused on just two, Di and Robyn K. for the final data analysis. I chose the final two teachers for mainly pragmatic reasons (see above). Although Di and Cheryl were at the same school I had more data on Di than on Cheryl. Cheryl team-taught a Kindergarten class. My classroom observations seemed to coincide with a time when Cheryl was not actually teaching the class but instead was supporting her team-teaching colleague. Return visits to the school specifically to observe Cheryl’s teaching would have been time consuming and so I was left with only a small amount of classroom observation data for Cheryl.
Di and Robyn K.’s schools were close to my place of work and could be reached easily from work at lunch time of after school. This made visits feasible even after a full working day. Robyn H.’s school on the other hand was some distance away and required that I take a half or full day’s leave from work in order to visit.

Di and Robyn K. showed a particular interest in the research. They avidly read the papers I prepared for publication, offered comments and requested further reading. Although Cheryl and Robyn H. were interested in what I wrote about them in the context of the research they were perhaps not so interested in, or else did not have time, to read other papers related to the research.

Finally Di and Robyn K. were both considered by their schools to be excellent teachers yet their teaching styles were very different. They seemed to have very different skills, attitudes and values. They had different teaching backgrounds and different life experiences. I felt that if I were testing ideas against teachers’ practice it may be an advantage to continually test my ideas against very different practices.

4.5.2 Process of analysis

The hermeneutic dialectic process described by Guba and Lincoln (1989:149-155) was used to analyse data and create reports of the multiple realities of participants. This iterative process of data collection and analysis is called by Guba and Lincoln:

hermeneutic because it is interpretive in character, and dialectic because it represents a comparison and contrast of divergent views with a view to achieving a higher-level synthesis of them all.

(Guba & Lincoln, 1989:149)

From this continuous process of cycling and recycling through the data themes and issues emerged that could eventually be categorised and that shed light on my understanding of teacher learning.

I made several attempts to organise in digital form (i.e. on the computer screen using a word processor) the transcripts of interviews with these teachers. I cut and pasted each person’s contribution to each conversation into a separate file in chronological order. I condensed this chronology slightly by removing from the transcribed speech hesitations, repetitions and asides that seemed to be irrelevant. I looked for changes over time.
I devised tentative themes for analysis from close reading of all the data and set up another file for each teacher to cut and paste all contributions under theme headings. I found this process difficult to manage and eventually printed out all transcribed data. I cut the data from each audio-recorded event into strips and dated each strip. I used a different coloured pen for each different event (i.e. for each date) and initially, terrified that I still might confuse them, I placed all strips from one event into an envelope labeled with the event and date (e.g. Video recall, Nov 3, 1999) and then worked through the envelopes one by one over the space of about a week. I cut the strips according to the flow of conversation.

Sometimes this meant that I cut off the whole of an answer to one question with the question included and the responses from one or more teachers. For example:

*J: And access to a trained facilitator, how important was that?*

*RH: Oh, essential*

*RK: It would have been easy just to give up and say this is all above my head, too much for me, and if you did not have somebody on hand you could ring or e-mail of something, you would just give up.*

Sometimes it meant that I cut off a number of comments around one topic from a conversation. For example in the video recall session of Nov 3, 1999:

*RK: Was that the one where we had a white board? Are we sharing a computer?*

*RH: Had to work in pairs?*

*RK: Am I writing?*

*RK: That was good*

*RH: we were really just following the book weren’t we, do this, do this, do this, do you remember?*

*RK: I can’t remember really but I remember we were just following the book and Judy was pressing the right buttons. It’s very directed isn’t it.*

I added to the data the case studies from the classroom visits and cut them up in the same way. When all were cut, from my, by then, intimate knowledge of the data I had some idea of major themes and issues addressed by the participants.
I began with a prominent theme, ‘working collaboratively’ and grouped together all comment strips that made reference to ‘working collaboratively’. Each strip bore the date and either the speaker or the event described. I formed a grid on paper 2.5 meters by 1 meter with the event dates across the top and room for the themes and issues down the side. I made ‘working collaboratively’ the first theme and literally pasted all the strips I had collected under this category onto the paper according to the event date (Appendix 11). This meant that each cell of the grid could possibly hold data strips from Di, Robyn and/or the facilitator, Jenny, enabling me to detect similarities and differences in their concerns, themes and issues over time. I tried again with another theme ‘relating the workshop learning to specific student needs’ and repeated the selecting and pasting. Occasionally I chose a theme that turned out to have few entries. In such a case I re-examined the entries and re-allocated them or devised another more inclusive theme that joined this group of entries with those of another row. An excerpt of the wall chart is provided in Table 7.

Table 7: Wall chart showing data analysis categories and a sample of event dates across the top row

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
</tr>
<tr>
<td>Relating to specific student needs</td>
<td>Paper strips</td>
<td>Paper strips</td>
<td>Paper strips</td>
<td>Paper strips</td>
</tr>
<tr>
<td></td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
</tr>
<tr>
<td>Relating to classroom teaching</td>
<td>Paper strips</td>
<td>Paper strips</td>
<td>Paper strips</td>
<td>Paper strips</td>
</tr>
<tr>
<td></td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
</tr>
<tr>
<td>Trying things out (change/learning)</td>
<td></td>
<td>Paper strips</td>
<td>Paper strips</td>
<td>Paper strips</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
</tr>
<tr>
<td>Empathy with student learning/being a learner</td>
<td>Paper strips</td>
<td>Paper strips</td>
<td>Paper strips</td>
<td></td>
</tr>
<tr>
<td></td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
<td>pasted onto chart</td>
<td></td>
</tr>
</tbody>
</table>

Straus and Corbin (1990) describe this process as a ‘comparative contrastive process’. Lincoln and Guba talk of the ‘constant comparative method’, describing it as a “continuously developing process” (1985:340) where each stage of analysis builds on the last and informs the next throughout the inquiry. Neither description hints at the messiness and all-consuming, sometimes almost manic, nature of the whole thing as you move from the fullness of ‘thick description’ (Geertz, 1973) out to a bald category heading and back again in an effort to do justice to the complexity of teacher learning.
It was at this stage that I truly understood Guba and Lincoln’s reference to the demands of this methodology. They say:

> The methodology of the constructivist is very different from the conventional inquirer … [it] is iterative, interactive, hermeneutic and at times intuitive and certainly open … . It makes demands of its own so heavy that anxiety and fatigue are the constructivist’s most constant companions. It is a different path, one strewn with boulders, but one that leads to an extravagant and hitherto virtually unappreciated rose garden.

(Guba and Lincoln, 1989:183)

Once pasted up I used the chart as source material for a discussion of the themes and issues important to each of the two teachers remaining in the study. Three times throughout the above process I took the chart to meetings with my supervisors at the university where we explored the general categories emerging from the themes and issues and they posed questions that prompted further analysis. Table 8 shows the slightly different categories that I initially identified for Di and Robyn and the properties (themes and issues) that seemed to provide the dimensions of each category (Lincoln and Guba, 1985; Merriam, 1998).
Table 8: Categories and properties originally identified for Di and Robyn

<table>
<thead>
<tr>
<th></th>
<th>Di</th>
<th>Properties</th>
<th>Robyn</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Teaching issues arising from use of technology</td>
<td>• control of student learning</td>
<td>Learning about and through working with others</td>
<td>• collaboration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• lost art of teaching</td>
<td></td>
<td>• networking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• classroom management</td>
<td></td>
<td>• reflecting on classroom practice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• school organization</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• implications of technology for teachers and teaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Learning about and with technology</td>
<td>• Di’s learning</td>
<td>Learning about the technology and relating it to the classroom</td>
<td>• relating workshop to an individual student’s needs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• changing practice over time</td>
<td></td>
<td>• relating workshop to general classroom practice</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• changing practice over time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• exciting possibilities of technology</td>
</tr>
<tr>
<td>3</td>
<td>Learning about learning</td>
<td>• experience of being a learner</td>
<td>Learning about learning</td>
<td>• experience of being a learner</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• empathy with students as learners</td>
<td></td>
<td>• empathy with students</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• constraints on adult learners</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• taking responsibility for own learning</td>
</tr>
<tr>
<td>4</td>
<td>Comments on the program</td>
<td>• facilitator</td>
<td>Comments on the program</td>
<td>• facilitator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• unwritten rules</td>
<td></td>
<td>• workshops</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• videos</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• values</td>
</tr>
</tbody>
</table>

After further discussion, and realizing the development of grounded theory demanded that the categories should match for each of my participants I stepped back once more from the data. I realized that Di and Robyn’s comments on the program were in fact part of their background as TILT participants and moved this section to the introduction of each participant. On reflection it became evident that Robyn’s networking was about feedback on her teaching and her discussion of group work and collaboration were about teaching strategies. Thus my categories became:

- learning about teaching;
- learning about technology and
- learning about learning.
Out of all of the above process I developed a paper for each of the teachers that I felt captured the themes and issues that each had addressed in some form throughout the study. Below is an excerpt from Robyn’s themes and issues paper (Appendix 9), to which she later responded.

A long process of reading, writing, cutting and pasting (literally) thinking and classifying has been undertaken in order to arrive at the themes outlined below. Initially every item of Robyn’s participation in the research was extracted from raw data (video and audio recordings, and workshop and interview notes) and placed in a written chronology revealing the history of Robyn’s discussion contribution and workshop participation over the research period. At this stage it seemed the chronology documented little more than the practicalities of participation in a professional development program when other duties (home and school) were pressing. An attempt to cut and paste into categories on screen did not seem to reveal any change/learning over the twenty-month period or any issues that needed to be addressed. It therefore became important to begin the process of looking for patterns in a different way. Instead of summarising and condensing Robyn’s contributions they were printed out, cut into strips, each strip representing a conversation focus (change of conversation focus, new strip) dated and placed in envelopes. A chart was drawn up on a large paper. Ten columns represented the ten separate encounters on the horizontal axis (i.e. five workshops with follow up discussion; 2 school visits; one video recall day; two interview/discussion meetings). The vertical axis was left blank in the hope that categories would emerge. The envelopes were opened in chronological order and the strips placed in the appropriate column. They were positioned and re-positioned in the columns until patterns began to emerge. When something seemed to gel a category was placed on the vertical axis and a line drawn across the whole page.

In this way the grid slowly grew. A pattern began to emerge. Robyn’s themes seemed to be consistent throughout the data collection period.

These detailed analyses, together with teacher and facilitator feedback on the analyses, are reported in chapter five.
Figure 11 maps this part of the data analysis process. However the map appears far more linear than the process actually was. It was in fact an iterative process in which I re-visited the raw data, audio and video tapes as well as the transcriptions both to check ambiguities in the transcriptions and to ensure that things I had discarded in condensing them were in fact not relevant to the present task. I also moved between the growing wall chart and the original, uncut, versions of the chronologies in order to re-read the cut items in context in case I had misinterpreted anything. In writing this now I can again feel the intense ‘anxiety’ referred to by Guba and Lincoln!

**Figure 11: Map of the data analysis process**
At this stage the stories I had produced were descriptive. It was not until I took four weeks of study leave and spent two days each week at the University that I was pushed into the next step of trying to synthesise these stories in some way.

4.5.3 Pulling the stories together

I had sent the stories to the teachers for ‘member checking’ (Guba and Lincoln, 1989) and received their comments. Robyn was so interested in the process and excited by the paper that she asked to visit me at work during the school holidays to talk about it. Di sent me copious notes in the margins of hers. Jenny and I met one lunch time, at her suggestion, so that she could convey her comments.

I had sent the stories to my supervisors at the University for comment and had now had several lunch time discussions with them.

Meanwhile I was continuing my reading and thinking about learning in a cybernetic paradigm and relating my reading to the emerging pictures of teacher learning in TILT. The prominent role played by environment in living/learning was apparent from my reading. In my effort to ‘see’ my data differently I felt environment may be a relatively safe place to begin.

With Turbill’s advice (1993:139) I began with the sentence starters “Jenny, Di and Robyn all ……” or “Di and Robyn both……..”. I found that it was not difficult, using the themes and issues papers and my coding chart, to find common ground. With environment in mind it was relatively painless to say that their concerns and issues seemed to operate in three distinct environments:

- the TILT program;
- the broader professional context; and
- their personal contexts.

After my initial excitement at finding a range of issues and themes common to Jenny, Di and Robyn I stood back from my work and was overwhelmed by disappointment!
I felt that after all this work I had said nothing much of interest, had pointed out the obvious and observed what many had seen before me. I also felt that in cutting up and categorising the data I had lost something of the whole, which had definitely not been my intention; and something of the fine detail which again had not been my intention. In addition some of the assumptions, underpinning a traditional examination of teacher development, and that I had started out with in my original design (Figure 9), could still be said to be operating in this first analysis of the data. This was so even though I had developed a new theoretical framework from which to examine the data, one with a different set of assumptions (Figure 12).

**Figure 12: Some assumptions underpinning the application of a cybernetic lens**

<table>
<thead>
<tr>
<th>Cybernetic lens Assumptions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• all participated in a different <strong>TILT</strong> program</td>
</tr>
<tr>
<td>• the program was fluid and dynamic</td>
</tr>
<tr>
<td>• the teacher learning environment (personal, professional and program) changed constantly</td>
</tr>
<tr>
<td>• Di and Robyn's learning arose from need for survival</td>
</tr>
<tr>
<td>• the program 'taught' whatever fitted with life history and was anticipated in some way</td>
</tr>
<tr>
<td>• learning was triggered by the environment, there were no direct inputs</td>
</tr>
<tr>
<td>• Di and Robyn's emotioning provided the ‘preparation to act’ and changed over time</td>
</tr>
<tr>
<td>• learning from program may be diffused throughout professional and personal life in idiosyncratic ways sometimes only loosely connected with the program content and processes and continue over time as part of participant’s life trajectory</td>
</tr>
</tbody>
</table>
I returned to my original questions and reminded myself that I had intended to:

- examine in detail the participation and learning of two teachers in the Technology in Learning and Teaching (TILT) program; and

- apply a cybernetic lens through which to interpret the descriptions of their learning.

Through these two strategies I had hoped to develop a theory of teacher learning grounded in the real world of teacher professional development and classroom practice viewed through a cybernetic lens.

I had developed the following questions to guide and frame the study:

- what is learning and why do people learn?
- why do they learn this (and not something else)?
- how does learning happen and what is the role of communication and environment?

I felt that through the process mapped in Figure 11 above I had addressed my first intention. However some of what I had done was still underpinned by the traditional change theory/teacher development literature that was inevitably part of my 'bag of tricks' (Bawden, 1994). Just like the learning of Di and Robyn that my research was mapping over time, my own learning was evolving during the course of this study. Like Di (6/5/99) I sometimes wanted to annotate my early drafts with: 'I can't believe I said that'.

Nevertheless through my reading, writing and pondering outlined in chapter three I had, in a theoretical sense, addressed the what, why and how of learning and the role in learning of communication and environment. This, I reminded myself, was to provide me with the lens through which to examine the data afresh. It was now time to address my second intention and apply a cybernetic lens to what I thought Di and Robyn had learned in TILT.

As an enquirer I would now try, as Eisner (1991) says, “to account for what … [I] have given an account of” (italics in the original, p35).
The stories emerging from the data provided a rich resource for the exploration of my developing explanations of what constitutes learning and why and how we learn. Applying that lens to the data was the first step in my attempt to account for them. I entered yet another round of Guba and Lincoln’s (1989:149-155) hermeneutic dialectic process. With the same data analysed through a grounded theory, qualitative research, process but consciously applying a new lens I began again. Figure 13 indicates the conscious shift I began to apply.

**Figure 13:** Same data, different lens: Applying a cybernetic lens to the data

<table>
<thead>
<tr>
<th>Change theory/ teacher development lens</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assumptions:</strong></td>
</tr>
<tr>
<td>• all participated in the same TILT program</td>
</tr>
<tr>
<td>• the program was an artefact with an identifiable boundary</td>
</tr>
<tr>
<td>• the teacher learning environment (personal, professional and program) was constant for the duration of the program</td>
</tr>
<tr>
<td>• Di and Robyn’s learning arose from their professional responsibility to their students</td>
</tr>
<tr>
<td>• learning occurred as a result of inputs from the learning environment</td>
</tr>
<tr>
<td>• Di and Robyn’s emotions were implicated in their learning</td>
</tr>
<tr>
<td>• extent of program implementation measured by what program content is being used in the classroom</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cybernetic lens</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assumptions:</strong></td>
</tr>
<tr>
<td>• all participated in a different TILT program</td>
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<td>• the program was fluid and dynamic</td>
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</tr>
<tr>
<td>• learning was triggered by the environment, there were no direct inputs</td>
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<tr>
<td>• Di and Robyn’s emotioning provided the ‘preparation to act’ and changed over time</td>
</tr>
<tr>
<td>• learning from program may be diffused throughout professional and personal life in idiosyncratic ways sometimes only loosely connected with the program content and processes</td>
</tr>
</tbody>
</table>

Data: collected through observation, discussion, interview, video recall and oral and written responses to texts produced through the research process; synthesized through an iterative process of categorization; explained through two different lenses
4.5.4 Data as testing ground for developing explanation of learning

If a cybernetic view of the world was to be useful then I should, as a starting point, be able to detect concrete examples of the theoretical answers to my questions in chapter three. To answer my question ‘what is learning?’ I should be able to detect ‘perturbations’ in the ‘environment’ that triggered idiosyncratic changes in the participants. This would give me a clue about what constituted ‘information’ to them. To answer my question ‘why do we learn?’ references to what could be viewed as ‘survival’ should become obvious. For ‘how does learning happen? evidence of ‘structural coupling’ in a system/environment thinking/learning network should emerge. To answer the question ‘what is the role of communication and the environment?’ having concluded that communication is part of environment, I should be able to detect subtle aspects of languaging and emotioning and their link with learning/cognition. Figure 14 illustrates the links that I now began to make.
Figure 14: Linking the cybernetic lens to the data in order to answer the research questions framing the study

CYBERNETICS: describing one domain of reality and bringing into being system and environment

Change, learning, living in co-ontogenetic structural drift

Information and survival

What becomes information depends on life history and is anticipated in some way

System/environment learning/thinking network (structural coupling)

Coupling with the environment through communication

Communication as ‘jointly actualized meaning’ (Brier, 1992:3)

Languaging

With self in reflection (Schon)

Emotioning

Through metaphor with others

Emotions and cognition

Emotions and action

Robyn learns to use the camera for survival as a ‘good teacher’

Robyn learns to do through practice

Di sees the program as ‘philosophy’

Non-specific trigger – Di’s learning breakthrough is the catalogues

Di’s changed understanding of student learning revealed through metaphor over time.

Robyn ‘catching up’ as a good teacher

Why do we learn?

What is learning?

How does learning happen?

What is the role in learning of communication and the environment?
For this cycle of the analysis I drew on not only the case studies developed for Di and Robyn but also the ‘maps’ that each had constructed of significant moments in their respective educational journeys. These provided clues about what each counted as important learning. I put on my cybernetic glasses and reviewed the data through different lenses. At first it was difficult to make this shift, but after reviewing the cybernetic framework developed in chapter three I found I was able to view the data from a different perspective.

For example what each considered to be a breakthrough in their learning in TILT took on new meaning as I noticed changes in Di’s conversations and actions following the ‘breakthrough’. I began to notice ways in which idiosyncratic bits of the learning environment ‘fitted’ with their existing knowledge of the world and became part of their life trajectories.

From the data analysis chart I could see clear differences in the learning of the two participants. I found when I considered these differences through a new lens definite instances of ‘fit’ with the environment emerged that were quite different for each of them and that seemed in keeping with their life-time’s significant learning events.

I noticed evidence of the organism-environment learning system, which, in the framework I had developed, potentially formed the basis of new knowledge (chapter three). In viewing these data as a system/environment thinking learning system I was identifying processes from which new learning emerged rather than testing for knowledge directly associated with what, for example, the workshop facilitator said or demonstrated during the TILT program. I felt this was emerging from a close examination of the changes in Di and Robyn’s actions (including conversation) over time. For example Di described reading software catalogues as a breakthrough in her learning. However on examination of the data it was obvious that she was not referring to the learning of information about specific software items. Nevertheless this moment for her was significant and was followed by changes in her conversations.
Subtle changes in communication (languaging and emotioning) that might indicate changes that must be happening in each participant over time also began to emerge as I re-examined the data. To help identify and explain this ‘inside’ learning I drew on Schon’s idea of reflective practitioner. I began to notice examples of reflection ‘in action’ which, Bamberger (2000:13) says, are often missed but should be recognised as “sense making” and hence, knowledge building, moments. I realised that Robyn’s workshop experience with the digital camera in which she experienced and enjoyed group work provided just such an example of reflection in action, which I believe: illustrated the idea of languaging as “the structured (patterned) flow of our behaviour” (Fell & Russell, 1994a: 220); and the role of communication (languaging and emotioning) as the means of learning through coupling with the environment; and the expression of learning in ‘reflection in action’. I think this incident also illustrated Sheets-Johnstone’s (1999) complex interrelationship between brain and body and the role that she sees for emotions as “prime motivators” (p273). As she points out, to omit the whole body dynamic is to miss the fact that emotion in an evolutionary sense is not there to communicate but “to motivate action” (p273). This led me to ponder on how I might see this ‘emotion that motivates action’ that I believe is also what Maturana referred to as ‘emotioning’, the lived stream of emotioning that is not revealed by naming emotions but may be revealed through more subtle means.

I turned to my reading in metaphor drawing on the work of Jaynes (1976), Bar On, (1999) and Krippendorf, (1993). Using these writers as a guide I analysed the change in metaphors used by the two teachers over time. I searched for ways to speculate on the learning of a participant in a milieu, made obvious by what they do differently, and its connection with the inside learning within each individual which becomes knowledge out of which future actions arise. At this stage the following questions emerged:

- Did Di and Robyn’s metaphors change over time?
- Were there differences in metaphors between them?
- Did the metaphors reveal emotioning?
- Did they reveal anything about their learning?
I was excited to find what I felt were revealing changes in Di and Robyn’s use of language to discuss learning and technology over the course of the study. Their changing metaphors revealed not only changing ideas, for example Di’s ideas about student learning and Robyn’s ideas about her technology skills in relation to the skills of others, but also their underlying emotional changes: from fear (of loss of control for Di, and being left behind for Robyn) to becoming comfortable with the new opportunities that the technology offered for their teaching. The emotioning part of communication, which was probably revealed in many subtle ways that I had neither the equipment nor the expertise to detect, I felt was revealed through their metaphors. It began with some anxiety and over time apparently changed to a more comfortable approach to technology. The ongoing emotioning revealed through metaphor differed from the emotions listed by participants in each workshop (Appendix 10). Robyn intimated as much when she said that she “never ticked isolated” on the emotions checklist but:

   always ticked happy and confident and pleased to be there and enthusiastic but
   I thought ah I’m glad there’s no more of this to worry about


Languaging and emotioning, communication, did indeed seem to be part of the dynamic reciprocal relationship with the environment. Furthermore it did seem that as closed, autonomous living systems interacting in an environment participants were constructing idiosyncratic meaning out of their own personal history and whatever communication was available.

4.6 Conclusion

In this way a theory of learning emerged grounded in the learning of two teachers over nineteen months and viewed through a cybernetic lens.

This chapter has outlined the history of the development of the research focus and purpose over three identified phases of the project. It has described the research paradigm used to frame the research project and what and how data were collected.
The chapter has also described how Di and Robyn's conversation and classroom practice was sorted into themes and issues and then under three broad category headings from which I produced profiles and case studies and out of which three major categories emerged. It tells of my immersion in this process and final realization, on surfacing, that the emerging picture revealed nothing new about teacher learning.

Finally the chapter indicates how the case studies were then viewed through a cybernetic lens to provide what, to me, was a satisfying explanation of teacher learning.

The following chapter is in two parts. Part one describes the TILT workshop, including a profile of the facilitator, as setting for the learning of Di and Robyn in the TILT program. Part two presents a detailed case study of Di and Robyn's participation in the program. Chapter 6 applies a cybernetic lens to the learning of Di and Robyn and sheds fresh light on teacher learning.
Chapter 5

Results of the study
The study at a glance

Chapter 1: What is learning? Why do people learn? Why do they learn this (and not something else)? How does learning happen? What is the role of communication and environment? What do teachers learn in TILT?

Chapter 2 Part 2: Socio-political context: TILT development and implementation

Chapter 3 Part 1: Systems Co-ontogenic structural drift Change and survival System/environment thinking network

Chapter 3 Part 2: Linguaging and emotioning

Chapter 4: Methodology

Chapter 5 Part 1: The TILT program setting

Chapter 5 Part 2: Di and Robyn’s learning in TILT

Chapter 6: Di and Robyn’s learning in TILT through a cybernetic lens

Chapter 7: Conclusions

Chapter 2 Part 2: Socio-political context: TILT development and Implementation

Viewed through the lens of...

Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7

Chapter Five 188
Chapter 5:
Results of the study

This chapter describes the results of the study related to the participation of Di and Robyn in the TILT program. The data that have been synthesised to form these results were collected during the six months of the TILT workshops and in observations and interviews for a period of thirteen months afterwards. This chapter addresses the purpose of the study, which is to develop a grounded theory of teacher learning.

Part one describes the TILT workshops as the immediate setting in which Di and Robyn’s TILT related learning took place. Included in this section as part of the setting for Di and Robyn’s learning is a description of the physical setting and conduct of the workshop; synthesis of the post workshop discussions between the four original research volunteers; and a description of the facilitator’s attitudes, values, views and concerns gathered through workshop observation, interview and written response to questions.

Part two helps to realise the purpose of the study by examining in detail the participation and learning of two teachers in the Technology in Learning and Teaching (TILT) program. It presents detailed case studies of two of the volunteers, Di and Robyn. The two case studies describe the learning of Di and Robyn as they participated in the program and during the thirteen months of the research project after the workshops. This satisfies the first aim of the study, which is to examine in detail what two individuals actually learned in TILT that could be attributed to their participation in the program. Linked closely to their learning are the themes and issues that occupied these two participants during that time.

The categories, and within them the themes and issues, I have employed as organisers for the learning of Di and Robyn have emerged from the data and from a particular theoretical framework. The case studies reported in parts one and two have been organised within categories and are recognisable by those who had a stake in the research, namely the facilitator and the participants.
Someone else from a different theoretical framework would have identified different themes and issues and formed different categories as a framework for organising the data.
Part 1:  

The *TILT* workshops

5.1.1 The setting

Each workshop evening from eight to ten participants arrived at the district office between 3.45 and 4.00pm. Of the research workshop group (group 2) Jenny, the facilitator, said, “There’s an even mix of primary schools and high schools. I gave them the opportunity to come when they wanted to” (9/3/99). Not all groups are a high school primary school mix but Jenny tried to avoid having a group of people from the same school in the same workshop. She recognized the potential difficulties in group dynamics:

> which means they bring all the school power play with them - the school pecking order is directly transferred to the workshop. It’s much better to mix people up. They don’t have to bring their school persona with them.

(post workshop, 9/3/99)

On arrival participants made coffee and tea in the district office kitchen then moved across the playground to the first storey library where the biscuits were. Jenny had previously left the biscuits in the district office but found that she missed out on the pre-workshop chat, which she knew was a valuable informal introduction to the workshop, because she was in the library setting up for the session. As she said “I can pick up the vibes - I like to have a chat beforehand it’s better to lead in” (post workshop, 9/3/99). For this reason Jenny removed the biscuits from the downstairs kitchen and placed them on a small table in the library so that participants brought their coffee over to the library with them and included Jenny in the informal chat until 4.00pm when the session began.
The library had a network of computers recently connected to the Internet. The computers were arranged along three sides of a large recess off the library bounded by the wall of the stairwell (an extension of the end wall of the library), an outside wall and the librarian’s office. There was also a bank of computers in the middle of this space. Participants seated themselves in a circle that overlapped into the main body of the library, shielded from the bookshelves and tables by a large wheeled white board placed at an angle hiding the door to the stairwell (Figure 15). Jenny (the facilitator) seated herself in the circle with her back to the main body of the library facing in towards the computers.

**Figure 15: Layout of library showing location of computers between the office and the stairwell**
5.1.1.1 Workshop procedure

Each workshop began with housekeeping (eg distribution of the videos; email addresses) and a discussion of anything the participants had tried out between workshops. This was followed by a discussion of the video that participants had watched either at home or at school between workshops. Jenny usually gave an outline of the video first in case some participants had not been able to watch it. Jenny found that participants had often not watched the videos. She encouraged viewing by explaining that they were a part of the TILT course, that they were not meant to be instructional videos, but were a discussion starter. She hoped in this way to “gradually get the message across” (facilitator questions 30/3/99).

Discussion of the video was followed by an overview of the workshop and demonstration of the activities to be conducted if appropriate (see samples of individual workshop descriptions Appendix 6). Participants were reminded that if they were familiar with the technology to be explored they could pursue one of the extension activities instead. They were also reminded of the need to take their three relief days and to book the facilitator to visit on a relief day if they wanted one-on-one help with something. There was usually a reminder that anything they saw or used in the workshop could later be borrowed. During this time participants made notes in their journals. Participants then moved to the computers either one to a machine, in pairs or small groups depending on the activity. At least one hour was devoted to hands on activity. This was usually followed by a short discussion to finish.

1 For example at 4.10 in workshop three (30/3/99) Jenny asked participants to take a copy of the tape with the next three videos on it and to sign to say they had received it: ‘Can you cross off 1, 2, 3 when you return it and tick 4, 5, 6.’ One participant said she’d never seen any of the first three videos: ‘I’ve never got a video. All this talk about videos and I’ve never even seen one.’ Jenny said that Sue would have received the copy for her school and asked the participant to follow it up and watch the three videos before the tape was returned.
During the demonstration Jenny occasionally asked a participant to read out the instructions in the workshop book while she followed them on the computer. This was in order to check that the instructions were accurate, to remind participants that the instructions were in the books and to involve members of the group in the demonstration. While this was happening Jenny asked other participants to follow in their books and make any notes that they needed to help them interpret the instructions. She also suggested that this approach took “the limelight” off her as the facilitator and gave “someone else a chance to say something as well” (video recall, 9/6/99). By about 5.45pm Jenny usually instructed the group to close down their machines and gather together for a final discussion. They shared their evening’s successes and failures and arranged to borrow equipment or to meet between workshops. The session closed at 6.00pm. Jenny checked the machines, packed up the biscuits, disks, jelly bean and mintie box, handouts, etc and handed over responsibility for security to the cleaner who was waiting to come into the library.

Jenny followed the workshop model of discussion, demonstration and hands-on activity followed by what she called “a wrap-up” at the end of the session. This was the model intended by the program developers. However Jenny felt that often the unexpected happened, and also the dynamics of each group was different (post workshop 26/5/99, one day after workshop five). As she remarked:

you never have two workshops that are entirely the same, even though you might start out with the same aims and do the same things, they are always different.

(video recall 2, 20/12/99)

Jenny ran each workshop seven times (once for each of her seven groups of ten participants). The workshops observed for the research were the first repeat of each one. Jenny felt that the first time she conducted a workshop it was more of an experiment, but the second time “you hope you get things right”. She said:

the fact that you’re always seeing the second workshop that I do in a group probably impacts on what you see, because after that I seem to, I don’t forget to say as many things.

(post workshop 26/5/99)
5.1.2 Post workshop discussion

Following the workshop four participants, Di, Robyn K., Robyn H. and Cheryl, met with me for thirty minutes. They addressed the questions: What happened in the workshop? What did you learn? What did you think? After posing each question I allowed the conversation to follow its natural course. At the same time Jenny recorded her answers to the same questions.

5.1.2.1 What happened in the workshop?

With this question I hoped to gain a personal perspective on what for participants were the major ‘happenings’ of the workshops.

In each of the five debriefing sessions the answer to this question followed a similar pattern (see Appendix 5). One person mentioned an incident important to her, for example:

So I was starting to feel like a jinx and I thought this is what I hate about computers. And third time was lucky and it was fine and there was no problem - like I look back and I didn’t do anything wrong - but I still felt like how could I have done that I must be stupid and then it was frustration.

(Di, post workshop discussion 9/3/99)

This usually triggered a conversation about how children must feel as learners. For example:

I keep thinking of the children... how much do we put before children and we know what our intent is... but often we’re bamboozling them with data and everything is stimulating for them.

(Di, post workshop discussion 9/3/99)

that reminded me the children have to do that all the time.

(Cheryl, post workshop discussion 25/5/99)
This was often followed by discussion of pedagogy:

in a fifty minute lesson... how far are you going to get trying to communicate all the information and make sure everyone’s at the same stage and then you say well if there are some kids who can go ahead why shouldn’t they go ahead.

(RH, post workshop discussion 9/3/99)

in my class if children, you’re wanting them to learn about each other they could actually enter their own data in the fields for themselves but then use the data base to enrich their knowledge about each other.

(Cheryl, post workshop discussion 25/5/99)

Often also the conversation triggered an analogy with something more familiar:

it’s like learning to drive a car.

(RH, post workshop discussion 9/3/99)

or a personal story:

When we were first married we couldn’t afford the phone - had to use the local telephone box now what you can do, now we’ve got Internet in the room.

(Di, post workshop discussion 30/3/99)

Discussion around the question ‘what happened’ often referred to feelings sometimes presented as metaphors, for example, being afraid of falling behind (“you think you’re behind” Cheryl 9/3/99), or some kind of physical punishment (“hit between the eyes” Di 25/5/99), or references to specific feelings such as: being anxious, feeling stupid, frustrated, stimulated (“by the visual smorgasbord on the screen” Di 9/3/99) (see Figure16).

Except for the incident described by one of the group that acted as a trigger for the discussion, usually the discussion around ‘what happened’ related to the unobservable thoughts and feelings taking place inside these participants.
It seemed that the important ‘happenings’ for participants, those worth commenting on, involved feelings towards the technology and learning and more general thoughts about teaching and learning rather than the activities presented in the workshop. The conversations suggested that the things that ‘happened in the workshop’ that were important to these participants were to do with an inner stream of thought making links between what was presented in the workshops and their lives as teachers and as learners.

**Figure 16:** The number of times *time, empathy with the learner* and *pedagogical issues* were raised in debriefing sessions, and how many times various feelings were expressed.
5.1.2.2 What did you learn?

This question seemed to trigger a discussion around teaching issues. Often someone began by mentioning something related to the technology content of the workshops such as:

I learned today about the TAB button.

(Cheryl 9/3/99)

I felt we were learning superficial information… learning about how the digital camera worked.

(RH 30/3/99)

This was often accompanied by comment on the implications of what had been presented in the workshop, for their own teaching. One of the major implications was to do with time (see Figure 16).

I tuned out of the concept keyboard - tuned out it seemed like an enormous amount of work - when will I have time?

(RK30/3/99)

If you are going to use it in the classroom you need to know it thoroughly and you need to read the manual and you’ve got to be confident and that takes a lot of time before you can present it to the class.

(RK 4/5/99)

It just made me realise how computer applications are very time consuming

(RH 9/3/99)

when do we get the time?

(Di 4/5/99)
Participants also learned about learning. This again had implications for their own classrooms. One such example was to do with following instructions, in answer to the question ‘what did you learn?’ after workshop 5 (25/5/99) Cheryl and Di answered:

read the instructions before you start.

(Cheryl, 25/5/99)

we say, have you read it and the dear little pets have but we read it too, we read it. If you'd said to us if Jenny had come over to us and said have you read it? We would have said yes four times we've read it and done it.

(Di, 25/5/99)

Other discussion focused around support for learning, again this was related back to their own classrooms. The following exchange provides an example:

RH: I think a lot of assumptions are made… it’s an assumption that I know … it’s devastating to your confidence

Di: But aren’t we describing what happens in our classrooms? (post workshop discussion, 9/3/99)

After the final workshop Di summed up what she had learned throughout the course saying:

cooperating, sharing, being willing to compromise…. I think that’s one of the major features coming out of this… a lot of the pedagogy of teaching is really brought out in this… you know, individual needs and choice at what rate they do things… and I thought, you know, really it’s all about lots of really different things although it's technology driving it, TILT is driving it, but it’s still about the heart of what we do, it’s about teaching.

(Di 15/6/99)
When asked what they had learned it seemed that these four participants either did not think it relevant to talk about learning technology skills or perhaps did not think that was what I wanted to hear about. Although the technology addressed in the workshop occasionally was mentioned it was never a major focus of the discussion. The discussion instead tended to focus on the implications of the technology for their teaching, such as time to become familiar with software or hardware. The discussion also often led to considerations of what it's like to be a learner and how their students must sometimes feel about classroom learning.

I had expected this question to provoke answers more directly linked to the content addressed in the workshops such as ‘I learned to use a word processor’ or ‘now I know how to operate a digital camera’. It is possible that nobody learned these things and hence there was no discussion about this kind of learning. However it is also possible that for these teachers such know how was of minor importance, because neither the gaining of skills nor the non-gaining of skills took up much of the discussion time. The discussion tended to centre around learning about learning or learning about teaching. Both would be missed in any evaluation of the course that centred on teacher learning of workshop content (i.e. the technology).

5.1.2.3 What did you think?

This is the question that I had originally hoped might reveal the inside story of what a participant was really thinking and feeling, not realising (what now seems obvious) that ‘what happened’ and ‘what was learned’ would also be personal stories and probably not something that could be observed by someone looking on (in this case, me). Each participant’s being in the workshop, experienced through a particular life history, seemed to be only loosely connected to what the facilitator and the TILT program were providing as a learning context (and what I as an observer, observed). The answers to ‘What did you think?’ seemed to be more predictable (to me) than the answers to the previous questions. For example after the workshop on the Internet and email conversation focused on the exciting possibilities of these technologies for learning.
After the workshop on digital cameras and concept keyboards conversation was around the time needed to learn how to use these effectively in the classroom. The database workshop (Workshop 5, 25/5/99), where participants were required to work in small groups, produced the most enthusiastic response. Group discussion centred around the fun and satisfaction of working together (“the companionship of working with someone because I think on my own I would have felt very lost and frustrated” (Cheryl); “it was company to be with other people... especially having somebody who was really good” (RK); “in a classroom that would be good reason for having buddies” (Di)).

Figure 16 summarises the main items of conversation. It shows the number of times various types of responses were made throughout the series of five workshop debriefing meetings with the four participants. The chart shows that most of the discussion centred on the business of teaching and being a learner. It also indicates that although time was an issue discussed after each of the five workshops the frequency diminished over time, this is picked up in more detail in the profiles of Di and Robyn (Appendix 9). The chart also indicates that negative emotions on the whole declined over the workshops and positive emotions on the whole rose.

5.1.3 Jenny as workshop facilitator

Jenny was a Primary School teacher working full time across the district as the TILT facilitator. She was responsible for 70 TILT participants organized into seven groups of ten. She had recently replaced the previous facilitator who had been successful in gaining a Technology Adviser position in another district. She had applied for the role because, she said, “I feel that it's a very worthwhile program, I think it's exciting”. Jenny believed that technology should play a bigger part in schools and recognised that it would “never happen unless we help teachers to be enthusiastic, and want to use technology, and make it fun and, of course, relevant, because they won't use technology unless it is relevant to them” (facilitator questions 30/3/99).
5.1.3.1 Facilitator’s teaching style

Jenny was quietly spoken and described by one of her participants as “gentle”, “respectful” and “caring” (Di, 1/11/99). Another said “She’s very calm” (Cheryl, 4/5/99). Someone else appreciated that she was “well presented, spoke clearly, well groomed and organised” (Robyn, 28/6/00). Other participants agreed, saying she was “calm”, “unflustered”, “reassuring” and “non-threatening”. Jenny herself worried that she spoke too quietly and that participants may not have been able to hear her well enough. However this did not seem to be a concern to participants, some of whom had expected the facilitator to be a ‘computer whiz’ something they said they would have found intimidating.

Jenny was anxious not to be seen as “an authority on everything”. As she said:

I don’t think I would pull that off very well anyway, I don’t know what others think when you say ‘I don’t know’... but that’s the way it has to be if you don’t know something. So, I just often wonder whether when you don’t know something people think ‘she’s not very good, she doesn’t know this’, but there is not much I can do about that.

(Jenny, post workshop, 4/5/99)

In earning labels such as ‘gentle’ ‘respectful’ and ‘caring’ Jenny sometimes faced dilemmas. For example when people were speaking when she was addressing the group although she told me that she considered this rude she did not say anything to the participants:

only because I was trying to be nice to them, I probably should have indicated that. But I want them to feel comfortable and have positive feelings towards TILT, so that's why I try to be as kind as possible to people.

(Jenny, post workshop, 4/5/99)

To the same end she made, “light of their silly mistakes”, and did not “blame them for not being able to do something that they really should be able to do” (4/5/99).
5.1.3.2 Facilitator’s emotions during workshops

In order to try and tap into the emotions of participants and facilitator I asked them to indicate what emotions they were experiencing by ticking the appropriate words on a slip of paper (Appendix 10). I asked the group to do this at the beginning, middle and end of workshops two to six in order to capture any changes in reported emotions during the course of the evening. I constructed a list of emotions from Plutchik’s (1994) synthesis of the literature on emotions and added others such as bored, challenged, confused and motivated that seemed appropriate to workshop participation. I had thought it might give me some clue as to what was going on inside the participants and facilitator as I observed them interacting in the workshops. As my reading about emotions progressed, however, I dismissed this tool as a useful indication of the emotioning that I was trying to uncover. Nevertheless it did convey the emotions that participants wanted to name for whatever reason and probably said something about changes in feelings during the evening. The facilitator indicated that she found it useful and continued using it with other groups as an indication of the way her participants were responding to the workshops.

At the beginning of workshop two (9/3/99) Jenny indicated that she was feeling challenged, but also happy, hopeful, interested and motivated. Half way through she reported still feeling interested and motivated but also confident, engaged and pleased. By the end of the evening she was happy, hopeful, interested, motivated and pleased. At the beginning of workshop three (30/3/99) Jenny said that she was feeling exhausted but at the same time was engaged, hopeful and motivated. She reported ending the evening feeling capable, confident and happy. At the beginning of workshop four (4/5/99) Jenny said that she was feeling anxious as well as a range of positive emotions (capable, challenged, confident, motivated and hopeful).

Half way through she said she was no longer feeling anxious but felt pleased but at the same time disappointed. At the end she felt happy, interested, motivated and pleased. At the beginning of workshop five (25/5/99) Jenny reported (on the emotions checklist) that she was feeling challenged, hopeful, interested and motivated. In the middle of this workshop Jenny was feeling capable, confident and pleased.
At the end of the workshop Jenny felt capable, pleased and motivated adding surprised to her list. At the beginning of workshop six (15/6/99) Jenny said she felt challenged and overwhelmed but at the same time interested. Half way through Jenny was no longer feeling overwhelmed, instead she felt hopeful and engaged. At the end of the workshop Jenny felt confident and happy as well as motivated and pleased (Figure 17).

Among a range of other emotions that changed from workshop to workshop there were some constants. Jenny reported feeling interested at the beginning of every workshop, mid way through each workshop she indicated that she felt engaged and interested and at the end of every workshop Jenny reported feeling happy, motivated and pleased.

**Figure 17:** Jenny’s reported emotions before, during and after the workshops, expressed as a percentage of the workshops in which the emotion was mentioned
It seems evident from her reported emotions that Jenny did not take her role lightly. She indicated that she approached the workshops often with mixed emotions. According to the emotions survey she was usually hopeful, always motivated or interested, but sometimes anxious or exhausted. The positive emotions she reported at the end of each session suggest that a deal of hard work was put in during the two hours to ensure that things went well and that workshops ended on a positive note. It also seems evident from the reported emotions that Jenny enjoyed her role, and gained pleasure from conducting it well.

5.1.3.3 Participants

Jenny said that she was anxious to learn as much as she could about the participants so that she could adapt the workshops to their needs.

One participant said the Internet had been in her staff room for a year and she’d managed to avoid it. One bloke in his first workshop was straight into the extension activities. He was helping the person next to him - he’s good on the Internet.

(Jenny, 9/3/99)

By workshop three she had:

had a couple of school visits with participants in that group, so I felt more familiar with the actual individual participants than I had in the past.

(Jenny, debriefing, 30/3/99)

The district superintendent attended one of the workshops as a participant. Jenny said:

he was very slow he was the slowest …and in the end he said to me ‘I was okay until the last 10 minutes but you really confused me after that’.

(Jenny, video recall, 9/6/99)
Said Jenny:

In a workshop there can be people who are very negative and people who are very positive and I think the challenge is to make sure that the positive ones prevail and that they set the tone for the workshop and not the negative ones.

(Jenny, response to questions 30/3/99)

Jenny commented that the size of the group made a difference to the interactions that were possible. She felt that a small group “was almost like having a conversation with friends rather than actually conducting a workshop” [Di had felt similarly] (debriefing 4/5/99).

During the debriefing session the day after workshop five (26/5/99) Jenny talked about this particular workshop group. She said,

These people seem to be a lot keener and a lot more committed and I've seen some really great ideas and some really great teaching strategies when I've been out visiting these people in their schools... For me, I think that is the most valuable part of TILT. I really enjoy seeing what people are doing and seeing the way that they choose to use technology and the ideas that they come up with.

(Jenny, 26/5/99)

Jenny felt that the participants were very interested and conscientious. She visited a number of them in their schools and found that they were “very interested in learning” (video recall, 9/6/99). She said that she was impressed with their teaching and enjoyed seeing what they were doing in the classrooms.

Two days after workshop four (27/5/99) two teachers (Di and Cheryl) from the same school booked Jenny for a school follow up visit. They had requested to be shown the Lego materials that had featured in one of the videos. Di had also asked about how to assess student learning when students were engaged in exploring the Internet or a computer adventure game. She found it difficult to understand how she would know what learning outcomes her students had achieved.
Jenny brought along an article that described how the teacher could frame the learning for an open-ended task. It explained that an assessment rubric was given to the students beforehand.

Di wanted to check her email so, in readiness, Jenny found the appropriate web mail site on the Internet. However Di did not realize this and began a search instead. Jenny noticed what had happened, explained to Di and quickly re-found the site. Jenny said later that she was concerned that Di should not have another negative experience with the technology (after having to change machines three times in workshop two and the camera not working in workshop three) so endeavoured to prevent potential problems and smooth over any problems that arose.

Most of the rest of the morning was taken up with the Lego materials. Jenny sat to the side of the computer while Cheryl and Di followed instructions in their TILT books and built and tested a temperature sensor. Jenny was on hand in case things went wrong, she made the occasional suggestion and generally encouraged them. Jenny suggested that Di and Cheryl borrow the Lego kit after she had finished using it for the workshops. She advised them to:

  start small and have success then you'll try something else. You can't do everything at once but you can know it's there and keep it at the back of the head.

(Jenny, 27/5/99)

Jenny was also aware of potential classroom management issues. The small parts of the Lego meant that they could be easily lost. Jenny pointed this out and encouraged the teachers to consider how this issue could be managed in the classroom.

In this one school visit Jenny had covered a range of activities and issues. She had found an article to address Di’s learning outcomes concerns; she had discussed curriculum content and skills; assisted in the use of email and Lego; encourage the teachers to start small; and addressed classroom management associated with using Lego. All of these points helped to personalize the program for these two participants. The visit like visits to other schools helped Jenny to get to know her participants.
Jenny said that as she got to know people better, particularly from going out to their schools and seeing what they were doing, the things they were interested in, and their teaching styles, she found it easier to run the workshops. She was able to make specific references to what they were doing. She said:

I've been really impressed with what people are doing in schools and particularly in that workshop, there are some great things going on.

(Jenny, post workshop, 26/5/99)

Jenny also felt that she “made a difference to people” in her school visits, that she “helped them along the way to doing things with technology that they hadn't been able to do before”. She particularly enjoyed:

going out to schools and working one-to-one or with a small group of people in a school. I think that that is the most valuable part of TILT and that's certainly the part that I enjoy most.

(Jenny, post workshop, 4/5/99)

Jenny said she spent all her working time planning the workshops, and making sure that she was prepared:

then doing the follow-up activities, and being aware of the participant's particular interests, and if they ask for something like, for example, ‘travel buddies’ address on the Internet or Japanese font that they want to use, then I will try and follow that up for them.

(facilitator questions 30/3/99)

However participants not only operated in a school context, they also had a home context that often impinged on their learning. One participant had told Jenny that her son had said “why are they spending this money on you, are you ever going to learn?” Jenny hoped she proved him wrong (video recall, 9/6/99).
5.1.3.4 The workshop experience

Jenny was concerned that the actual workshop experience should be a good one for all participants. To this end she encouraged participant interaction.

Needing to get the workshop off to a good start Jenny was keen that the discussion should go well. Of workshop three she said:

I was quite pleased by the discussion in the beginning. Some groups are hesitant to discuss things, perhaps discussing the video, they haven't watched it, or they can't remember it, or they're just too tired by the time they get there to be bothered to think about it, but that group was quite good, and responded well to video discussion. 

(Jenny, 30/3/99)

Jenny also encouraged the sharing of stories “about how technology was being used” (30/3/99) at the beginning of each workshop. She thought it was good that there were lots of positive stories. She reported feeling pleased that people were starting to share what they had done with TILT. She said:

the positive and encouraging comments that came from the participants when they shared small successes that they’d had, I thought was something that I should try and draw out from every group.

(Jenny, 30/3/99)

Jenny, herself, also talked about participants’ successes. She found that this started the workshop off “with a good feeling” (facilitator questions, 30/3/99).

She also encouraged participants to help each other. She spoke of one participant who had:

fairly good skills in, probably not in all areas, but a lot of areas, but he's a great asset to have in the group because he's patient and helps people that need to have things explained to them.

(Jenny, 26/5/99)
Jenny wanted the workshops to be remembered as fun. She thought workshop five was successful because:

there were lots of jokes, people teamed up with people that they didn't necessarily work with, which was a good thing... I think it's great that people can form pairs and groups with other people and bounce off them and have a bit of a joke while they're doing things as well.

(Jenny, 26/5/99)

She felt that workshop six was similarly successful. She said:

I think they enjoyed themselves and they were really very engaged in what they were doing and I think that they also learnt from working with somebody else that there are these interactions that go on in group work that wouldn't go on if you're working alone, I think that was good. Everybody had success... and there was lots of laughter at the end which was the way I wanted to finish... I think that they did enjoy looking at other people's [multimedia presentations]... they had something to look at and something to laugh at.

(Jenny, debriefing workshop 6, 15/6/99)

5.1.4 Jenny’s beliefs about teaching and learning

5.1.4.1 Teaching and technology

Through modelling in the workshops Jenny said that she hoped to encourage the use of group work. Of workshop five she said:

I think that the sort of interaction that we got yesterday was just so much better than having people sit there by themselves and do something at a computer by themselves and I hope that that has come out for the people in the workshop as well.

(debriefing, 26/5/99)
In her discussion with teachers she encouraged student project work. Jenny felt that in high school particularly the teacher tended “to be out the front delivering a content driven curriculum” (workshop five, 25/5/99). But she felt the role of the teacher was changing. Jenny said that often teachers were:

trying to teach in the old way they have always taught and incorporate the computer into it and I don’t think that is possible. I think you have to use the computer in a different way [rather than as] something extra on top.

(video recall 2, 20/12/99)

In discussion of the curriculum Jenny said:

I don't think the curriculum can be content based because there is so much overlap we need to link the content and pull out the common skills across the curriculum.

(in-school support 6/5/99)

She did not believe that many teachers had read the research concerning teaching and technology. Also she felt there were people who still thought that they could “get away with teaching and not using computers” and they think that:

if they don't use the computers then nobody is going to jump up and down because, you know, it's not really something that anybody really cares about.

(video recall 2, 20/12/99)

Because of this Jenny made the point that:

in TILT if you take just one thing that you can see an application for and that you can use in the classroom, then start with that, and start small, and have success with that, then you will eventually be able to incorporate all the other things in it as well.

(video recall 2, 20/12/99)
Jenny regarded technology as "a new way of doing something". She considered technology as a tool giving the example of the “apes that used the sticks to get the ants out of the ant holes so that they could eat them”. She felt that:

what we do today is just to use the scientific means that we have to do things in an easier and newer way.

(facilitator questions 30/3/99)

However Jenny indicated that one thing she always looked for was whether she could do something better with technology than without it (workshop four 4/5/99). She reassured participants that teachers were not going to be replaced by computers but felt that technology should be accessible to all teachers. However she realized this was not the case in many schools. She recounted:

finding in one school that the Internet computer was locked away... you had to get a key to get in there.

(video recall, 9/6/99)

She realized that much of what she said about using the Internet would not be realistic for a teacher in this school. She recognized that she had:

been spoilt because I've had the Internet for a long time and... you know I can see that the sort of things that it's opened up to me it will open up to teachers as well.

(video recall, 9/6/99)

Teaching with and about technology had another set of concerns. Said Jenny, “people were frightened that they might break the computer” (9/6/99). To counter this she said that she modelled the attitude that the computer would:

look after itself basically and they'd have to do a lot to break it and there are a few basic things you need to remember.

(video recall, 9/6/99)
She felt that this realization was a major “breakthrough for people” (video recall, 9/6/99).

When things did go wrong Jenny said that she tried to explain what was happening without using jargon:

> to try and get things back on track in the quickest possible way preferably without ripping the mouse out of their hand… and not to make them feel as if it's their fault.

(video recall, 9/6/99)

Jenny believed that not all teachers had easy access to email. Some of the female teachers had home access but often it was through their husband's email account. Because of the difficulties that some participants had experienced with email Jenny thought that she must not have explained it very well. She was pleased to see during the video recall session that she had explained in detail how to access a browser based mail service. However even with this demonstration and explanation Jenny realized that some participants still had difficulty. She recalled Di’s misunderstanding on the school follow up day:

> Di still didn't … understand how to access that email even then which was a long time later.

(video recall, 9/6/99)

She went on to say:

> it's obviously a new concept (inaudible) completely and I mean my belief is that you actually do need to hook new learning onto old stuff that's already in there, if there's nothing in there to sort of hook it onto it takes longer to make sense of it.

(video recall, 6/9/99)

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2 Throughout the video recall sessions Jenny watched each video clip for instances of ‘taking over the participant’s mouse’. She was highly critical of herself whenever this occurred.
In teaching the email section Jenny said she must:

remember to go through very slowly, remember that they can’t just put in a password at the beginning, they have to sign on first but still two or three get lost.

(post workshop questions 9/3/99)

Jenny said that she constantly asked herself if she had explained well enough. She said things in two or three different ways because, she believed, different people make different connections. At the same time she was conscious of making sure that she didn’t belittle anyone.

Jenny explained that for her one of the complications of teaching with technology was the vast range of hardware and software available in schools. She recognised that she was not an expert on everything but came to believe that this was not really important. She believed that it was good for participants to see that she did not know everything and began to “actually make a point of saying” that she didn’t know some particular piece of software. However when a participant asked about how to do some specific thing she said that she would always say that she knew, “generally that it can be done” and “that by looking around we are going to find out how to do it” (video recall, 9/6/99).

This changing role of the teacher (from teacher as the font of knowledge to co-learner) brought with it concerns. Jenny said:

I know that you’re not meant to be the font of all knowledge anymore but it still does concern me if I’m not able to answer people’s questions. I feel that I need to be helpful to them, and I feel that if I say “oh I don’t know”, then they’re going to think “well, what is she doing here teaching us”. But, I know that you can’t know everything and I always do get back to people.

(post workshop, 26/5/99)

This is borne out by Robyn’s comments on the expertise of others (see part 2).
5.1.4.2 Empathy with students

Jenny felt that teachers gained empathy with students as learners. She said:

I think that what also people have learned is how kids in their class feel when they're in the same situation, and I think that that is one of the great benefits of TILT, that's probably not one of the aims, but to have teachers become learners again and be put in a learning situation I think is a great experience.

(post workshop, 26/5/99)

Jenny was pleased that:

lots of people had said . . . that they now understand what kids are thinking . . . that now I understand how kids feel in the classroom you know when they and particularly when I say one thing and they're doing something else and they feel like the child in the classroom who's . . . doing the wrong thing . . . it's quite funny I think it's good to be reminded.

(video recall, 9/6/99)

In a similar way Jenny remembered how she had felt not so long ago when she learned how to use the Internet and so had empathy with her participants. She said:

it's not that long ago that . . . I started using the Internet I can also sympathize . . . not sympathize but empathize cause I know what they're going through and also it's very obvious especially in the beginning of TILT that they feel in a position that they haven't felt for a long time and they feel stupid.

(video recall, 9/6/99)

5.1.4.3 Facilitator’s beliefs about learning

As evidenced above when Jenny speculated on how participants viewed her, she was concerned about the feelings of her participants. This concern it seems had roots in her beliefs about the conditions in which learning could take place. She tried to make people feel comfortable. She had noticed “that teachers put in a position of knowing nothing about a subject can be absolutely devastated” (26/5/99). She had “seen teachers who are good competent teachers, just absolutely, having lost all confidence” (26/5/99).
As a consequence Jenny said:

their behaviour and attitude and general demeanour is like a child in a classroom, a child who can't do things and is embarrassed by it and acts out in all sorts of ways.

(post workshop 26/5/99)

This, she said, was why she usually ignored what she thought was “rude behaviour”.

Jenny also felt that participants learned best when they were not belittled or made to feel stupid in any way. As she said:

I always try and make sure that people don't feel stupid, don't feel that if they make a mistake then it's going to reflect badly on them as a teacher or anything else like that, and lots of people do feel that way, and I think that once they sort-of realize that I'm not judging them, I think that the whole relationship is better, or that I'm not judging their teaching ability . . . I do try to . . . make them feel comfortable about making mistakes which I think is important.

(debriefing 26/5/99)

She avoided causing embarrassment to participants even when occasionally it meant that she ignored problems they were having and left them to sort things out for themselves, “just because I knew that they wouldn't want me to come over there and embarrass them” (video recall, 6/9/99). For example, whenever Jenny heard the sound of the computer “start up” she knew, “that somebody [had] shut down the computer accidentally”. She tended to ignore it, because “if I go over there then they have to tell me, oh I did this wrong, you know and I'd rather not hear them say that” (video recall, 6/9/99).

She also tended to ignore talk that was not about the workshop task, “because I don't want to get them offside and I don't want to make them feel as if I'm Hitler there making them do their work either” (video recall, 6/9/99). She reasoned that if they were talking about other things they had, “probably reached… full up by that stage, they know when they've had enough” (video recall, 6/9/99).
Linked to this was Jenny’s belief that learning had a lot to do with confidence. Had she always been there to show people what to do they would not have had a go at working things out for themselves. She said:

I think it gives them confidence that they can have a go and they can work it out and that sometimes you just have to do that I mean a whole lot of using computers is problem solving I think. We need those strategies to know how to go about it.

(video recall, 9/6/99)

Jenny believed that the experience of working in pairs and small groups was invaluable for participants. It allowed them to interact socially as well as intellectually. It also meant that they would be able to complete the task more quickly. However the most important reason was for “modelling what we want them to do in the classroom” (20/12/99). Jenny felt that working in pairs was the best way for participants to learn how it felt and that, “even though they are in pairs, there is very valuable learning going on” (video recall 2, 20/12/99). She said:

I think that if they were to make the connection between how they're learning, what they're learning, back to when they've got their students doing the same thing in the classroom, I think if you reflect on that, the learning that's going on then, and relate it to the learning that the kids are doing, then it gives you, you know, a good basis for planning and... the sorts of outcomes you want to get from them.

(video recall 2, 20/12/99)

However Jenny recognised that “this is more difficult in high school than in primary”. In high schools, Jenny observed, you were more likely to see computers in labs where they were the property of Computer Studies to the exclusion of other groups (workshop five, 25/5/99).

4 See Robyn’s comment on working in pairs and groups in section 2.
5.1.4.4 Summary of Jenny’s beliefs about teaching and learning

Over the research period Jenny’s beliefs about teaching and learning were consistent. She used the workshops to model groupwork, which she saw as important to what she believed was a new way of working afforded by the technology. This new way of working was process rather than content focused and involved a change from teacher as the knowledge giver to that of co-learner. Jenny modelled this in workshops by her relaxed attitude towards not having all the answers, and her willingness to find out. She felt that learning had to do with confidence and to this end endeavoured to make her participants feel comfortable and competent through a policy of never causing them embarrassment. Jenny often noticed potentially embarrassing incidents during workshops however she ignored these while at the same time recognising that the teachers would probably learn from such incidents what it means to be a learner and hence empathise with their own students.

5.1.5 Facilitator’s concerns

5.1.5.1 Preparing for the workshops

Jenny had taken a group through part of the program during semester 2, 1998. The group that I observed was the second of Jenny’s seven groups in semester 1, 1999. So when she took workshop two she had already been through the material twice before. “This was the third time I had done this workshop so now I was quite confident” (9/3/99). And again after workshop three:

This was the third time I'd done this particular workshop, so by then I was fairly familiar with the content and quite happy with how the workshop was structured.

(post workshop, 30/3/99)

However the program changed from time to time in response to participant feedback and changing school access to technology. As more schools acquired scanners they became an option in workshop three (Computers and Related Technology).
Jenny realized she:

had to become more familiar with the scanner software, it's not a scanner that I have used much . . . and the software is slightly different from the sort of software that I used before, and even though it is not a major part of the workshop it is something that the participants are interested in using, because they have them in their schools, so I need to become a bit more familiar with that.

(post workshop, 30/3/99)

Jenny indicated that she was not equally conversant with all parts of the TILT program. For example she did not have the “temperament, or the interest, or the patience to sit there and work through” adventure games like MYST (debriefing 4/5/99). She thought they were “great for problem solving” so was embarrassed having to say that she didn't know the program. However she decided it was better to admit to not knowing.

It was also easy to forget the details of a workshop from one semester to the next. Of workshop five Jenny said:

I wasn't as concerned about all the little tricks and things that you need to know in ClarisWorks yesterday, because I found the day before I was fairly confident in using it, but I found the day before that there were a few things that had gone rusty in my mind over the time since I've used it.

(post workshop, 26/5/99)

Preparation for the workshops included preparing all materials, loading software onto the computers if necessary and ensuring afternoon tea was available. As well as this Jenny said that she prepared herself mentally.
On one occasion she had not been able to do this, which was of great concern to her:

I think that the most significant thing about the workshop is that I was, right up until 20 minutes before it, heavily engaged in something else, so I was in a real rush to get that finished and get over to the workshop ... so I was feeling a bit harassed I guess, not by anything to do with TILT, but just by other things that I hadn't got done. I think the workshop began okay, but I just didn't have my head around what we were doing, so I was sort-of didn't get into facilitator mode I don't think for a while ... I should have been more on top of things and I should've had a better idea in my head of where I was going. I just was not mentally organised for today, I was physically organised, but was not mentally organised. Once I got onto the interaction with the people though that was fine, they're a lovely group.

(post workshop 15/6/99)

Jenny was disappointed with her handling of this workshop “in the beginning, but fairly pleased with the way that it turned out in the end” (debriefing workshop 6, 15/6/99).

5.1.5.2 Working with technology

Jenny was very much aware that participants were apprehensive about the use of computers. She knew that problems with the computers could confirm their beliefs that they were inadequate to the task, and that it was their fault that things did not work. Jenny said:

I like to keep technical problems to the minimum and if it does happen then I try to give participants the impression that it’s not their fault.

(post workshop 9/3/99)

This was evident when Di had to change machines several times during workshop two and asked if it were her fault the machines would not work Jenny referred to the incident several times in discussions later, concerned that Di may have been upset by the incident.
During the next workshop Di ran into problems with the technology again. During the debriefing session Jenny recalled:

at one stage when something happened with the camera I heard, and I presume it was the same person who has commented in the last workshop about her effect on technology which wasn't very good, saying that last time she had been on three computers so she wasn't surprised that something was going wrong now, so I immediately went back over to see if I could work that out before it went any further.

(post workshop, 30/3/99)

Internet access was an issue in workshop two. It was slow when a number of people were accessing at the same time (video recall, 9/6/99). Jenny was concerned that this would be off-putting for people.

Of workshop three Jenny said:

I was conscious of the fact that I didn't want too many technical hitches because it gives a bad message to people if they see that things don't always work, then they're not very confident to try it themselves, so I like to try and keep any sort of technical problems to a minimum, and if anything does happen I try to give the people the message that it's not necessarily their fault, that it's not something they've done to make it happen.

(post workshop, 30/3/99)

She said that she worried about the technology not working. When viewing the video of workshop three and asked what she was thinking at the time she said she was probably thinking “is this damn thing going to work or do I have to say sorry, try again” (video recall, 9/6/99 – digital camera).

Workshop six had a different set of problems. Because the sound hadn’t been working on her usual computer Jenny used a different computer with the light projector the second time she ran this workshop. Unfortunately she found when she “went to show the movie, that QuickTime wasn't installed”.

So she had to:

quickly install that, which I think was fine because at least people had something to concentrate on while I was doing it they could watch what was happening on the screen and that was okay.

(post workshop, 15/6/99)

Six months later watching the video of this workshop Jenny again recalled the frustration of things not working. She said:

it's terribly frustrating when you go in and, you know, the computer you used the day before . . . all of a sudden, you've set everything up, and 'oh something has happened', it's not working properly, you can't show the sound, you can't show the video. I find it terribly frustrating.

(video recall, 20/12/99)

As she watched the video Jenny remembered what must have been the problem:

looks like something's not working there. What was it? The QuickTime mustn't have been on. Oh dear. See what I mean? See how it's sort-of big gaps in when I am talking?

(video recall, 20/12/99)

As Jenny watched more of the video she recalled more of the problems with that particular workshop. She also recalled the ways she had devised to overcome the problems, like using plain backgrounds for the Hyperstudio stack because the colour seemed to leach out:

so depending on which background you've chosen, you end up with very strange colours in your stacks . . . there are lots of little tricks in this last [workshop].

(video recall, 20/12/99)
Later she said, “this workshop is fraught with problems – machines can’t play sound or can’t take movies”… Jenny was careful to only allow participants to “use computers that actually have the sound working on them and have QuickTime properly installed”. However things could change between one day and the next because the school used the library computers every day. Machines that worked for the first group may not work the following night for group two. (video recall 20/12/99).

Jenny also found that participants needed basic computer navigation knowledge to be able to find their way around the CDROM in the final workshop:

if they don’t understand directory structure and navigating around the computer, they just find the whole thing totally confusing because they cannot find that particular directory that they need to look for with all the resources in it.

(video recall 20/12/99)

To overcome this problem Jenny “learned early on that if you had not worked on that basic computing knowledge . . . then they just couldn't do it”. (video recall 20/12/99). She felt the final workshop was “almost a test . . . of their understanding of basic navigation” (20/12/99) and was disappointed that “some of them, even at the end of TILT, did not know the difference between the A drive and the D drive” (20/12/99). This was even more confusing for “people who used Macintosh and didn’t have PCs” because this particular school lab was a PC lab. Jenny felt that some participants could actually complete TILT, if they were not paying too much attention, without gaining “very much knowledge about a computer” (20/12/99). Because of this Jenny made sure that subsequent groups:

understood what the drives were and how to navigate, that was something that . . . I've always made a point of since I realized that.

(video recall, 20/12/99)
Other practicalities of the workshop were also discussed in the debriefing sessions. During workshop two Jenny had projected from her computer onto the wall and was concerned that participants had difficulties seeing the image. After that she projected onto the white board instead. Jenny was also concerned that a participant might be offended when a high school Geography teacher had searched the Internet for ‘hot deserts’ and found pornographic sites.

One of Jenny’s major concerns during workshops was stopping herself from taking control of someone’s mouse. During one video recall session she was pleased to see herself with her hands behind her back leaning over towards a participant’s computer obviously explaining something but not taking control.

5.1.5.3 Time

A constant concern for Jenny during the workshops was time. She was very “conscious that I had to get the workshop done by 6.00pm” (9/3/99). Again on 30/3/99 Jenny commented on this problem when asked what she was thinking during the workshop:

I was thinking I had to ... get this workshop over by six o'clock and make sure we are ready to leave by six, because I have a constant battle with the cleaner, and the night before she'd been up and was quite rude because it was after six o'clock.

(post workshop, 30/3/99)

The cleaner had spoken to the district superintendent about the group not leaving on time and Jenny was under pressure to pack up and leave the building promptly.

Another aspect of the time issue was remembering to include everything. After workshop two she said:

I forgot to show the Dennis Hill library page. I also had some things on search engines that I forgot to put out.

(post workshop, 9/3/99)
Her main concern with the software workshop was to cover all the content. Occasionally she forgot things that she had planned to say or show. In order to help with this problem she devised a strategy of placing:

everything that I need around me, either on a chair or on the table or somewhere where I know where it is and then I work through them, and those things act as the prompts to me so that I know what I'm going to do next, rather than referring to a sheet of paper all the time, I find that more helpful.

(post workshop, 26/5/99)

Related to this was the timing of the whole workshop. Watching the video of one of the workshops Jenny recalled:

that the timing wasn't very good there I think that the email bit [was presented] too late … I don't know we just seemed to run out of time, there wasn't enough time to get it all in, that might have been a reason why they didn't get the email because we started it fairly late on and they didn't actually get that much of a chance to play around so I would time it differently next time.

(video recall, 9/6/99)

Timing again was an issue in workshop six. Jenny commented later:

the demonstration should have been much quicker than that and we should have got people on to actually using it faster, because people then didn't finish their stacks which was a shame.

(post workshop, 15/6/99)

On watching the video Jenny remarked:

see this workshop has been going now for a very long time, and we're still going through this, we're not even onto the computer yet.

(video recall 20/12/99)

A reference to the difficulties some participants later had with accessing and using email.
Jenny recalled that she was “conscious of the time going past” (20/12/99).

Jenny was also mindful of the need to provide all participants with adequate time. Said Jenny:

I need to be aware of including everyone in moving around the room. The two near the whiteboard - I didn’t seem to spend as much time with them. Dividing your time is difficult. A few demanded more time than others. When three people are saying ‘Jenny’ at the same time which do you go to - who hasn’t had as much time - the one who’d had the Internet for a year but not used it - how do you react to that? Do I encourage or give the challenge back?

(post workshop, 9/3/99)

Another concern linked to the problem of time was explaining to participants at the beginning of a workshop and then having to repeat the explanation for late-comers. Jenny said:

you go through all this at the beginning, but then somebody else arrives, and they ask you the question that you just . . . explained and you can't really go through it again because everyone else has heard it.

(video recall 20/12/99)

5.1.5.4 Managing the group

Jenny faced a dilemma in managing the group. She did not want to embarrass her participants yet did feel that one or two of them were sometimes quite rude. She said:

there was one participant who talked, or two of them who talked while I was talking, and I thought that was actually quite rude. Perhaps if I'd been saying something interesting they might have listened, maybe it was my fault, but I did think that they were quite rude to be sitting there talking when I was talking, and considering that it was such a small group, so that when they were talking that was a third of my audience that were engaged in something else.

(post workshop, 4/5/99)

6 Compare Di’s attitude to manners in part two of this chapter and her concern that she should be well mannered.
A similar thing happened the following workshop:

When I began, it was the same as happened last time, people didn’t stop talking, which I feel is a bit rude, but obviously they feel that what they’re saying needs to be said first, so eventually they listen.

(post workshop, 26/5/99)

Another group was particularly talkative and Jenny felt “it was hard to get a word in edge-wise, and most of the time they were off task too” (video recall 20/12/99).

5.1.5.5 Summary of the facilitator’s concerns

As facilitator Jenny had a number of concerns. She felt that occasionally she was under-prepared for the workshops. Once she referred to not having time to prepare herself mentally, but usually her feeling of under-preparation referred to the technology. She was not equally familiar with all the software and hardware and although she did not feel the need to always be the expert she did require the technology to work. She felt that she should avoid problems with the hardware if at all possible so that participants would not become frustrated. At the same time Jenny recognised that participants needed to become confident with the technology and that she must avoid providing assistance too soon and avoid ‘taking over the mouse’ when helping to solve problems.

Other major concerns for Jenny were to do with time and with managing the group. She was obliged to finish on time however sometimes the beginning of the workshop was delayed as participants took time to settle down or latecomers needed instructions to be repeated. Jenny often faced the dilemma of not wanting to embarrass participants by drawing attention to what could be viewed as bad manners, but on the other hand not being able to run over time. There was a great deal to get through each workshop, the timing of elements of the workshop and remembering to cover everything were on Jenny’s mind as she dealt minute by minute with the interactions of the group.
Jenny’s concerns as a facilitator provide insight into some of the practical implications of her beliefs about teaching and learning expressed above. Some of the dilemmas she encountered seemed to arise when her beliefs about teaching and learning were put to the test by temperamental technology and novice participants.

5.1.6 Overall Summary

The evidence indicates that TILT in Chester district was being conducted as the program developers had envisaged. The facilitator appeared to be well prepared for the workshops, aware of the pitfalls and prepared in case things did not go to plan. She learned from experience and thought about improvements to her practice. She appeared to be highly competent and able to meet the diverse needs of her participants. She seemed to be approachable, aware of the sensitivities of learners and able to provide the support they needed. Her workshops demonstrated good learning practices that participants seemed to appreciate.

Jenny’s discussion of her beliefs about teaching and learning indicated that she was in tune with the concerns of the four participants who discussed the workshop experience in the post workshop sessions. They discussed how they felt as learners and how children must feel as learners. Jenny also commented on teachers as learners and the need for support so that they did not lose confidence. Jenny also recognised that putting teachers in the position of learner was probably good for them and that reflection on how it felt to be a learner would ultimately benefit their teaching. Jenny hoped that participants would enjoy group and pair work and transfer this to their own classroom teaching. In post workshop discussion the four participants discussed this aspect of the workshops, recognising that this was an enjoyable way to learn.
This part of chapter five described the setting in which Di and Robyn’s *TILT* related learning took place. It has included as part of the setting a description of the physical location and conduct of the workshop; synthesis of the post workshop discussions between the four original research volunteers; and a description of the facilitator’s attitudes, values, views and concerns gathered through workshop observation, interview and written response to questions. This description provides a view of the milieu in which Di and Robyn participated and learned. Part two describes the learning of Di and Robyn as they participated in the program and during the thirteen months of the research project after the workshops.
Part 2:

The *TILT* related learning of Di and Robyn

Part two of chapter five satisfies the first aim of the study, which is to examine in detail what the interviews and observations indicated that two individuals learned in *TILT* that could be attributed to their participation in the program. It describes the themes and issues that occupied these two participants during that time. Case study one is Robyn’s story and case study two tells the story of Di. These are followed by a summary of their common concerns.

Case study one - Robyn

5.2.1 Background

5.2.1.1 Time line of significant learning events

When asked to chronicle her significant lifetime’s learning events Robyn drew a line dividing the paper from top to bottom (Figure 18). Along it she placed dots at irregular intervals. Against the dot at the top of the page she wrote “Chestwood Pre-School”. To the right of the line she wrote “many ‘hands on’ learning experiences; special days”. On the left of the page she wrote “Lived in adjoining properties with grandparents – very important, support” and, “Nanna lived in Beeston – weekly contact”. Both indicate a close family with plenty of support between the generations and recognition on Robyn’s part that grandparents contributed significantly to her learning.
Figure 18: Robyn’s drawing of the timeline of her significant lifetime learning events
Beside the next dot on the line Robyn wrote: “Chestwood Infants and Primary”. To the left of the line Robyn briefly described this part of her life. She said, “Excellent teachers who motivated and inspired me, especially in Yrs 4, 5 and 6. Dance, speech (elocution) music (piano) lessons every week for 10-15 years. Swam 1-1 1/2 Km every morning Monday to Friday from age 8 – 16 years. Played netball all through Primary and High School years.”

The third dot was labeled: “[Private Girls School] for years 7-12” and about three centimeters below was another dot that said: “Rotary Exchange Student to New Zealand during six months of Year 11”. This, she wrote, was a “very busy life for high school with sport every Saturday. Wonderful teachers who inspired and motivated in a fabulous school. Made friends from many different suburbs, cities and countries (boarders)”.

After [Private Girls School] Robyn went to University to do a BA Dip Ed with a double major in Education and Child Psychology. During this time she worked at “Myers/Farmers/Grace Bros. (the same store changed names) for five years part-time while at Uni”. She described this experience as “fabulous”. She met “many different people”. At this time Robyn was also president of Chestwood Rotaract, a community service group with seventy members.

After finishing University Robyn “traveled through Asia and Europe for 12 weeks”. Between this dot on the time line and the next there was a gap of about six centimeters. The next dot was labeled, “Started full time teaching” first at Gabton South and then at Blakewell Road, Granville. Soon after this she married and moved to work at “Middle Dural”. The next dot was to announce the birth of her daughter (now 16.5 years old). This was followed by a move to her current school and birth of her son who is now 10.5 years old.

7 When commenting in the margin of a draft of this timeline Robyn wrote: “Robyn’s family water skied every Sunday all year round on the Hawkesbury River (for 21 years)"
5.2.1.2 Robyn’s Year 6 classroom

During the first few weeks of the school year Robyn indicated that she taught her students the class routine. From then on she expected them to know and follow it. On the two Mondays of my observations (22/11/99; 22/5/00) which covered two different years and therefore two different classes, the routine was almost the same and the students seemed to need no reminders. They worked in silence except for the occasional sound of a ruler being picked up or put down, or quiet voices followed by Robyn saying “sh sh”. Robyn said, “I do structured lessons every Monday” (28/6/00). Not a moment seemed to be wasted. The students moved from one activity to the next without a break. Those students who had not finished when it was time to move on were told to finish at home. Robyn explained that she gave out “a lot of awards and praise” (28/6/00).

She said:

Most kids will have about ten awards by the end of the year. I have a policy to speak to everyone in a day. If there are problems at home or school that I know about, I’ll ask after them as well. I try to give reassurance.

(28/6/00)

It was evident that Robyn took great pride in her teaching and her classroom. For the school’s fiftieth anniversary Robyn’s room was decorated with the students’ best work. The walls and windows were decorated with paintings. Robyn had placed pictures back-to-back so that the paintings attached to the windows had a colourful picture looking out as well as one looking into the room so that passers by outside would benefit as well as the visitors inside. Three and a half thousand people visited the school during the day. Robyn said that she “wandered round the classroom with the crowds and listened to the feedback” which she greatly enjoyed:

they didn’t know who I was, people commented on how nice the room looked, and what a good teacher this must be.

(post-observation interview, 28/6/00)
Robyn talked about her belief that:

people judge you by the way your space looks. I like the room to look bright and colourful. I come here every day I like to have it looking bright.

(post-observation interview, 28/6/00)

She seemed to have achieved her aim. At the anniversary she said that she overheard an eighty year old woman saying: “What a wonderful room! This is a disciplined, well organised teacher” (22/5/00).

Robyn indicated that she believed that teaching Year 6 was about preparing students for high school. Robyn believed that they would need legible well formed handwriting for high school. To this end she provided handwriting lessons which, she said, most students had not participated in since Year 3. One of the benefits that Robyn assigned to the TILT workshops was the opportunity to ask the high school teachers how her students were getting on.

I was in a group with teachers from Tamarama High School and Ribendale and I had sent students to both schools and the high school teachers knew them so I could catch up on how they were going.

(post–observation interview 28/6/00)

Attention to detail seemed to contribute to Robyn’s pride in her classroom as a working space and in the actual work of her students. For example she told the students that they would be so proud of the picture books they were writing that they would keep them to show their children and grandchildren. She prepared them for the writing by meticulously examining every aspect of picture book construction.

Robyn commented:

most would have taken about 100 hours [to complete their book] and about 24 hours would have been class time. We’ve had lots of lessons on the technicalities of book making. With their kindergarten buddies they’ve looked at lots of picture books. We look at the ISBN number, at the cost and copyright. We’ve looked at lots of picture books. I show them mine that I made when I was at school. I tell them they’ll keep theirs and show it to their children and grandchildren and they laugh and don’t believe me.
We spend a long time planning, writing, looking at the details in illustrations, trying to get an understanding of how people write books. It's all about decision making. They have to decide the age group, the binding, page numbering, borders, margins, printing, colours, cover. We look at lots of models and discuss authors and illustrators. They do an author's study where they have to read at least four books by the same author. We sometimes have authors and illustrators visit the school.

(interview, 28/6/00)

Robyn’s attention to detail was evident in other aspects of her teaching. In giving instructions to her students on the writing out of a poem for example, she told them “the poem has 22 lines and must fill a page” so they must “count up 22 lines from the bottom of the page which gives the size of the space at the top of the page for the heading” (22/5/00). She reminded them of the rules they had learned for good spacing. She also reminded them that if they were writing with different coloured pencils then they should check to make sure all the pencils were sharp before they began (22/5/00).

Robyn claimed that:

attention to detail is important. We had a catering business, you were always on show to the public – everything has to be right – I teach them how to fold serviettes – little things are important.

(observation, 22/5/00)

This attention to detail included sitting correctly, Robyn explained this arose from her love of Yoga; and speaking correctly, Robyn had taken elocution lessons as a child. She attributed her love of poetry to her elocution lessons, saying:

people are surprised I teach handwriting and poetry I love poetry [as a child] I did elocution and speech, handwriting and presentation.

(observation, 22/5/00)
5.2.1.3 Summary: Robyn’s Year 6 classroom

Robyn took pride in her well ordered classroom and in her focused and highly structured teaching. She prepared her students for high school and as a major part of their preparation she drew their attention to details in the preparation for, and execution of, their learning tasks. In her teaching Robyn drew on her own experiences as a school student, for example in the writing of the picture books. She also drew on her upbringing and family life, relating her attention to detail to the requirements of working in the family business.

5.2.1.4 Robyn as TILT participant

In undertaking the program Robyn said that she was:

looking for new ways to teach things, I’m keeping up with the times and the kids. They get in and do it. They’re not afraid. It’s a fear of the unknown for us.

(interview, 10/7/00)

As explained earlier the TILT program is for teachers ‘who are not currently using computers in the classroom.’ According to the base data survey of all TILT participants of semester one, 1999, Robyn did not really belong to the target group because she was already using a number of software packages at least once a week. Her students used word processing, the Internet, databases, drill and practice and simulation software. Robyn also indicated that she used her word processing skills for administrative and preparation purposes.

Although she already used some technology in the classroom in other respects Robyn seemed to fit the profile of a typical TILT participant. She was in a similar age bracket to the typical TILT participant who had been teaching for 15 plus years. Also typically, although access to computer technology was available at home Robyn made little use of it (see Robyn’s profile Appendix 9 for more details).
According to a response written in the margin of a draft of this section Robyn applied for TILT because, she said:

I was very interested and wanted to increase my skills and knowledge in this area, I could see the huge benefit of using the technology and programs in the classroom – I needed to ‘keep up’ with my own children and husband who were always using the computer for Power Point presentations, research, Internet, email, down loading photographs from digital camera etc while I was cooking cleaning and washing! I wanted to keep pace with changing technology.

A year after the completion of the program Robyn indicated that she had not been disappointed. When asked by Di what the main message of TILT was Robyn said, “Have confidence in yourself. Have a go” (10/7/00). Robyn felt the TILT program was “fun” and that it presented new challenges, “new worlds” and an opportunity to learn (28/6/00). She also said that she “learned not to take things too seriously, have fun” She felt that it “was comforting to have people around being learners” and that, “you remember the laughs looking back” (10/7/00).

Eight months earlier however Robyn had reported that sometimes she felt that information provided in the workshops was too fast for her and that she couldn’t keep up. When recalling the workshops (video recall 3/11/99) she said of the facilitator

sometimes she was going at it at such a pace and sometimes I felt as if I tread water, you know as if you’re in water and she was swimming away [laughing] you know and I couldn’t keep up with her.

(video recall, 3/11/99)

The water metaphor was again alluded to when asked how important it was to have the facilitator to provide individual assistance. Robyn said:

It would have been easy just to give up and say this is all above my head, too much for me, and if you did not have somebody on hand you could ring or email or something, you would give up.

(video recall, 3/11/99)
Later in the interview Robyn again mentioned this feeling of too much to take in, “she moved very quickly . . . you are trying to take all that in and listen to her and watch what we’ve got on the screen.” She went on to add, “you were looking for her attention often you know – are you free now?” (3/11/99). During the video recall session (3/11/99) Robyn again mentioned trying to attract the facilitator’s attention not wanting to “press the wrong thing” and feeling uncertain:

The kinds of things you were doing there that were unfamiliar to you and you couldn’t get a handle on them . . . then you go to say something and she’s busy with someone else.

(video recall, 3/11/99)

Even so Robyn seemed to have a high regard for the facilitator. Although Robyn said that she had initially felt that the workshop facilitator was ‘rather quiet’ and reserved (and possibly even ‘boring’) she later expressed appreciation of her quiet, calm attitude (28/6/00; 10/7/00). Robyn called her “the quiet achiever” (28/6/00). After the second workshop Robyn remarked, “she doesn’t make you feel inadequate” (9/3/99). The following year Robyn recalled that Jenny had given them her phone number and email address, something that she had appreciated (28/6/00).

She said:

It was good to know Jenny was there to help if needed. It gave you confidence to try things. I had a list of questions for Jenny’s school visits. She came to the school three or four times.

(post-observation interview, 28/6/00)

Robyn expressed appreciation for the in-school support provided by Jenny. She said, “by the time Jenny came to the school I had questions that no-one else could answer. The visits were very important” (10/7/00). Robyn booked Jenny’s time for a series of half-day visits to the school: “we had half days when she came and showed us things. She was really helpful” (3/11/99) this was “an important part of the program” (28/6/00) “nothing was a problem, she taught me there are many ways to solve a problem and you never give up” (10/7/00).
Robyn also appreciated the *TILT* workshops. Although she said that she found it hard to attend workshops at the end of the day (28/6/00), when asked about the value of the workshops Robyn said: “The workshops are *TILT*, the homework and follow up are in my time, they’re part of your life” (28/6/00). She saw the workshops as “a chance to share ideas” (10/7/00). She explained, “It was fabulous to have that understanding and encouragement, the chat afterwards and reflecting” (10/7/00).

When shown snippets of video from the workshops Robyn often could not recall that particular moment or her actual thoughts at that time. However she could usually remember the workshop activities, what she had done and whom she had worked with. She remarked on her frequent laughing, which she said must indicate that she had enjoyed herself. She remembered laughing in the Internet workshop because she and the group member she was working with were, “going to go into David Jones shopping you know (laughing) and I can remember laughing and we would look up [to see if anyone was watching]” (3/11/99).

In the third workshop Robyn recalled photographing Betty and playing with the image:

> We photographed Betty, and [I'm aware, we were doing] things to her (laughs) we were trying to, you know, crop the background and enlarge, I think that's what we are doing. Obviously it was funny, (laughs).

(video recall, 3/11/99)

During the final (multimedia) workshop Robyn recalled the fun of seeing everyone’s attempts to make a multimedia presentation. Again she and her partner can be heard on the video laughing loudly.

Robyn indicated that she found the workshop folder and books “the most useful”. She said, “I’m a visual learner and I can use them afterwards as a reference” (28/6/00; also referred to in 10/7/00). This helped her to keep up because she said she, “tended to miss things in the workshops”. For this reason she felt, “the chat afterwards was important … for filling in the things you might have missed” (10/7/00).
The TILT videos also suited Robyn as a “visual learner”. The school supported Robyn’s participation in the program by allowing her and her colleague to watch the TILT videos during school assembly. Robyn indicated that she followed this up by re-viewing at home particular parts that she was interested in (3/11/99). She also wrote notes on the videos and:

filled the journal with all my thoughts and contacts and who to ring you know if I needed to follow up.

(video recall, 3/11/99)

Later she recalled:

I took lots of notes and jotted down points and ideas. I like listening to other teachers. I tried things out from the videos the next day in class.

(post-observation interview, 28/6/00)

Robyn stated that she watched all the videos, some two or three times. She indicated that they suited her style of learning. She commented that she was able to “rewind and watch certain parts of it again and you know with the lesson you couldn’t do that” (3/11/99).

The video for workshop five (How Can I do This in my Classroom) she claimed was particularly helpful because she gained ideas about developing keyboarding skills (3/11/99). She claimed that she “learned a lot” and was particularly interested in “how other people were using the tools and what uses and how they were used in other classrooms” (3/11/99).

The final video Robyn said that she watched three times “because the teacher’s there in a primary classroom and she was setting up groups” (3/11/99).

Later when Robyn was asked what she thought were the values underpinning the TILT program she said that “TILT valued different learning styles” (10/7/00). She stated that she appreciated that the program was “very well structured and clear, it was well organised” (10/7/00 also 28/6/00) so that you “knew what to expect” (28/6/00 see also 10/7/00).
She indicated that she liked to be prepared for the workshops and the structure of
the program made this possible. She also said that she appreciated the fact that
“Jenny was well presented, spoke clearly, well groomed and organised”. Robyn said
she “could relate to that, I’m a little bit like that” (28/6/00).

When asked if she thought the TILT program was about skills Robyn said she
thought that it wasn’t mainly about skills and went on to say how much she had liked
the videos and how much she had learned from them. Speaking of one of the early
videos she said:

I remember one of them was quite basic and I actually enjoyed watching it and
my children came through and said ‘Oh mum’ you know ‘what are you watching
that for’ (laughing) but I actually was getting a lot out of it and that’s all part of
what TILT is – you asked me what is TILT what does it mean and was it just
skills well it wasn’t just skills was it and I think the videos were a very good part
of it.

(video recall, 3/11/99)

Robyn explained that friends and family had asked what TILT was about and what
TILT stood for:

and they say ‘What do you do? What technologies?’ And I say ‘you know the
digital camera you know the different gadgets that we were using’…yes I did
skills too [but] it wasn’t mainly about skills was it?

(video recall, 3/11/99)

When asked about the readings provided in the TILT folder Robyn talked about the
practicalities in them too:

I mean they were practical too, I mean, some of it was theory, but a lot of it was
where people actually talked about how they had done things.

(video recall, 3/11/99)

Robyn appeared to appreciate hearing from other teachers and conveyed the
feeling that in the videos and the readings what she valued was the work of other
teachers.
5.2.1.5 Summary: Robyn as a TILT participant

Robyn was in some respects an atypical TILT participant because she was already using some technologies in the classroom. However she typically had fifteen or more years of teaching and she made little use of the computer at home. Robyn felt that she needed to keep up with her own family’s use of computer technology as well as provide greater access for her students.

Commenting on TILT in retrospect a year after completion Robyn remembered “the laughs” and that the program had been “fun”. She felt that the program was about having confidence in yourself, having a go. She remembered the facilitator as calm and caring and that she had not made her feel inadequate. However only five months after completion Robyn had remembered feeling “left behind” and unable to keep up with the facilitator, who, she felt, sometimes moved too fast. Even so, Robyn concedes that she must have enjoyed herself in the workshops because the workshop videos show her interacting with other participants and laughing frequently.

Robyn felt that the workshops were TILT. The rest of the program she explained was part of her life, because most was conducted in school time or in her own time.

Robyn appreciated the program’s organisation and structure. She also appreciated the variety of components (video, folder, books, workshops) suggesting that they catered for her as a “visual learner”.

5.2.1.6 Overall summary

The same values as Robyn found in the TILT program seemed to be apparent in her own classroom. Her classroom appeared well organised, the tasks she presented to students seemed well structured. The variety of tasks offered is likely to have catered for a range of learning styles.
They indicated that appearances\(^8\) (of her classroom, herself and her students) were important, and noted that the \textit{TILT} facilitator was “well groomed”. And just as Robyn indicated that the \textit{TILT} program provided her with the skills to survive in teaching (where students were entering her class with computer skills beyond her own) her own energy seemed to be directed towards giving students the skills they would need to survive in high school. These included handwriting, being able to get along with a whole range of people, being able to write an essay, being able to research using the Internet, CDROMs and books, and being responsible for one’s own learning.

Three broad categories emerged from Robyn’s topics of conversation during her participation in \textit{TILT} these can be summarised as:

- Learning about teaching
- Learning about technology
- Learning about learning

Table 9 shows the categories and their corresponding properties, which were the themes and issues addressed by Robyn throughout the nineteen months of the study.

\begin{table}
\centering
\begin{tabular}{|l|l|}
\hline
\textbf{Category} & \textbf{Properties} \\
\hline
Learning about teaching & • collaboration  \\
& • networking  \\
& • reflecting on classroom practice  \\
\hline
Learning about the technology & • relating workshop to an individual student’s needs  \\
& • relating workshop to general classroom practice  \\
& • changing practice over time  \\
& • exciting possibilities of technology  \\
\hline
Learning about learning & • experience of being a learner  \\
& • empathy with students  \\
& • constraints on adult learners  \\
& • taking responsibility for own learning  \\
\hline
\end{tabular}
\caption{Categories and their properties (themes and issues) that arose from the data for Robyn}
\end{table}

\(^8\) For herself and her students this included posture.
Firstly Robyn learned about teaching particularly in relation to working with others in pairs and groups. The most consistent thread throughout her interviews, conversations and participation in workshops was her obvious enjoyment in working with colleagues. Every encounter was punctuated with laughing. She gave and sought help frequently; she knew her fellow participants, their schools and jobs; she asked after her students who had moved on to high school. This enjoyment in working with others was reflected in Robyn’s teaching (see below). Throughout the nineteen months of the study Robyn’s comments indicated that she took pride in her teaching and took her responsibilities as teacher (and parent) seriously.

The second category to emerge was Robyn’s learning about the technology and relating the business of the program to her classroom practice. As she worked through the TILT workshops and videos she indicated that she made links with her students’ needs. She learned and practised skills that she introduced in the classroom based on the needs of her students in preparing for high school. She was excited by the possibilities of the technology and recounted stories of students past and present, colleagues and family members who were able to perform something particularly well using a computer.

Thirdly Robyn learned about learning. She empathised with her students as learners and on several occasions compared her position as learner with theirs. However Robyn felt that whereas students had seemingly infinite amounts of time to put into their own learning, she was constrained by time needed for family and school matters. Despite drawing attention to her lack of time Robyn held the view that we are all responsible for our own learning, something that seemed obvious in her classroom work with students and her participation in the program.

5.2.2 Category one: learning about teaching

_TILT_ is all about there are many ways to teach things- technology is one avenue, you can use it in anything it is just a tool.

(interview, 10/7/00)

Robyn indicated that she learned about teaching from the way that Jenny conducted the workshops as well as from watching other teachers on the _TILT_ videos and reading about them in the journal articles provided with the materials.
5.2.2.1 Collaboration and teaching

Consistent with Jenny’s espoused approach to teaching in all workshops Robyn was observed talking to and working with other participants. Sometimes she asked others for help (e.g. workshop two, 9/3/99) sometimes she chatted to her neighbour about the task (e.g. software sampling in workshop four, 4/5/99) at other times she worked with a small group (e.g. workshop three using the digital camera, 30/3/99). Throughout workshop five Robyn worked with a small group of high school teachers who treated the database task as a challenge not to be taken too seriously. On the video they can be heard laughing frequently. For example, when Robyn and her workshop partner, Erica, realised that Jenny had been handing out a set of additional instructions that could have saved them some time they laughed and asked for a copy.

Robyn felt that this session was particularly memorable because she was working with others who were talented people who got the job done and enjoyed themselves. As she said:

it was comforting to be with other people and um especially having someone who is really good. The other lady that was such a fast typist and Ryan who was really conversant with the technology.

(post-workshop discussion 25/5/99)

She also thought they were funny describing one as, “a barrel of laughs” who, “saw a funny side to everything”. She indicated that she had so much fun in this session, more so than any of the other sessions, that she believed she would remember it well for this reason.

Six months later during the video recall session Robyn could remember the names, jobs and schools of her team members (Robyn and Robyn video recall, 3/11/99). The following year Robyn still talked of this group. Of one member she commented, “he was laid-back and didn’t take it too seriously” (28/6/00). The video of workshop six also revealed Robyn and her workshop partner laughing loudly and frequently, this time as they constructed a multimedia presentation to be shown to the rest of the group at the end of the session (workshop 6, 15/6/99).
Jenny had hoped that the workshops would be an enjoyable experience and that through modeling the benefits of collaboration and group work participants would be encouraged to use group work in their own classrooms. Reflecting Jenny’s intention Robyn said that she had learned much about setting up groups from the TILT program. During the video recall session Robyn noticed herself asking her neighbour for help when the facilitator was busy and commented that the students probably do that all the time (3/11/99). Robyn said that since doing the course she had given more thought to allowing students to work in pairs. She said:

I've thought more, it's quite good to work in twos, in pairs, ‘cause they can teach one another and gain more, rather than insisting that they work on their own.

(video recall, 3/11/99)

When asked, she agreed that this change in attitude to working in pairs was because she had so much enjoyed working in a pair or small group in the workshops.

In the video recall session (3/11/99) Robyn tells of how she learnt a great deal about setting up groups from one of the TILT videos which she had watched three times “because the teacher’s there in a primary classroom and she was setting up groups” (3/11/99). A year later Robyn was using group work regularly with her students. She explained:

Sometimes I organise groups by ability according to need. Sometimes I put students with a particular group for a particular purpose. But usually they are mixed. They decide who will record and who will be the spokesperson etc. But sometimes I will tell them which roles to take so that everyone gets a go.

(post-observation interview, 28/6/00)

During the discussion following workshop five Robyn remarked on her enjoyment of working in a group. Relating this to the classroom she said, “In a classroom that would be good reason for having buddies” (25/5/99). A year later Robyn’s students were working with their “kindergarten buddies”. On the day of our post observation interview (28/6/00) Robyn explained that her students would be conducting sports activities with their buddies.
These had been planned the previous day:

the class got into groups of two or three and worked out what they will do for a
45 minute lesson with their buddies using the available equipment. They’ve
organised themselves for this, they’re working in friendship groups. They’ll
report back on it in the morning.

(post-observation interview, 28/6/00)

Robyn occasionally referred to her embarrassment at not being able to do things in
the workshops (post observation interview 28/6/00). However one of the benefits of
groupwork, she indicated, was that if she didn’t know something someone else did
and tasks could be completed.

Recalling her participation in the third workshop she said:

I didn’t know what I was doing but I felt quite comfortable, [laughs]. The others
were around, but what someone didn't know someone else did, and we
managed to get through it, and took the photos, but I hadn’t used a digital
camera before so it was quite exciting.

(video recall, 3/11/99)

Another comforting aspect of working with others, Robyn suggested, was realising
that others, who you thought would be more knowledgeable than you, didn’t actually
know everything! This was the case with one of the other participants from her own
school. Her colleague had been at the school for some years before Robyn arrived.
At that time the school had been well known for the work it was doing with computer
technology. Robyn reported that she had assumed that this teacher knew more than
she did:

because they were the leaders in technology and she was the one who showed
us around and this was twelve or fifteen years ago and I assumed she was well
down the track with her computer knowledge.

(video recall, 3/11/99)

It was of interest to Robyn to find that on this particular workshop topic her colleague
“didn’t have a clue”.

Chapter Five
Robyn remarked on a similar interest in the skill level of other participants in the discussion following workshop five (25/5/99). Although she enjoyed working with a group of people she felt were “really good” she was also comforted by the fact that one group member (she was “a fast typist”) had problems opening the CD that she had borrowed from Robyn because she had forgotten to bring her own. It seems that in this event even though Robyn did not have the technology skills her organisational skills allowed her to contribute to the group (i.e. she had remembered to bring her CD).

Five months later Robyn recalled that the workshop had been “very friendly” but wondered how “the fast typist” had felt at the time. She said:

> It would be very interesting to ask the one we thought was so efficient wouldn’t it [laughing] it would be good to chat to her and see if she was feeling out of her depth or anything or if she was thinking this was all a bit easy.

(video recall, 3/11/99)

[Although Robyn often did not profess to recall her actual thoughts and feelings when prompted by video excerpts from the workshops, her comments above reveal an interest in skill levels of group members, and by inference suggest an interest in her own place in the group, that accords with her interest and comments at the time of the workshop.]

Later Robyn also recalled that she had felt this way during workshop three when the facilitator was having difficulty with some of the equipment. Robyn recalled:

> The camera didn’t work. I remember exactly where I was sitting. We swapped over. I think Jenny felt phased the camera didn’t work for her. I was so glad it happens to the experts and when she couldn’t fix it I felt even better. She got us another one.

(post-observation interview, 28/6/00)

It seems Jenny was right in her belief that it was good for participants to see that, as a teacher, she did not know everything.
Robyn talked about helping colleagues through the program. She indicated that she relived the whole course as she helped the Teacher’s Aide who worked with Cheryl (a child needing special attention) in Robyn’s classroom and who participated in TILT the semester following Robyn’s participation. Robyn said:

The Teacher’s Aide (Special) did the TILT program last year and I relived it all with her. That was very useful. I did all the homework when I did the course and I could help the TA with hers.

(post-observation interview, 28/6/00)

She also indicated that she assisted the teacher in the next door classroom where she could. However she was conscious of trying not to alienate her colleagues by appearing too “pushy” or “know-all” echoing Jenny’s low key approach to teaching in the TILT workshops.

5.2.2.2 Summary

It seems that Robyn enjoyed working with colleagues during the TILT workshops. She enjoyed group work and set up groups in her own classroom after experiencing group work in the workshops and watching the TILT videos. It appeared that as part of the process of becoming comfortable with working with colleagues Robyn was interested in the skill levels of others and her own contribution to the group. Over a year later she recalled the skills of group members, indicating the importance, to her, of this knowledge. She seemed relieved to realise that even the ‘experts’ didn’t get everything right. Robyn practised what she had learned about teaching not only with her own students through group work but also in helping colleagues through the course.

5.2.2.3 Networking: feedback on teaching

Robyn indicated that she appreciated the networking opportunities afforded by the TILT workshops. When asked by Di what else she had got out of TILT Robyn said without hesitation:
Networking. I could ask about the children I’ve taught. Kids from [my school] went to twenty-nine different high schools, selective, private, local, Catholic. It was a chance to ask about the kids.

(interview, 10/7/00)

She had made a similar comment in the previous interview:

I was in a group with teachers from Tamarama High School and Ribendale and I had sent students to both schools and the high school teachers knew them so I could catch up on how they were going. We were able to help each other and share. One teacher from Tamarama was particularly helpful and funny.

(post-observation interview 28/6/00)

Robyn thought it was, “good to meet people from different schools”. She said that she discussed her school’s ‘reporting to parents’ initiative with Cheryl and Di who were “keen to get information on student led reporting” (follow up interview 28/6/00).

Robyn indicated that she also used her time at the workshop to catch up with people at her own school:

I also caught up with Judy from the Infants Department at our school, we work on a split site so I don’t see much of her, it was good to chat with her. The chat was incidental to the task but it was helpful.

(post-workshop interview 28/6/00)

The importance of meeting people and getting along with others was reflected in Robyn’s classroom practice. Each Monday Robyn changed the classroom seating arrangement. She shuffled the students’ names and dealt them out onto the desks. She gave students 30 seconds to find their name and be unpacked and seated. This was one of the ways in which Robyn believed she was preparing her students for high school where they may find themselves seated next to someone different each lesson (Classroom observation, 22/11/99; 22/5/00).
5.2.2.4 Summary of category one: learning about teaching

Robyn learned about the enjoyment of working with others through her experiences during the TILT workshops. She developed her understanding of how to set up group work through watching the TILT videos. This enjoyment and know how were reflected in the group work opportunities that she later organised for her students.

Robyn was also focused on preparing her students for high school. She gained feedback on her students’ progress at high school (and indirectly on her own teaching) from high school teachers she met at the TILT workshops. This was an important networking opportunity for Robyn and an opportunity to gain feedback on her teaching. Her enjoyment of this was reflected in the fun that she reported in working with the group of high school teachers during the workshops.

Through working with others Robyn developed technology skills. Her new found expertise she in turn passed on to colleagues.

5.2.3 Category two: learning about technology

Throughout the interviews and observations it was apparent that Robyn constantly made links between her learning about technology in the TILT workshops and her classroom teaching. Sometimes the link was specific to a particular student’s needs, sometimes it was to her teaching in general. Usually the link related to the use of items of hardware or software, occasionally it related to teaching ideas taken from one of the TILT videos. Sometimes Robyn’s conversation about her students and technology related to activities they were already doing in the classroom before her participation in the TILT program.

5.2.3.1 Relating the workshops to the needs of individual students

After workshop two (the Internet and email) during the post workshop discussion Robyn talked about the use of email in relation to a boy in her class:

I’ve got a little boy who’s going to Holland on Saturday he’s known all the kids since he was three he’s devastated about leaving but I said don’t worry we’ll chat we’ll get hooked up there. The possibilities are wonderful.

(post workshop discussion 9/3/99)
She mentioned the boy again after the next workshop indicating that the class would take photographs and email them over to him (post workshop discussion 30/3/99). Robyn again talked of him after the fourth workshop. She and the class had resorted to postcards after encountering email problems (post workshop discussion 4/5/99). She commented that the technology was “just another means of communication”. Robyn was also concerned about the implications of the workshops for working with all her students.

She said:

I have two disabled children and one from Korea with no English in Year 6 and he just sits and grins at me all day and I was thinking it’s really hard for the ones who are able where do you start for a class of 31? Imagine … I don’t have time to teach like that, the program says you should be teaching to the individual but …

(post workshop interview 9/3/99)

In relation to the needs of one of her disabled students Robyn commented on the concept keyboard after workshop three:

The concept keyboard is for very specific needs you can program a stencil on it. We have one for our cerebral palsy child the teachers can program it. It would be good for our ‘cotton wool baby’ [Cheryl] the keyboard would be good for her I have an Aide for her 19 hours a week.

(post workshop interview 30/3/99)

As in the previous post workshop discussion this comment was followed by a discussion about how much time it would take to prepare materials for individual needs.

Seven months later Robyn talked of taking the “cotton wool baby” along with the rest of the class, to Chinatown for the culmination of the class study of China. She talked also of using the Internet with her class for research on China: “we were able to use the Internet and actually see… aspects of the culture” (Robyn and Robyn video recall, 3/11/99). This, she said, was something new in her annual teaching of the topic.
Commenting on the program as a whole over a year after it had ended, Robyn remarked that it:

> was really helpful with Cheryl, I was always thinking about how I could adapt something for her and for the IO child in my class, as well as the rest of the class.

(post observation interview, 28/6/00)

When, five months after the end of the program, Robyn was shown a video of the workshop in which the digital camera was introduced she recounted the story of a girl in her class who she classified as a “slow learner”.

She said:

> Penelope, she has an older sister who’s just started working for British Airways and she lives in London.

> Penelope is the bottom end of Year 6, and very, very slow, but I have been amazed about what she knows about the computer, and I’ve thought, ‘gee, I should have picked this up at the beginning of the year’, [laughs] She has been emailing her sister, and she does it from the classroom, and she showed me the other day a picture of her sister. Her sister sends photos every week, using a camera, and Penelope could get into it very quickly in the classroom. And she called us all over, ‘here’s my sister’.

(video recall, 3/11/99)

### 5.2.3.2 Summary

Robyn, it seems, constantly related the use of technologies introduced in the workshops to the needs of her students. At the same time she was aware of the time implications of using technologies such as the concept keyboard. She felt that one of the implications of the TILT program was more individual work in the classroom and again considered the time required for working with individuals.
5.2.3.3 Relating the workshops to general classroom practice

During the workshop three post-workshop discussion (30/3/99) Robyn mused on the use to her of the hardware they had explored during the workshop. She felt the scanner was rather slow and the concept keyboard not suitable to her needs. However the camera she described as “fabulous”. She could see the potential for its use for the whole class.

In the discussion after workshop four Robyn talked about using the Internet and Encarta the previous week (i.e. following the previous workshop on Internet and email).

She was excited by her success

I've had a lot of success the last week with the Internet and Encarta because we're studying the Antarctic, and the first time I've actually - because we do this every year and rather than just rely on the library this is the first time we've actually got into Encarta and on our staff development day I devised these questions and it's exciting really because they were really excited doing it I just wanted them to explore and find out some answers so I just made up the sheet and that was really successful it was a buzz and the librarian found out about the web sites and things on Antarctic.

(post-workshop discussion, 4/5/99)

Workshop four dealt with software. Robyn said that she enjoyed exploring a range of different programs and having the time to browse. She said:

In Year 6 I always do a topic on the endangered species in Australia and I've never found a program that fits in with that. So I rely on books and I got quite excited when I saw that one on the eco, then I was really disappointed when I got into it there was just so much reading and I thought this is awful I have a group who are non-readers and I thought they would get very frustrated, it wasn't as good as the booklet that came with it and the blackline masters so I thought I'll give that one a miss but then I went on to the human body one and that was really good.

(post-workshop discussion, 4/5/99)
Some time later Robyn talked about preparing her students for high school. Since doing the *TILT* program she felt she had “tried to get them to do a lot of research and accessing information [on the Internet], before they go to high school” (video recall, 3/11/99).

Robyn felt that if you were to use a piece of software in the classroom you would:

> need to know it thoroughly and you need to read the manual and you’ve got to be confident and that takes a lot of time before you can present it to the class.

(post-workshop discussion, 4/5/99)

This concern about time was echoed in relation to time needed to program a concept keyboard. Her comment also implies that Robyn would not be comfortable allowing students to use software which she had not thoroughly prepared for (i.e. with work-sheets and study guides).

After the fifth workshop discussion arose concerning typing. Robyn said that she had been using a typing tutor with her students for the past three or four years and that some of her year six students were “up to 90 words per minute . . . with 100% accuracy.” (post-workshop discussion 25/5/99). The principal, she said, believed this was because:

> they do it all the time it's on their desk and there's lots of little games that they play on the desk and then when they go onto the computer room they're prepared.

(post-workshop discussion, 25/5/99)

Robyn also used an idea from one of the *TILT* videos:

> you cover the keyboard with a tea towel . . . and they all had to bring their tea towels in and they have to type without looking.

(post-workshop discussion 25/5/99)
Robyn used ideas from the workshops to add interest to the typing exercise for students. She said:

you photocopy the keyboard and laminate it and put it on each child's desk . . . I thought what a great idea so they're looking at it all the time then you play games in the classroom and they can actually type on it.

(post-workshop interview 25/5/99)

Robyn referred to her students’ typing skills again over a year later, saying:

They type for 15 minutes following the exercises and the instructions. By the end of the year they become faster typists. Through the year they have typing assignments and most of the things they hand in have to be typed as the year goes on. Some students are up to 42 words per minute. Some are on 12. Some students will go on typing for the full 45 minutes – it’s their personal challenge. I tell them to make sure they are comfortable, to adjust the screen and the keyboard and have them straight in front. Posture is important.

(post-observation interview, 28/6/00)

A year later Robyn was also using one of the strategies from the TILT video about keyboarding. She said, “I photocopied the picture of the keyboard and put it on each student’s desk to practise typing skills to get them out of bad habits” (28/6/00).

Also following the fifth workshop (25/5/99), which was about databases, Robyn talked of using databases in the classroom. She said she was using “an especially good one for the Antarctica project” her class was engaged in. She went on to talk of the project in more detail, with visits from travelers to Antarctica and classroom viewing of a series of programs from the ABC.

Robyn related to the classroom not only the good things that happened in the workshops but also the disasters. During the video recall discussion (3/11/99) Robyn, who had used a traditional camera before, explained that she could not operate the digital camera.
She recalled that:

there was something wrong with the camera, and I remember feeling really pleased that that had happened to Jenny, [laughs]. Because how often in the classroom does it happen? You know, equipment failed, you know, like today. You’ve got to just change your plans and find something else.

(video recall, 3/11/99)

Although Robyn could not usually recall details of the workshops when shown a video clip she could remember the camera incident vividly fifteen months later and without a video prompt. She said, “The camera didn’t work. I remember exactly where I was sitting” (28/6/00).

Robyn’s reaction to Jenny’s ‘classroom disaster’ was consistent with her attitude to, and curiosity about, the skills of other participants. Perhaps such ‘disasters’ happening to others (whom she believed to be good teachers) helped to reassure Robyn that she was not the only one “feeling quite inadequate” (video recall 3/11/99) and that it was possible to be a good teacher despite the lack of skill in this particular area.

It is interesting to note that the kinds of occasions that roused the greatest emotion in the workshops (laughing and having fun, and feeling inadequate but encouraged to see others struggle with the new learning) were the occasions that Robyn seemed to remember best when prompted by the video five months after the end of the course.

In relating the workshops to classroom practice Robyn did not see time to learn about and prepare for the new technologies as the only impediment. She twice raised the issue of money for computers in the classroom and for software. She was concerned about the ‘practicalities’ and felt that “you need to have it [the computer] in the classroom and get the software” (video recall, 3/11/99).
5.2.3.4 Summary

*TILT* seemed to have an impact on Robyn’s teaching in general. She saw classroom uses for the video camera and provided her students with opportunities for its use. She allowed her students to use the Internet and email as part of their preparation for high school. Robyn discovered software to support the curriculum, she introduced Encarta to the school staff and added use of the Antarctica software to her regular teaching program.

Robyn also picked up several new strategies for the teaching of keyboarding skills, something that she thought important for her students to learn before high school.

5.2.3.5 Changing practice over time

Robyn felt, looking back on the program five months after it had finished, that her classroom practice had changed. She felt that she was using the Internet far more. She felt she had “tried to link what Jenny had taught us” (video recall 3/11/99). When asked a year after finishing the program what had changed in her classroom since doing *TILT* Robyn said:

> the computer is always on. We use the Internet more to locate information. In the classroom if we come across something we don’t know I can say go and ask Jeeves. The kids find out and they tell me. We use it as a tool to locate information quickly.

(post-observation interview, 28/6/00)

By this time (i.e. a year later) Robyn also had, “more software added to the classroom computer” and was having chess installed (28/6/00).

She also felt that she was persevering with her administrative work, using the computer for example, to produce handouts to be shared with the rest of the staff even though hand writing may well have been quicker (video recall 3/11/99). As she pointed out she was “trying to learn and changing all the time and thinking about how I can use this new technology”. Her husband worked in TAFE and used the computer for rosters. Robyn had her class lists on the computer:
but he’s saying to me oh you can get all your marking and (laughs) and graphs and things like that.

(video recall 3/11/99)

Again Robyn referred to the lack of time however she had put her “program onto the computer I wouldn’t have done that a few years ago it’s quicker to hand write it” (3/11/99). Robyn reported a year after finishing the course that she was “typing up outcomes with teacher and student evaluations for portfolios” (28/6/00). She had also typed up “homework sheets for students” and was typing up all of her hand written worksheets. She also used the Internet for research. As she pointed out, “I’m always looking for new ideas, I constantly try to improve and change” (28/6/00).

The growing use of computers in the classroom brought with it organisational problems. Robyn explained:

I’ve tried having a roster to make sure everyone gets a go. We had six rainy days in a row. Everybody wanted the computers so we had to share carefully. I had boys’ groups and girls’ groups.

(post-observation interview, 28/6/00)

Even though Robyn said that she often felt inadequate in the workshops and wished for more time to try things out she explained that she returned to her classroom and, using her notes from the workshop, tried things out for herself (video recall 3/11/99). However sometimes Robyn’s own learning about technology was interrupted because students already knew how to do things. As she pointed out:

I have some quite bright kids in my class who’ve had computers since they were born and they’re quite confident. And one of the boys in my class has gone to Denmark he went in May and we email him they do all this cut and paste in front of my eyes and we got into this Blue Mountains cards have you heard of this? And he sent Nicholas these musical greetings and things and I just thought Oh I don’t know what you’re doing but I was thinking all those sorts of things when I was there thinking I wish I could cotton on to this a bit better.

(video recall 3/11/99)
Talking about the digital camera (video recall 3/11/99) revealed a similar scenario. Robyn said she had used the camera “a couple of times” since the workshop. However she said, “the kids have used it”.

She had given the camera to a small group within her class who had “been trained by David last year so they’re confident”. She was going to use it again the following week:

   to photograph . . . everybody in Year 6, and at the school dance I am going to have the photos of everyone around the hall, . . . with baby photos, Year 6 . . . the kids would do all the work though, I’ll just set it up. They can take the photos.

   (video recall 3/11/99)

A year later when asked what had changed since finishing the program Robyn said that she was using the digital camera, “the next step is to have the kids use it to put pictures in their work” (28/6/00) (note: this would be a new group of students, not the ones referred to in the quote above). She was also communicating with a Canadian teacher, sharing photographs via the Internet.

When asked if she felt she had achieved the outcomes of the TILT program, Robyn replied:

   Yes I think I achieved all the outcomes of the word processing component. I already knew something about word processing but it was good to go over the basics.

   (post-observation interview, 28/6/00)

She felt that she had achieved the Internet and email outcomes and those of component three (digital camera, scanner etc) although she qualified this reply saying, “I remember doing the touch sensitive pad activity but I had already decided I wouldn’t use it so I didn’t take it in.” Of the software component Robyn said:

   I looked at two pieces of software. I did the zoo and an ecology one. I got a list of all available software for borrowing and borrowed some to try out.

   (post-observation interview, 28/6/00)
Although Robyn could recall well the multimedia component (workshop six) “I can remember exactly where I was sitting and the people around me” she felt she had only partly achieved the workshop outcomes. She felt she was still:

not sure about accessing multimedia resources from the Internet, and not sure about what constitutes a multimedia text.

(post-observation interview, 28/6/00)

One of the important long-term gains for Robyn was in confidence. She said, when asked about this by Di:

I gained confidence and now I tend to do different things . . . the children now hand their projects in on disk, now more than ever, five years ago they did a project in a book.

(interview, 10/7/00)

But as Robyn pointed out:

the kids coming through are different. From one class the kids do web pages... they set the challenge the kids who are confident will go for it. They'll teach their peers. David’s kids are very confident, they use the digital camera they are able to help the others.

(interview, 10/7/00)

This confidence had also affected other activities. Robyn had organised a link with Kindergarten students. She said:

We’re using Year 6 to teach kindergarten. We’ve buddied up with Kindergarten Blue. We meet them for half an hour a week.

(interview, 10/7/00)

These changes necessitated changes to availability of equipment, Robyn explained:

I have three computers in the classroom. Sometimes I set up six laptops. Then we use the computer room.

(interview, 10/7/00)
5.2.3.6 Summary

One year after completing the TILT course Robyn was making more use of computer technology. She reported that: the classroom computer was always turned on; she had more software on the computer; students used the Internet frequently; students made use of the digital camera; she used the digital camera herself; and she had written up her teaching program using a word processor. Robyn felt that she had gained confidence in teaching with the technology. One of the consequences of this, she said, was the introduction of a Kindergarten buddies system whereby her students taught computer skills to Kindergarten students.

5.2.3.7 Exciting possibilities of technology

Although Robyn had gained confidence she still believed that she was not a confident user of computer technology. Even so she was excited by and often amazed at the potential of the technology in everyday life as well as at school. Robyn believed that many of her students were confident and capable users of computer technology. She explained that her role was to make the technology available for student use and that the competent students would show the others.

Robyn expressed admiration for effective use of software and hardware. For example she was proud that her daughter could use PowerPoint (28/6/00) and that her son had spelled his name in Kindergarten as e-v-a-n-spacebar-k-e-n-t. She spoke several times of her colleague’s use of the digital camera and the way he trained his students to develop web pages. She also indicated that she was impressed by people who could use the new environments for their own ends, for example the casual teacher sending greetings cards, and another colleague who:

- started an online business, shopping and delivery. She researches the best buys, and does people’s grocery shopping for $12 a shop.

(post-observation interview, 28/6/00)
These stories revealed possibilities of the technology that Robyn found to be “exciting” or “amazing”. She was also interested in the future possibilities of the technology and the rapid rate of change. She quoted a radio interview she had heard with a “computer expert” who said that “we’re not even half way [up the development spiral] yet, so it makes you wonder what will be next . . ." (3/11/99).

Robyn indicated that she was excited by the possibilities of the digital camera, which she had not used before the workshop although she was aware of its uses. During the post workshop discussion she told the story of the birth of a colleague’s baby. She said that she was amazed that someone could have sent a picture [by email] overseas of the new baby only a couple of hours old (30/3/99). Robyn referred to her colleague and the photographs again eight months later when she talked about her amazement that the camera had no film. She had been impressed, she said, by her colleague’s stories of emailing pictures of the baby’s every movement, not realising until after the workshop just how easy this was (3/11/99).

Robyn expressed excitement at the possibilities of multimedia during workshop six. She said that she would be able to use video and digital (still) cameras at the school’s open day in October and that the material would be able to be used on the school website (15/6/99). She had been a member of a school committee responsible for setting up the school’s website which was considered a success (3/11/99). Soon after it had been set up someone rang the school from another state wanting to enrol his child because he was moving into the area. Robyn commented:

> just being able to take enrolments . . . to be able to put on all the information about the school and pictures of the school, and our library, and just a whole lot of information about what the school does. Where my daughter goes to school, all of that’s on, they have their own site, and I can look in and read the newsletter and find out everything about . . . and the head master there, the principal, actually talks to you, ha, ha. It's just amazing, just amazing, how technology has gone in the last couple of years.

(video recall, 3/11/99)
However the most exciting event for Robyn associated with the website was when an ex-student noticed Robyn’s name on the website and got in touch. He was then a TAFE student, studying in Orange. Robyn emailed him and invited him to the school’s fifty year reunion the following May. She recalled receiving his reply:

it was on one of the days when I was having a TILT day, and I was just playing around and, you know, didn't really know what I was doing with the books, I was trying to follow instructions, and I had mail and it was from him. It was really exciting, I remember the morning tea bell going, and everyone coming in the staff room, and I was just beside myself (laughs) telling everybody ‘anyone remember Chris?’. And, you know, the couple who had been there a long time did, and it was just really exciting, everyone was hanging around, wondering what had happened.

(video recall, 3/11/99)

Despite the excitement she expressed Robyn viewed technology as “one tool, not the be all and end all” and “just a tool” that could make “classroom life more interesting”. She felt that it provided new challenges and “other ways of locating information” (28/6/00).

5.2.3.8 Summary

Robyn was excited by the possibilities of the technology. Although still not a confident user herself she was keen to ensure that her students had opportunities to use the technology. Robyn was proud of her family’s use of computer technology and impressed by friends and colleagues who were competent users. However she was glad to find out that using the digital camera, for example, was not such a difficult task as she had imagined. Robyn had been a member of the school’s website committee and was excited by the possibilities it afforded for communication. The communication potential of the website had been demonstrated when an ex-student had contacted her after having seen it on the Internet.
5.2.3.9  Summary of category two: learning about technology

TILT it seemed had an impact on Robyn’s classroom use of computer technology. She made links between her use of technology in the TILT workshops and the needs of individual students and the whole class. She recognized the time implication of teaching to individual needs using technologies such as the concept keyboard. She also recognized cost implications of providing software and hardware covered in the workshops. Nevertheless one year after completion of the course Robyn indicated that she was making far greater use of a range of technologies. She also employed new strategies for teaching keyboarding skills, important for her students as preparation for high school.

Robyn had gained in confidence and had introduced a Kindergarten buddies system whereby her students taught computer skills to Kindergarten students. Robyn was excited by the possibilities of the technology and impressed by those who were competent users.

5.2.4  Category three: learning about learning

Robyn was keen to learn in a number of fields. She had recently attended a Women in Educational Leadership conference. At the conference she attended an interesting session on the brain, learning and leadership. She found that her strengths (precision, planning, punctuality, attention to detail, organisation) and preferences (being in control, having structured tasks, being the administrator) were congregated in “the bottom left quadrant of the brain”. Interestingly the person she found the most difficult to get along with on the school staff had strengths that were almost entirely in “the top right quadrant.” She felt this was useful to know because it would help her to understand and appreciate her colleague.

Robyn frequently discussed learning, the experience of being a learner and consequent empathy with students. She also discussed the difficulties of being an adult learner with other responsibilities and time constraints and the importance of taking responsibility for one’s own learning. As an adult learner occasionally she felt that it would be better not to admit to her ignorance of some computer related tasks, especially to her own highly competent children!
When asked what the breakthroughs in her learning had been Robyn said: “Making the initial decision to do it. Organising my family so that I could attend lessons after school and into the evening. Applying and being accepted” (interview, 10/7/00).

### 5.2.4.1 Experience of being a learner

When asked by Di what she had got out of TILT, Robyn replied: “It was wonderful to have the time to be the learner. Being a learner, having the role reversal as a learner” (10/7/00).

One area of learning for Robyn was, she suggested, the “sense of confidence [that] came from working with pairs” (15/6/99). She felt that the TILT release time should be taken with a partner because “a partner helps cue memories and sees things you miss, to clarify the whole picture” (15/6/99). She indicated that she had learned the value of cooperative learning through learning cooperatively. The TILT videos had also been instrumental in this. She felt they were “about collaboration” and as such might have been more “helpful at the beginning” (15/6/99).

During the discussion following workshop four Robyn said that she and her partner had put up their hands and waited for help from the facilitator, “and when she came over it was the next thing that was printed here telling us what to do” (4/5/99). She and her partner had laughed at themselves over this incident. When asked what she had learned from this workshop she said she had learned to, “read the instructions before you start . . . you have to read it twice before you start.” This is something, she claimed, that most teachers would have said to their students at some time.

### 5.2.4.2 Empathy with students as learners

During the post workshop three discussion (30/3/99) Robyn empathised with students who are often asked to complete a difficult task with no appreciation on the part of the teacher of how difficult the task might be for the learner. She had found it was difficult colouring in the dragon in the concept keyboard task, “but we say that to the kids all the time - go and do that - but it’s difficult.”
Another participant commented that students must feel isolated when they’re using the technology and get stuck and can’t access help. Robyn however, questioned this. She doubted if students felt that way about technology, in her experience they were confident users, “Do you think that happens though with the way their . . . understanding is of technology. Do any of them feel that way?” (4/5/99).

Nonetheless she did feel that students might find it reassuring to work in pairs (as she had done). She said, “It must be the same for children in the classroom too actually sometimes I go to computer with them and we’re on our own like they have a computer for themselves and other times they pair up and I think it’s a waste of time for one person if you’ve got two at a computer.” However after the workshops Robyn changed her mind on this point and no longer believed it would be “a waste of time for one person” (3/11/99).

5.2.4.3 Constraints on adult learners

Robyn believed that the time constraints on teachers learning to use technology contributed to their lack of confidence. She believed that the students were “so good at it because they spend lots of time and they’re not afraid whereas we think we might wreck it” (post workshop discussion 9/3/99).

Although Robyn felt that she needed time, unlike her students she felt guilty spending time “playing on the computer”. She felt that students gave it:

a top priority because it’s a real focus point of their free time but for me my free time is fairly limited and when I do have it the computer really isn’t a priority I have to do other things the only time I feel like that is when I’m traveling on a bus and I can do that without feeling guilty.

(video recall, 3/11/99)

She felt that for students something like email was, “the focus of their lives” but for her it was a luxury for which she did not really have the time.
During the post workshop three discussion Robyn admitted to tuning out of the concept keyboard demonstration because it seemed like an enormous amount of work. She said she had thought, “When will I have time?” (30/9/99). During workshop four she had a similar response to some of the software (4/5/99). Before using new software she would need to know it thoroughly and prepare worksheets and she did not feel she had the time to do this.

Other responsibilities intruded on Robyn’s time in two major ways. She found that sometimes thinking about family and school responsibilities took her attention during the workshops when she ought to have been concentrating on the learning. And having to do other things as a parent, school leader and computer coordinator took up time which might otherwise have been spent in learning.

Occasionally during the workshops Robyn was distracted by thoughts of family responsibilities such as, “what's for dinner?” causing her to “sort of lose momentum” (3/11/99). After the final workshop Robyn said that it was such a busy time at school that she “was quite relieved it was the last one”. She said that she:

was starting to feel really fed up I’d had enough of this and I remember that night I had to organise my own family you know they had music lessons and tennis lessons and things and I can remember thinking oh I hope Jack’s remembered to do this and do that so I wasn’t giving it my hundred per cent attention . . . I was thinking I hope they get dinner and . . . I can remember thinking I thank god this is the last one you shouldn’t feel like that I mean I was pleased to be there.

(video recall, 3/11/99)

Robyn usually looked after, “the shopping and the washing and cooking dinner” so was “the last in line for the computer” hence her responsibilities as parent took up time that was then not available for her own learning (3/11/99; 28/6/00).

Robyn was pleased this was the last one for another reason too. She said:

it was a busy time at school and I never ticked isolated on the sheet I always ticked happy and confident and pleased to be there and enthusiastic but I thought ah I’m glad there’s no more of this to worry about.

(video recall, 3/11/99)
Robyn also occasionally saw the workshops as a chance to catch up with school business. She said:

sometimes... it was all a bit much and we’d chat about school. (laughter) We’d be waiting for help – like she runs the infants and I’m second in charge of the primary and we’d chat about something. It was a chance to catch up. That happened a few times.

(video recall, 3/11/99)

Robyn’s duties at school as “second in charge of the primary” meant that she was always busy. She said:

I find that as soon as you get to school there’s always so much to do. I had two meetings yesterday before school then I have to run the assembly and you’re checking microphones and things and people want to make announcements and that’s the time you should be checking the computers and then once the kids come into the room it’s go go go.

(video recall, 3/11/99)

Time was a major, but not the only constraint on Robyn’s learning. She also felt constrained by what others would think of her, especially what her own nine year old son thought. She explained:

One time I had a problem I had to ask my nine year old. One of the videos was quite basic, my nine year old said: ‘Oh mum you’re not watching that!’ He’s so good with computers, so is my daughter. So when I came on a problem at home I used to think I can’t ask them they’ll think I’m stupid.

(video recall, 3/11/99)
5.2.4.4 Summary

Robyn indicated that she learned from the experience of being a learner. She said that she empathized with students as learners recognizing that as a teacher she was sometimes not sufficiently appreciative of the difficulty of tasks that she set. She claimed that she enjoyed learning cooperatively and learned the benefit of working in pairs. This she transferred to the classroom, allowing her students to work in pairs at the computers.

Robyn felt there were constraints on adult learners that did not apply to children. For her time was an issue. She had family commitments that kept her from her own learning about computer technology. She also had school commitments that made it difficult for her to spend the time necessary to set up computer activities for her class. Robyn also suggested that occasionally she felt constrained in her learning by the attitude of others, for example her young son, who commented on her need for basic computer training.

5.2.4.5 Taking responsibility for one’s own learning

Robyn believed that as a learner she should “be a good listener, and just be conscious of the fact that you are not going to understand everything” (3/11/99). She attended the workshops with the attitude that she would “have a go”. She recognised that if you “went along expecting to be told how to do something” and expecting to walk away knowing how to do it, “you could be so disappointed” (3/11/99).

Robyn appeared to take responsibility for her own learning throughout the program. She explained that she prepared for the workshops, “you can read the booklets beforehand and know what the workshop will be about” (28/6/00). She indicated that she conscientiously watched all the videos (some parts several times), discussed them with a colleague and made detailed notes. She said:

I was given one hour at school to watch the videos with the others who were doing TILT. I watched them again at home then maybe watched bits of them a third time. I took notes. The second time I fast forwarded bits.

(interview, 10/7/00)
Robyn was observed contributing to and participating in each workshop, she explained that she regularly tried out activities in the classroom and maintained her learning journal (3/11/99). She said:

I actually was writing notes on the videos I actually filled the journal with all my thoughts and contacts and who to ring you know if I needed to follow –up.

(video recall, 3/11/99)

Robyn appeared unsympathetic towards those who did not take the same responsibility and who complained about parts of the program, for example, that the videos were old and no longer relevant. Robyn suggested that they did not gain as much from the program as she had. She said:

there were different people at school that spoke to me about it and they have said ‘oh, the videos are shocking’ and they are sort-of slap-dash people anyway… they just want to give it a little bit of time, gloss over, and, you know, get along to the next thing.

(video recall, 3/11/99)

She also commented on a colleague who did the course the semester after Robyn had finished and who did not “bother to watch all the videos” and did not maintain her journal when she, Robyn, had gained so much from them. Robyn commented, “I learned a lot that way and when you read back through them you think yeh that’s right” (3/11/99). On another occasion she said:

the two teachers who are going now are not getting as much out of it – they don’t do all the homework or watch the videos.

(post-observation interview, 28/6/00)

Robyn also appeared to be impatient with people who complained about innovation without giving new things a try. As a teacher she believed:

you’ve got to be a person that’s adaptable and open to change, and changing your ideas, and changing your way of doing things.

(video recall, 3/11/99)
Of the teacher next door to her, Robyn said:

I’d love to get her to go to TILT, I have been trying for three years to get her to go to TILT. She whinges about everything, and all the new things that I present at staff meetings, you know, she will give a negative comment first, and so many things she whinges about, she could get the answers by coming to your course, at TILT, but she won’t, she won’t give up her time, you know, after school to come, and she is very set in her ways, and very old fashioned as a teacher, and she won’t even change, although I’ve tried, but I’d really love to get her along, but probably if I did she wouldn’t get anything out of it, cause... she’s one of these people that doesn’t hear and doesn’t see.

(video recall, 3/11/99)

Taking responsibility for one’s own learning seemed to be reflected in Robyn’s classroom which she explained “runs itself, I don’t need to be there” (classroom observation 22/11/99). Her students were familiar with the routine, (this seemed as true early in the year as it was at the end). Monday morning consisted of spelling and writing. The tasks for the morning were listed on the blackboard: writing; spelling; sentences (22/5/00). On one of my observation days a student who arrived late sat down, took out his book and immediately began work. The room was quiet, the students were writing. As they finished their work they placed their books on the growing pile open on the front desk, then returned to their desks and continued working in their spelling books. At one time Robyn helped one or two students move a block of desks that were slightly out of position making it awkward to get passed. The desks were moved with hardly any disruption to the work of those seated at the desks. The activity did not seem to be noticed by any one else in the room (22/5/00). There was the occasional sound of a ruler being picked up or put down, otherwise the room was quiet. (22/5/00). Occasionally the students chatted very quietly, occasionally Robyn said “sh sh”. (22/5/00). When one student wandered over to talk to a friend Robyn commented on his wandering.
He waved his hands in the air and wandered amiably back to his seat and continued work. None of the other students seemed to notice. The class continued in exactly the same way whether Robyn was present in the room or not. After recess the students returned to the classroom and began writing their essays. Again there was silence. Robyn sat at the desk of an absent student and marked books. After half an hour she told the students to rule off, check their punctuation and paragraphs and re-read and edit their work. The papers were collected for marking.

When asked what her students would be doing while she was participating in a discussion with me Robyn again said that they could run the class themselves (28/6/00). She said that they would be working at their own pace through a typing tutor program in the computer room, “some students will go on typing for the full 45 minutes – it’s their personal challenge” (28/6/00). After the typing they would be searching the Internet to answer ten questions about tornadoes. Robyn said they would:

   go to Yahoo or Ask Jeeves and record their answers on a sheet. We’ll have a report back tomorrow and I’ll collect all their typing and their tornado work.

   (post-observation interview, 28/6/00)

During a later interview Robyn talked of her students running the school assembly “they run it themselves they don’t need me there,” she said (10/7/00).

Robyn’s emphasis on responsibility for one’s own learning seemed to be reflected in an equal emphasis on responsibility for one’s own health and well being. She believed posture to be very important and told her students to “listen to their bodies” and “be aware of what’s happening in their bodies” (28/6/00). She had “done Yoga for years” and had taught Yoga to children. She believed in exercise to release energy. Before a test Robyn said:

   I get them to rotate their hands in the air, stand up, breath deeply then go for it! But they have to remember to keep breathing.

   (post-observation interview, 28/6/00)
This concern for health translated into a concern for posture while seated at the computers.

5.2.4.6 Summary

Robyn discussed the importance of taking responsibility for one’s own learning. She expected to have to prepare for the TILT workshops, listen and “have a go” during workshops and maintain her journal throughout the program. She felt that it was important to be open to change and seemed to have little time for colleagues who were not willing to put in the required effort to gain maximum benefit from learning opportunities.

Robyn’s attitude towards responsibility for learning appeared to be reflected in her classroom management. Her students moved from one task to the next with little prompting. They continued working in the same quiet manner whether Robyn was in the room or not. She was confident that they would also continue in this manner while she, Robyn, was away from the school. She indicated several times that the class “could run itself”.

5.2.4.7 Summary of category three: learning about learning

Robyn indicated that she learned about learning. She learned the enjoyment of learning in collaboration with others and transferred this to the classroom, allowing her students to work in groups and pairs.

Robyn felt in learning about technology students had more time to play with the computer and therefore probably found it easier to learn. For Robyn as an adult learner there were other demands on her time. These demands came from family and school. As an adult learner Robyn also occasionally felt constrained by the comments of younger learners who may have been impatient with her lack of knowledge and skills.
Robyn believed that she was responsible for her own learning and to this end prepared for workshops, participated in them and used her journal for notes on the workshops and videos. Robyn was critical of others who were not prepared to invest time and effort in their professional learning. Robyn’s attitude towards responsibility for learning was reflected in her classroom practice where she expected students to get on with their learning tasks with minimum supervision or interruption.

5.2.5 Summary of themes and issues addressed by Robyn in interview and observation

Robyn learned about, and discussed, teaching. She developed an understanding of how to set up groups through watching the TILT videos. This was reflected in the group work opportunities that she organised for her students.

Robyn gained feedback on her teaching from high school teachers she met at the TILT workshops who were now teaching Robyn’s ex-students. Robyn regarded the workshops as important and enjoyable networking opportunities. This was reflected in the fun that she reported in working with the group of high school teachers during the workshops. In collaboration with others Robyn developed technology skills and passed on her new found expertise to colleagues.

Robyn learned about, and discussed, technology. She indicated that she used what she learned about technology in the TILT workshops to address the needs of individual students and the whole class. One year after completing the program Robyn indicated that she was making far greater use of a range of technologies despite the time needed to incorporate new technologies into her teaching program and the additional costs involved.

Robyn said that she had gained sufficient confidence to introduce a Kindergarten buddies system whereby her students taught computer skills to Kindergarten students. Robyn indicated that she was impressed by the exciting possibilities of computer technology and recounted stories about friends, colleagues and family members who were competent users.
Robyn learned about, and discussed, learning. As well as developing teaching strategies for setting up groupwork mentioned above, Robyn experienced the enjoyment of working in collaboration with others. She transferred this to the classroom, allowing her students to work in groups and pairs.

Robyn also experienced difficulties from the learner’s perspective and speculated on difficulties that her own students must sometimes face. She saw working in pairs as a possible remedy for this.

However Robyn also believed that as an adult learner she faced problems that her own students did not face. She had time constraints imposed on her by family and work commitments, and so had little time to ‘play’ on the computers. She also indicated that she sometimes felt, as an adult learner, vulnerable to the negative comments of younger learners.

Finally Robyn believed that she was responsible for her own learning and critical of others who did not similarly take this responsibility seriously. In turn Robyn expected students to be responsible for their own learning and undertake their learning tasks with minimum supervision.

Table 10 shows the themes and issues addressed by Robyn during interviews and observations throughout the study. The ticks show the presence of that particular theme or issue during the event indicated at the head of the column. Throughout the study Robyn told a number of stories about friends, family and colleagues. Many were repeated on several different occasions. The table illustrates when certain themes emerged and when they disappeared.
### Table 10: Themes and issues addressed by Robyn during interviews and observations 1999-2000

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<td>Pride in teaching</td>
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* For the purpose of categorising the data something was referred to as a story if it had: only an indirect (tangential) link to the question posed or topic of discussion; an identified character or characters; an activity that the character(s) were engaged in (in this context the activity was computer related).
The video recall session prompted several spontaneous stories (i.e. the prompt for the story was not obvious to me, the observer) that had been told originally in the debriefing sessions following the workshops that had been video recorded. For example the stories about students told in the video recall session (3/11/99) included a story similar to one told in the workshop debriefing of 9/3/99 and referred to again in the debriefing of 4/5/99. In the video recall session the story was prompted by a snippet of, to me seemingly unrelated, video from the 9/3/99 workshop. Similarly a story first told in the workshop debriefing of 30/3/99 was retold in the video recall session prompted by a video snippet from the 30/3/99 workshop.

Two of the 3/11/99 stories about students were new as was one of the stories about colleagues.

Four topics disappeared from the conversations after 3/11/99. These were empathy with students, stories about students, stories about the curriculum and stories about self. It is possible that, no longer immersed in the TILT program Robyn was losing the perspective of what it’s like to be a learner. Perhaps also five months after completion of the course Robyn had made decisions about the integration of computer technology into the curriculum and it was no longer seen as an issue.

Four topics entered the conversation on or after 3/11/99. These were stories of family, responsibility for one’s own learning, change in teaching practice over time and pride in teaching. It is possible that, having gained some technology skills and confidence Robyn could now turn her attention to her responsibility as a teacher. Part of this responsibility she suggested, was to keep her skills up to date.
Case study two - Di

5.2.6  Background

5.2.6.1  Time line of significant learning events

When asked to chronicle her significant lifetime’s learning events (Figure 19) in the top left hand corner of a large sheet of paper Di wrote:

The beginning is the end and the end is a new beginning…

Just above the bottom left hand corner she began a line that snaked up to the top right corner. About two centimeters along this line she placed the first dot which indicated her birth in Melbourne. This was a lifetime’s significant learning line which accounted for the words next to this first dot: “Grandparents – Wisdom!!” Along about three-quarters of the line she placed dots at varying intervals with explanations of their significance. She said she needed her grandparents’ wisdom as a small child coping with school and serious illness and in the following years coping with the many changes in her life, changes of career, training, family circumstances and geographic location.

Figure 19:  Di’s drawing of the timeline of her significant lifetime learning events
Victoria
Her memories of pre-school, she says, are of “nasty children” and “unfair” treatment. In primary school she remembered the enjoyment of dance and drama and extra-curricular activities however this was interrupted by a life threatening illness when she was eight. At age eleven Di felt the challenge of a full curriculum and also the competitiveness of school in Year 6. An Independent high school brought a different set of challenges, more responsibility and problems of time management (which featured many years later in her teaching). However a private education had advantages and Di said that she felt, if somewhat tongue in cheek these days, that she was taught to “be a lady”.

Queensland
The transition to university life in Queensland, she said, opened up new worlds. Here social and political issues had a huge impact on her life. It was the time of the Vietnam war and student protests. For Di it was also the time when she met her husband, gave up university, married and moved to Lithgow in New South Wales.

New South Wales
Having given up a University place and moved to a country town Di felt she needed to take on new academic challenges. She enrolled in Bathurst College of Advanced Education to study Social Work and at the same time worked in the Child Welfare Department, which she explained satisfied her social conscience and interest in equity issues.

Australian Capital Territory (ACT)
A move to Canberra brought with it a move to the Riverina College of Advanced Education and a continuation of her course in Social Work. However once again she did not finish the course. She and her husband moved to Malaysia.

Malaysia
Although this was another beginning, it was also a continuation of the same issues that had concerned Di in the past. She explained that it brought her face to face with cultural diversity, political challenges and welfare issues on a much larger, more immediate scale. She worked in a refugee camp and contemplated issues of freedom, displacement and loss. At the same time, she explained, she was coping with her own sense of displacement.
ACT
Back in Canberra she picked up her Social Work study for the third time. She became involved in the settlement of refugees and had two children of her own who she said were her best mentors.

USA
A move to the United States followed. Again she was faced with cultural diversity and coping with change as well as a different set of social and welfare issues. The children began their education and Di became involved with the School Board.

ACT
Once again a dislocation and need to adapt to change, this time with two children to settle into new schools. Coping with cultural difference was again an issue, as was a sense of loss for a familiar life style even though there was also a sense of belonging and home-coming for her.

South Australia
The next move was to Adelaide. What she referred to as a mid life crisis took her in search of a new challenge. Di enrolled in the University of South Australia, this time to take a degree in Education and so into teaching. These, she indicated, signified big changes in her life. She took out the University medal and was invited to continue her study. But it was not to be.

New South Wales
Di moved to Sydney where she began teaching full time while continuing her fourth year studies. At the same time she pursued her own personal studies in Philosophy and Psychology. She was faced with the issue of death.

It is at this point in her education/learning that Di took up the TILT program.

From the perspective of this lifetime’s significant learning TILT seems like a natural progression. She saw it as her next challenge, another learning journey, embracing inevitable change. It was also a way of providing greater learning opportunities for her students which she saw as an equity issue.
5.2.6.2 Di’s Year 3 classroom for gifted and talented students

It was evident from visiting Di’s classroom that one of her major concerns was for the productive use of time. She began the day on both of my visits (1/11/99 and 5/4/00) with students gathered around her on the mat. On the count of three students were on the floor and ready to listen and contribute to discussion. The conversation was fast moving. On one occasion students were discussing sending parcels to soldiers in East Timor. There was a problem over quantity of items and the amount of packaging available. Students were asked for ideas to solve the problem. The following sequence took no more than ten minutes.

Di: ‘Three, two, one.’

The room becomes silent.

Di: ‘Into a circle on the floor everyone, into a circle without fuss.’

Children assemble on the floor.

Di: ‘Now our priority is to get our care box finished. One box is nearly full already and my mathematical mind tells me as I look around that the volume of the stuff here will exceed the capacity of the box. We’ll look at what we’ve got. Why might we look at what we’ve got - the things that we’ve got?’

Student 1: ‘We’ve got doubles of magazines and pencil sharpeners.’

Student 2: ‘We probably have enough to do two care packages.’

Student 3: ‘Why not do partner packs?’

Di: ‘Tell me more, what do you mean?’

Student 3: ‘Two people can do a pack between them.’

Di: ‘Let’s do a PMI [Plus, Minus, Interesting] on that. Positives?’

Student 4: ‘More soldiers will benefit.’

Student 5: ‘No double ups.’

Di: ‘Minus?’

Student 6: ‘One person might not bring enough.’

Di: ‘Interesting?’

Student 7: ‘Lots of little packages, we’ll have to carry lots of things to the post office.’

Di: ‘As the box-getter that might be a minus for me.

Student 1: ‘We might run out of string.’
Student 6: ‘We might run out of wrapping paper.’
Di: ‘Jed, go and estimate how much string we’ve got.’
Student 3: ‘Instead of pairs we can do it in groups.’
Di: ‘Oh, tell me more. That’s an interesting thought.’
Student 3 elaborates.
Di: ‘Picking up on Beth’s idea of pairs we could make it larger groups.’
Student 8: ‘But we have an odd number of people in the class.’
Di: ‘What number can divide into our class size? There are actually 28 people because Brad’s back but he’s not here, he’s probably jet lagged.’
Student 8: ‘If it’s 27 we can divide into groups of 3. If it’s 28 we can divide into groups of 4.’
Di: ‘What other number will go into 28?’
Student 9: ‘Seven?’
Di: ‘How many times? Two goes into 28 how many times? Count in twos.’

Just as Jed was sent off to check on string other students volunteered for other tasks throughout the session, such as checking the Internet was working in the lab next door (1/11/99) or checking the atlas to see where Germany was (5/4/00). On one occasion Di was sidetracked into a related conversation, she soon curtailed it with the remark, “Lovely to chat but we need to keep on task” (5/4/00). Di pointed out to the students that she had left a copy of Life’s Little Time Management Book on the top of the bookcase for them to borrow (1/11/99).

On one occasion (5/4/00) some students had written short stories. Di moved students into small groups, assigned a story writer to each group, the writers read their stories, and when finished all students moved back to the main group on the floor. All of this took place within the space of four minutes.

At the end of one morning session (5/4/00) Di declared they had been cheated out of two minutes by an early lunch bell and would not be able to hear today’s reading of their serial story before the break.
Just as Di would not waste learning time neither would she allow one student to waste another student’s learning time. Disrupting the learning of another student was seen as a serious matter and would result in students being separated. However Di also encouraged students to first try to solve problems themselves. As she explained to one who reported students for playing with a rubber band.

Student 3: ‘Three people are playing with rubber bands.’

Di: ‘I noticed that. I referred to people playing before hoping they would do something about it. There is another way you could have handled that you know. You could have just told them to stop. If you refer it to me I tend to waste everybody's time.’

(observation, 5/4/00)

Related to her efficient use of time was Di’s attitude towards students helping each other. After the morning session on the floor students moved to table work. Di told them:

You are doing table work, helping others around you to achieve their best too.
Your table will benefit from your help.

(observation, 1/11/99)

Helping was quite distinct from copying or allowing someone to copy your work. Although Di encouraged cooperation she viewed copying as “cheating yourself out of a learning opportunity”, and allowing someone to copy, as “doing his thinking for him” (5/4/00). Her students seemed very familiar with these two phrases and could recite them along with Di.

She reassured her students that it was all right to make mistakes. That getting things wrong was a learning opportunity and having a mistake corrected was “feedback” (5/4/00). Students were engaged in writing letters to the editor of the school magazine. Di called this “giving the editor feedback” for which, she assured the students, the editor would be grateful. Di was, however, careful to make the distinction between right and wrong answers and opinions. She encouraged her students to state their opinions and not be afraid that others thought differently.
Di indicated that she trusted her students as learners. The blackboard was covered in messages for individual students and for groups. There were lists of tasks for the day and a list of priorities for the week. Students seemed to check the messages and carry out the indicated tasks without interrupting Di or other students.

Another example of trust was spelling tests, which students marked themselves. Cheating, like copying, was viewed as a missed learning opportunity. After marking the spelling test (1/11/99) Di asked students if there were any words that they needed help in remembering. Students were then asked to share their tricks for remembering spellings.

It was evident that Di also valued student contributions to the running of the class. She frequently asked students to vote and had a range of strategies for doing this, from a simple thumbs up or thumbs down (1/11/99) to a more complex system used once for voting on which book was to be read. The books were lined up on the blackboard ledge and students lined up behind the book of their choice (5/4/00). This and other such strategies also served the purpose of allowing students to move around between activities while ensuring that the movement was purposeful and focused on a specific task.

Finally Di indicated that she saw herself as “an ideas person”. On her classroom door was the message:

```
TURN BACK
OR BE PREPARED TO ENTER AT YOUR OWN RISK
There’s no escape exit!
WARNING........
You are entering a wonderfully
whacky ideas room where ideas bounce
around the walls daily!
Beware.......  
This is a think tank and brains get stretched here!
```
Di constantly thanked students for their good ideas and publicized the good ideas of individuals and groups. This could be as simple as someone putting a fallen poster back on the wall, ("Who do I thank for this good idea of pegging the sound waves up here [on a string over the window]? What a good idea" 1/11/99) or it could be reassurance for a child who believed he had done the wrong thing for homework as the following field diary excerpt indicates:

The poster is late and the boy had been concerned that it was not like everyone else’s. The day before Di said he had quietly told her, that he had done a mind map instead of a poster like those on the wall made by the other students. Di tells him his mind map was a good idea.

(observation, 5/4/00)

5.2.6.3 Summary: Di’s Year 3 classroom

Di took pride in her busy, purposeful, learning classroom. She prided herself on ideas and on recognizing and rewarding student ideas. She believed in giving students a say in how their classroom operated and welcomed student votes on aspects of classroom life. Di trusted students to learn and expected them to take responsibility for their own learning and for assisting the learning of others. Di respected students’ opinions and helped students to respect each other’s opinions.

5.2.6.4 Di as TILT participant

On hearing that she had been accepted into the TILT course Di said, “I felt like I had won lotto” (1/11/99).

According to the base data survey Di belonged to the target group of teachers ‘who are not currently using computers in the classroom’. Although Di used her word processing skills for administrative and preparation purposes she made little use of computer technology in her teaching and allowed students only limited access. The access she allowed students was in the area of word processing in which she herself was competent and confident.
It was her need to expand opportunities for her students that, she said, brought her to the TILT program:

I thought, no I have to do it, I can't, this is technology, I can't afford to live without it now and so I'm into that mode of I don't care how many hours it takes I don't care that my program is late.

(video recall, 19/5/99)

In most respects Di seemed to fit the profile of a typical TILT participant, the main difference being length of service. Having come late to teaching however, Di was probably in a similar age bracket to the typical TILT participant who had been teaching for 15 plus years. Also typically, although access to computer technology was available at home Di made little use of it (see Di’s profile Appendix 9 for more details).

During the early part of the course Di commented frequently on the overwhelming amount of information there was to take in (9/3/99; 30/3/99; 4/5/99; 6/5/99; 19/5/99). She was aware of how much there was to learn about technology and how difficult she found it. For this reason, she explained, the TILT folder provided her with a sense of security (19/5/99) because if she missed something in the workshop she could always look it up later. Although at first she had been overwhelmed by the size of the folder she was relieved to find that it “looked structured” (19/5/99).

Despite the frustrations experienced in almost every workshop (see below) Di said she couldn’t “believe anyone got as much out of TILT” as she did (1/11/99). She believed that the post workshop debriefing sessions and her drive home in the car with Cheryl helped her to remember the workshop, proving to her “the benefits of reflective practice” (1/11/99). She also spoke of the drive home as:

like a synergy . . . it became more than the two of us in dialogue. It's the continuity it's like you gave me something I gave you something, that it's like an exchange.

(interview, 1/11/99)
Di stated that, on reflection, she thought the TILT course was more like a unit of study at university than a DET training program. Certainly she believed she had worked as hard, achieved as much and been challenged to think as much as she had during any university course she had previously attended (1/11/99). She believed that the course was extremely valuable. She indicated that she particularly enjoyed the post workshop debriefing sessions, which she said, were beneficial to her learning (1/11/99). Having to recall what she had learned during the workshop helped fix it in her memory, she said. However, an examination of the transcripts of the debriefing sessions revealed that very little of the workshop activity was ever discussed. The discussion was usually around pedagogy and empathy for students as learners. It is possible that anticipation of the debriefing session made these participants more focused throughout the workshop.

Reflecting on the whole program a year after finishing the course (10/7/00) Di believed that she did learn “extra skills in technology” however “the best thing about it was the reflection afterwards… and in the car afterwards elaborating on it”. Di believed that she would have acquired the technology skills over time but the discussion post-TILT was an additional benefit. She again referred to the sense of privilege she felt in being chosen for the course (19/5/99; 1/11/99; 10/7/00). The feeling of privilege, she said, came from the knowledge that the course was generous in its allocation of resources (trained facilitator for workshops and inschool support; package of materials; three relief days).

9 Di wrote on the draft: “But it was the replay of it internally that deepened the appreciation of the experience.”

10 Di’s response to this comment written in the margin of a draft: “I don’t believe so – I have a memory of being tired for many workshops but found the reflective analysis after stimulating. It was the ideas and the thinking through thoughts that I valued”. This comment was immediately followed by another: ‘sorry I should read on – I’m using this scribble as a dialogue with the text!”
Di saw herself as, “A reflective, big picture learner. I’m philosophical, I like to ponder. I like to satisfy myself that I have turned every stone” (10/7/00). She said, “I like to have a skeletal framework. I like the whole scaffold. I like to see the big picture to begin with” (10/7/00).

Di concluded:

the heart of the program is about that philosophy of learning, collaborative group work . . . Not just the skills of TILT and what to do with it – this is radically going to change things. The impact big picture is going to manifest in ways of pedagogy … impact on learning …we just skim, learning is pleasurable but it implies great changes, a challenge.

(interview,10/7/00)

Di summed up the TILT program saying it wasn’t just skills “it was thinking about thinking, it was philosophy” (10/7/00).

Even though, on reflection over a year later Di indicated that the TILT program had been like a unit of study at university and that participating was a privilege, during the course Di had often been frustrated. During the workshop two debriefing session (9/3/99) Di said that she was willing to learn from her mistakes but couldn’t follow the materials implying perhaps that the materials were over complicated.  

Driving home after workshop three (30/3/99) Di commented on the limitations of the concept keyboard for a child’s learning (she found it very limiting with not enough flexibility); she saw the scanner as “time consuming”; and believed the digital camera had resource implications for the classroom.

11 Di’s response to this was: “I rather think it was my own limitations – I thought the resources were very good.”

12 In the margin Di wrote: “The workshop experience was [i.e. time consuming] but the potential to save time once you knew how to master it was evident to me because I was excited about its possibilities.”
She suggested that the workshop did not provide her with satisfactory learning experiences\textsuperscript{13}. On reflection Di remembered thinking that there was a lot of “down time” (19/5/99) in that workshop. The one thing about the activity that made it worthwhile Di explained, was the fact that the participants were working as a team sharing the responsibility. Di said she found it much easier working with colleagues in a group and that she enjoyed learning that way.

During the video follow up meeting (19/5/99) Di compared the \textit{TILT} workshops with her own classroom teaching. She explained that she gave students a framework and the outcomes they could expect from the work. She said she would have appreciated more of this in the \textit{TILT} program so that she could have seen the big picture and would have known where she was going and been able to make connections. She would also have appreciated what she called “the guts of it” coming a bit faster because she was impatient to learn.

Exploring the software \textit{MYST} in workshop four (4/5/99) Di recalled (during the video follow up meeting, 19/5/99) thinking that it was not very educationally sound. It should have been more user friendly. She explained that she remembered thinking \textit{MYST} was a bit like the concept keyboard – it had great potential but she felt she was wasting her time with it and was frustrated\textsuperscript{14}. A second piece of software that Di explored had no sound, a third piece Di believed was only testing dexterity and ability to use a mouse neither of which was a very high level skill. She commented that she remembered thinking “why had \textit{TILT} put this in if it wasn’t so good”. This, she said, was a little disappointing.

\textsuperscript{13} Di’s response to this was: “Joy I don’t know if this is a then or now statement but I do recall this workshop and my reaction is oh how much seeing the power potential of these things would have been better than the frustration of doing too many ‘bits’ in a short time span.”

\textsuperscript{14} Di wrote in the margin of the draft: “I was impatient at being a ‘discovery learner’… I wanted to get to the ‘meat’ of what \textit{MYST} had to offer… I believed it to be powerful but didn’t leave knowing its potential.”
Di recalled a great deal of information from this session (the magazines; advice to trial before buying; the name of a software company). She stated that she felt the workshop had been a great opportunity but that she had not benefited as much as expected (19/5/99).

During the workshop five debriefing session (25/5/99) Di again compared the workshop with her own classroom. She commented that the TILT facilitator had only 10 'students' but they still had to wait for her help. Di explained that teachers have three times that number and “students are full of energy” and often not willing to wait, as teachers do, without being disruptive. This, she said, was one of the difficulties faced by teachers in using computer technology in the classroom.

On workshop six (15/6/99) Di commented that a group of three would have been better than two because there was so much new information to take in. Di said that she would not be willing to spend time on this activity again without the new CDROM because the faults on the current one meant that participants wasted a good deal of time, although she acknowledged the excitement and potential of multimedia.

When asked to focus on different aspects of the whole program during a school visit the following semester (1/11/99) Di said she liked the idea that the video could be watched at home while other household activities, such as ironing, were taking place.

Commenting on the facilitator Di indicated that she had expected a “whiz-bang” technology expert (1/11/99). Instead she said, she found the facilitator was “gentle and she was respectful and she was caring she was quiet and calm” (1/11/99). She recalled the day that she and Cheryl were caught in traffic and came into the workshop late, “flustered” and “upset”. She felt that Jenny was very “calming”. During the video follow up meeting (19/5/99) Di referred to Jenny as “non-threatening competent, calm and capable”.

Chapter Five
Di also stated that she appreciated that mistakes in the workshops were learning opportunities, something that Di told her students regularly (see above). However Di believed that not all the “mistakes” that she learned from were her “mistakes” some she believed could have been avoided. She believed the workshops were “good modeling” however she observed that “children are not as tolerant as adults and maybe not as generous with their time” (10/7/00). This did not seem to be said as a criticism of the facilitator but indicated Di’s constant relating of workshop experiences to her own classroom practice. It also illustrated Di’s idea about the unwritten workshop rules where good manners were important and criticism was kept to a minimum (10/7/00).

While watching the workshop videos (19/5/99) Di talked about how an activity (for example the digital camera) was for her a waste of time. However she could be seen joining in the activity as part of a group with other participants appearing to be enthusiastic. This she put down to good manners. She explained that a particular kind of person took up teaching as a career. That kind of person would tend to help colleagues and consider their needs (19/5/99).

Di also spoke in positive terms about the workshop (10/7/00) even though she said she was sometimes thinking, “Well that's old hat”. She was asked to speculate on how it was that the TILT workshops could ‘work’ for such a diverse group of people with such different needs. She said she thought it was to do with the teaching profession attracting people who were naturally supportive, who wanted “a fair society”, who were aware of “good manners” and “common courtesy” and “decency” and “respect” (19/7/00).

Di also explained that she felt privileged to be doing the course, she had applied twice previously and had not been selected. She assumed others felt the same way and would therefore be keen to help each other get the most out of the course. She concluded that she believed the rules for participation were “communicating and co-operating” (19/7/00) rules that would probably not have been out of place in her classroom (see above).
5.2.6.5  Summary: Di as a TILT participant

Di was in some respects an atypical participant because she was using word processing in the classroom and she had not been teaching for more than fifteen years. However she came late to teaching so was probably in a similar age bracket to the majority of participants. Like most TILT participants Di made little use of computer technology at home and did not use Internet or email at school. Di felt she owed it to her students to improve her technology skills so that she could use a wider range of hardware and software in the classroom.

For Di it seemed many of the workshops were a frustrating experience. She sometimes felt the materials were not of a high enough standard, equipment was unreliable and the workshops wasted her time. She made comparisons with her own classroom practice but although she sometimes felt critical of the program good manners prevented her from voicing her criticism.

Commenting on TILT in retrospect a year after finishing the course Di believed that she had learned some technology skills although she believed that she would probably have acquired the technology skills without TILT. However Di believed that the course had been as exacting as a university course and that she had worked as hard and learnt as much as she would have done had this been a university course. Much of her learning she felt, was of a philosophical nature – more to do with learning about teaching and learning than to do with acquiring technology skills. She claimed that for her the reflection time had been important. She felt that the program was about philosophy and as such had radical implications for teaching and learning.

5.2.6.6  Overall summary

Di’s enjoyment of what she termed the philosophy of TILT was consistent with her personal studies in Philosophy undertaken prior to taking up the course. Her comments on the course itself seemed consistent with the values and attitudes apparent in observation of her classroom and in discussion.
Throughout the nineteen months of the research project Di’s comments indicated that she was concerned about a number of teaching issues arising from the use of technology. Firstly she was concerned about how she would control her students’ learning particularly in relation to the Internet, how she would know the expected outcomes of her students’ learning and how she would evaluate their learning. Di also indicated that classroom management and school organisation related to technology use were issues. Di also commented frequently on “big picture” issues to do with school education and computer and information technology. Issues such as copyright, student access to undesirable material, the production of support materials, and industrial issues for teachers were discussed.

The second important category to emerge from the data was to do with learning about and with technology. Di discussed her own learning from the TILT program and her changing classroom practice as a result of her learning.

The third category that emerged from the data was Di’s commentary on her own learning and the experience of being a learner. This commentary included comments on the seemingly overwhelming amount of information she was dealing with; her growing empathy with students as learners; and her own learning in general.

These themes, although different in their detail, can fit under the broad category headings identified in Robyn’s case study above:

- Learning about teaching
- Learning about technology
- Learning about learning

Table 11 shows the categories and their corresponding properties, which were the themes and issues addressed by Di throughout the nineteen months of the study.
Table 11: Categories and their properties (themes and issues) that arose from the data for Di

<table>
<thead>
<tr>
<th>Category</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning about teaching</td>
<td>• control of student learning&lt;br&gt;• lost art of teaching&lt;br&gt;• classroom management&lt;br&gt;• school organization&lt;br&gt;• implications of technology for teachers and teaching</td>
</tr>
<tr>
<td>Learning about technology</td>
<td>• Di’s learning&lt;br&gt;• changing practice over time</td>
</tr>
<tr>
<td>Learning about learning</td>
<td>• experience of being a learner&lt;br&gt;• empathy with students as learners</td>
</tr>
</tbody>
</table>

5.2.7 Category one: learning about teaching

5.2.7.1 Control of student learning

The second workshop in the series (9/3/99) dealt with the Internet and email. During the post workshop debriefing session Di said that she was concerned about not being able to know her students’ thoughts and where they were “up to in their learning”. This was in relation to her students searching the Internet. She indicated that she would not know what sites they had found and therefore would not know what they might learn.

Three weeks later (30/3/99) driving home from the third workshop (Computers and Related Technologies) Di again questioned how she would know and evaluate her students’ thinking processes.

The fourth workshop in the program (4/5/99) dealt with software. During the post workshop debriefing session Di talked about how difficult it would be to know what learning outcomes one can expect from a piece of software. She accepted that students might gain enjoyment from using a piece of software (e.g. MYST) but needed more than enjoyment as an outcome for the time spent on the activity. She felt she needed to identify skills and knowledge outcomes for it to be worthwhile. Di asked: “how do you evaluate the thinking process” (4/5/99) when students are absorbed in their own thoughts?
Di continued this theme in the car on the way home (4/5/99, car conversation). She expressed concern about “testable outcomes”. Di indicated that she would be happy to be a facilitator who “sets up that structure for that learning to occur” but she felt she was still struggling with the idea of how to identify what outcomes a student was achieving. She pointed out that when students were doing group work (even if the topic was unfamiliar to the teacher) she was able to “get around everyone” to assess the outcomes. But in the case of technology she indicated that she did not feel confident enough with the technology (and software) to be able to assess the students’ learning. She felt that she would need time to set up criteria for the groups.

Di returned to this issue again two months later (6/5/99) during a school follow-up day when the facilitator visited the school to show Di and her colleague, Cheryl, the Lego set and some pieces of software they had requested. This time Di’s concern seemed to be broader than simply searching the Internet. She was concerned about how she would know what learning outcomes her students would be gaining through the use of technology. She said that she didn’t know how she would be able to “control the child’s mind”\(^\text{15}\) if they were allowed to explore the technology themselves. Di expressed concern that the child might day-dream instead of focusing on the task at hand. She asked the rhetorical questions: How would she know; how would she evaluate the learning in such a case when as she said, “the child’s pondering is not mine to measure”? (6/5/99).

The implication seemed to be that Di wanted to know thoroughly every piece of software (or the capabilities of things like Lego) and work out exactly what outcomes the students would be able to gain from its use before they were able to use it. While Di believed that much of teaching was about allowing students to explore, she also felt that they needed boundaries. Furthermore she indicated that the exercise was around “thinking skills, science and technology” that require the teacher to know the materials well and to understand the possibilities.

\(^{15}\) Di wrote in the margin of a draft: “I can’t believe I said that”.
These concerns were raised during a visit to the school (19/5/99) a short time later. Di explained that she did individual contract work with her students and was therefore “the consultant” rather than the teacher. Each contract card had a task on one side and a scaffold on the back for the text that was to be produced.

This provided freedom within a supportive framework, freedom within boundaries, she believed. Di explained that she constructed tasks at multi levels so that students had freedom of choice (of structured tasks) but within the bounds that she had allocated.

To support her point Di described an assessment task she had devised for students to independently assess their own word processing skills. Students had to produce a document with specific features of font, layout and style. Di believed this was an achievement for herself and the students.

Fourteen months later (10/7/00) during a visit to her classroom Di was reminded again of this concern. She remembered her concern about the Internet and felt it “probably had a censorship component” also an “evaluation component to it”.

She indicated that at that time she had been concerned about keeping her assessments up to date when she had no idea “where their [the students’] boundaries have gone”. She recalled that early in the program she had felt the “boundaries were too big” and that “knowledge would go beyond what we could control and handle”.

Fourteen months after the course had finished Di indicated she took it (student learning) “from where they’re at”, constantly redefining the boundaries. Now she asked students to tell her where the boundaries were. She said:

> the terrific thing about that is that the boundaries aren’t where you would have put them and that’s really great because however it works it allows greater possibility.

(interview, 10/7/00)
It would appear that Di had found a new way to be “in control” of student learning. She indicated that she now remained in control in a different way. Instead of identifying the learning outcomes for every activity and assessing her students’ progress against them she had shifted focus to her programming and the evaluation of her teaching. She said that she continually evaluated, reassessed and reprogrammed her teaching. This, she said, allowed her to provide open-ended learning activities for students but remain in control of the total teaching/learning picture.

5.2.7.2 Summary

Early in the program Di appeared concerned about evaluating student skills and knowledge when they were using software with which she was unfamiliar or the Internet over which she had no control. She did not think it possible to evaluate student thinking or identify testable outcomes in these circumstances. However one year after completing the course Di had found new ways to construct student tasks and assess student learning in open ended learning activities using the Internet.

5.2.7.3 Lost art of teaching

At the same time as Di indicated concern about implementing the DET’s move towards outcomes based education she also expressed concern that the notion of measurable outcomes taken to an extreme had the potential to destroy the art of teaching. On three occasions (4/5/99; 6/5/99; 1/11/99) Di expressed concern about what she called the “lost art of teaching” together with the possibility that students would become passive consumers and teachers would become “number crunchers” as they were asked to rely more on technology and less on forming relationships with students. Her comments indicated that she feared that important aspects of teaching would be crowded out of the curriculum. Di also talked about the compartmentalisation of the curriculum (1/11/99) in terms of measurable outcomes. She believed that teaching was an art and feared that the curriculum would become so prescriptive that there would be no room left for good teachers to teach to the moment. The interview data indicated that Di was aware of student outcomes and felt insecure at this stage (1999) if she could not explicitly define what outcomes her students were working towards.
5.2.7.4 Classroom management

During the post workshop debriefing session (9/3/99) following the second workshop Di expressed concerns to do with individualised instruction and being available for each student when the need arose. She suggested that one of the implications of the TILT program was to cater for individual needs, however she also saw the huge time investment in planning in order to manage this so that it worked for each student.

Di returned to this theme after the next workshop (30/3/99) when she indicated that she thought teachers needed to change their pedagogy to make best use of the technology. Later that evening as she drove home with Cheryl she returned to classroom management issues saying that the digital camera, for example, would be hard to manage in a classroom. She suggested that either you would need several cameras or there would be a lot of time wasting as students waited for their turn, which seemed to imply that Di had in mind a whole class activity rather than several different activities of which using the camera was one.\textsuperscript{16}

During the post workshop debriefing (4/5/99) Di told the group of her first attempt to use the Internet with her students. She explained that before the lesson she spent a long time researching sites that she would take the students to. She prepared step be step instructions so that all students visited the same sites. During the lesson she monitored students’ screens to ensure they kept together and no-one raced ahead. Di indicated that this was a rewarding and exciting experience for herself and her students.\textsuperscript{17}

\textsuperscript{16} Di clarified this comment: “This is in relation to limited access to camera… e.g. taking shots of plants around the school for science (how many periods would I have the camera a week?) to allow students’ use I wanted one available 100% of the time.”

\textsuperscript{17} Di’s comment in the margin was: “Oh how awful!”
Di again came back to the subject of classroom management on the way home from the fourth workshop (4/5/99). This time she was considering the difficulties of group work with technology. She wondered how she would be able to get around to each group in time “to assess the outcomes” if she had several groups working in different locations. At that time she had students organised into groups around a computer taking notes from the screen. Di indicated that she thought the answer was a lap-top for each student and site licenses for software, so that everyone could work towards the same outcomes on the same task.

During the school follow up day (6/5/99) when the facilitator visited the school Di suggested that she might have to “let go” a bit as a teacher. This led her back to the previous theme of control of student learning. She said that she would be willing to let go as long as she were confident the “outcomes are there” (6/5/99).

Two weeks later (19/5/99) during a follow up meeting Di explained how she gave the students website addresses to look up. She had spent several hours the night before in preparation, checking the sites and deciding what specific things she wanted the students to find out. She therefore knew what the sites looked like so could determine at a glance that they were at the right site and on task. She had also decided what outcomes she wanted them to achieve. From classroom observation Di seemed to expect all her students to be on task almost all the time so that their learning time was maximised. This required that Di had previously defined the task, knew what the learning should be and could monitor the students’ on-task behaviour.

A classroom visit took place in November 1999 (1/11/99) four months after completion of the TILT training program. Di’s students were divided into four groups with each group assigned a task. One group had been sent to the small computer room at the end of the verandah to type up their sound poems that had already been written out by hand. They had to meet specifications for heading, font and borders. Di visited intermittently instructing them on correct posture and finger positions for typing. Another group was to have visited the Internet site for Australian soldiers in East Timor but the network was down so they were also typing up their sound poems. The students said they used computers at least once a week usually for word processing or Internet searches.
In the interview following the classroom visit (1/11/99) Di indicated that the major changes in her use of technology were in the classroom use of software and the use of Internet for research. She had a system in the class of teaming up those who were computer literate with those who wanted to learn more. A list of class experts indicated to whom students must go for help before consulting Di.

Another classroom visit took place almost five months later (5/4/00) nine months after completion of the program. Like last time students had been divided into four groups. There was a different task for each group. Di instructed the Internet search group to have a good period of time searching for Olympic sites. She told them that half an hour should be spent searching and half an hour spent filling in the fact sheet. Di suggested they use the Anwers or Yahoo search engine. Students suggested Google and Ask Jeeves. Di told them they then had to decide what key words they were going to use. She told them they must ask, “Is this a good web site? Is it a good home page? Does the home page give me what I need?” They worked in a room along the verandah. One of the objectives, Di told them, was for them to feel comfortable using the technology.

The same instructions were given to the CDROM group. Both groups had to write a question for others to answer (from the Internet or CDROM). They then had to write a sample answer to show what kind of quality they are looking for in the answers of their classmates. Di called these “fat questions”. “Skinny questions” were questions that have only one answer and don’t require a great deal of thinking. Di told them that half the time should be used to explore the program and half the time should be used to fill in the work sheet. The CDROM group worked on the computers that were situated between Di’s classroom and the next room.

Di told the students that she wanted the CDROM people to compare the CD with the Animals CD. They were asked to comment on: “what is the same, what is different, who designed the CD, who is it for?” She told the students it was their turn to be the critic, and to use all the judgments they had talked about in class. Unfortunately the CDROM could not be made to work so the second group was given the Internet task instead.
Di had asked a third group to construct a spiral using Logo. They worked in the classroom next door. The fourth group was given a worksheet about the class novel. They worked in the classroom.

It should be noted that this is not the same class as the 1999 class that was given the task (in November) of visiting the East Timor site to look for specific information. That class had moved on to Year 4. This class was not being asked to search for, compare and evaluate web sites because now they had learned how to search for and critique sites and last year they didn’t know. This was a new group of students at the beginning of their year in Di’s class. It seemed that this group was benefiting from Di’s learning over the past year, not just her technical know how (which seemed, judging by her confidence using the technology, to be greatly improved) but what she referred to as her philosophical pondering on student learning, learning outcomes and pedagogy.

It also should be noted that this new group of students was benefiting from Di’s recognition that she would have to “let go a bit” (6/5/99). Instead of having to answer Di’s questions these students were asked to pursue areas of interest and report back in the form of questions to classmates. Di indicated that this satisfied her need to control the teaching situation and ensured that students were not wasting time off task.

Di also seemed to have developed for the students a meta-level of learning related to the technology. Her students helped each other with bookmarking sites, searching and browsing, and had a knowledge of search engines and what different ones were good for. They also had a language for the critique of websites and CDROMs. Di indicated that this relieved her of the task of pre-searching and quality assuring sites before sending her students to them for specific pre-determined items (5/4/00).
5.2.7.5 Summary

Throughout the TILT program Di commented on classroom management issues associated with what she believed the program was implying about the organisation of student learning. She discussed using individualised instruction, whole class instruction requiring multiple items of equipment, and group work with members of small groups each working on the same materials. She considered these issues in the context of the previous concern for control of student learning and the teacher’s responsibility for learning outcomes.

From classroom observation it seemed Di’s classroom management strategies and her construction of the learning tasks reflected her shift from teacher control of the parameters of the learning task to student control. However often it seemed, school organization, in particular access to the technology, played a major role in what Di could actually do.

5.2.7.6 School organisation

During my classroom observations Di was seen to be constantly moving from group to group answering questions, sorting out problems and ensuring that students were on task. Di explained that she also had contingency plans for every lesson in case the computers were not available or not working.

Di described the first day she took her whole class to the computer room to work on the Internet (19/5/99). It was to have been the beginning of a week-long project. However the next day when she needed access to the Internet to finish the work the network was down and unavailable for the rest of the week.

On my first classroom visit (1/11/99) Di was using the computers outside her classroom and the small computer lab along the corridor (this was not the computer room which Di rarely used because it was “booked out most of the time”). However the students’ disks were incompatible with the lab machines so students were instructed to type in and print out their poems because they would not be able to save them to disk. The lab was locked so Di had to find a key. A student checked that the printer was working so that the exercise was not a waste of time.
Meanwhile the second group of students discovered that the Internet was not working in the mini lab outside the classroom after all so they too used the machines for word processing. Di had to constantly move from room to room to check on progress.

On my next classroom visit (5/4/00) Di had access to the computers in the next-door room (which had Logo software installed) because the teacher and class were away for the day. She also had access to a room further along the corridor because that teacher and class were also away. She allocated the computers situated between her classroom and the next-door room for the CDROM activity however the CDROM would not work.

A student asked about the class newsletter. Di replied that it had not been printed because there was “a glitch in the computer”.

5.2.7.7 Summary

Di seemed committed to allowing students to work on computers when they were available, however, this always seemed to involve her in having to visit groups of students at some distance from her own classroom. Such organisational problems would deter many teachers from attempting to make use of the technology. Di said that she persevered because she saw enormous benefits for her students. As she learned more herself about the possibilities of computer technology for her students’ learning she appeared to become more determined to ensure her students had reliable access.

5.2.7.8 Technology implications for the teaching profession

Di indicated that she was aware of industrial issues around the implications of report writing on computer. Writing reports on the computer, she explained, meant that she had to take a computer home from school, which intruded into her own time (30/3/99).
Di described what she called “integrated time” (i.e. time given to writing reports by hand that could be integrated into the business of the family and could be done in the family room) and “dedicated time” (time given to writing reports on the computer that required the teacher to move to the family computer room). Di explained that she willingly spent many hours at home in research and preparation but did not like being told how she should spend her gift of unpaid time (30/3/99). The issue here is that she was being asked by “the Department”\textsuperscript{18} to do a particular job at home and to do it in a particular way that narrowed her options for accommodating family needs.

From the beginning Di saw implications for commercial interests (30/3/99) in the growing use of computer technology in schools. In conversation with Cheryl on the way home after workshop three (30/3/99) Di suggested that the Board of Studies, the Department and private enterprise would catch up and produce resources to support the use of computers in classrooms. She said that she thought initially teachers would make their own resources then others would catch up and provide “what we don’t have time to provide”.

She recognised that there would be what she referred to as: “secondary and tertiary jobs to come out of the technology” and that the industry “will catch up” and for example “provide black-line masters for thinking skills in MYST”\textsuperscript{19} (4/5/99 debrief). But until that time, said Di, “it’s just us”. No wonder she found the introduction of computer technology so overwhelming! Although when viewing the video of workshop two (19/5/99 video follow-up meeting) Di recalled being relieved that the Department had dealt with the issue of censorship and had provided boundaries for student Internet searching.

\textsuperscript{18} Di’s response to this point was: “But is the Dept asking us that? We’ve gone to reports on computer but now with a computer on every teacher’s desk it’s not an issue- again my point was about the bigger system impact not a personal impact. Oh for the day we all have a small laptop or notebook (ideally salary sacrifice and ‘best deal’ price through mega-purchasing power for our whole profession).”

\textsuperscript{19} Di’s comment in the margin of the draft: “Oh no!! How far I’ve come!!”
Di also claimed that she realised early in the course that teachers needed to become critical users of technology and provide feedback to software developers so that they could develop educationally sound programs and support materials (4/5/99 car conversation). She came back to this idea a couple of days later (and again later in the month) saying that industry would have to provide resources to support the use of software because teachers did not have time for this task (6/5/99 school follow up day; 19/5/99 video follow up meeting).

Contemplating the practicalities of implementing learning strategies that incorporated computer technology and recognising the huge changes involved in “wanting the technology to become a way of life” Di said (in reference to the role of industry) “we’re just a little outfit at the bottom but there’s giants up there”.

5.2.7.9 Summary

Di frequently referred to “big picture” issues as she deliberated on the meaning of computer technology for education. She saw implications for government, business and her own philosophy in much of the TILT program. She also discussed wider implications of the growing use of computers in school, particularly in the area of student reporting. Di was occasionally impatient with the TILT program when she felt she was not being given the “big picture”.

5.2.7.10 Summary of Category one: learning about teaching

As a responsible teacher trying to implement the DET’s move towards outcomes based education Di was concerned that she would not know what outcomes her students were working towards if they were using the Internet or software that she was unfamiliar with. She was concerned about control over their learning. However one year after completing the course this was no longer a concern. Di had found new ways to construct student tasks and assess student learning.

Di was also concerned about what she called the “lost art of teaching”. She felt to some extent computers were to blame for this, especially when coupled with student reporting and the concern that students would become numbers rather than people.
One of the major issues facing Di as she tried to implement what she was learning in TILT was management of resources, including time. She discussed individualised instruction, whole class instruction requiring multiple items of equipment, and group work. She considered these issues in the context of her concern for control of student learning and her responsibility for learning outcomes.

School organization, in particular access to the technology, also played a major role in what Di could actually do. Although Di was committed to allowing students to work on computers this often involved her in having to visit groups of students scattered around the school. However Di seemed determined to provide opportunities to use computer technology and therefore persevered despite organizational difficulties.

Di was aware of what she called “big picture” issues. She saw wide implications for government, business and the DET in the introduction of computer technology. This was particularly so in the areas of resources and support and student reporting.

5.2.8 Category two: learning about technology

5.2.8.1 Di’s learning about and with technology

Despite the feeling of being overwhelmed by the enormity of the learning task Di said that she felt the first workshop inspired her (4/5/99). However she found she was too busy to actually try something out in the classroom after the workshop. This was a disappointment, she said. She also reported feeling frustrated because she had misunderstood something and could not make the TILT CDROM work in her own home machine. Di recalled that at the end of the Internet session she had felt reasonably confident; she remembered thinking that there might be competition for the home computer which her son also used for email.

Di reported that using email at home, however turned out to be “a hassle” because she had misunderstood the role of the CD. She had thought it had to be used for email not realising that Start.com was available to anyone on the Internet (19/5/99).
[During the early part of the course (30/3/99) Di felt that one reason for her lack of progress in using the computers at school was because she had to send her disk to the computer coordinator for printing, she could not learn to do this for herself. There was no machine available to her and little access to printers anywhere in the school.]

Di said that a significant moment for her was watching the video on related technologies (watched prior to workshop three, 30/3/99). She explained that the item on Lego had impressed her. She said that she remembered wanting this for her students. Di followed up the workshop with a visit from Jenny to go through the Lego kit.

Di recalled another significant moment when she felt she had been given the “key to the door” (19/5/99). As part of workshop four, participants were given software catalogues to browse through as Jenny unlocked the mysteries of the software descriptions. Di claimed that her ideal learning situation was listening (in this case to Jenny), making notes as necessary, reading and thinking. She said that she particularly liked the option of being able to do all these things at once and not feel rude, “I found that way I was listening to something but I was also researching for my own benefit and I like that type of learning” (19/5/99).

As Di said, everyone would be learning something different, an issue she returned to in relation to her students and their use of multimedia technology (see discussion of control of student learning). Di indicated that she learned best when she could follow her own interests but within a given structure. Sitting on the floor browsing through the catalogues Di believed that her interests were served but also the interests of good manners (paying attention) were served because she could monitor the facilitator’s commentary and pay attention when something particularly interested her.

It is interesting to note that what Di referred to as a breakthrough in her learning was not the mastery of some skill but came when she was presented with a selection of software catalogues placed on a low table in the middle of the circle during workshop four (4/5/99) while the TILT facilitator addressed the group.
I mean I went down onto the floor and just sat there and just sat there and then I thought, why isn’t everyone else coming down and this is what it is about you know listening to someone talk or you can actually be doing and looking. I thought it didn’t get people as excited about this as I was. I can remember thinking this is the key. I’m very much a visual person like I like to, I’m very much hands on and while I’m hearing things I like to read as well. I can still listen to Jenny but I can still have my own thoughts scan the things that I’ve (inaudible) to what I’m interested in … so you didn’t feel rude that you were actually servicing your own need while receiving something from them together. I found that way I was listening to something but I was also researching for my own benefit and I like that type of learning.

(video recall, 19/5/99)

Di commented that she could see the big picture and could discern order and categorisation. She felt she had access to information that the experts seemed somehow to “know”. 20 She also suggested that she now had access to the language she needed for communicating with experts (commercial and educational) and for making educational decisions for her teaching. For her, she said, it was the key to understanding technical requirements, educational content of software and links with the curriculum, all of which had remained a “bit of a blur” thus far (19/5/99).

Two thirds of the way through the course (19/5/99) Di indicated that she hadn’t learned about any new technology that she wasn’t aware of previously (except for the touch sensitive pad). She did not feel that she had achieved the workshop outcomes. However she said that she had persevered with the word processor and spreadsheet even though she thought it would have been quicker to draw lines with a ruler. Because of this she felt she was actually “thinking differently… thinking of the tools that are on that computer” (19/5/99).

20 Di wrote in the margin of a draft of this section: “I wanted to know where to go to get what I needed to extend resources/learning.”
About a year later Di said:

You have to keep expanding your own knowledge. It’s what you value. I value the impact of technology on my programming but haven’t had time to learn the technicalities my priorities are people.

(interview, 10/7/00)

5.2.8.2 Summary

A look at Di’s interactions with the technology throughout the TILT program may explain her feeling of not having achieved workshop outcomes. She had a number of frustrating experiences and on several occasions felt that her time had been wasted. Time wasting was an issue which Di discussed often with her students (see above) she felt responsible for not wasting students’ time and occasionally felt the program did not pay her the same respect.

Di claimed that her significant learning arose in watching the video about using Lego in the classroom, and in reading the software catalogues. Neither event was about actually learning to use the technology.

5.2.8.3 Changing practice over time

During the first school visit (1/11/99) several months after the course had finished it seemed that a change had taken place in Di’s thinking. Where she was previously concerned about control of student learning and checked all web sites before allowing students to access them she now allowed students to use the computers for research purposes. This did not necessarily represent a change in Di’s technology skills but it was a difference in pedagogy.

Just over a year after completing the program Di reflected on changes to her teaching. She said:

It has changed the whole way I’m teaching. I still do the same structure and content but I rely on those machines now. The computers outside the classroom are now inside the classroom.

(interview, 10/7/00)
Di went on to indicate that the learning of skills was of secondary importance, the post workshop reflection, which she saw as the “learning about learning” carried more weight with her. This, she indicated, provided intellectual stimulation and challenge. Di recognised from this distance (i.e. a year after completing the course) that TILT was not about skills but about “best teaching practice” (10/7/00). This was what had influenced her teaching in the long term, she said.

5.2.8.4 Summary of category two: learning about technology

It seemed TILT had an impact on Di’s classroom use of computer technology. However Di believed that the changes to her use of technology were contingent on her reflections on learning prompted by the program rather than on the learning of technology skills during workshops and inschool support.

5.2.9 Category three: learning about learning

5.2.9.1 Experience of being a learner

During workshop two (9/3/99) Di changed machines three times because there was something wrong with the computer. During the post workshop debriefing session Di speculated that it might have been her “electric energy” that caused the problems. She reported feeling frustrated with herself and the technology and suggested she might have been “jinxed”. At one stage she reported thinking she “must be stupid” (9/3/99) because she couldn’t do what the others in the class were doing. During the workshop debrief Di talked of the potential of the technology for learning but also the frustration. Two months later (19/5/99) during the video follow up meeting Di remembered thinking it must have been her, “electro-magnetic field” interfering with the computers. She recalled having tried three different machines and thinking she must have done something wrong and she remembered the frustration of not knowing what it could be.

During workshop three (30/3/99) Di again said that she encountered frustration with the technology. At one stage she had error messages on the screen that the facilitator could not explain, at another time she had problems with the digital camera.
Di wondered aloud what she had done to the machines this time but at the same time she suggested that had this been her classroom she would have ensured the equipment was in working order before beginning the activity\textsuperscript{21}.

When watching the video of this incident later (19/5/99) Di recalled thinking that the \textit{TILT} camera was not as up to date as the school camera. She remembered being reluctant to use it for that reason\textsuperscript{22}. Not only that but the camera batteries were flat, which meant that four people were held up and wasting time.

During workshop four (4/5/99) Di encountered yet another technological obstacle. She moved from one computer to another in an effort to find one where the software would work. A similar thing happened in the following workshop (25/5/99) when Di and Cheryl had trouble with their machine, and then later with the data base instructions. They made a simple mistake, but nevertheless it was very frustrating for Di and Cheryl who had been trying for some time to follow the directions. When shown the video of this workshop Di and Cheryl agreed it was frustrating. Di concluded that the instructions were inadequate.

During workshop six (15/6/99) Di and Cheryl found something wrong with the \textit{TILT} CDROM although it was some time before they knew that the disk was at fault. They expressed frustration at the waste of time. At the end of the workshop when other participants had multimedia presentations to show off Cheryl and Di could not find their work on the computer hard drive and were able only to show an early version without sound effects.

\begin{flushleft}
\textsuperscript{21} Equipment problems are referred to by the facilitator in Part One of this chapter (as is this incident). Jenny was greatly concerned about the effect of technology problems on participants.

\textsuperscript{22} Di wrote in response to this comment: “I stepped back to let others use it… because I’d used it at school… I don’t think that was reluctance but choice to let others experience it.”
\end{flushleft}
Although Di said that “there are a lot of learning experiences in this workshop” (15/6/99) it seemed from her later conversation that she felt that her time had been wasted because she was not alerted to the fault on the CD before they began.

Di frequently talked about wasting her own and students’ time. She talked about the lack of time and the enormity of the task ahead of her (i.e. the learning to be done: 30/3/99; 4/5/99; 19/5/99). During the post workshop four debrief (4/5/99) Di indicated she was concerned about wasting students’ time on dubious outcomes from software packages. She said that teachers needed to justify the use of student time because it was too precious to waste.

Just as Di tried not to waste students’ time she believed the workshops should not waste hers. In the debrief following workshop six (15/6/99) Di commented on the number of “learning experiences” in the workshop referring to the problems that she and Cheryl had encountered. However the real issue for Di seemed to be that of wasted time. Although the facilitator blamed the disk this, Di said, frustrated her even more because now she realised that their time had been wasted on a known problem that they could have been alerted to. However this was not always the case, occasionally the technology failed.

5.2.9.2 Summary

Di encountered frustrations with using the technology in the TILT workshops. Some of these related to unknown technical faults but others, Di felt, were avoidable. She drew comparisons with her own classroom management and felt sometimes that her time had been wasted in the workshops.

5.2.9.3 Empathy with student learners

In the debriefing discussion after workshop two (9/3/99) Di talked about how, having been placed in the position of learner herself, she now had greater empathy with students as learners.
During the workshop two debriefing (9/3/99) Di remarked on the amount of competing information on the computer screen. She speculated on how students would know which items were important and which they should attend to when she herself found this difficult. She also reported that she had a similar problem of what to attend to when listening to Jenny, taking notes, and keeping up with the activity. Again Di commented on the fact that students also have this problem (9/3/99).

In her conversation with Cheryl while traveling home (4/5/99) after workshop four Di talked about listening to instructions in the workshop yet still not being able to make things work. She commented that students were often accused of not listening. She thought that they must feel as she did. Di commented that there was a lot of “learning about learning coming out of this”.

A similar thing happened in the next workshop (25/5/99). Di and Cheryl misread one instruction and because of this they could not complete the activity. Both of them misread one word “at least three times”. Di speculated on what we do to children. She said the first thing the teacher says to a student is “have you read the instructions” and invariably the student has. Di suggested that in the workshop they had been asked to deal with content as well as the learning of new skills. Di again speculated on how often we ask students to deal with content but don’t give them the necessary skills.

5.2.9.4 Summary of category three: Learning about learning

Di seemed to find being a learner in *TILT* a frustrating experience. Some of the frustrations, she seemed to believe, could have been avoided, and if arising in her own classroom, she suggested, were likely to have been anticipated and dealt with in advance. Nevertheless the course seemed to provide Di with opportunities to reflect on what it is like to be a learner. In particular she commented on empathising with students who do not know what information to pay attention to and what to ignore. She also empathized with students who had difficulty listening to, and remembering, verbal instructions.
5.2.10 Summary of themes and issues addressed by Di in interview and observation

Di’s recognition of the multi-layered nature of change and the many systems involved in a big picture perspective on change seemed to make her sensitive to the amount of work ahead of her if she were to understand the technology enough to incorporate it into the classroom. She seemed to be impatient with herself and the course at various times, although she was usually too polite to criticise the course directly.

Nonetheless when reflecting on the program as a whole Di said:

It provided a range of experiences and you could tap into one that suited you. It was not just skill development but you could find yourself in the materials. It was thinking about thinking it was philosophy, giving value to thinking about thinking. It’s like driving – you still get there at different times and speeds but when you have been a learner you are conscious of learning but we’ve not been given an opportunity [to reflect on learning about learning or thinking about thinking] in any other program.

(interview, 10/7/00)

When asked about the values underpinning TILT Di commented:

TILT is designed to value individual learning styles of the participants. It understands the time constraints on teachers and provides such a generous package. The handbook, it’s non-judgmental, it’s a friend. The workshops are interactive facilitating hands-on practical. The program is inciteful and respectful. There was great value in having Jenny come to us.

(interview, 10/7/00)

It is interesting to note that the program values Di nominates here appear evident in her own classroom (see classroom observations Appendix 1). She appears to value individual learning styles and respect for each individual student. Di’s classroom language seems to be non-judgmental of her students. Di suggests that TILT provides a package that recognizes time constraints on teachers, she promotes student understanding of time and profitable use of time.
Di summarised by saying that she found the course extremely stimulating, she likened going home from the workshops to “just how you’d been to a meeting and you’d be still really hyped up over it”. She says, “I thought that when I think about a unit of study that we might do at Uni I thought for what we covered I thought we really had covered a lot.” (10/7/00).

Despite her overall comment on TILT in retrospect the program workshops seemed to be a frustrating experience for Di. The technology sometimes didn’t work, she sometimes felt her time was being wasted, she occasionally misread instructions and had to wait for the facilitator to help out. She felt she did not achieve outcomes that she had expected to achieve. She was introduced to little that was new to her. However when Di commented on the program as a whole she talked in terms of the intellectual challenge, reflection, learning about learning and the gift of time. Most of the themes and issues that recurred in her discussion throughout the nineteen months of the study were to do with these more theoretical topics and not the actual technology or learning how to use it, which she seemed to dismiss as of minor importance. The themes addressed by Di are summarised in Table 12.
### Table 12: Summary of themes and issues addressed by Di during interviews and observations 1999-2000

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<td>Lost art of teaching</td>
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<td>Overwhelming information</td>
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<td>Lack of time</td>
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<td>Lack of resources (DET, BOS &amp; industry will provide)</td>
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<td>Wasting time</td>
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<td>Frustration with technology</td>
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<td>Learning about learning</td>
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<td>Breakthroughs/key moments</td>
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<td>Video/ Lego</td>
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<td>Software catalogues</td>
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| change |  |        |         |         |         |         |         |         |         |         |
|        | Workshop 2 & debrief | Workshop 3, debrief & car conversation | Workshop 4, debrief & car conversation | In-school support visit | Workshop 5, debrief & car conversation | Workshop 6 & debrief | Interview | Classroom visit | Interview | Interview |

**X** = raised as an issue or addressed as a theme

**X** = discussion of ways of resolving the issue

**x** = recognition that this is no longer an issue
Although lack of time was an issue for Di it disappeared as a discussion topic after she experienced what she called a breakthrough reading the catalogues in the software workshop\textsuperscript{23}. At the same time she stopped discussing the lost art of teaching and the overwhelming nature of the new information. It seemed that as Di developed a framework for categorising her learning and saw new possibilities for the “art of teaching” these issues dropped into the background.

It is also possible to see from the table Di’s struggle with the issue of control of student learning. In the early part of the program Di was concerned about losing control of student learning. During the inschool support visit after workshop four it was apparent that Di was beginning to resolve this issue in discussion with the facilitator. Two weeks later Di again discussed her ideas for solving the issue. Thereafter her references to student learning were in the context of student control rather than teacher control.

In the case of classroom management of technology Di can again be seen encountering the issues in the workshops and later discussing ways to deal with them.

\textsuperscript{23} Di’s response to this comment was: “But more so when experience allowed me to ‘lift the lid’ or loosen the boundaries of learning experiences. The Internet was the biggest escape from the 4 walls of the classroom – much more so than software.”
Summary of Di and Robyn’s learning in TILT

5.2.11 Links with Jenny’s themes and issues

Before discussing Di and Robyn’s learning I want to mention the links, or lack of them, between Jenny’s issues and concerns and those of her participants. The concerns that occupied Jenny’s thoughts during workshops were not those of participants. For example Jenny was concerned with finishing on time and not upsetting the cleaner, covering all the material, not taking over someone’s mouse and managing the group dynamics. It is likely that little of this was evident to the participants or occupied their thoughts.

However as an acknowledged skilled facilitator and good classroom teacher, Jenny knew what she wanted to convey to participants through modelling: the benefits of group work; teacher as facilitator rather than authority; teacher as learner; and teacher as confident user of technology. But Jenny also knew that her participants needed “hooks on which to hang new information”.

There is evidence to indicate that Jenny achieved her goals to varying degrees with Di and Robyn. It is likely that Di and Robyn’s ‘hooks’, acquired through different life histories, made for differences in their learning. It is also likely that the TILT program’s structures (workshops, in-school support, independent learning, relief days) and range of materials and resources (video, audio, written, software, hardware) provided enough variety of opportunities so that Di and Robyn could find something that resonated with their individual and idiosyncratic needs and on which they could ‘hook’ new learning. The discussion of their learning in a cybernetic framework in chapter six will examine the ‘hooks’ that probably made possible the learning of one thing rather than another, and the role in learning, in the context created by the program and people.
5.2.12 Di and Robyn’s common ground

Di and Robyn, as teachers, have a number of areas of interest in common. The themes and issues they both raised during the course of the study can be broadly summarised into three major categories: pertaining to teaching and being a teacher, pertaining to the technology and pertaining to learning and being a learner. This is hardly surprising since both were teachers engaged in a teacher learning program dealing with technology. In addition I was posing questions about what they had learned in the workshops and observing their teaching in relation to learning in the TILT program. However within these broad categories Di and Robyn discussed a range of issues, some coincided but others were different.

Both commented on their learning in relation to their professional teacher obligations such as teaching to outcomes (Di) and preparing students for high school (Robyn). Both developed new teaching strategies such as group work (Robyn) and ways in which to control and assess student learning in Internet based research (Di).

Both Di and Robyn commented on their learning about and with technology. Both commented on global issues such as the possibilities afforded by new technologies (Robyn) and issues associated with use of the technology, such as industrial issues (Di). Robyn related the learning from the workshops to the needs of specific students and to general classroom practice. Both discussed changes to their classroom practice.

Both were extremely interested in their own and their students’ learning and the experience of being a learner. Both raised the issue of time for learning and Robyn discussed other constraints on adult learners. Both empathized with students as learners.

These issues were raised in relation to the professional teacher environment, their personal environment, and the environment afforded by the TILT program. The three environments and the learning they afforded are summarized below.
5.2.13 The learning environment

5.2.13.1 Context afforded by the TILT program

*TILT* afforded a range of learning experiences and resources. The organisation of the program meant that Di and Robyn could work with colleagues, something they both said that they enjoyed. They also both seemed to appreciate the materials provided for them by the program. Di mentioned being able to return to the *TILT* folder and booklets and both mentioned the videos that could be re-run as many times as necessary for note taking and detailed observation.

While contributing to the learning environment afforded by the *TILT* workshops the facilitator pondered some of the same issues as those identified by Di and Robyn. Jenny, Di and Robyn talked of how they felt as learners and how children must feel as learners. Jenny recognised that putting teachers in the position of learner was probably good for them and that reflection on how it felt to be a learner would ultimately benefit their teaching. This seemed to be borne out by the comments of Di and Robyn.

Jenny hoped that participants would enjoy group and pair work and transfer this to their own classroom teaching. Robyn recognized that this was an enjoyable way to learn and went on to transfer this learning to her classroom practice.

All three recognised issues to do with the use of computer technologies provided by the program for use in workshops. Jenny commented on the need for sensitive support in using technology so that participants did not lose confidence. Di was frequently frustrated by her interactions with the computers often having to change machines because of faults with the equipment. When equipment failed Robyn on the other hand was comforted by the thought that even the experts met with disasters sometimes.

Both Di and Robyn appreciated Jenny’s support. Both spoke positively of the assistance she gave during workshops and inschool support, although Di did feel that time was often wasted in workshops she was careful not to apportion blame for this.
5.2.13.2 Professional context

Both Di and Robyn referred to aspects of the broad professional context in which they operated as teachers. Di talked about potential industrial issues to do with expectations that teachers would use computer technology for student reporting meaning that they would have to dedicate time to the activity (i.e. sitting in front of the computer) rather than fitting it in between other tasks at home (perhaps at the kitchen table). She also discussed the need for classroom support materials for computer use and suggested that the Board of Studies, the DET and industry should produce resources to support the classroom use of computers. Robyn also referred to the technology in a broader framework than school. She found the possibilities, particularly of email and the Internet, exciting. She had helped set up her school’s website and mused on the possibilities of taking student enrolments from overseas.

Di and Robyn also referred often to the professional context of school. Their discussion included aspects of school organisation such as access to computers, the needs of specific students and the needs of the whole class. Robyn was concerned with preparing her students for high school and Di’s concerns centred around student learning outcomes.

5.2.13.3 Personal context

Both Di and Robyn’s families featured in their conversations relating to TILT and the technology. Di felt that she would have to compete with her son for access to email at home. Robyn was proud of her children’s use of computer technology and wanted to “keep up” with them. She saw part of her responsibility at home as attending to family meals and laundry, and felt guilty spending time learning to use the computer. At one time she mentioned the disparaging attitude of her young son towards his mother’s learning. Robyn also made reference to friends and what they were able to accomplish with the technology.

Robyn sometimes felt that TILT intruded on her family responsibilities distracting her from learning.
5.2.13.4 Summary

These three contexts had varying prominence in Di and Robyn’s discussions. However it seemed that all three were related to their learning in some way. It could be said that the three together formed the teacher learning context for TILT related learning (Figure 20).

Figure 20: Three contexts for learning

5.2.14 Learning in the teacher learning context

Di and Robyn’s TILT related learning over a nineteen month period seemed to fall into three broad categories: learning about teaching including classroom organisation and management (e.g. group work) and discussion about the art of teaching; learning the technology including practical learning about how to do things with the technology and speculation on the possibilities for learning with technology; and learning about learning including empathising with students as learners and constraints on adult learners. It could be said that the learning was centred around the environment afforded by the whole TILT program (including workshops, resources and people) and was contingent on the individual’s personal and professional contexts.
5.2.14.1 Di and Robyn’s learning about teaching

Robyn said that she learned about pair and group work from experiencing group work in the workshops and from watching the videos. Having experienced it for herself she introduced more pair and group work into her classroom practice. Robyn also gained feedback on her teaching from talking with the high school teachers in the workshop group.

Di’s major concern throughout the whole program was control of student learning. Over the nineteen months of the study Di said she learned to “let go” her control of her students’ learning and allow them more freedom to set their own learning boundaries. She introduced changes to her teaching that reflected her changed attitude to student learning. Di also speculated on the changing role of teacher and her fear that teaching would become a lost art. She was concerned that the teacher-as-expert role would disappear and that teachers would be merely facilitators of learning.

5.2.14.2 Di and Robyn’s learning about and with the technology

Robyn learned to use the Internet and email and how to use a digital camera. Because of her learning in TILT, she said, she allowed her students greater access to computer technology. She felt they would need to be able to use the Internet and they would need to be good at touch typing when they went to high school. Robyn also learned to use a word processor and began to produce worksheets and class lists. Robyn said that during TILT workshops she had in mind the needs of particular students (eg the concept keyboard for the “cotton wool baby”) as well as the whole class.

Robyn talked about family and friends who were good with the digital camera. She wanted to learn how to use the camera not just for her students but for her family. Robyn said that one of the reasons she applied for TILT was that she needed to keep up with her children and husband “who were always using the computer for PowerPoint presentations, research, Internet, email, downloading photographs from digital camera etc” while she was “cooking, cleaning and washing” (response to Portrait of a Teacher of Year Six Students, Semester 2, 2001 Appendix 9).
Di’s technology learning needs were different from Robyn’s. She said that she persevered with the word processor and spreadsheet for classroom and administrative uses. She learned to use the Internet so that students could use it for research. She, like Robyn, allowed her students to use the Internet, but while Robyn’s students were practising Internet research skills for high school, Di’s students were finding “fat” and “skinny” questions to ask their peers. Both groups of students were researching using the Internet.

Di talked of her son and possible competition for use of the family computer and email facility.

5.2.14.3 Di and Robyn’s learning about learning

Although Di learned some new skills with the technology most of her learning she said, was about learning itself. She found this the most stimulating aspect of the program with the greatest impact on her teaching. It was out of her changing notion of learning that Di said she arrived at the point of allowing her students to use the Internet.

Robyn said that she learned what it was like to be a learner and gained insight into student learning. However Robyn felt there were constraints on adult learners that did not affect students. One such constraint was limited time because of personal and professional obligations. Nonetheless she felt that everyone should take responsibility for their own learning.

5.2.14.4 Summary

It could be said that Di and Robyn’s learning in the teacher learning context fell into the broad areas of learning about teaching, learning about the technology and learning about learning (Figure 21). Within those broad categories Di and Robyn learned different things. They related their learning in the environment afforded by the program to different needs growing out of different personal and professional contexts.
5.2.15 Comment

There seemed to be evidence of changed practice for both Di and Robyn. Both Di and Robyn linked their changed practice to their learning in the TILT program. They came to the program for different reasons and brought with them different histories and different learning needs. They had different workshop experiences and responded in different ways to the challenges they encountered. Both reflected on their own learning and about learning in general, and both acknowledged, and said that they learned from, the expertise of others (e.g. the facilitator, the videos, the readings). None of this represents a new perspective on teacher learning. The development of TILT was underpinned primarily by the professional development and change theory literature. The emerging grounded theory outlined above can be accounted for through the teacher development and change theory literature.
For example Turbill (1993) in her examination of the learning of teachers in the Frameworks program developed a grounded theory that identified four categories that contributed towards the change process, namely: intellectual unrest; enablers and inhibitors of change (structures, processes, language-in-use and people); an awareness of and attitude towards the change process; insights into the change process. She developed A Model for Developing Personally Empowered Professionals that incorporated what she termed an “inside out view” made up of the teacher’s personal theory of learning and the personal theory in practice; and an “outside in view” made up of the theory of others and the theory of others in practice. These two views were tied together with collaboration, reflection and sharing, and built on teachers’ tacit knowledge.

“As a consequence of all of the above”, she says:

teachers move towards becoming personally empowered professionals . . . As teacher learners become personally empowered learners, their beliefs, knowledge, understandings and practices integrate to become a personal theory which is in a constant state of change as teachers continue to reflect, to collaborate, to share, to seek information. They are personally empowered professionals who become selective in what is presented to them; who can make judgements which they can justify about the appropriate teaching practices for the students in their care.

(Turbill, 1993:350)

I could draw similar conclusions from my data. Di and Robyn experienced some kind of ‘unrest’ that brought them to the program. The TILT structures, processes, language and people enabled and inhibited in various ways. Di and Robyn were aware of the change process and had insights into why and how things were changing.

The model I have produced above also fits well with Hargreaves (1992) notion that teachers’ “work is deeply embedded in teachers’ lives, in their pasts, in their biographies” (p233). He talks of blurring boundaries between in-school and out-of-school lives to create supportive change environments.
The model above includes in-school and out-of-school contexts as part of the teacher learning context of what seems to have been a supportive change environment. So while this research fits within the teacher development and change theory research it adds little or nothing that is new.

My data were collected through observation, discussion and interview, analysed through the iterative process of categorization, and synthesised through development of a simple model bringing together contexts and learning. The model can be said to be grounded in the data arising from the research process. However no interpretation of data can be value or theory free. My discussion of an emerging grounded theory so far, for example, could be said to rest on the assumption that both Di and Robyn participated in the same workshop context and encountered the same people and experiences, because although one would assume that the personal and professional contexts of each participant would be different, unless explicitly addressed one would probably assume that the circle representing the TILT program context was constant for all participants. The assumption represented is that TILT is an artefact with a neat boundary separating it from the rest of life. It would also seem that all contexts were constant over time. My discussion also could be said to assume that learning took place in Di and Robyn as a direct result of inputs from the learning environment, and that success of the program could be measured against what and how much of the program content was being implemented in Di and Robyn’s classrooms. Moreover it could be said that Di and Robyn learned to use the digital camera, Internet and email (program content) because it was a professional responsibility to give their students access to these technologies.

In addition it is likely that the teachers were emotionally involved in the training program because teaching is emotional work (Hargreaves & Fullan, 1998), and that they would probably be able to describe their emotions. These are reasonable assumptions within teacher development or change theory literature.
However I want to re-examine the emerging grounded theory using a different lens in an attempt to shed light on why things happened the way they did. The above data analysis has identified three learning contexts or environments: the program, teacher professional context and a personal context. I want to know more about the role that the environment, which includes all communication, plays in learning and how learning happens. In the process I want to question the assumption that all participants are in the same learning environment and that participants learn as a result of inputs from the learning environment. I want to understand more about the learning context of each individual and how and why it is that each ‘selects’ from what is presented. I want to look at the role of emotioning in learning, rather than ‘emotions’, as part of communication. Looking at the above emerging grounded theory through a new lens should provide different information.

Chapter six presents these data (above) in a different framework. The learning of Di and Robyn is examined through a cybernetic lens. The above descriptions of what took place are re-shuffled and accounted for in a different way. Chapter six satisfies the second aim of the study by applying a cybernetic lens to the descriptions of teacher learning in the hope of throwing new light on the meaning of learning as it was experienced by the teachers in the study. Such a lens explores why these two teachers learned what they did and how learning happened. It looks at the context for learning and the learning of Di and Robyn in the learning context.
Di and Robyn’s learning in TILT through a cybernetic lens
The study at a glance

Chapter 1: What is learning? Why do people learn? Why do they learn this (and not something else)? How does learning happen? What is the role of communication and environment? What do teachers learn in TILT

Chapter 2 Part 1: Research context: Change theory Literature

Chapter 2 Part 2: Socio-political context: TILT development and implementation

Chapter 3 Part 1: Systems Co-ontogenic structural drift Change and survival System/environment thinking network

Chapter 3 Part 2: Language and emotioning

Chapter 4: Methodology

Chapter 5 Part 1: The TILT program setting

Chapter 5 Part 2: Di and Robyn’s learning in TILT

Chapter 6: Di and Robyn’s learning in TILT through a cybernetic lens

Chapter 7: Conclusions

Viewed through the lens of...

Chapter 1  Chapter 2  Chapter 3  Chapter 4  Chapter 5  Chapter 6  Chapter 7

Chapter Six

Page 332
Chapter 6:
Di and Robyn’s learning in TILT through a cybernetic lens

6.1 Introduction

The purpose of the discussion below is to satisfy the second aim of the research project, which is to apply a cybernetic lens to Di and Robyn’s learning in TILT outlined in the previous chapter. In so doing I investigate answers to the remaining questions identified in chapter one as guides for the study:

- What is learning and why do people learn?
- Why do they learn this (and not something else)?
- How does learning happen and what is the role of communication and environment?

These questions were addressed in the theoretical framework developed in chapter three. The theoretical framework developed there will guide my analysis below. For example in examining why people learn I use Maturana and Varela’s (1987) notion of ‘co-ontogenic structural drift’ which suggests that learning is living, we learn for reasons of survival and we learn continuously in a reciprocal relationship with our environment. In addressing the question of why teachers learn this rather than that I draw on Bateson’s (1972:381) understanding of information as “a difference which makes a difference”, and Brier’s (1999:178) idea that to be perceived as information something has to be “of relevance for the survival and self-organization of a living system”.

In pursuit of how learning happens through the linking of outside environment with inside as one continuous learning system I make use of ideas about the thinking system encompassing living system and environment including artefacts and conversation (Brier, 1999; 2000; Jarvilehto, 1999; Maturana and Varela, 1987; Bateson, 1972).
I address the ‘how’ of learning on the inside through ideas on movement, emotion and cognition (Sheets-Johnstone, 1999; Damasio, 1996; Núñez, 1999; also the placebo literature discussed in chapter three). Bale’s (2000) metaphor of the Janus-face expresses my inside and outside interests neatly. It portrays the idea of the system facing inwards concerned with maintaining an internal steady state (survival) and, as part of a meta-system (part of the environment of other living systems), facing outwards, being changed by and changing the environment. I use the role of communication including metaphor (Krippendorf, 1993; Bar-On, 1999; Jaynes, 1976; Núñez, 1999; Reddy, 1993) to provide a bridge between living system looking in and living system looking out. I hope the view from the bridge will assist my understanding.

Below is a discussion of what Di and Robyn indicated was the learning that they experienced during the nineteen months of the study. It also looks again at the learning environment reported through a qualitative data analysis process in chapter five. Drawing on Maturana and Varela’s notion of ‘co-ontogenic structural drift’ (1987) the discussion addresses some of the assumptions that could be said to be consistent with the change theory literature and that I have not yet explored through the preceding chapter, i.e. that:

- both Di and Robyn participated in the same TILT program;
- the program was an artefact with an identifiable boundary; and
- the teacher learning environment (personal, professional and program) was constant for the duration of the research.

The assumptions that underpin the change environment viewed through a cybernetic lens are quite different and have different consequences for explanations of the data.

The discussion of environment is followed by a discussion of Di and Robyn’s learning about teaching, technology and learning, answering the research questions above and addressing, through a cybernetic lens, the assumptions not previously addressed but inherent in change theory and teacher development literature.
Table 13 shows the research questions and possible answers arising from assumptions underpinning the change theory and professional development literature. It also includes the assumption in change theory and teacher development literature that program success can be measured by the extent to which program content is being implemented in the classroom. This assumption underpins the TILT longitudinal evaluation strategy.

Table 13: The research questions with possible answers arising from assumptions underpinning change theory and professional development literature

<table>
<thead>
<tr>
<th>Research question</th>
<th>Assumption underpinning change theory/teacher development lens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why do people learn?</td>
<td>Di and Robyn’s learning arose from their professional responsibility.</td>
</tr>
<tr>
<td>Why do people learn this and not that?</td>
<td>The program taught what it was designed to teach.</td>
</tr>
<tr>
<td>How does learning happen?</td>
<td>Learning occurred as a result of inputs from the learning environment.</td>
</tr>
<tr>
<td>What is the role of communication?</td>
<td>Di and Robyn’s emotions were implicated in their learning.</td>
</tr>
<tr>
<td></td>
<td>Program implementation success can be measured by program content evident in use in the classroom.</td>
</tr>
</tbody>
</table>

Some of the assumptions that underpin change viewed through a cybernetic lens build on and extend assumptions underpinning change theory and teacher development literature, others are quite different. Each set of assumptions has consequences for what can be judged as a successful program.

The learning environment

6.2 Context of the learning: a system in its environment

Previously I identified three contexts for learning in TILT: personal, professional and program. It seems reasonable to assume that the personal and professional contexts would be different for each participant, however unless explicitly discussed it may be reasonable to assume that the TILT program was the same for all participants.
The analysis clearly shows that Di and Robyn had different experiences in *TILT* and learned different things however I have not yet explored any possible explanation for these differences. Below the notion of ‘co-ontogenic structural drift’ is used together with a system/environment perspective of the *TILT* program. This allows for a description of *TILT* as an organic and dynamic process to be lived in by each individual participant rather than a parts-and-whole static artefact to be adopted by all. Figure 22 shows assumptions about the learning context implicit in the change theory and teacher development literature compared with assumptions about the learning context suggested by a cybernetic view of the data.

**6.2.1 All participated in the same *TILT* program or each in a different program?**

Maturana and Varela (1987) say that we become coupled with the environment in what they call ‘co-ontogenic structural drift’. This means that we find ways to fit with the environment according to our individual history of interactions over a lifetime, and we change and are changed by it. The environment includes the natural and built environment as well as all communication (languaging and emotioning). In the case of this research the program environment includes the workshops followed by the debriefing session, in school facilitator support and school visits including people, artefacts and conversations.
Figure 22: Some assumptions about the learning context: same data viewed through two different lenses

<table>
<thead>
<tr>
<th>Change theory/ teacher development lens</th>
<th>Cybernetic lens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumptions:</td>
<td>Assumptions:</td>
</tr>
<tr>
<td>• all participated in the same <em>TILT</em> program</td>
<td>• all participated in a different <em>TILT</em> program</td>
</tr>
<tr>
<td>• the program was an artefact with an identifiable boundary</td>
<td>• the program was fluid and dynamic</td>
</tr>
<tr>
<td>• the teacher learning environment (personal, professional and program) was constant for the duration of the program.</td>
<td>• the teacher learning environment (personal, professional and program) changed constantly</td>
</tr>
</tbody>
</table>

One data set: collected through observation, discussion, interview, video recall and oral and written responses to texts produced through the research process; synthesized through an iterative process of categorisation; explained through two different lenses

For example Di interacted with the environment in a particular way, witness her experiences with the technology in the early workshops and Jenny’s response and concern. This coloured her view of the workshops (time wasting, frustration). Robyn on the other hand was probably unaware of Di’s workshop experience, her version of the *TILT* workshops was of networking with colleagues and enjoyment in working in groups. Neither Di nor Robyn had access to the experience of the other, each experienced a different milieu and the milieu continually changed in response to interactions. In addition Di’s workshop and debriefing session included Robyn as a member of the milieu and Robyn’s workshop and debriefing session included Di as a member. In this alone they were in different workshops and debriefing sessions. Di by her presence changed the milieu of workshop and debriefing session. Without her, different conversations would have taken place and different events would have occurred. By being part of the milieu other members of the group, including Jenny, were changed by Di’s presence and in turn changed her. The same could be said from the perspective of all other individual living systems in the workshop milieu. Figure 23 is my attempt to depict the living system in the environment. Each living system ‘fits’ with the environment in a different way and has no way of experiencing or recognising the way in which another living system is ‘fitting’.
An indication of Di and Robyn’s participation in different programs is their very different answers to the question: what is the main message of TILT. Robyn felt the main message was “Have confidence in yourself. Have a go” (10/7/00) while Di summed up the program saying it wasn’t just skills “it was thinking about thinking, it was philosophy” (10/7/00). It could be said that Robyn’s history of ‘doing’ and Di’s history of ‘thinking’ are reflected in the different ways they fitted with the environment and the different messages they took away with them.

6.2.2 Program as artefact or program as fluid and dynamic?

Not only is each living system learning in a different environment but, according to Maturana and Varela (1987) the environment is also being changed over time by the interactions of the living systems in the environment. It seems this happens on a minute by minute basis (e.g. Jenny’s response to Di’s computer problems) as well as over a longer time scale. As Jenny pointed out, by workshop three she had made “a couple of school visits” and “felt more familiar” with the participants (30/3/99). This, she said, changed her interactions in the workshops. She was able to make specific references to what they were doing in school. Jenny also said that she felt more confident having delivered the workshops before. She felt that she was remembering more of the content each time. On another, longer time scale the program was being changed each semester in response to teacher feedback, which in turn was influenced by a changing curriculum in a changing world.

Participants were also getting to know Jenny and each other, which changed their interactions. For example Robyn sought out the high school teachers for feedback on her students who had graduated to high school the previous year.

For these reasons TILT was not a single, discrete change program (artefact), stable over time. It was a different program for Di, Robyn and Jenny as it was for all other participants. And the TILT environment for this group of participants was different from that created for and with any other group.
Figure 23: Living system changing and being changed by the environment

Movement through time and space

Living system fitting with the environment

Environment changing and being changed by the living system

Living system fitting with the environment

Environment changing and being changed by the living system

Living system fitting with the environment

Environment changing and being changed by the living system
6.2.3 Teacher learning environment constant over time or changing constantly?

Just as the TILT program changed over time so did the personal and professional contexts in which participants operated. For example Robyn’s son’s disparaging comments affected her willingness to ask for help at home. Di’s persistence in using the computer technology at school enabled her to acquire greater access to hardware and software for her students. Thus the figure constructed in chapter five of three interlocking circles with definite context boundaries and precise areas of overlap fixing each participant in the same learning space in the same TILT program gives way to a fluid image of multiple living systems moving through time and space, each at once part of the milieu and an observer looking out into the milieu. But the view out into the milieu will be of a different milieu for each individual living system that is doing the observing. The learning environment consists of the ‘outside’ environment afforded by the program and the ‘inside’ environment of each living system as it interacts in the program environment.

6.2.4 Summary

It could be said that Di and Robyn each participated in a different TILT program. At its most obvious Di’s program included Robyn as a participant and Robyn’s included Di. Each brought to the program a different life history and out of that life history ‘fitted’ with the program, facilitator and other participants making as many TILT programs as there were living systems to describe them. The program itself could be said to be fluid and dynamic, changing in interaction with participants and facilitator as they found ways to ‘fit’ with the environment in ‘co-ontogenic structural drift’. Viewed through this new lens it seems that not only did the TILT environment change over time but also personal and professional environments changed in interaction with participants as they too learned and changed over the course of the program.
Di and Robyn’s learning

6.3 Introduction

When Di and Robyn, two teachers in a technology training program were asked about their learning the learning they identified was, predictably, learning about: technology, teaching, and learning. The analysis of their learning in chapter five was organized around these category headings. However within the categories Di and Robyn addressed some different themes and issues. Possible reasons for these differences have not yet been discussed but are central to my research purpose. Assumptions about learning underpinning change theory and professional development literature are not addressed directly in the analysis of Di and Robyn’s learning in TILT presented in the previous chapter. However they remain in the background as the traditional lens through which the data would be examined. Below the data are looked at through a lens developed in chapter three requiring that a new set of assumptions be considered. Figure 24 shows assumptions about learning implicit in the change theory and teacher development literature compared with assumptions about learning suggested by a cybernetic view of the data.
### Change theory/ teacher development lens

**Assumptions:**
- Di and Robyn’s learning arose from their professional responsibility
- the program taught what it said it would teach and not something else
- learning occurred as a result of inputs from the learning environment
- Di and Robyn’s emotions were implicated in their learning
- program implementation success can be measured by program content evident in use in the classroom

### Cybernetic lens

**Assumptions:**
- Di and Robyn’s learning arose from need for survival
- the program ‘taught’ whatever fitted with life history and was anticipated in some way
- learning was triggered by the environment, there were no direct inputs
- Di and Robyn’s emotioning provided the ‘readiness to act’ and changed over time
- learning from program may be diffused throughout professional and personal life in idiosyncratic ways sometimes only loosely connected with the program content and processes and continue over time as part of participant’s life trajectory

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**Figure 24:** Assumptions about Di and Robyn’s learning: same data viewed through two different lenses

One data set: collected through observation, discussion, interview, video recall and oral and written responses to texts produced through the research process; synthesized through an iterative process of categorisation; explained through two different lenses
In applying this lens to gain answers to my research questions different things come to the fore. Table 14 shows the research questions aligned with the two sets of assumptions.

**Table 14: The research questions and corresponding assumptions underlying a change theory/teacher development lens and a cybernetic lens**

<table>
<thead>
<tr>
<th>Research question</th>
<th>Assumption underpinning change theory/teacher development lens</th>
<th>Assumptions underpinning a cybernetic lens</th>
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<tbody>
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<td>Why do people learn?</td>
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</tr>
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<td>Why do people learn this and not that?</td>
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<td>Learning fits with life history and will be anticipated in some way.</td>
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<td>How does learning happen?</td>
<td>Learning occurred as a result of inputs from the learning environment.</td>
<td>Learning was triggered by the environment, there were no direct inputs.</td>
</tr>
<tr>
<td>What is the role of communication?</td>
<td>Di and Robyn’s emotions were implicated in their learning.</td>
<td>Di and Robyn learned in total system/environment thinking/learning system; emotioning provided the ‘readiness to act’ and changed over time.</td>
</tr>
<tr>
<td>Program implementation success can be measured by program content evident in use in the classroom.</td>
<td>Learning from program may be diffused throughout professional and personal life in idiosyncratic ways sometimes only loosely connected with the program content and processes and will continue over time as part of participant’s life trajectory.</td>
<td></td>
</tr>
</tbody>
</table>
6. 4 Why do people learn: Professional responsibility or a more basic need for survival?

Both Di and Robyn had some technology skills, so that although they had previously applied to participate in TILT they had not been successful. On this occasion they were successful, however both approached the prospect with mixed feelings.

I thought, no I have to do it, I can't, this is technology, I can't afford to live without it now.

(Di, 19/5/99)

looking for new ways to teach things, I’m keeping up with the times and the kids. They get in and do it. They’re not afraid. It’s a fear of the unknown for us.

(Robyn, 10/7/00)

Although both had some technology skills both seemed to acknowledge some kind of hesitation, almost fear to do with gaining new skills. Turbill (1993) refers to teachers experiencing ‘intellectual unrest’ and suggests that recognizing this is a necessary first step towards becoming a personally empowered professional. The ‘unrest’ or ‘anxiety’ suggested above could be interpreted in an emotional framework as well as intellectual and as pertaining to their social and cultural contexts as well as professional. For although Di and Robyn refer frequently to the needs of their students and their professional responsibility there is also some larger context to do with the age in which we are living that seemed to have brought Di and Robyn to seek out and accept places in the TILT program when it was again offered in 1999. In the framework I developed in chapter three the action of Di and Robyn in taking the plunge and applying for and accepting places in TILT to address the anxiety they were experiencing as teachers and members of society, even though the process may be uncomfortable, could be interpreted as a ‘survival’ strategy.
Survival as a healthy living system in the classroom could be linked, for example, to stress reduction\(^1\), which can be achieved by learning more about teaching. It could also be linked to increased career options, higher up the pecking order, higher salary – i.e. better able to provide for family, better chance for offspring’s survival - a related but different interpretation of survival. A similar ‘survival’ case could be made for a social and cultural context in which survival as an intelligent and capable member of the group could be enhanced by keeping up to date with technology.

For example in Robyn’s opinion a good Year 6 teacher covered the curriculum and prepared students for high school. Increasingly both covering the curriculum and preparing students for high school needed computer skills. In post workshop discussions (9/3/99; 30/3/99; 4/5/99; 25/5/99) Robyn told stories of what colleagues and students were already achieving with computer technology, in particular their uses of Internet, email and digital camera. So it is likely that for Robyn to survive (in her own eyes as well as those of others) as a good teacher of Year 6 students, many of whom were arriving in her class with excellent computer skills, she felt she needed to learn more about computer and information technology, in particular use of the digital camera, the Internet and email. In Maslow’s hierarchy of needs the need for esteem of self and others comes after biological and safety needs are met and the person is secure in love, affection and belongingness (Honolulu Community College, 2001). It is feasible that Robyn’s view of herself as a good teacher, and possibly the esteem of colleagues, was at stake.

\(^1\) This is not necessarily stress that comes from dealing with challenging students, it could be stress that comes from dealing with our own high standards and expectations of teaching excellence, or the stress of managing the expectations of education system, principal or colleagues.
6.4.1 Summary

Di and Robyn arrived at the TILT program with some anxiety concerning their lack of skills and knowledge and indicated apprehension about the possible discomfort of the learning process. However, it can be said that their perceived need for this learning outweighed their anxiety. In these terms their participation in the TILT program could be viewed as a survival strategy. In suggesting ‘survival’ as a motivating force I do not seek to diminish teacher professionalism including teacher concern for student learning. I believe these teachers had a need to survive as good teachers as well as a need for survival in their wider social contexts. This view encompasses Turbill’s ‘intellectual unrest’ but suggests that the unrest is based in a fundamental need for ‘survival’ as a good teacher.

6.5 Why did Di and Robyn learn what they learned instead of something else: the program taught what it was designed to teach or learning was contingent on life history?

As suggested above teachers bring different personal and professional experience to the learning environment. From a neurological perspective Damasio says that:

> Much of each brain’s circuitry, at any given moment of adult life, is individual and unique, truly reflective of that particular organism’s history and circumstances.

Damasio (1996:260)

Because of our different history of interactions we find different ways to ‘fit’ within the environment. Bale, in discussing Bateson’s work says:

> Each personality in the class will receive-organize- translate information according to their own set of self-stabilizing patterns—patterns that have succeeded, over time, in allowing the ‘individual’ to ‘fit’ within the context of a learning environment.

(Bale, 2000:2)
Bateson says that information is “a difference which makes a difference in some later event” (1972:381). And Brier suggests that for “something to be perceived as information it has to be of relevance for the survival and self-organization of a living system” and therefore will be “anticipated to some degree” (Brier, 1999:178).

These writers suggest that something will become information to us and effect learning in us if it is anticipated in some way through our life history and is relevant to our survival.

Thus it is likely that particular parts of the TILT program would be relevant to the ‘survival’ of Di and Robyn and so become ‘information’ to them. However for something to be seen as relevant in the first place it would have to be anticipated to some extent. It is therefore not surprising that the parts of the program Robyn adopted most readily into classroom practice were the use of digital camera, Internet and email. In addition from a life history of reaping the benefits of practice in swimming, music and elocution Robyn also saw as relevant, and immediately made classroom use of, part of the program that relied on drill and practice. She had, over the previous few years, taught keyboarding skills to her students (for their survival in high school). From the program she immediately adopted new keyboard practice ideas into her teaching (post workshop interview, 25/5/99).

Robyn could ‘do things’ (swimming, music, elocution). Being able to ‘do things’ and do them well could be said to be important to her (as it seems to have been to Robyn throughout her life and to her family, who relied on ‘doing things well’ in the family business to make a living). She was impressed by others who could ‘do things’ (witness the stories of what students, colleagues, family and friends could ‘do’ with the technology, and her interest in the videos that showed other teachers ‘doing things with the technology’). She was excited by the prospect of being able to do things with the technology.
She used language like “the possibilities [of the technology] are wonderful” (9/3/99); email is “brilliant for long distance relations” (30/3/99); being able to use Encarta is “exciting” (4/5/99); and technology is “a wonderful tool... it’s exciting” (15/6/99). Hence what she wanted out of the program was to be able to ‘do things’ with the technology for herself. Robyn’s learning seems to have been in, for example, learning to use the digital camera (and realising that what her colleague had been describing wasn’t that difficult after all). Robyn did not identify a particular breakthrough in her learning. When asked the question ‘what, if anything, was a breakthrough in your learning?’ Robyn replied:

Making the initial decision to ‘do it’. Organising my family so that I could attend lessons after school and into the evening. Applying and being accepted.

(interview,10/7/00)

Overcoming her apprehension about the discomfort of putting herself in the situation of learner followed by the practical steps towards participation, it seems, were significant events for Robyn. Having put herself into an environment that would afford the learning that she was seeking, it could be said that her learning arose out of her anticipations of the course and her ‘survival’ needs. Her learning also seemed to arise in a manner consistent with her life history of learning to do things. There was no memorable breakthrough during the course instead learning seems to have unfolded based on practice over time.

6.5.1 Summary

Looking at the data through this lens it could be said that Robyn learned what she learned, and not something else, because it fitted with her life history, could be anticipated in some way and was in some way necessary for her survival as a good teacher. In this sense it could not be said that what Robyn learned could be considered ‘wrong’. For Robyn at this moment in time it could not be other. The way in which Robyn learned to ‘do things’, through practice, was also part of her life history, fitting with her years of practice at swimming, elocution and music.
6.6 How did learning happen in Di and Robyn: teacher learning through inputs from the environment or teacher learning triggered by the environment?

Di’s learning was quite different, she was excited by ideas and by what she referred to as ‘pondering’. Di indicated that a breakthrough in her learning came when participants were given software catalogues to browse through and the facilitator explained the terminology and the significance of the descriptions (e.g. type and memory of machine required). For Di this seemed to unlock mysteries. The catalogues stood out from the smorgasbord of information presented in the workshops and follow up activities, which Di had before called ‘overwhelming’, and seemed to become in Bateson’s words a “difference which makes a difference” (1972:381). It became significant information to Di because, she said, it seemed to let her into the secret world of software. It provided her with the key and the resource so that she could have control over the business of, for example, ordering educational software. It seemed it brought her a feeling of order out of the chaos of a new field of study and new language and terminology.

The information was also presented in a familiar medium (i.e. it could be ‘anticipated to some degree’). Di indicated that she knew where and how to find significant information in the book/magazine format, taking headings, font, pictures and colour as cues. The format of the medium meant that the information was ‘anticipated’ to some extent. This contrasts with Di’s comment on not knowing where to focus attention when faced with the competing smorgasbord of information on the unfamiliar medium of computer screen (post workshop debriefing 9/3/99).

Maturana and Varela (1987), Brier (1999, 2000), and Jarvilehto (1999) say that we do not take anything in from the environment. The environment can act as a non-specific trigger only – triggering changes in us.
As Maturana and Varela (1992) say, we are modified by every experience:

there is no interaction and there is no coupling without consequences for the operation of the nervous system as a result of the structural changes triggered in it. We human beings in particular are modified by every experience, even though at times the changes are not wholly visible.

(Maturana & Varela, 1992:168)

Much of the stream of change (learning) we apparently are unaware of, it enables us to go on living. Asked to stop and comment on significant moments in the learning Di chose the incident with the catalogues as one of two significant moments.

However Di’s learning breakthrough did not seem to be a matter of her senses ‘taking something in’ from the environment (in Di’s case her eyes ‘seeing’ the catalogue described above) and storing it in memory. After this breakthrough Di did not suddenly have particular knowledge fixed somewhere inside her to be pulled out and pointed to at any time. Reyes and Zarama (1998) and Glanville (1999a) talk about ‘knowing’ rather than ‘knowledge’. If knowing is about making distinctions as Reyes and Zarama, (1998) say, it could be said that Di had found something, the experience of the catalogues, that enabled her to see (distinguish) order in the seeming chaos of hardware, software and ideas presented to her through the program thus far. She talked later about liking to have big picture organisers so that she could see where things fitted in. It seemed as though with the catalogues she had a new organizer, a way of knowing about software (and technology in general) that allowed other things to fall into place – things that had been bothering her like censorship, curriculum support, finding time to know a range of software. It was likely that a background of anxiety had been removed because Di could see that she was not on her own, the responsibility for the big issues that she was concerned about was not entirely hers because others had already given some thought to these matters. She realised that she and her colleagues were small players but there were, as she said, “giants up there” (car conversation 30/3/99).
After this breakthrough in understanding, the themes and issues addressed by Di in the debriefing sessions and in the follow up interviews began to change. She seemed to be less concerned about control of student learning (this could have had something to do with the fact that she felt more ‘in control’ of her own learning); for the last time a couple of days later (6/5/99) she mentioned feeling overwhelmed by the information (except to recall that she had previously felt that way in the video recall session 19/5/99). It was as though having found an organiser she was no longer overwhelmed by an amorphous mass of stuff. After this time also Di no longer referred to the lack of time (except during the inschool follow-up day two days later). Also classroom management issues and school organisation became less prominent in her discussion.

If making distinctions is about ‘knowing’ then, Reyes and Zarama (1998) say, learning is the process by which “we embody these distinctions in our actions” or as Krippendorff (1993:15) says “all knowledgeable beings enact their knowledge”. It could be said that Di had made a distinction (the software catalogues stood out from everything else covered in the first three workshops) and gained understanding about the world of computer technology (something like: ‘software is catalogued and classified and therefore my time will not be taken up in doing this myself and also I can now see that it is likely that other things have also already been dealt with – like censorship’). She embodied this knowing in her actions. It changed her conversations (i.e. this is different from displaying specific knowledge of software). She no longer raised the same issues for discussion. In turn this changed the conversation of the research group and hence the trajectories of other members of the group. Different discussions took place with different consequences.

For example, as part of the debriefing group, I recorded each workshop, transcribed the conversation and thought about each participant’s contribution. I was changed by the debriefing conversations. Out of consideration of the conversations (and after reading Marland and Edwards’ (1986) study of school children) I wrote a paper about the differences between what an observer observed and what people said about their learning. Later Di’s comments about technology led to my writing a paper about self and technology (Murray, 2001). Both papers had other consequences for my life trajectory (people met through the papers, other conversations that would not have been possible).
The one High School teacher in the group commented on Di’s knowledge of pedagogy and how much she had learned from her:

Well I mean I was inspired by Di, the way she talked about her classroom and how she sort-of related to her students. I think that’s a valuable point [about] in the classroom.

(video recall: 3/11/99)

They had spent no more than five thirty minute debriefing sessions together discussing what they had learned in the workshops and how they had felt.

It would seem that the change that was brought about was determined by Di (not by the workshop). The workshop merely provided the environment that triggered the change. Di’s learning was unique and idiosyncratic. In support of this assertion it can be said that of the research group of four participants no other mentioned the catalogues as in any way significant to their learning; neither has anyone ever mentioned them, as far as I know, in any of the thousands of program evaluations received by the DET since 1995.

6.6.1 Summary

Different parts of the TILT program became information to Di and Robyn. The information that each found linked to their life history in some way and was likely therefore to have been anticipated by them. It seems feasible to speculate that in some way each found information that could be seen as important for survival.

The description of Di’s learning above suggests that her learning was not a matter of taking something in through the senses but was instead triggered by the environment. This is consistent with the idea that as we bump up against the environment and others in it, we are changed and we effect change in the environment making new possibilities for learning, and influencing the life trajectories of other living systems. Like Robyn’s learning referred to above Di’s learning could not be referred to in terms of ‘right’ or ‘wrong’ – at this moment in time in this environment it could not have been other.
6.6.2 One brain/body system

The placebo literature reported in chapter three suggests that the body/brain system responds to environments with chemical, somatic and emotional changes where the whole body learns and changes in response to the environment itself and anticipated change. To underline the idea that the brain does not take in information but the whole brain/body system is involved in learning in communication/interaction with the environment I also draw on Núñez’ (1999) ideas of embodiment. He says that a:

theory of mind and cognition must consider the primacy of the specific constraints of our bodily grounded experience shaped by the peculiarities of our brains and bodies . . . in order to understand cognition and the mind, one must conceive them as *fully embodied* phenomena.

(italics in original, Núñez, 1999:54)

Núñez (1999) describes the embodied mind as:

situated, decentralized, real-time constrained, everyday experience oriented, culture-dependent, contextualized, and closely related to biological principles.

(Núñez, 1999:55)

He sees cognition as:

a product of complex adaptive behaviour emerging from on-going action on the part of an agent which is always immersed in a real-world environment, and with physical and real-time constraints.

(Núñez, 1999:56)

Di’s learning emerged from interactions in the *TILT* environment. As Nunez suggests it could not be explained by inputs from the environment to the brain but rather through ‘bodily grounded experiences’ contingent on a particular brain and body interacting in a particular environment. This can help to explain the idiosyncratic learning occurring in each participant that sometimes seemed to have little to do with the *TILT* program provided by the facilitator.
Di’s mental breakthrough with the catalogues that triggered a change in her thinking and Robyn’s realisation that working in pairs was not wasting one student’s time, discussed in chapter five, were only loosely connected to the program and could not be entirely explained by the materials or the workshops. Even though the catalogues were provided as part of the program materials and the facilitator had hoped to encourage the use of groupwork by teachers, Di’s particular mental breakthrough and Robyn’s attitude to group work as time wasting were unlikely to have been anticipated by program designers.

Furthermore Di, in learning about the Internet, appeared to reorganize, over several months, what she knew about student learning and about teaching until she was comfortable with a different way of seeing the control of student learning. It seems she was obliged to do this because some of the things she felt the workshops implied threatened her notion of herself as teacher (giver of knowledge) and could be said to have undermined her survival as a teacher with pride in her work. The shift from her 1999 concern about knowing the outcomes her students were working towards, to her classroom organisation in 2000 in which her students ‘put the boundaries on their own learning’ was a major change in her thinking. It was not a part of the TILT program yet, having made such a major shift in her thinking, it was easy to see why Di thought the main message of TILT was nothing specifically to do with use of technology but for her was “thinking about thinking it was philosophy” (10/7/00).

On the other hand Robyn felt the main message of TILT was, “have confidence in yourself, have a go” (10/7/00). Through participating in group learning she realised that she could learn in a group situation while not being singly responsible for the outcome as she usually was in situations of individual practice and striving to win in a competitive context (e.g. swimming). She learned that it was not a waste of time for some, possibly less active, members to work as part of a group and rely on others for help. She also said that she realised this way of working could be enjoyable. This required a new way of seeing learning and changed what she did in the classroom.
The program offered time, technology and support for participants to learn how to use various pieces of hardware and software; understand some of the possible classroom uses of the hardware and software; consider classroom organisation issues; and evaluate software. However in what would traditionally been viewed as the same learning program Robyn and Di learned different things. Although Di learned something about technology, she also learned about her own teaching and student learning triggered by the environment afforded by the program including the research program. Similarly Robyn learned among other things, some keyboard activities and how to use the Internet and a digital camera. She also learned something about learning that was afforded by the workshop environment.

As Maturana and Varela (1987) suggest the environment acted as a non-specific trigger. In a similar vein, in a health environment Brody says:

> the patient, and not the physician, is in the end the therapeutic agent- the placebo stimulus, whether the physician’s behaviour or something else, simply uncorks the internal pharmacopoeia which all humans possess as a biological programmed tool for self-healing.

(Brody, 1997, citing the work of Bulger, 1990)

It could be said that the TILT program for Di and Robyn uncorked their ‘internal gnolocopoeia’ of self-learning, learning that came from within as they reorganized what they knew of student learning in communication with the course materials, self and others.

### 6.6.3 Summary

Di and Robyn appeared to be in different programs that afforded quite different ‘main messages’. They, as whole mind/body beings, learned different things triggered by different parts of the environment afforded by the whole TILT program.

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2 Gno from the Greek meaning knowledge; poeia from the Greek meaning make
Both in some way reorganized their internal ‘gnolocopoeia’ and learned something about teaching and learning as well as something about technology. It could be said that the learning occurred in communication with self, artefacts and other living systems as they interacted in the environment afforded by the program. Living system and environment together, it is suggested, formed one learning system. The learning was not dependent upon specific program inputs but was part of the continuous process of living in the total environment provided by the program that triggered idiosyncratic changes.

6.7 What is the role of communication and the environment in triggering learning?

In the framework developed in chapter three communication is described as part of the environment of all living systems. If learning occurs as we bump up against each other and the environment, but we do not learn as a result of direct inputs from the environment then the question remains: what is the role of communication and the environment in learning? In answering this question I first want to discuss the idea of a living system plus environment learning system. Secondly I want to look at communication, specifically emotions and emotioning, the role of emotioning in learning and the link between emotions and motivation. I follow this with a discussion of movement as part of communication, and its role in learning.

6.7.1 Living system plus environment linked in one continuous learning system

Several writers in the area of second order cybernetics (Brier, 1999, 2000; Jarvilehto 1999; Bateson, 1972; Maturana & Verela, 1987) believe that part of the thinking system is (or can be) outside the body. Bateson (1972:316) says “mental characteristics of the system are immanent, not in some part, but in the system as a whole.” (italics in original) and “large parts of the thinking network are located outside the body.” (italics in original, p320).
Bale, in discussing Bateson’s work says that:

mind is immanent in the larger system—person-plus—environment. The resulting image requires that we eliminate the commonly held notion that mind is to be identified as residing only within the boundary of our physical body, and is somehow radically separate from other.

(italics in original, Bale, 2000:5)

Clark (1999) quotes the work of Iriki, Tamaka and Iwamura (1996), which showed that macaques that repeatedly used a stick as a tool showed neural activity indicating that the image of the stick had become incorporated into that of the hand. It seems that in a biological sense artefacts that are part of our environment can also become part of us.

Take the example of what Di indicated was a breakthrough in her learning: reading the software catalogues (4/5/99). In this example part of the thinking network seemed to be located in the interaction between Di, the facilitator and the catalogues. The catalogues triggered a major shift in Di’s thinking (i.e. she referred to this activity as producing a ‘breakthrough’ for her). Her learning was not about the facts and figures displayed in the catalogue, Di never mentioned these items as significant knowledge. Rather it seemed to be about a breakthrough in her understanding about the new (to her) world of technology that was evolving for her in communication with the facilitator, other participants, the materials, possibly the researcher, and herself. None could account for the learning (change) on its own, none could be said to ‘contain’ the change (learning) that Di indicated she experienced.

The learning, it seems, couldn’t be accounted for by Di alone or the catalogues alone. It could be said to be better accounted for by the interplay of environment, technologies and people, in the context of the program and its workshops. It is likely that the whole learning environment influenced the learning that was taking place. Just as in the placebo effect in medicine (see chapter three) the context announces this is a healing environment so the TILT workshop environment said this is a technology learning environment.
What Di indicated that she learned on this occasion was more than just the meaning of some of the terms in the catalogues (and that catalogues with this type of information existed). What she learned was that she was not alone in her struggle to understand, that others had been down this path and categorised and labelled – something that seemed to change her attitude to other aspects of the program as well as her approach to teaching. This is an outcome that could not have been predicted, it came from the interaction between players. People and artefacts/technologies could be said to have been coupled in a dynamic learning system.

6.7.2 The role of emotion as part of communication: emotions or emotioning?

Hargreaves (1998) suggested emotions should be acknowledged in any discussion of change. He also concluded that teachers’ emotions were involved in all aspects of their work after conducting research with teachers of Year 7 and 8 students asking them to document their emotions over a period of time (Hargreaves 1997a). My interest in emotions led me to employ a similar strategy. I asked all workshop participants to indicate their emotions at the beginning, middle and end of each workshop. However after reading some of the literature on emotions (e.g. Plutchik, 1994; Stocker with Hegeman, 1996; Bar-On, 1999) and work on emotions and cognition (e.g. Damasio, 1996; Maturana & Varela, 1987) and thinking over Maturana’s (1993) statement that communication is the braiding together of languaging and emotioning, I began to see emotions in a different way. The necessity for a different view of emotions was reinforced by Robyn’s statement that although she “never ticked isolated on the sheet” but always “ticked happy and confident and pleased to be there and enthusiastic” (3/11/99) she was in fact feeling quite different emotions during the workshops, worrying about her family and the work left undone at school. She had also felt some ‘fear’ in undertaking the program and was feeling an ongoing concern about her ability to “keep up with” (3/11/99) the learning expected of her in TILT.
My assumption that emotions could simply be identified and named was shifting towards a view of emotioning as part of the lived stream of communication rather than the reported feelings of participants as they take part in the workshops because as Bar-On (1999) suggests talking about emotions can have a generative role (by talking we change or fix something that is fluid, multi-layered and often elusive). Talking about an emotion (and so naming it) to self and others becomes a part of the conversation and hence part of the milieu which in turn has an effect on the living systems in the milieu (Efran, Lukens & Lukens, 1990). Also the emotion in Sheets-Johnstone’s terms (the readiness to act), which I think is close to Maturana’s ‘emotioning’, may not be accessible to cognition and hence to language. Communication (languaging and emotioning) he says, is the lived flow and pattern of the sum of a person’s presence in and (by being there) contribution to the milieu.

My original research design had toyed with ambitious ways of ‘seeing’ sites of activity in the brain and monitoring perspiration and heart rate. I thought I could have recorded some of the inside story of the activity that was going on. I thought I could have made guesses at the emotion being experienced as ‘revealed’ by the ‘scientific’ instruments probing brain and body and made comparisons with the emotions recorded in words at the time and afterwards. I might have drawn conclusions that the intensity of emotions talked about belied that recorded by the instruments (or vice versa) and from this concluded, say, that Robyn was too polite to express her true feelings. Or it could have been that she did not ‘know’ her ‘true’ feelings because once expressed in words (for whatever reason) the feelings expressed became the ‘true’ feelings (Bar-On, 1999).

3 We name an emotion for a range of reasons. It is possible to deliberately mis-name an emotion we feel – which may or may not be obvious to others in the milieu. The naming or misnaming, the reaction of others to the (mis)named emotion and our own reasons for the (mis)naming will all constitute a part of the milieu as it travels through time and space and so affect the life trajectory of everyone present in some way (even if that effect is minuscule).
Or it could have been that hooked up to machines to monitor ‘true’ feelings Robyn displayed true feelings of being monitored. Or the machines monitored the changes that were monitor-able by the machines and much was lost in the translation. Or that the body acts on ‘true feelings’ all the time and we only use language (to ourselves and others) later to talk about what it is our body has already decided to do on the basis of its lived stream of emotions (Cytowic, 1993). And our communicating with self and others changes the environment in which our body is interacting which changes the emotional interaction with the environment and so on.

So would I have known much more? As Fields and Price (1997) say even if we could gain clues to what makes something meaningful (relationship, social/cultural practice) to an individual through the study of neuropeptide receptors we would still need “to explain ‘meaningfulness’ in psychological and sociocultural terms, and not merely in biochemical ones.” (Fields and Price 1997:87)4. The fact that peptide receptors are clustered in the parts of the brain linked to emotions rather than the cerebral cortex (centres of cognition) may well mean that we “come to know about the world in large part via our emotional reactions to what we perceive” (Brody, 1997:86) and as Sheets-Johnstone (1999) says our emotions are a readiness to act, the action, which could be describing the emotion to self or others, does not necessarily reveal the emotion.

If I could have looked inside Robyn and Di I may have known differently but not necessarily ‘more’. As it is I can speculate that learning did occur (both made changes to their classroom practice) and Robyn’s and Di’s emotions were involved as part of all communicating with self and others.

4 In his search for a theory of information, cognition and communication Brier says much the same – such a theory needs to encompass “social sciences and humanities as well as biology and the physiochemical sciences” (Brier 1999:170).
6.7.3 Motivation and emotion

As I shifted my view from 'emotions' to 'emotioning' I began to notice different things in the data. In answer to the question ‘what did you learn from the program?’ Di’s first response was: “Extra skills in technology.” However she then modified her answer with the observation that:

the best thing about it was the reflection afterwards [30 mins after each workshop spent with three other participants and the researcher discussing what was learned in the workshop] talking about the workshop and in the car afterwards elaborating on it [driving home with another participant and recording their conversation for the researcher]. It was indulgent in a special way. As a learner we learn with motives and we have a need, an outcome such as a skill but also branching out in our thinking about learning. Being a learner. I love change. I love the tension. I had to cope in rough weather and do things on the run I had to wish for more time to reflect.

(interview, 10/7/00)

Di mentions that we “learn with motives” and “have a need” for particular learning. We know what we want out of it – in Di’s case new pedagogical possibilities for herself leading to new learning environments for her students and the excitement of a challenge. Sheets-Johnstone (1999) talks of emotions as “prime motivators” (p273). The emotion of excitement is apparent in the language Di used to talk about learning (eg “I love change”; “I love the tension”; “indulgent”; “special”). This could suggest that Di’s motive for undertaking the program and remaining with it despite the frustrations stemmed from her general feelings of excitement about learning (her ongoing lived stream of emotioning) which, as Sheets-Johnstone says, is ‘a readiness to act’ (1999) and as such led her (Di) to seek out learning opportunities (and change). [Contrast Robyn’s excitement about what the technology could ‘do’.

A year after completing the course Di said that although she valued “the impact of technology” on her programming she hadn’t had time to learn the “technicalities” (10/7/00). Her interest, it seemed was not in learning to use the technology for herself. Identifying reflection as the ‘best thing’ about the program may have some bearing on how it was that Di could feel frustrated in almost all workshops and yet remain positive towards the program and believe that she had probably learned more than anyone else.
6.7.4 Summary

I asked participants to name emotions experienced during the workshops but this naming of emotions did not uncover the underlying ongoing emotioning, like Di’s excitement about learning, conveyed in other ways over the course of the program. For Di the excitement of the whole perhaps dissipated the frustration of some of the isolated bits. Her motivation seemed to arise from a love of learning, her learning seemed to be predominantly about learning rather than about using the technology.

6.7.5 Bodily movement, emotion and cognition

Not all workshops were totally frustrating. The workshop session that involved reading the software catalogues was presented in a way that Di liked to work. Her understanding of her own learning needs was respected (she felt) because she could sit on the floor, browse, tune in and out of what the facilitator was saying all without appearing rude which was an important factor for her. Di indicated that she felt relaxed and able to learn in her own way, browsing, stopping whenever she felt interested in a particular item and tuning in to Jenny’s informal address to the group whenever she heard something that interested her. In this posture and feeling relaxed Di made what she described as a breakthrough in her learning.

Di felt comfortable sitting on the floor. If, as Iverson and Thelen (1999:19) believe, “cognition is a product of the body and the ways in which it moves through and interacts with the world” (also Núñez, 1999:45) Di’s bodily interaction with the world at this point was familiar and relaxed (whereas sitting at a computer was not a familiar posture for her, and she felt anxious about her use of computers). Sheets-Johnstone (1999:263) talks about the work of Nina Bull in which she shows a generative as well as expressive relationship between movement and emotion. Di was relaxed sitting on the floor.

5 Robyn on the other hand sat upright with feet together and water bottle beside her chair on the floor either at the computer or on her chair in the circle. Robyn stressed posture with her students, she had learned yoga for many years and taught yoga to her students from time to time.
If as Sheets-Johnstone, (1999) says posture and emotion are entwined and having taken up a particular posture the posture in turn generates the emotion and if emotion and cognition go hand in hand (Gibb, 1996; Damasio, 1996) (e.g. Gibb says that angry students simply cannot learn\(^6\) ) then in this familiar posture experiencing this emotion Di has a further, bodily way of anticipating to some extent the learning provided by the environment. Iverson and Thelen (1999:37) believe that action “influences thought as much as thought motivates action” and Clark (1999) says “there are no neat dividing lines between perception, cognition and action”. Action, cognition and emotion are entwined and in a milieu action (including conversation) and emotion ‘set up’ the living system for change (learning).

This can be summarised as:

- bodily experience is fundamental to cognition (Iverson & Thelen, 1999; Núñez, 1999);
- bodily experience generates as well as expresses emotion (Sheets-Johnstone, 1999);
- cognition and emotion work together for the survival of a living system (ie so that it can go on living/learning); and
- learning (cognition and emotion) it seems, is therefore fundamentally about the whole body’s interaction with the world over time.

It seems likely that Di’s whole body was involved in her learning. What she identified as a learning breakthrough came about in communication with self in reflection and the environment including artefacts and other living systems.

\(^6\) Cannot learn what it is the student was expected to learn – if learning is living/survival we learn something all the time.
6.7.6 Summary

It is likely that Di was motivated to participate in TILT by her love of learning as well as her need to learn about technology. Di’s excitement about learning can be detected throughout the program. It is possible that this sustained her even though she often found workshops frustrating. Di expressed her lived stream of emotioning in the context of the program in conversation over time. Di’s conversation by being part of the milieu had an effect on the learning of others. Di’s whole mind/body stream of communication with self, artefacts and other living systems, expressed in her whole body’s orientation to the learning context afforded by the program, can be said to have constituted her learning.

6.8 Communication with self and others in reflection

Having discussed communication with artefacts and other living systems and its role in learning, I now want to look at communication with self and others in reflection and its link with learning.

If I converse with myself, and if I find that I create the same meaning time and time again, I may say that I have attained a constancy of meaning. … But, if I converse with myself and find that I do not create the same meanings, then my thinking may shift.

(Glanville, 1996:15)

Through conversation with others in the workshops and interviews, and with herself in reflection Di’s thinking shifted, she reorganised what she knew about teaching and about student learning. In interviews she referred to “learning about learning” as the most important part of the TILT program. She valued the time to reflect above the practicalities of the workshops. She said:

TILT is dynamic we’re practising skills but the learning is a privilege – to have time to reflect. I would have got there with the skills but I valued highly the discussion post-TILT.

(video recall, 19/5/99)
It is interesting to note that the learning of skills was of secondary importance, time for reflection, the learning about learning was the real privilege. Schon was interested in “learning and its cognitive tools, and the role of reflection (or lack of it) in learning processes in general, and conceptual and perceptual change in particular” (Pakman, 2000:5). Di seemed to embody Schon’s ‘reflective practitioner’ (Schon, 1983). This could be seen as she examined her hitherto tacit theories of action (theories-in-use) such as her control of student learning with all that it entailed in terms of classroom activities and organisation. It could be said that her concept of learning changed over time and with this changed her view of herself as teacher (I shall have to “let go a bit” 6/5/99). These changes led to changes in classroom organisation and student learning activities, which in turn led to changes in learning opportunities for students (e.g. students constructing fat and skinny questions for their classmates, school visit 5/4/00).

Although Di said that reflection (in this case she was referring to the opportunities afforded by the debriefing sessions and her drives home with Cheryl) helped her to remember the learning of the workshops, the discussion in debriefing sessions and in her drives home ranged over a number of issues not directly associated with the workshop. In any event these debriefing sessions could not have reinforced know-how development because they did not involve any use of computer technology.

However Di explained (13/6/01) that while discussing pedagogy she was in fact re-living the workshop in her head, hence her reference to reinforcing the learning in the debriefing session. On practically all occasions Di had most of the conversation, leading it and airing the issues that she saw as important.

As stated previously the learning of skills was not the important aspect of the course so that when Di said that the reflection reinforced her learning she was likely to be talking about her ‘learning about learning’ or her ‘learning about teaching’. These were the things she said were important about the course despite the fact that they were peripheral to the espoused business of the workshops, which attempted to teach know-how. Just as Robyn learned through practice, by herself and with others, Di also learned through practice although a better word might be ‘rehearsal’.
Robyn practised ‘doing things’ and came to be able to do things that she hadn’t done before, like use the digital camera; in reflection Di tried out (practiced) ideas and came to regard learning in a different way from the view she had held before participating in the program.

I could paint a similar scenario for Robyn. Robyn made changes to her classroom practice. She said she “learned not to take things too seriously, have fun” (10/7/00). This was a change from her swimming/drowning metaphors used earlier to describe her feelings about learning computer skills. Robyn also said that the post workshop discussion was important to her learning (“I tended to miss things in the workshops the chat afterwards was important for that, for filling in the things you might have missed” (10/7/00)). This is despite the fact that Robyn’s focus was on learning know-how and the post-workshop discussions were simply a discussion about what had happened in the workshop, what they were thinking and what they were feeling. Robyn was learning through discussion and reflection, but also through repetition (consistent with her lifelong reliance on learning through practice). She watched some of the videos several times to work out how the teacher organised groups, for example. She reported reading and re-reading the workshop booklets going over the workshop activities on her own later at school.

In Schon’s view as well as taking time out to reflect “on an object, subject, or idea – a stop-and-think” (Bamberger, 2000:12) Robyn’s reflection was also “in action” (Bamberger, 2000:12). For example Robyn asked and was told that there was no film in a digital camera, her family members each owned a standard camera and were good photographers so this came as a surprise, Robyn adjusted her concept of camera and worked with a group to take a photograph, load it into the computer and make changes to the image. She said:

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8 e.g. in the course of discussion Di seemed to shift her view of student learning from transmission of knowledge to student construction of knowledge.
I didn’t know what I was doing but I felt quite comfortable (laughs). The others were around, but what someone didn’t know someone else did, and we managed to get through it, and took the photos, but I hadn’t used a digital camera before so it was quite exciting. I was amazed you could take photos without film, because at home we all have cameras and we do a lot of photography, but it was amazing to have this one that had no film in it.

(video recall, 3/11/99)

Her preferred way to learn was in practice on her own but in the workshop she had to work with a group. Having lost her concept of camera and therefore her know-how of photography Robyn made second by second decisions (reflection-in-action) as she joined and worked with a group, not knowing what she was doing but eventually, with the group, achieving the desired result. Bamberger, writing of some of the issues tackled by herself and Schon says:

> We say that ‘actions speak louder than words,’ but because the active mind behind the moment’s actions doesn’t seem to speak at all, we feel uncomfortable attributing the results of these reflecting actions, this sense making, to ‘knowledge’.

(Bamberger, 2000:13; see also Sung-Chan, 2000)

Robyn’s knowledge appeared to change in a number of ways in this workshop. One was her understanding of camera, another was to do with a preferred way of learning which later transferred to the classroom in the form of student group and pair work.

Yet another was her realisation that what her colleague had impressed her with (his prowess with the digital camera) was not really that difficult (and therefore not really that impressive) – she hadn’t needed to be that impressed. Her measure of her own professional expertise against that of others could be realigned. One of her motivations for learning was ‘to catch up’ with colleagues. Her realisation that using the digital camera was ‘so simple’ meant that she had ‘caught up’.
Robyn’s excitement is evident in her account of the digital camera workshop. Her motivation for learning to use the camera was associated with her need to ‘catch up’ with a particular colleague linked to her view of her own survival as a good teacher (see metaphor discussion below). Robyn’s whole self/body was involved in the learning. The particular learning was contingent on what Robyn brought to the learning environment, her history of interactions over a life time, and the environment afforded by the program including other living systems in the environment and in particular all communication that linked the players together in a particular learning system.

6.8.1 Summary

Di and Robyn interacted in the learning environment in which the whole self (brain/body) participated in communication with self, artefacts and other living systems. In doing so it can be said they each learned according to their life histories and their needs. They were each a part of the milieu and as such contributed to the learning of others, through communication including emotioning. This is Bale’s (2000) Janus face looking outwards as part of a meta-system, part of the environment of other living systems, being changed by and changing the environment. The Janus face looking inwards is concerned with maintaining an internal steady state, with survival.

Above I discussed the notion of survival and suggested that ‘unrest’ or ‘anxiety’ brought Di and Robyn to the TILT program. Through learning over the course of the program this anxiety dissipated and the lived stream of emotioning associated with the workshops and learning about technology changed over time as anxiety gave way to a more comfortable approach to technology.

In survival terms Di and Robyn probably reached ‘a steady state’ in relation to this goal in life. Without recourse to the probes and prods of science I turned to metaphor as a way of glimpsing the possible lived stream of emotioning of Di and Robyn on the inside as they participated in TILT.
6.9 A view from the metaphor bridge: insights into Di and Robyn’s ‘inside’ learning

Commenting on their own learning and on the environment in response to my questions Di and Robyn talked about a range of issues, and through observation I noticed changes in their conversations and in their teaching. However I was interested in the idea of emotioning, their lived stream of emotion, over time and its relationship to their learning. I turned to metaphor as a possible insight into emotioning and learning and asked the questions:

- Did Di and Robyn’s metaphors change over time?
- Were there differences in metaphors between them?
- Did the metaphors reveal emotioning?
- Did they reveal anything about their learning?

6.9.1 Di’s metaphors indicating changes in emotioning and learning

An examination of Di’s metaphors seemed to suggest that she gradually reorganised and reconstructed her view of student learning. She began by talking about her concern that she was “not plugging into them” (ie not knowing where her students were up to in their learning) and not being able to “span across” to them (9/3/99). Technology is seen as “just one tool” (4/5/99) but Di needed “testable outcomes” in order to know that learning had taken place.

These are metaphors of constructed physical connections using tools and the technology of electricity and bridges. They are also physical in that they involve movement, such as “spanning”, “plugging”, “outcome” and “getting around” (eg how “can you get around to every child before they finish that activity to assess the outcomes?” (4/5/99)). The “plugging in” metaphor in particular implies a conduit notion of teaching and learning, a cable down which knowledge can flow.
In Jaynes (1976) terms not understanding student learning is the metaphrand; the metaphier is the electrical plug and cord; the paraphiers (associations or attributes of the metaphier) are the nuances of plugs to do with hard technology, rigidity, connection, cable along which energy travels (itself a metaphor), being switched on or off and lighting up; these paraphiers in turn become the associations (or paraphrands) of the original metaphrand. Hence understanding student learning becomes a matter of connecting with the constant stream of energy (electricity) occurring in the cable that is the student learning conduit between information source and brain(s).

At the same time as Di is concerned with student learning she is also concerned about the role of the teacher. One implication of students using a range of technologies is that the teacher will not be required to ‘teach’ any more, or else there will be too much for one teacher to know. As she points out:

if they all want to do different things you’ve then got a smorgasbord forget the fact that you’re taking teachers out of their discipline of knowledge, forget that. How do you then multiplex with the outcomes.

(post workshop, 4/5/99)

Again the metaphor (“taking teachers out”) is physical and about bodily movement. And the “smorgasbord” metaphor indicates sampling without depth – a dismissal as trivial of the many areas that a student may pursue without the help of a teacher (just as a smorgasbord has no need of someone to serve the food).

It has connotations of the basic need for food coupled with the disappointment of the food not being substantial enough (or the regret that goes with eating too much ‘because it’s there’) and the beauty of the display coupled with the possible disappointment that one serves oneself without need of a professional⁹.

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⁹ Metaphrand – students all choosing to do different things; metaphier – smorgasbord; paraphriers – tasting; not substantial, not regulated, trivial, self service, choice, paraphrand – no need for a teacher, students not thinking in depth, or gorging on things that interest them without control and balance.
At the same time (4/5/99) Di says the use of technology implies a “facilitator” role for teachers “a lay person role” that does not require the art of teaching, but she warns “when they get blocked they need you [the teacher] again”. Here the term ‘facilitator’ is used to indicate that the specialist role of teacher (for which Di has prepared all her life) is no longer required in this new world of technology. For her survival Di needs at this stage to convince herself and others that the art of teaching is still needed.

The ‘blocked’ metaphor for student learning seems to indicate a view of learning as a channel or tunnel down which the learning runs – without expert help the tunnel can become blocked (like a drain). Just two days later Di sees things a little differently. She says:

I can’t possibly know all of that myself I might have to let go a bit as a teacher I might be willing to let go but I need to know the outcomes are there.

(in-school support, 6/5/99)

Again the metaphor is of movement but instead of moving towards or holding on (plugging in; spanning across) this metaphor (‘let go’) is allowing freedom. The plugging in metaphor is concerned with the action of connecting and maintaining control over, it has connotations of action occurring (i.e. electricity flowing through cables) but not being part of it. The taking teachers out metaphor is about moving away, exposure, discomfort, not having control over (i.e. someone else is doing the ‘taking’), whereas the let go metaphor implies control and choice.

A few days later Di says:

But if I let children daydream the child’s pondering is not mine to measure... I can’t evaluate it. Much of what we do is about allowing children to explore but they need boundaries too. I’m expressing my own sense of overwhelming choice - what is the emotional impact of choice?... The gifted under achiever how much more do we disenfranchise them from disciplined thought if we throw them open to this open ended learning?

(in-school support, 6/5/99)
The metaphors used here indicate Di’s shift of perspective. She seems to be torn between the idea of boundaries and holding on to her students (metaphors of physical structures and movements) and allowing exploration and “throw(ing) them open to...” There is a tension here beginning to be seen between Di’s earlier position of ‘plugging in’ and her later suggestions that she may need to ‘let go’ a bit.

Again Di is not wanting to give up what she has worked so hard for. Di seemed to see her teaching as an act of ‘giving’ (itself a metaphor), of generosity. She seems to be saying here that the role is changing and it is not one that she looks forward to. She fears the art of teaching will be lost if “you’re a facilitator of learning not a giver of knowledge.” She does not like the implications of the technology workshops – that education should be organised differently, that the teacher is not the giver of knowledge.

However several months later (1/11/99) Di recalled that early in the program (early in the year) she had felt the “boundaries were too big” and that “knowledge would go beyond what we could control and handle”. Now Di said she “takes them [students] from where they’re at”, constantly redefining the boundaries. But in order to feel ‘in control’ of the situation Di defined her programming in terms of the evaluation spiral (“continually evaluate, reassess, re-programme” 1/11/99). This allowed her to provide open-ended learning activities for students but remain in control of the total teaching/learning picture. I reminded her of her concern early in the year about allowing students to use the Internet for their learning. Di had felt that she would not know what the learning outcomes would be, she would have no control over their learning.

As Krippendorff says:

> To preserve their understanding, individuals may then have to invent new constructions of reality, redefine their role in it, or die from lacking this ability.

(Krippendorff, 1993:15)

He suggests that “new metaphors are the principal source of this creativity.”
The metaphor of ‘throwing’ students towards learning, something that as a responsible teacher Di could not do, is now one of ‘taking’ students, something that implies care and nurturing. The movement indicates connection of a personal rather than a mechanical nature perhaps indicating that something that was previously external to and distant from (spanning and plugging) Di, is now part of her, connected. And whereas in the past the ‘boundaries’ metaphor indicated that they were beyond Di’s control now she can talk about ‘redefining’ them, that is, they are in her power to be defined and redefined. Di is once again in control of the learning but in a completely different way.

6.9.2 Summary of Di’s use of metaphor

Di’s view of learning appeared to change from: the transmission model of teacher filling students with knowledge and each student being given, and gaining, the same knowledge; to all students moving through the learning environment that she had created in their own way at their own pace and taking out of it whatever they were able. Di’s change in the way she understood student learning can be traced in her metaphors for learning and teaching over the research period.

Likewise it seems the emotional tensions that are part of her learning can be traced over time revealing something of the emotioning entwined with the languaging that made up her communication that not only revealed but was an integral part of her learning.

Di’s learning about learning identified in chapter five touched on her frustrating experience of being a learner and her growing empathy with her students as learners. Not until I examined her use of metaphor as a possible bridge between what was observable from the outside and what was changing in Di’s understanding on the inside did I see what could be interpreted as a fundamental change in Di’s concept of learning from transmitted to discovered and, possibly then, her construction of reality from pre-existing and able to be communicated, to a reality that was individually constructed.
6.9.3 Robyn’s metaphors indicating changes in emotioning and learning

Robyn also used metaphors of movement in relation to using technology. She talked of filling or getting into (a container)\textsuperscript{10} or covering a surface and “keeping up”, being “in line” (10/7/00) “racing ahead” or “getting through” everything (10/7/00). She talked of getting “hooked up” to the Internet (post workshop debriefing 9/3/99) and “sending over” pictures using email (post workshop debriefing 30/3/99). She felt students were “so far ahead” in their use of the technology they “click on here, now go here” (post workshop debriefing 4/5/99), and that the facilitator “moved very quickly” (3/11/99). She and her students “got into” the software (post workshop debriefing, 4/5/99). Like Di, Robyn used the idea of a ‘tool’ to describe computer and information technology (post workshop debriefing 15/6/99).

Unlike Di however, Robyn’s metaphors were mostly about ‘doing’ something to or with the technology (‘hooking up’, ‘getting in’, ‘sending over’) or about someone moving ahead or falling behind (in know-how e.g. ‘click here’, ‘go there’) rather than about student learning. The first set of metaphors fits in with Robyn’s need to ‘do things’ and the importance to her of learning to do things with the technology.

The second set seems to imply some kind of competitive race in which the students are ahead of the teacher and the facilitator is leaving the participant behind (years of swimming, elocution and music exams may have imparted an individualistic view of learning and a competitive view of life\textsuperscript{11}).

\textsuperscript{10} “get into” software (4/5/99); “fit everything in”, “cram into a day”, kids “get in and do it”, (10/7/00)

\textsuperscript{11} This would fit in with Robyn’s view that two students at a computer was a waste of the time of one of the students.
To describe her own learning Robyn at one time used a water/swimming metaphor that fitted well with her life experiences (10-15 years of swimming lessons). When recalling the workshops (3/11/99) she said of the facilitator, “sometimes I felt as if I tread water, you know as if you’re in water and she was swimming away”. This idea of the ‘expert’ moving ahead is similar to Robyn’s point above, about students being “so far ahead” of the teachers. Again later in the same interview she said, “It would have been easy just to give up and say this is all above my head”. A short time later Robyn talked of the difficulties of trying to learn to ‘do things’. She said, “The kinds of things you were doing there that were unfamiliar to you and you couldn’t get a handle on them” describing the difficulty in terms of a practical work tool (i.e. something with a handle). This feeling of being left behind changes the following year when Robyn says she is “keeping up with the times” (10/7/00) however she is still “the last in line” for use of the home computer.

Robyn’s emotion associated with not knowing how to use the technology, which appeared to have some similarity to the experience of lagging behind in a race or competition, changed when she began to see what others, possibly seen as her ‘fellow competitors’, knew and could do.

When she found out that those she had probably identified as her ‘fellow competitors’ in the ‘race’ (e.g. the colleague who could use the digital camera (30/3/99), the TILT facilitator (28/6/00), the “fast typist” in the workshop group (25/5/99)) were either not ahead at all or else were not too far ahead that they could not be caught12 she said she ‘felt better’ (e.g. “I was so glad it happens to the experts and when she couldn’t fix it I felt even better.” (28/6/00)).

12 “I remember thinking ‘ah, this is so simple’. You know, I didn’t think it was simple at the time, but I could see how for him, it’s simple just to do it and put it through the computer”. (3/11/99 video recall) on recalling how she felt during workshop three about her colleague’s ability to use the digital camera (30/3/99).
Her stories about others changed. A year after completing the course the stories of colleagues were different. One was about a colleague who started her own Internet business (i.e. not a challenge in the field of teaching) and the other was about two colleagues who were then attending the course but not learning as much as she had (28/6/00). Robyn still told stories about what people could do with the technology but they tended to be about pride in what her family members could do rather than about Robyn trying to catch up with what colleagues could do (28/6/00; 10/7/00).

Meeting others in the TILT workshops who did not appear to view the acquisition of technology skills in terms of a race seemed to have been significant to Robyn. She remarked often on the enjoyment of working with a group who did not take the ‘race’ too seriously. She explained:

I didn’t know what I was doing but I felt quite comfortable, (laughs). The others were around, but what someone didn’t know someone else did, and we managed to get through it.

(video recall, 3/11/99)

Later Robyn introduced group work into her classroom, realizing she said, that it was not a waste of time for less skilled members of the group.

6.9.4 Summary of Robyn’s use of metaphor

Something of Robyn’s flow of emotioning can probably be seen in her changing metaphors, as ‘falling behind’ gave way to ‘keeping up’. As she learned more about the technology she apparently realized that those ahead of her in the ‘race’ were not really so far ahead which seemed to be a relief. At the same time as Robyn was concerned about her ability to keep up and noticing the relative skills of others she began participating in group work. Instead of competing and taking sole responsibility for the outcome of the endeavor (‘winning’) she was sharing responsibility and seemed to enjoy the experience. Five months later Robyn wondered if one of the members of that group had really been as competent as Robyn had imagined her to be (3/11/99) indicating an on-going interest in the acquisition of know-how (her own relative to that of others). The importance of know-how is also indicated by Robyn’s view of technology as tool, which is also revealed through metaphor.
Robyn’s emotioning – her lived stream of emotions – throughout the period of the research was indicated through her metaphors. Her apprehension that can be detected in her use of metaphor was at odds with the emotions she says she admitted to on the sheet handed out each workshop where participants were asked to indicate how they were feeling at the beginning, middle and end of the workshop. I suggest that the competitive swimming metaphor enabled an understanding of Robyn’s interest in the skills of others and apparent relief at finding that some were not as skilled as she had at first thought.

6.9.5 Summary

Di and Robyn’s metaphors seem to provide an indication of an inside change in their view of the world. Their metaphors were different and seemed to reflect something of their life histories and interests. Di’s metaphors indicated that she changed her ideas about how learning occurs from a transmission view to a view of students constructing their learning outside the bounds of her external control.

Robyn seemed to change her idea about the enjoyment of learning and learning as competition. She still seemed to see learning in competitive terms (only now she had ‘caught up’) but was more relaxed as she realized that the others had never been as ‘far ahead’ as she had imagined.

In the course of this discovery she seemed to move away from the idea of competing and individual practice as the only ways in which to learn. By the end of the research period Robyn could see the benefits of cooperating in learning with the additional benefit of enjoyment in the process.

In light of the above discussion it is possible that the use of metaphor in communication can act as a bridge for an observer to cross from the outside learning environment to glimpse the inside emotioning and cognising of another living system. Metaphor can perhaps be used to reveal ways of seeing the world and what was counted as information and possibly hint at why this particular item was information to an individual learner.
6.10 Program implementation success can be measured by program content evident in use in the classroom?

Di and Robyn believed that they had learned a great deal from participation in the TILT program. As a consequence of the program a year on both Di and Robyn allowed their students to access the Internet. Di’s Year 3 students were looking for ‘fat’ and ‘skinny’ questions to ask their peers, Robyn’s students were learning Internet research skills as part of their preparation for high school. Both teachers had arrived at this point by considerably different routes, for different reasons and purposes. Whereas Di was now allowing Internet access because she had found new ways to ‘control’ student learning and she wanted to expand learning opportunities for her students, Robyn was allowing access because she had learned how to do it herself, it was not as difficult as she had thought and her students needed it to prepare them for high school. For both teachers participation in the program had increased their range of teaching options.

If the use of metaphor can be an indication of Di and Robyn’s lived stream of emotioning throughout the program it seems that both had begun the course apprehensive about taking part, anticipating some possible discomfort in the learning process. However both had eventually become comfortable with their learning. Both began with some apparent anxiety but by the end of the research period this seemed to have given way to a more comfortable view of their own ability in using, or providing access to, technology.

Part of the success of the program in this case could be seen as increased confidence. However again this was via very different means and in different ways for each of them. Di’s concern about the role of teacher, the enormity of the learning task and her ability to control student learning can be seen to dissipate over the course of the research when she became once again the competent teacher in control of her teaching. Robyn’s concern was in not being able to do things that she saw others doing, she was behind in the race. However over the course of the program she realized that it was possible to catch up and that through practice she could become a confident user of technology.
An exit survey about the TILT program would most likely have produced an enthusiastic response from Di and Robyn. A survey conducted later that asked which items of hardware and software introduced in the TILT program were now part of classroom life for Di and Robyn would probably have had a disappointing result. It would miss the richness that both participants felt they had gained in learning from the program. It could be a measure of ‘success’ in achieving the particular aim of classroom use of technology, which could be important information, but it could not be considered as a measure of teacher learning.

6.11 Concluding remarks

In this chapter I have discussed what seemed to be major events in Di and Robyn’s learning and attempted to explain this learning from a framework I have called cybernetic. In the process of this examination I have tried to explain my view of what learning is and why people learn, how learning happens and the role of communication and environment.

In the course of this explanation the assumptions underpinning a traditional change theory and teacher development view of successful change programs and learning have been discussed and compared with the assumptions underlying a cybernetic view of learning (Table 15). This new set of assumptions has been used above to provide explanations of learning that satisfy my research questions.
Table 15: Comparisons of assumptions underpinning a traditional change theory/teacher development view of teacher learning programs and teacher learning and the assumptions underpinning a cybernetic view

<table>
<thead>
<tr>
<th>Change theory/ teacher development assumptions</th>
<th>Cybernetic assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>All participated in…</td>
<td>the same program.</td>
</tr>
<tr>
<td>The program was…</td>
<td>an artefact with an identifiable boundary.</td>
</tr>
<tr>
<td>The teacher learning environment was…</td>
<td>constant for the duration of the program.</td>
</tr>
<tr>
<td>Learning arose from…</td>
<td>professional responsibility as teachers.</td>
</tr>
<tr>
<td>Learning …</td>
<td>occurred as a result of inputs from the learning environment.</td>
</tr>
<tr>
<td>The program taught…</td>
<td>what it was designed to teach.</td>
</tr>
<tr>
<td>Emotions were …</td>
<td>identifiable and implicated in learning.</td>
</tr>
<tr>
<td>Program implementation …</td>
<td>success measured by content in use in classroom.</td>
</tr>
</tbody>
</table>

Chapter seven discusses the conclusions that follow from the above debate. It summarizes the grounded theory and provides recommendations that flow from the key principles that make up the grounded theory.
Chapter 7

Conclusions and recommendations
The study at a glance

Chapter 1: What is learning? Why do people learn? Why do they learn this (and not something else)? How does learning happen? What is the role of communication and environment? What do teachers learn in TILT

Chapter 2 Part 1: Research context: Change theory literature

Chapter 2 Part 2: Socio-political context: TILT development and implementation

Chapter 2 Part 3: Research context: TILT research

Chapter 3 Part 1: Systems
- Co-ontogenic structural drift
- Change and survival
- System/environment thinking network

Chapter 3 Part 2: Languaging and emotioning

Chapter 4: Methodology

Chapter 5 Part 1: The TILT program setting

Chapter 5 Part 2: Di and Robyn's learning in TILT

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Chapter 7: Conclusions and recommendations

7.1 Summary

Table 16 presents a summary of the research project’s guiding questions together with the assumptions relevant to each question in a cybernetic framework and in a traditional change theory/professional development framework with an example of supporting literature.

The summary shows up some major differences in the assumptions underpinning work in each paradigm. Whereas traditionally it could be said that teachers undertake professional development out of concern for their work, viewed through a different lens this could be extended to say that teachers undertake training because in some way the lack of knowledge and skills has bearing on their survival, which will invariably include concern about the work context. Within the professional development tradition one may also assume that a professional development program teaches what it is designed to teach. Viewed through a cybernetic lens it seems that the program does not ‘teach’ rather participants learn whatever fits with their life history and can be anticipated in some way by them. Moreover through this cybernetic lens it would appear that learning is triggered by the environment rather than there being direct inputs from environment through the senses to brain and thence to storage in memory. In the case of the TILT program the facilitator is part of the environment. This view in no way diminishes her role as teacher. As a well prepared and skilled teacher the facilitator contributed to the construction of an environment in which what was to be learned had an optimum chance of being learned.

The framework developed in chapter three also looks at the role of emotions in learning. Whereas a more traditional view of change theory suggests that emotions are involved in learning, the view through a cybernetic lens suggests that the idea of ‘emotions’ could be better viewed as ‘emotioning’, as part of the lived stream of communication, which in turn is part of the environment influencing and being influenced by the emotioning of others.
<table>
<thead>
<tr>
<th>Research question</th>
<th>Cybernetic explanation</th>
<th>Cybernetic literature</th>
<th>Traditional explanation</th>
<th>Change theory /teacher development literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>what is learning and why do people learn?</td>
<td>Di and Robyn’s learning arose from need for survival</td>
<td>Maturana and Varela’s (1987) notion of ‘co-ontogenic structural drift’ Learning is living</td>
<td>Di and Robyn’s learning arose from political pressure to change and their professional responsibility as teachers</td>
<td>political pressures (Fullan, 1982; 1993a; &amp; Hargreaves, 1997) Intellectual unrest (Turbill, 1993)</td>
</tr>
<tr>
<td>why do they learn this (and not something else)?</td>
<td>Learning fits with life history and will be anticipated in some way</td>
<td>Bateson’s ‘difference which makes a difference’ (1972:381) Brier’s ‘relevance for survival and self-organization…and therefore anticipated’ (1999:178)</td>
<td>the program taught what it was designed to teach</td>
<td>competencies and capabilities (e.g. Armstrong, 1991); checklists for school change (e.g. Scott, 1999)</td>
</tr>
<tr>
<td>how does learning happen?</td>
<td>Di and Robyn’s learning was triggered by the environment, there were no direct inputs</td>
<td>thinking system encompassing living system and environment (e.g. Brier, 1999; 2000; Jarvilehto, 1999)</td>
<td>learning occurred as a result of inputs from the learning environment</td>
<td>cognitivist view, the nervous system picks up information from the environment through the senses and the brain stores the information in memory (e.g. apprenticeship models (Tickle, 1994); Microsoft applications tutorials; the International Computer Driving Licence)</td>
</tr>
<tr>
<td>what is the role of communication and environment?</td>
<td>Di and Robyn learned in total system/environment thinking/learning system; emotioning provided the ‘readiness to act’ and changed over time</td>
<td>the whole body learns in communication with the environment (Sheets-Johnstone, 1999; Damasio, 1996; Núñez, 1999)</td>
<td>Di and Robyn’s emotions were implicated in their learning</td>
<td>checklists include affective domain (Kouzes &amp; Posner, 1999); change programs recognize emotions (Stoll &amp; Fink, 1995; Fullan, 1997b; Hargreaves, 1998) Emotional intelligence Goleman (1996)</td>
</tr>
<tr>
<td>program success</td>
<td>learning from program may be diffused throughout professional and personal life in idiosyncratic ways sometimes only loosely connected with the program content and processes and will continue over time as part of participant’s life trajectory</td>
<td>program implementation success measured by program content evident in use in the classroom or professional life</td>
<td>Fullan (1993a) referred to ‘partial success’ of change programs; the DET longitudinal surveys (Lum Mow: 1998, 2000 &amp; 2003) requested information about which T/L/T technologies were being used for professional and classroom purposes</td>
<td></td>
</tr>
</tbody>
</table>
In chapter four I quoted Strauss and Corbin’s description of grounded theory as:

one that is inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to the phenomenon.

(Strauss & Corbin, 1990:23)

The theory of learning presented here was inductively derived from a study of the learning of two teachers over nineteen months. Data were systematically collected and analysed and then deliberately viewed through a cybernetic lens rather than the, often undeclared, lens through which teacher learning is traditionally viewed.

The key principles of this grounded theory so constructed, are:

- professional development is a survival strategy
- learning is living, it is a continuation of life history, fitting with what has gone before and in some way anticipated
- learning is triggered by the environment, there are no direct inputs of information through the senses for storage in the brain
- the environment and communication as part of the environment form the living/learning connection for every living system
- learning is diffused, idiosyncratic, continues over time as part of life, and from an observer’s perspective it may be only loosely connected with the program of study

Each of these principles has consequences for professional development programs and practices. Together they have implications for the meaning of program success.
7.2 Professional development as a survival strategy

In the story I have told above I suggest that 'survival' in various guises is a factor in motivation to undertake professional development activities. If this is so then program presenters need to be aware that there may be a fairly high level of anxiety among any group of participants in a course. However survival strategies may take many different forms. For example being known at your school as an ‘expert’ may contribute to the way in which you interact in a workshop where there are other members from your school staff. Jenny’s point about a group of teachers from one school who all were put into the one workshop group illustrates this issue:

they all got put in the one workshop - which means they bring all the school power play with them - the school pecking order is directly transferred to the workshop. It’s much better to mix people up. They don’t have to bring their school persona with them.

(debriefing 9/3/99)

At a time when the trend is towards workplace learning there may be a good case to be made for inter-school as well as intra-school work based learning, so that teachers can interact away from their ‘school persona’ and the expectations of colleagues.

At a different level if governments want teachers to undertake training the proposed training will have to be seen by teachers as necessary for ‘survival’ as a ‘good teacher’ able to satisfy the needs of students and of the profession. This points to a case for teacher registration and ongoing accreditation requirements, developed in consultation with the profession to ensure relevance.
7.3 Learning as living: a continuation of life history, fitting with what has gone before and in some way anticipated

In order for participants to make good use of the learning on offer they need to know that what they are about to embark on will in some way connect with what they already know about the world, and that it is likely to fulfill a need that they, themselves, have identified. This requires easy access to accurate information about what learning programs are available, what content is covered, what processes are employed and what structures are in place to support learning. The importance of this is borne out by the TILT program that, the base data surveys indicated, took some time to find its intended audience. Initially schools sent along their computer experts because in the past all computer courses had been for those with an existing interest and some skills. Word of mouth, the program’s reputation, as well as a renewed effort to convey content and processes eventually resulted in reaching teachers with little or no experience in this area.

There is also a case to be made for beginning each course with a discussion of course content and participant expectations. Where there is a mismatch between content and expectations participants need to have time to consider withdrawing from the course without adverse consequences. In the case of online learning a pre-course teleconference or synchronous online discussion can serve this purpose. Where a group of teachers in a school or schools is drawing on pre-packaged materials to support their own work-based learning accurate information about the package is crucial together with a negotiated process for accessing and working through the content together.

If learning is part of living there may be little distinction between ‘in class’ and ‘out of class’ learning for many participants. If it is important to log the learning from a particular program of study participants may want to journal their ‘out of class’ learning for ‘in class’ discussion face-to-face or online.

At a different level governments need to express clear expectations of teacher knowledge and skills over the course of a career so that teachers can anticipate a career path and what they need to do in order to remain current and/or to progress.
7.4 Learning triggered by the environment: no direct inputs through the senses for storage of information in the brain

If learning is triggered by the environment and we connect with the environment in idiosyncratic ways according to life history and our anticipations then it will be essential to provide as wide a range of potential ‘triggers’ as possible and as many ways of connecting with the learning environment as possible. However it also needs to be recognized that participants may or may not learn from the environment so constructed, what it is that program designers wish them to learn.

7.4.1 A minimal and sufficient framework

Program initiators and designers need to be aware that their only possible influence on participant learning rests with the environment that they construct (note that environment includes all communication). To connect with diverse learners they will need to provide a range of content options, strategies and learning pathways to convey whatever it is that they hope to convey within any particular course. Moreover within each course they will need to provide multiple ways of engaging with the materials, a facilitator/mentor/leader and other participants.

For teachers and schools there needs to be ways to put together individual courses into a program of learning to meet local needs. In the case of online learning this suggests a data bank of options, accurately described, from which teachers may construct a personal or group program of learning. Whether online or face-to-face learning programs need to be provided within as broad and loose a framework as possible while meeting the bureaucracy’s need to be accountable for public funds and the need of the workforce for appropriate accreditation.

An accountability framework, for example, would be constructed around providing access to materials that teachers need in order to conduct their work and implementation strategies to ensure that all who need training have access to it. It would also require someone taking responsibility for whatever use of public funds is involved. If accreditation were to be a requirement then an infrastructure to deal with this would also be required.
However to provide teachers with maximum flexibility and access to learning when needed, the framework needs to be large enough to allow for teachers, and groups of teachers, to undertake learning programs of their own design (made up from combinations of available materials) and in their own or work time. These various combinations, illustrated in Table 17 have different implications, each requires sufficient infrastructure to support it but should be constructed with the minimum impact on flexibility for the learner.

### Table 17: Accountability and accreditation frameworks for development, delivery and access of teacher development programs showing range of training needs and purposes

<table>
<thead>
<tr>
<th>Development, access and delivery framework</th>
<th>Accreditation</th>
<th>No Accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accountability</strong></td>
<td>Role specific mandated courses; legal requirements; formal courses with cost implications (delivery; access; development).</td>
<td>Informal, locally designed learning program conducted either in work time, or out of work time using materials with cost implication (delivery; access; development).</td>
</tr>
<tr>
<td><strong>No Accountability</strong></td>
<td>Accredited training conducted in own time, at own expense.</td>
<td>Training conducted in own time, pursuing own learning agenda using materials freely available.</td>
</tr>
</tbody>
</table>

### 7.4.2 Program facilitators

Although this model suggests that learning is triggered by the environment and is therefore not necessarily what anyone sets out to teach, *teaching* is nonetheless important and a great responsibility. As part of the learning environment program facilitators, be they online, face-to-face workshop leaders, or a group of colleagues mutually facilitating each other’s learning are faced with the prospect that whatever they contribute to the learning environment may become part of the living/learning of others, and that they cannot directly ‘input’ any of their knowledge into an/other participant.
They cannot cause change. Instead they can contribute to a learning environment where whatever they wish to convey has a chance of being conveyed. Good facilitators will be those who have a range of options at their fingertips both for explaining concepts, demonstrating, modeling teaching strategies and relating to participants any one or combination of which may trigger learning.

7.5 The environment and communication as part of the environment forming the living/learning connection for every living system

The environment in which any learning takes place is one and the same as the environment in which living takes place. All we have access to, for our learning/living, is our inside whole body dynamic which arises out of our history of interactions over a lifetime (personal and professional) and the outside natural and built environment in which we are living and surviving with others at any moment in time. Our means of connection with this environment is communication in which the outside and inside are connected as one brain/body/environment living/learning system. Our communication in this environment, our manner of being, is part of the environment of others.

If this is so then constructing and maintaining the learning environment is an ethical endeavor; it is crucial work and in fact is all the facilitator and program designers can take responsibility for. They cannot be responsible for the nature of the learning that takes place because it will depend on individual life histories and ways of fitting with the environment provided. What they can be responsible for is constructing environments, face-to-face or on line that provide a range of ways of relating to artefacts and people. Maintaining relationships that allow people to communicate freely is part of the facilitator’s role. A good facilitator will be aware of the communication options made possible by the environment and sensitive to the ways in which communication - languaging and emotioning - as part of the environment supports learning.
Detecting the underlying emotioning of participants may be a difficult task when most teacher interactions are governed by social and professional expectations. However alerting participants to the idea of emotioning and its role in learning may be a useful strategy. The use of metaphor as an indication of their emotioning and ultimately of learning could be an interesting concept for some teachers. For example participants could be asked to record in a learning journal any metaphors they have found themselves using in reference to their participation in the course. They could also be encouraged to listen out for and share with a learning partner any metaphors they have heard the learning partner use. Changes in these metaphors over time can provide insights into their own and their partner’s learning.

The integral nature of learning and communication indicates that one of the ways to increase likelihood of learning is to maximize opportunities for communication with self and others in reflection. Both Di and Robyn mentioned the benefits of reviewing the workshops through discussion. They felt that they were reminded of things that they had forgotten. For Di it was also a means of rehearsing her learning about teaching and learning and reorganizing what she already knew about learning to make a fundamental shift in her notion of how learning happens.

Because different parts of the program will resonate with different people in different ways some, like Di, will need time to rehearse ideas and others, like Robyn, will also need time to rehearse know how. Time for both kinds of rehearsal should be built into a program. If communication is a whole body endeavor a range of ways of relating to the environment, a variety of activities, should also be provided.

7.6 Learning is diffused, idiosyncratic, continues over time as part of life, and from an observer’s perspective it may be only loosely connected with the program of study

The above discussion indicates that learning cannot be judged by the extent to which program content and processes are evident in teacher practice either immediately after the finish of the program or over time. This is so because what a participant has learned will be different for each participant and may be difficult for an observer to recognize or a participant to articulate.
However if the intent of a program is, say, to have teachers using a range of technologies in the classroom, then its ‘success’ in these terms may be judged by whether or not this is happening. This is different from commenting on the extent and nature of teacher learning and may account for why exit surveys can indicate enthusiastic response to a program and longitudinal surveys may show that only a small part of the program content is being implemented in the classroom (i.e. what Fullan (1993a) called ‘partial success’). Both may be true but they are different things. One is about teacher learning, some indication of which may be picked up by an exit survey; the other is about the ‘success’ of the program in doing what it set out to do and may be indicated by a follow-up survey specifically asking questions about implementation of program content.

For example Di and Robyn learned different things and allowed student access to the Internet for different reasons and purposes. However the end result was that they both began using the Internet in student learning. Program ‘success’ in this case may be judged by their use of the Internet, linked to the range of variations in the environment content and processes that allowed for two different teachers to connect with it in different ways. However such a measure of success would miss the richness of the learning that occurred for Di and Robyn. Thus it is possible to talk of a program’s success in achieving its goals however it must be recognized that this is different from any assessment of learning that can be linked to participation in the particular learning environment.

7.7 Implications for the learner, facilitator, program designer and the bureaucracy

As human beings we apparently have a great advantage over other members of the animal kingdom – we have complex language built on metaphor, and a sense of time. With these technologies we can reflect on the past and plan and hope for the future. But it seems to me, we can only plan and hope out of our history and into whatever we can anticipate as possibilities for the future. In the present we interact in communication with, and in, a milieu that includes other living systems. In our interactions we strive to maintain ‘a stable state’ through minute by minute decisions.
If the milieu in which we find ourselves is totally unknown and therefore unpredictable and in which we do not know the possibilities for the future we cannot hope and plan. If the milieu is too unsettling and we cannot find ways, from our past history, by means of which we can ‘fit’ we will ‘depart’ for another environment; this could be for example, by creating change in the environment making some part of it familiar (e.g. the ‘off task’ behaviour that Jenny made a decision to ignore), withdrawing into our thoughts or physically relocating.

According to the discussion in chapter six it seems that whatever we do arises out of our minute by minute decisions in communication with ourselves, the environment and other living systems. Whatever those decisions they cannot be otherwise at that moment in time, they cannot be ‘wrong’. This view of how the world works places a responsibility on anyone who views the world this way to act ethically because whatever we do or say is part of the environment and therefore part of the living/learning of other living systems.

Table 18 shows some of the implications that this view of the world carries with it for the learner, facilitator, program designer and bureaucracy.
### Table 18: Some implications of the key principles of this grounded theory for the learner, facilitator, program designer and bureaucracy

<table>
<thead>
<tr>
<th>Principle</th>
<th>Learner</th>
<th>Facilitator</th>
<th>Program designer</th>
<th>Bureaucracy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Professional development as survival strategy</strong></td>
<td>realize that you may feel some anxiety on undertaking a program of learning; realize that others may feel the same way; don’t feel that you should always opt to work with colleagues, it may be better for you to work with a new group of teachers;</td>
<td>participants may arrive with some anxiety, this may manifest in different ways; acknowledge that you understand that this may be so; it may be good for participants not to work with colleagues from the same school;</td>
<td>develop a comprehensive and concise summary of course content, structure and processes for publicity purposes;</td>
<td>understand that people will participate in learning programs if they perceive a need, and are more likely to participate if their view of themselves as professionals and as educated and skilled citizens is enhanced through participation; ensure opportunities for inter as well as intra school work based learning;</td>
</tr>
<tr>
<td><strong>Learning as living: a continuation of life history, fitting with what has gone before and in some way anticipated</strong></td>
<td>make sure you understand what the program can offer; make sure that the content and processes interest you and are important to you in some way; don’t be concerned if you find parts of the program interesting that others do not and vice versa; take responsibility for your learning;</td>
<td>take time to convey or negotiate course content, structure and processes; allow participants to withdraw from the course ‘without prejudice’ if they find it is not what they expected;</td>
<td>build in an initial online, teleconference or face-to-face session for discussion of content, structure and processes;</td>
<td>plan a publicity and information strategy that provides accurate and comprehensive information about course purpose, content, structure and processes; ensure that this is easily accessible to all teachers;</td>
</tr>
<tr>
<td><strong>Learning triggered by the environment: no direct inputs through the senses for storage of information in the brain</strong></td>
<td>don’t be concerned if what you learn from a program is different from what others learn, it cannot possibly be the same; don’t worry if you don’t ‘get it’, ask for another explanation; take time to think about and talk about ideas and practise skills;</td>
<td>offer a range of options for working through the content of the program; present materials in a range of different ways including discussion and step-by-step guides to know-how; know that everything you say and do is part of the learning environment of your participants and will have some effect on learning, this is a great responsibility; recognise that all you have control over is setting up and maintaining the learning environment, of which you are an important part;</td>
<td>build a program framework that provides content options and allows within it multiple learning pathways so that program content can be accessed in many different ways; in writing materials consult and trial widely to ensure multiple ‘triggers’ for learning;</td>
<td>Provide a program infrastructure to support multiple learning program options based on need; within the infrastructure provide multiple access and support options;</td>
</tr>
<tr>
<td>Principle</td>
<td>Learner</td>
<td>Facilitator</td>
<td>Program designer</td>
<td>Bureaucracy</td>
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</tr>
<tr>
<td>The environment and communication as part of the environment form the living/learning connection for every living system</td>
<td>take time to think about and talk about ideas and practise skills; document, or ask a learning partner to document, your use of metaphors related to your participation in the program, they may reveal your underlying stream of ‘emoting’ and help you understand the process of your learning; know that whatever you contribute to the learning environment, by being there, is part of the learning environment of others and has an effect on their learning; this is a great responsibility.</td>
<td>know that everything you say and do is part of the learning environment of your participants and will have some effect on learning, this is a great responsibility; recognize that all you have control over is setting up and maintaining the learning environment; understand that communication is part of the learning environment so you will need to develop skills in maintaining communications that you feel will support the intended learning; provide time for reflection as communication with self and others build in reflection and discussion time; build in multiple ways of communicating with the program environment including other people; recognize that the ‘voice’ you adopt in any texts is part of the learning environment and will have an effect on participant learning;</td>
<td>build in reflection and discussion time; build in multiple ways of communicating with the program environment including other people; recognize that although ‘success’ of a program may be discussed in terms of classroom uses of the content addressed by the program this may bear little relationship to the learning that has arisen in individual learners; recognize that if the course content is not transferred to classroom use it may indicate that the program was too tightly focused and did not allow room for teachers to find idiosyncratic ways to fit with the learning environment</td>
<td></td>
</tr>
<tr>
<td>Learning will be diffused, idiosyncratic, loosely connected with the program and continue over time as part of life</td>
<td>don’t expect to put all new ideas into practise immediately; expect to continue building on your learning.</td>
<td>don’t be disappointed if participants haven’t learned what you think you have ‘taught’; participants will build knowledge out of their life history and the environment.</td>
<td>recognize that all information and communication concerning the learning environment is also part of the learning environment; recognize that the environment you provide for program development is part of the development and so part of the learning of all who are associated with the program; provide time for building relationships through communication;</td>
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</table>
7.8 Postscript

In undertaking this research project my own journey has mirrored that of Di and Robyn. My learning context has changed considerably over the research period. In 1999 the TILT program won a further round of government funding and grew rapidly. The NSW DET went through several restructures, each one impinging in some way on the program and on my life. My job changed to include management of several Commonwealth funded programs. Meanwhile my reading and writing in the area of cybernetics introduced me to people and ideas that I would not otherwise have come across.

As I have noted previously my early interest in emotions led me to consider various methodologies that I now find embarrassing. As I mentioned earlier this is not unlike Di’s comments in the margins of my reports of her learning over the course of the project. When she said “I can’t believe I said that” I knew how she felt. It is for this reason that I have reported the blind alleys I traveled down on my way to here. To write this report as though time had stood still while I undertook my study, and as though I had known from the beginning what I know now would not have been true to what I want to say about learning and the learning environment. My own learning can be detected along the way not least in my writing of the results in chapter five where some shift in assumptions can be seen but not until I reach chapter six have I fully recognized and examined this shift.

After all the messiness and upheaval of learning I now believe that the only environments that exist at any moment are the inside learning environment of the living system, which has been shaped by the living system’s history of interactions, and the immediate outside environment with all that it affords. The only possible learning that can occur is learning contingent on these two environments as the living system fits with the outside milieu and through communication with artefacts, self and others reorganizes its internal ‘gnolocopoeia’ until once again comfortable with its world.

I can only say that the generosity of those I have ‘bumped up against in my world’ along the way has provided me with infinite pleasure. I take full responsibility for what I have done with their generosity, what I have learned, and can only hope that, along the way, I have left behind something worthwhile for others.
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Appendices
Appendix 1

Classroom observations

Sheldon North Public School

1/11/99

Kindergarten

The two Kindergarten classes work together for much of the day in their large, light and airy double room. There are thirty-two children in the two classes together. One wall of windows looks out onto the playground, windows along the length of the opposite wall open onto a verandah. The partition between the two rooms is permanently drawn back. At each end of the double room is a blackboard running much of the length of the wall. The classroom door is to the right of the blackboard with a door to the store room to the left of the board. Above the board are signs saying ‘sounds are fun’ and ‘numbers are fun’. Across one corner of the room hang spiders’ webs and witches and cotton wool. Under the window overlooking the verandah is the play house equipment (a dresser, babies cot, small blackboard and easel). The teacher’s desk is next to this. Under the window overlooking the playground are kept the pencils, scissors and glue and assorted other craft equipment. There are also three Macintosh computers. Paintings of zebras and coloured cellophane ‘leadlights’ decorate the windows. From the ceiling hang hoops. One with faces suspended from it and the other with clouds.

The tables are arranged in one large block of six, seating eleven children, two blocks of two seating four each and another block of three tables with chairs for four children.

11.33

It is a practical maths lesson. The two groups are standing in a circle. They are playing ‘zap the number 20’. They count around the circle until they reach the number 20, the twentieth child must say ‘zap’ and sit down. This is repeated with odd and even numbers (the odd numbers must sit down).
11.52

Coloured paddlepop sticks are tipped onto the floor in the middle of the circle, ‘I’m going to add another one, how many?’ (children call out the number) ‘Now I’m going to add another two, how many? (children call out the number again). ‘That’s plus two.’

The children count together in twos by even numbers.

12.02

The teacher demonstrates making repeating patterns with the coloured sticks. She asks the children to take ten sticks each (all of one colour).

12.10

Teacher, ‘All the boys with green sticks find a girl who doesn’t have green sticks to be your partner. All those with pink sticks and no partner stand up.’

In this way all children eventually have a partner with different coloured sticks.

12.12

The children move with their partner into a space and begin making repeating patterns on the floor using the coloured sticks.

12.20

Many of the patterns are not linear as the teacher’s example had been. Some have made squares with two sides one colour and two sides another colour. Two girls are wanting to make a series of Hs (‘huh, huh, huh’). Both teachers walk among the groups asking about the patterns.

12.25

It’s time to pack away, the children put their sticks back in the box.

Lunch

1.45

The children arrive back in the room. They sit all together on the floor.

1.52

The teacher explains to them that the playground will become a Kindergarten to Year six playground from next week except for one ‘safe haven’ for Kindergarten down near the Kindergarten classrooms.
She says that this week she will take them on some walks to explore the other parts of the play area and show them the places where they are not allowed to go. There will be red lines on the ground past which they are not allowed to go. One child wants to know ‘what will happen if there are big people and they say mean things to you?’ The discussion goes on for another few minutes.

1.58

Teacher: ‘Look Mrs P-S has some exciting things for you here.’
Cheryl holds up an A4 paper with ‘All about Ice cream’ on the heading. A child says, ‘Ice cream comes from cows.’
Cheryl ‘Why do you say that?’
Cheryl: ‘When I was a little girl my mother used to make ice cream. We could make ice cream. I’ll have to ring my mother and see if she still has the recipe. What is the main ingredient in ice cream?’
Children: ‘milk’
Cheryl: ‘And where does that come from?’
Children: ‘A cow.’
Cheryl: ‘And how does it get in the cow?’
Children: ‘cows eat grass.’
Children: ‘the farmer milks the cow.’
Cheryl: ‘How does the milk get into the ice cream cone? What are those things called that are made with milk?’
Children: ‘Dairy foods.’
Cheryl: ‘If it was a hot day what would happen?’
Children: ‘It would go off.’
Cheryl: ‘What type of truck do you need to transport this in?’
Children: ‘A refrigerated truck.’ …‘so it wont thaw.’ ‘I’ve been to a milk dairy.’
Cheryl: ‘See these little canisters here – was it like that?’ (pointing to a drawing one sixth the size of the A4 page) ‘These are all jumbled up. Which ones will go first? The cows eating the grass? The man milking the cows? The truck going to the ice cream factory? Mrs ?? has put these in order for you – you’re going to number them. Go through with the children which comes first.’

Cheryl talks about how to glue the pictures into their books (‘a little smear in each corner.’) ‘You need to write the order and the right sequence there’ (pointing to a line on the page).

‘Paper people?’

Two children take the papers and distribute them onto the tables in Cheryl’s room. ‘Anyone not know what to do?’ ‘Put a little number on them first. I’m looking for correct numbering, careful pasting, careful colouring. Anyone who gets those three things will get a green card today.’

One boy writes numbers one to six on the page of his book, he sticks the pictures, which he has already coloured, onto the page first below the number four, five and six and then above the numbers one, two and three.

Cheryl: ‘When I’ve marked your work put it away and make sure your table is tidy. Put all your scraps in the bin. Stand behind your table. When your book is away get your reader for tomorrow and put it on your desk then sitting on the floor and I’m going to read you one of my favourite stories. Let me see my green card people. Stand up if you do not have your reader for tomorrow on your desk.’

Cheryl shakes her fingers, all the children shake their fingers. Cheryl reads Jeremy’s Tail at the front of the group

The bell goes to mark the end of the school day.

‘Good afternoon everyone. Now I’m going to see how grown up you are. Make sure you take your lunch box. Tomorrow is Tuesday what do we need tomorrow?’
Sheldon North Public School

5/4/00

Kindergarten

As in 1999 the two Kindergarten classes work together for much of the day in their large, light and airy double room. There are 34 children in the two classes together. One wall of windows looks out onto the playground, windows along the length of the opposite wall open onto a verandah. The partition between the two rooms is permanently drawn back. At each end of the double room is a blackboard running much of the length of the wall. The classroom door is to the right of the blackboard with a door to the store room to the left of the board. Under the window overlooking the verandah is the cubby house equipment (a dresser, babies cot, small blackboard and easel). Above this stuck on the window are photographs of the children taken with a digital camera. Underneath each picture are the sentences: I am a _______. I am ___ years old. The children have filled in the missing word and number. The teacher’s desk is under the window opposite. Also under the window overlooking the playground is a television, audio cassette player and three Macintosh computers (Power PCs) and a colour printer. In one corner of the room is a large stand with the words Welcome to Letterland across the top. Beside it is a large golden throne.

The tables are arranged in four large blocks, two in each half of the double room. The children are cutting out cat masks on the floor (except for the eyes which must be done at home with adult help). One table is set up with green paint for painting a large stenciled frog, another has play dough and two tables are being used by children cutting out small stenciled paper fish and colouring fish bowls.

10.05

‘I’m making a toad.’

Cheryl: ‘Just put lots and lots of green, children.’

‘I coloured in the eyes.’

‘I saw two frogs at my grandma’s house.’

As the children finish painting their frogs they take off their painting smocks and choose someone else who still has a smock on to go next to the painting table. In this way they can be sure everyone gets a turn.

Activities continue, children work at the appropriate table depending on their activity.
Mrs M: ‘Oh look I’ve found a frog without a name, where’s it going to go?’

Children in chorus: ‘In the bin.’

Mrs M: ‘Quick put a name on it. It’s pack up time.’

The children crawl across the carpet picking up every scrap of pink (cat) cardboard.

Cheryl: ‘Vacuum cleaners – I need some vacuum cleaners over here. I’m going to give out some cards.’

The children move more quickly to the tables to help pack up.

Several children are chosen for green cards.

Cheryl: ‘Come and find your name card and put it back on your table. Children like this (arm in air, clicking fingers) when you’ve found your name card.’

Cheryl begins a clapping rhythm and the children gradually join in as they assemble on the mat: ‘Do you remember the song about Alice?’

The children say they do and join in as the teacher begins to sing: ‘Alice fell in the bathtub.’ This is followed by ‘I’m a bow-legged chicken, I’m a knock kneed hen’ with the children performing the actions moving around the room.

Cheryl: ‘Maybe we could do the song about the rat.’

Mrs M passes to Cheryl to do the ‘No Rabbits’ chant.

10.57

Those with two stars stand up and go. Hands up if you have one star, those people go and get their morning tea. Those people are all trying.

11.00

Morning tea
Welcome Mrs Brent and 3B  
Room 21/11/99  
Study Hard and Progress Well

The classroom is entered through an anteroom between 2 classrooms that may previously have been used for coats and bags. Now it serves a dual purpose of wet area immediately inside the door (with a sink between the two outside doors - one door adjacent to Di’s classroom door and one adjacent to 3D’s classroom - both opening from steps leading up from the playground area) and a carpeted area just beyond the strip of lino. The carpeted area is home to 6 networked computers (3 against the wall adjoining Di’s classroom and 3 against the wall adjoining 3D’s classroom) and two printers. The walls are decorated with instructions on using the computer and lists of useful websites. A large sign says that children must remove their shoes before walking on the carpeted area. I notice that they all do so.

There are windows down either side of the classroom and a large explorers display and Treasure Island maps decorating the end wall next to a display of Escher drawings. The blackboard is opposite the explorers along the wall to the left of the door with the teacher’s desk and chair at the far end of it in front of the store cupboard, and below the clock. The clock is an hour behind because daylight saving ended over the weekend. The class votes to leave it that way for the day. Under the blackboard is a poster showing a dog fetching the paper with the words ‘It’s OK to be smart’. Another poster says: ‘The trick about life is to make it look easy.’ Above the blackboard are the class rules:

Listen, share, play fair
3B Helping each other to achieve our best.

The blackboard is covered in messages, lists and reminders. On the left are the tasks for the day: weekly review; contract time; spelling pretest; homework review; maths and extensions; contract time. Under this list is the daily contract: reading/writing task; insect drawing; handwriting. A packet of seeds is pinned to the board just below this list, with a sign and an arrow - plant seeds. Jesse and Joshua have ‘green cards’ underneath are the words Action, Diary, Action. Under the second Action is the instruction: put note on gift for adopted soldier.
Clay busts line the window ledge on the playground side and a large Chinese Dragon on a stand is secured in front of the window display between the row of shelves under the window and the bookcase just behind the door. The shelves are labelled Art Challenges; Writing Challenges; Maths Challenges. A science table at the far end holds rocks and shells with a magnifying glass for examining them.

Under the opposite window in the back left corner (just under the Treasure Island maps on the back wall) is a piano, played during recess by one of the students with several others looking on. A fishing net hangs above this window for half of its length holding three dimensional ‘escher’ shapes. Beneath it is a table with an ‘Energy’ display of student made circuits with batteries and switches. At the blackboard end of the window above the teacher’s desk the sill is full of curriculum and syllabus documents, administration folders and student work, assignments, spelling tests, journals.

There are fifteen desks in the room arranged in five blocks of three. Three blocks are positioned in front of the explorers at the back of the room and one at each side in front of them, leaving a large space in the middle for communal gatherings. Each block of desks can seat six students.

There are 28 students in the class. They come from schools across the district to spend a year in Di’s gifted and talented class. There are always far more applicants than places. For Maths and problem solving Di takes an extra 10 students who just missed out on joining the class.

On the day I visit the class is concerned with collecting gifts for soldiers in East Timor. There is a large collecting box at the front of the room.

9.00am

‘Three, two, one.’ Silence. ‘Into a circle on the floor everyone, into a circle without fuss.’

‘Now our priority is to get our care box finished. One box is nearly full already and my mathematical mind tells me as I look around that the volume of the stuff here will exceed the capacity of the box. We’ll look at what we’ve got. Why might we look at what we’ve got - the things that we’ve got?’

‘We’ve got doubles of magazines and pencil sharpners.’

‘We probably have enough to do two care packages.’
‘Why not do partner packs?’
‘Tell me more, what do you mean?’
‘Two people can do a pack between them.’
‘Let’s do a PMI [Plus, Minus, Interesting] on that.’
‘Positives?’
‘More soldiers will benefit.’ ‘No double ups.’
‘Minus?’
‘One person might not bring enough.’
‘Interesting?’
‘Lots of little packages, we’ll have to carry lots of things to the post office.’
‘As the box getter that might be a minus for me. We might run out of string.’
‘We might run out of wrapping paper.’
‘Jed, go and estimate how much string we’ve got.’
‘Instead of pairs we can do it in groups.’
‘Oh, tell me more. That’s an interesting thought. Picking up on Beth’s idea of pairs we could make it larger groups.’
‘But we have an odd number of people in the class.’
‘What number can divide into our class size?’
‘There are actually 28 people because Brad’s back but he’s not here, he’s probably jet lagged.’
‘If it’s 27 we can divide into groups of 3. If it’s 28 we can divide into groups of 4.’
‘What other number will go into 28. Seven? How many times?’
‘Two goes into 28 how many times? Count in twos.’

9.10
‘You’ll have to think about how you want to do it by the end of the day and let me know. Jess can you steady.’
‘Put your hand up if there is anyone interested in checking the web site for our Australian Soldiers in East Timor. Can you check to see if the Internet is up today. Who thinks it will be? Thumbs up. Who thinks it might be down?’

‘An action today for everyone is to write a gift tag saying why you’ve chosen that gift. Some are to share with a friend, some are to give to an East Timorese child.’

9.13

Boy returns from checking the Internet. ‘Four are up and two aren’t.’

‘Can you try to get them all up?’ ‘Can you take this web site address to next door?’

‘I’ll put this address up here on the board for anyone to copy down so that if you have the internet at home you can check it there.’

‘Your sound poem, remember that is to be word processed. Remember? But because the Internet is up we’ll use that for the soldiers’ site and there’s one on the constitution debate I want you to check. Word processing people we’ll try and get you into the computer lab across the way. You two go and check if it’s free. Your disk won’t work in the computer room machines so you’ll have to do the sound poem all at once and print it out. Quick fingers on that one.’

‘Beth what’s the story on the computer room? It’s locked? Right I shall have to see if I’ve got my key.’

‘Contracts off you go.’

The sound waves charts fall off the wall.

9.25

Children disperse to desks. ‘Put up your hand if you are doing the sound poem. Raff and Bing take that key and open the computer room. Remember I said the computers in that room are different from our computers here so it will be a quick job. Fiona is going to make sure the printer is on then you will write this is a test and check that the printer is working because if it isn’t it’s a waste of everyone’s time.’

‘Who do I thank for this good idea of pegging the sound waves up here [on a string over the window]? What a good idea?’

‘3B, Life’s little time management tricks [waving small book] I’ll leave it here. It’s really for adults but a lot of the things we’re doing here are in this book. Making a list etc.’
‘3B I’m checking the people in the computer room. After your ship drawing you can go and do the internet search.’

‘It’s not working. It looks as thought it is but it’s not.’

‘You can use those machines for word processing then.’

The computer room is at the end of the balcony passed 3D’s classroom. There are 16 Macintosh computers in the computer room four of which look quite old and are not working. Four not switched on are Performa 5260s. The eight networked machines that are on are Perfoma 6200s. There is a printer on a trolley in the middle of the wall opposite the door. The room is dark, it looks like two walk-in store rooms made into one room. The students have their sound poems already written out. They are there to word process and desk top publish.

9.23

Di comes into the computer room to check on her students. There are more fonts here aren’t there. Just do a check on the home keys everyone. I want one font and size for the top, one for the body of the text and a different one for your name. Show me your home keys, let me check. Go upstairs and downstairs from there. Try and use home keys.’

9.34

Di leaves. ‘Yell out if you want any help.’

There are 6 students in the computer room.

‘What font did you use for that?’

‘Scribble.’

One boy is trying out fonts for his poem: Household Sounds.

He writes: ‘Early in the morning When I first wake up I hear the sound of the keys on my dad’s computer.’

‘We have to hurry.’

‘How come you didn’t want to do what your mum said when we come to the door?’

‘I sang.’

‘Who sang Old McDonald had a farm?’

‘I was supposed to be Dracula but my make up came off.’
This was a conversation about a Halloween party at the weekend while some typing went on - hunt and peck with one hand.

Opposite the door a girl was helping a boy, ‘now highlight all of this.’

‘What are you doing?’

‘I’m not doing anything. I don’t know what I’m doing.’

9.50

A girl brings the teacher in.

‘Oh what the problem is is that you’ve gone back to left hand justification instead of centre. Now if that happens again - Bethany you had text on there what happened to it?’

‘I don’t know.’

‘Okay what’s your title? Are you all right Victor? Have you done a spell check? That heading is not centred. Highlight the block up to centre. Still not centred, use the whole of the page. How else can you change it? Use the computer to use up more of the page. Try changing the size. What happens? Fourteen? Maybe higher? Beth can you make this centred? Scot can you have both hands on the computer you’re only operating at 50% I know it’s challenging. I’ll be back.’

Leaves the computer room. ‘The kids are pretty good I can leave them here to get on and it’s close to my room. If I was upstairs I wouldn’t be able to do this.’

9.55

Beth, ‘It’s not working. How do I do it? How did the size jump to 36? It keeps going to 36 and changing font. What font do you want?’ A girl comes over to help, she presses random keys. The boy near the door who was asked to use both hands is now using two hands.

‘What’s that ‘t’ doing there?’ They all gather around the girl’s computer laughing. ‘That’s not how you spell shade.’

10.01

‘Do we print after spell check?’

‘Yes.’
Small group of 6 students and a teacher come into the room for a reading lesson. They sit on the floor at the unused end of the small room. They usually use this room for reading because they don’t have a room. The teacher asks Di’s students to work in silence so as not to disturb the reading.

10.04

Di arrives to check on her students. The boy near the printer finishes and prints.

‘Beth can you type harder and faster, get the word processing done first.’

10.05

Di goes back to her room and the children work in silence as requested. A girl types to the tune de de de de da, da da, da da.

Children print out their poems

10.10

Back in the classroom. ‘Here’s an action for today. Who wants to take this one forward today? Find Mr Nicholson and ask if we can have a disk to install more fonts on those machines here because the ones in the lab have many more fonts than those ones here. Two boys go out.

10.13

The two boys return from Mr Nicholson saying they can’t have the same fonts on these machines because they are not Macintosches. Di removes the action from the blackboard list of actions for the day.

10.15

In the minilab a girl is experimenting with font sizes.

10.17

Di briefly checks on the lab along the verandah, then back to the classroom. Another girl takes off her shoes and joins the mini lab group. Di says that before she begins she must check that her fingers are on the home keys. The children are very quiet. The girl sits at a computer, opens Clarisworks and names her file.

10.22

Down the verandah one of the girls is typing the second line of her poem. She has been experimenting with fonts and sizes. Di is outside the room talking with a colleague.
Back in the classroom five children are stretched out on the floor, their heads on the cushion snake, reading. Fifteen children are at their desks working on a variety of tasks.

A message on the board reminds them of the priorities for Term 4 Week 3:

Magazine contract
Shape poem
Sound poem (word processed)
Ship drawing
Internet
Escher tessalation page
DEAR (school novel)

Two boys talk to me about their work.

We use computers more now than before
We use them at least once a week when we need to do something
Mrs B picks one table then the next then another one
Mostly we use them for word processing and the Internet
When there’s something interesting on Mrs B asks us to use the Internet - like East Timor.
We search the channels like ABC and channel 10.
When we’ve finished all our work we can sometimes play games, like at the ABC site there are games

Di is talking to a group about communicating with signs. The children offer suggestions ‘like in an aeroplane with bats’ ‘flags, smoke’ ‘sign language’. You can use satellite, telephone, fax, computer email, writing or a clock - using clock numbers for directions.

Di calls the class to order. Eye contact 1-2-3 ttt, tf.
You are doing table work, helping others around you to achieve their best too. Your table will benefit from your help.

10.55

All are now on the floor. Di talks about the importance of writing practice.

Di: Until the bell we'll use the time wisely and do a homework check. Don't faint when you see the amount of paper.

These are so beautiful I'm going to give them back to you [assignments]. Di asks the students to decide on who will get an award for their assignment. She knows they will find it hard to decide who gets an award and might appreciate the difficulty of this task for teachers. They each have to give an award to another student by the end of the week.

Di: 1-2-3- sitting down.

10.59

the bell goes

11.00

a boy plays Silent Night on the piano.

After recess is the advanced maths class and the room becomes overcrowded so I leave.

12.32

Spelling pretest. metal - middle - minute

Di interrupts the test: 1-2-3-4 are your feet flat on the floor; 5-6-7-8 is your back nice and straight; 9-10-11-12 is your pencil correctly held.

Ben you seem to be really off task today, not your usual self.

screw - bathing - shoulder
goovenor - nephew - fool - connect

valley - view - vale

coin - complete - contents
government - stoop - coconut
bathe - goose - although - understood (Di reminds them that this is a compound word)
crew - bathers - hoof - altogether

Mark your own test

12.42

Di: I'll give you three to get ready. Di reads the spellings out. The children mark their papers with a coloured pencil. A boy asks if he can close the window. Di assures him he may, he doesn't need to ask. As she reads out the spellings Di moves around the room looking over shoulders. ‘Are there any words that you would like some help to try to remember?’

Raffi: ‘connect’

Di ‘con-nect people usually have trouble with the double n’

Dan: ‘Secretary’

D: ‘which bit’

Dan: ‘the tar bit’

Di: Do you think that somebody who puts all the tar on all the roads needs a secretary to help them? Usually with this word it’s the ary bit that’s the problem.’

Ch: There's secret in it

Di: Anyone who doesn’t know what a secretary does?

Di explains then offers a way of remembering the spelling: ‘ary is a secret secretary. Any other words you might like to have a bit of support for?

Jessica: altogether.

Di: which bit is tricking you? It’s not a compound word. [to the class] Can you think of a way to help her remember there’s only one l

No one offers any help and Di moves onto the next word. She notices Jessica is looking upset.

Di: Jessica you’re not happy with that - we didn’t get back to you - noone can help you with that one.
12.52

They move onto mischievous Di suggests they look at it for ten seconds and take a photograph with their eyes, she then asks them to write it down. If you got it right put your book away. If you got it wrong you have fifteen seconds to use all three levels of your thinking to remember the word - ttt - tf - on the floor.

12.55

Di: Listening - talking about thinking - looking and knowing. We can see the same thing and learn different things from it. We can look and not see. Focus. Focus means what? It means undivided attention and eye contact. Channel all your energy, use your eyes, ears and all your senses to help your thinking, you’ll be far more effective.
Di’s Room 5/4/00

The sign on the door says:

TURN BACK
OR BE PREPARED TO ENTER AT YOUR OWN RISK
There’s no escape exit!
WARNING........
You are entering a wonderfully
whacky ideas room where ideas bounce
around the walls daily!
Beware......

This is a think tank and brains get stretched here!

It's 8.30 and a child comes into the room carrying an elephant made of newspaper and a poster on a large sheet of paper. Di tells him, 'this is clear I can understand this.' The poster is late and the boy had been concerned that it was not like everyone else's. The day before he had quietly told Di that he had done a mind map instead of a poster like those on the wall made by the other students. Di tells him his mind map was a good idea.

And the day begins....

During the eight weeks of the term (and of the new school year) the students have completed a number of major projects including an assignment on endangered animals. This began as an in-class research project on Australian animals. The purpose of the in-class assignment was to model 'doing an assignment'. Its focus was on neat handwriting; information gathering; layout and design (headings, borders, colour, shapes, illustrations). Students were to use the Internet, CDROMs and books. Di took them through this step by step.

The project widened into one covering endangered species worldwide to be completed at home as an assignment. However, students were provided with scaffolding to assist them. Students were given a time line and daily prompts from Di that alerted them to where they should be up to in their work.
The classroom is much the same as last year, only the students’ work has changed and the objects displayed on the science table. Instead of busts along the window ledge it is filled with model bridges made from cartons, empty drink containers, coat hangers, polystyrene, string and paddlepop sticks. Some such as the Harbour Bridge and the Anzac Bridge are recognisable. Hanging in front of the windows at both sides of the room are the projects on endangered animals. On the back wall in the centre is a large (child painted) map of Australia with states and territories marked and capital cities. Beside it are the original projects completed in class.

The desks are arranged in two long blocks one at each side of the room and in front of each block two, two-seater, desks have been placed. There are 25 children in the class, almost twice as many boys as girls. Another 10 students join the class for mathematics. A long beanbag snake is coiled up at the back of the room. Later it is pulled out and arranged snake-like (resembling a letter S) on the floor. Children lie down with their heads on the snake to read or be read to.

9.00am

Students enter the room and put their chairs down. They gather on the floor to hear members of the class present their projects. Chi is the first. He shows his elephant and poster.

Di: When Chi did his project he brought other knowledge with him. Remember when we did mind maps? Well Chi did his as a mind map. He made it EXPLICIT and CONCISE [these two words are on the board in capital letters, Di has been discussing them]. It’s not as big as everyone else’s but when I look at it I can see all the learning. Now Chi project your voice and read it to us.

Chi begins in almost a whisper: I put a border round it..... (he continues for about 30 seconds).

Di: I’m going to have to stop you because the number one thing about talking to a group is to check your audience. And I think for most people this will be very hard to hear. Stuart at the back is moving forward - a good audience response. But Chi is going to have to strain his vocal chords.

Chi: Then I wrote the heading, then I put part 1 and part 2.

Di: That’s good he thought how it was going to be organised. Now I’m going to push you a bit today because I think there are people out there who wont be able to hear you.
Ch1: You said to put it on cardboard

Di: Yes, we had a highlighter pen, we were looking for key words [in the assignment instructions] the important things - maybe you didn’t hear that bit Chi. It’s fine to make a mistake. It’s only feedback, we won’t do it again. Now show us your elephant. Tell us how you did the body.

Chi: I crunched some newspapers inside and folded another piece round it.

Di: How did you make the trunk because that looks like a different technique.

Chi: I got another newspaper and folded it over and over.

Di: And what about the ears they’re different again.

Chi: I cut them out.

Di: What was the biggest problem?

Chi: The legs.

Ch 2: Does it balance?

Di: Your ahead of me. I was just thinking of the mathematics of that. It balances. Thinking mathematically the proportions are important.

9.13

Di: How did you fix the legs on? When you attach a cylinder to a flat surface you have to support it all the way round. Give him a clap please. Put your elephant somewhere safe - there’s a place at the back there.

Di: Rightio steady as a rock 1-2-3. Adam’s turn, he’s made a game about Mountain Pygmy Possums. Why don’t you put it up here [on the blackboard ledge] and then talk to it. What are those?

Adam: evolutionary chance cards, I’ll read some: ‘greenhouse effect reduces habitat go back 3 spaces’; ‘have 4 babies go forward 3 spaces’; ‘run over by a car go back to start’; ‘eat lots of bogan moths go forward 3 spaces’. And I’ve got these fluff balls and my mum stitched buttons on the bottom of them so they’d stand up - they’re the pygmy possums.

Di: What was the biggest challenge? What was your media, what did you use? Felt tip pen?
Adam: This giant ski slope takes you right down here. Each of the squares represents the bogan moths, when they've got up to here they've eaten so many moths they hibernate.

As Adam takes his game to the table another boy, aside, asks him the scientific name for Mountain Pygmy Possum. Adam tells him and from the name they deduce that the Mt Pygmy Possum must be related to the animal the second boy had chosen to write about.

Di: Give Elizabeth full attention please. Elizabeth has made a diorama for her chosen animal.

Elizabeth: I put rocks here and grass here. The first thing I did was spray paint most of the box yellow.

Di: Elizabeth if you put it up on that table there people will be able to see it. Speak from there.'

Elizabeth: Then I positioned the rocks.

Di: What did you use to hold the rocks because if you had just stuck them down with PVA glue it might work for a while but on your way to school they might all have come loose.

Elizabeth: A glue gun.

Di: Who can describe what a glue gun is? Describe the glue gun and how it works. It’s very hot you have to have adult supervision.

One of the students tells a story of a boy sealing himself inside the house with a glue gun and then getting locked in the shower. Several of the children have read it. Di says that it sound as though someone is doing something quite foolish. She asks the student to bring the book in for her to have a look at.

9.27

Di: Three more people to present. Lovely to chat but we need to keep on task. Elizabeth can you tell us what was the most difficult thing?

Elizabeth talks some more about her project then Di asks the students where she should put it for safe keeping. One or two students make suggestions. Finally it is decided that it should go on the floor but the piano stool needs moving.
Without being asked three boys jump up immediately and move the stool so that Elizabeth can put the large box on the floor.

Ch 3: Three people are playing with rubber bands.

Di: I noticed that. I referred to people playing before hoping they would do something about it. There is another way you could have handled that you know. You could have just told them to stop. If you refer it to me I tend to waste everybody’s time.

The next project is presented as a play, it has five characters. The writer gives a brief outline of the story (it is about ‘two wombats and a woodcutter and he’s about to cut a tree down when someone comes out of the bushes and asks him not to and tells him why’). He pulls a cardboard and silver foil axe out of his bag and a tree made from card and paper. Di asks him to plan to present the play to the class on Friday.

Di: What part did you enjoy the most.

Boy: Making the props.

Di: We’ll look forward to seeing the play performed on Friday.

The next boy has written a story. It’s called ‘Naughty baby Rhino’.

9.34

A number of students had previously presented stories but not had the opportunity to read them to the class. Di asks those who have written a story to go and get it, she instructs the students to split into four groups by numbering class members from 1-4, she numbers the story readers 1-4 and assigns each to a corner of the room. Students match the number they have been assigned to the number of the story reader and sit in a circle to listen. The whole process including story reading takes about 4 minutes.

9.40

Di: OK back in the middle of the room 5-4-3-2

The children quickly reassemble in the middle of the room.
Di: I think it’s really exciting all the different ways people have presented their projects. We had a recall test yesterday [to the two children who had been absent the day before] to show me what you had learned. On the back of the test was space for your reflections on your learning.

Di: How do you want to go with the projects for next week? I want you to vote. What are we going to do about the celebrations that occur about this time [Easter]?

The subject changes to a magazine the children are reading in class. Di has asked them to write letters to the editor.

Ch 4: Every time we read a magazine are we going to do this [write a letter to the editor]?

Di: Yes because she needs feedback. She needs you to write to her and meanwhile you are learning about the conventions of letter writing. And that will help her to provide the kind of articles you want. She’s interested in your letters and if she’s going to publish a letters page she needs your letters. Last year three letters from 3B got published. Who likes the serial? You might want to talk to her about that.

The children are now faced with the task of deciding which of four books Di should read to them (The Value of believing in yourself; The Value of sharing; The Value of giving; The Value of learning). Di remarks that everyone seems to want to read all of them. The books each tell a part of the life of a famous person. Last week they had read about Margaret Mead. She suggests that they will be able to read some of them in groups but for this morning they need to vote. She lines the books up on the blackboard ledge.

Di: Line up behind the book that you want me to read and put a chalk mark on the board above the book to make a tally then go to the back of the line and sit down. Okay 5-4-3-2-1 sit down.

While the students are doing this Di talks briefly to a boy from another class who is seated at work at the back of her room.

Meanwhile one of the students complains that someone didn’t know how to make a tally.

Di: I don’t want to hear that tone of voice again. It’s okay that people get things wrong. Don’t be so annoyed with him.
The winning book is The Value of Believing in Yourself, a story about Louis Pasteur. The children pull the snake out and settle down on the floor to listen.

Voting and settling has taken no more than three minutes.

The book is about seeking a cure for Rabies. Di interrupts her reading to ask if anyone knows where Germany and France are, they have been mentioned in the story. She sets three people the task of checking in the atlas while she goes in reading.

The story mentions ‘a dog that couldn’t bark’. Di asks why this might be. One child answers that it might have had its voice box removed (an answer that might not have occurred to an earlier generation of children or a different social or cultural group).

9.58

Di: Now I think we have a few people who have found Germany in the atlas. Jessica show us.

Jessica holds up the world map and points to Europe.

Di: Here’s Australia so which hemisphere is it in?

The children chorus ‘Northern’.

Di: And it’s joined to Asia.... I wonder what else we’ll discover today..

It’s now 10 o’clock and the extra students arrive for maths. The room is crowed so I leave until after recess.

11.30

The children come into the room from the playground. Di has been on playground duty. She asks two boys to sit apart from the others at the back of the room.

Di: I noticed that some of you came in today feeling crotchety..... Tom’s got to explain to his mum tonight why he’s got a ripped pocket.

The children settle down on the floor for instructions.

Di: The class next door is away today and the class along the verandah so I thought this was an opportunity to use the logo machines (next door). It’s time to do rotating groups. We have four activities (listed on the board: novel; logo; CDROM Aspire; Internet). We couldn’t get the CDROM up today. Who feels confident enough to try to get it up for us?
A boy and a girl go to the minilab in the space between the two classrooms.

Ch 1: How come we didn’t get our 3B News?

Di: Because there’s a glitch in the computer. I had a go at it after school earlier in the week. Your articles are on there so they are safe but we still have a bit of work to do.

Di goes on to explain what the four groups will do. She wants the Internet search group to have a good period of time searching for Olympic sites. Half the time spent searching and half the time spent filling in the fact sheet. The same with the CDROM. Half the time to play and explore and half the time to fill in the sheet. The Logo people will have just half an hour.

11.40

Di follows the instructions with an explanation of the questions that the Internet and CDROM groups must write for their peers. The worksheet asks them to write a question for others to answer from the Internet or CDROM. They must then write a sample answer to show what kind of quality they are looking for in the answers of their classmates. Di calls these ‘fat questions’. ‘Skinny questions’ are questions that have only one answer and don’t require a great deal of thinking. She asks ‘what might a fat questions be?’

Di: CDROM and Internet people you are going to be dealing with fat questions. I want you to find five fat questions each.

She explains to the students that one of the objectives is for them to feel comfortable using the technology. She wants the CDROM people to compare the CD with the Animals CD, ‘what is the same, what is different, who designed the CD, who is it for? It’s your turn to be the critic, use all those judgements we’ve talked about.’

Di chooses the eight girls in the class to work on Logo. Their task is to create a spiral in turtle graphics. The girls go into the next door classroom.

Di asks the Internet group to decide which search engine they are going to use ‘it might be Anzwers, Yahoo, what’s another one?’

Students suggest Google and Ask Jeeves.
Di: Then you have to decide what key words you are going to use. Then you have to ask is this a good web site? Is it a good home page? Does the home page give me what I need? She is interrupted by a girl from the Logo group who can’t get Logo up on her screen. ‘Who can help her?’ says Di. A boy goes with the girl back to the Logo room.

Di turns her attention back to the Internet group. ‘What is an easy question?’

Di: ‘Was it easy to find your way around the site? That has a yes no answer. But we can ask what made it easy to find your way around. You could do a Y chart on that - positives and minuses.’

Di: Then I want you to design a questionnaire for others in the class with fat questions. I want you to write your fat questions on this sheet and then you have to write the answer underneath. Decide what you are looking for in a good answer. You can work together.’

Di: We’ve just gone through what is a framework for thinking but first of all I want you to enjoy exploring the site - do that until 20 past [12]. The people I am giving this sheet to are allowed to go to Mrs Stevenson’s area.

The LOGO girl is still having trouble. Di tells her not to waste her time but to join another group. She says, ‘I'll be at least three minutes before I can come and help you.’

The CDROM can’t be made to work so a second group is given the Internet task and sent to the minilab just outside the classroom door between the Di’s room and the LOGO room.

The children working on their novel settle themselves at their tables. Their task is ‘A novel approach to the novel’. They must design five fat questions that would really test whether the person has read this book and truly understood it. Then Di calls the remaining three boys to the front of the room and talks about the torn pocket.

11.54 LOGO

The three working machines are Macs with a Stylewriter 1200 printer.

Di comes into the room. A girl complains that ‘they’re copying off ours.’ Di reminds the group that they are only cheating themselves because they are not doing their own learning - a response that the children obviously know well.
Di leaves the girls to their task but is back four minutes later (11.58) to check on them. ‘Has anyone been able to do it?’

Girl 1: Yes we’ve figured out a plan

Girl 2: They’re copying

Di: Don’t worry about them just concentrate on your own work.

She checks each pair, ‘Tell me what you are doing, how are you going to get there.’

11.59

Internet group (minilab between classrooms)

Di: Guys we can’t have three to a computer it just doesn’t work. Go down and see if there’s a spot on the other machines. The boys are searching for Australian Olympic sites. One boy asks, ‘Who put this web page up?’ his partner answers, ‘Australian Sports’. They both write it down on their worksheets.

Another computer displays the list of sites found by the search engine. Di reminds them that they have previously talked about the meaning of the percentages next to the site name.

12.02

Second Internet group (along the verandah)

There are six computers. The children are searching. Three students are disturbing the others. Di sends them back to the classroom to work on their novels, ‘You know what my problem is don’t you, what ever you are doing you are disrupting the learning of the others. I can’t let you disturb other people.’

Two boys are looking at the SOCOG site.

Di: What search engine did you use? What key words did you put in? Describe the home page.

She breaks off to ask one of the boys if he is using two machines or helping the boy next to him set up.

Di: Are you doing his thinking for him? I want you to ask questions if you need to but don’t let someone else do your thinking for you.

Di: Can I ask you two - you’re closest to the mouse are you making all the decisions or are you contributing to that - working it out together?
One boy has found an interesting site. The others want to know how he’s got there.

12.09
Di has left again to visit another group. The boy, Todd, reads out the site address, but his classmate wants to know where to click. Todd goes over to his machine and types in the address while his partner calls it out. The rest want to visit the same site so both boys read out the address while the others copy it into the address bar. While his partner writes questions Todd helps his neighbour to put the site into his favourite site folder, ‘You have to go the 3B’s folder, you can make a new folder for yourself in there.’

12.15
Di visits again. Two boys are in the classroom reading novels.

12.16
Di is in the minilab outside her classroom. She prompts, ‘What do you think about that site? How does it compare to others you’ve visited?’

12.19
Di is in the LOGO room, one or two girls are chatting at the computer, they seem not to have progressed since Di’s last visit. ‘Girls you’re still going on with that are you? You can’t do anything about it or are you choosing not to do something about it? You can’t do it? Well think about it. Talk about it. When something doesn’t work you’ve been getting some feedback, I like the word feedback.’

Three girls at one computer have made a wobbly spiral. They don’t want anyone else to see there LOGO program code. ‘That’s our secret recipe’ says one.

Seven boys are at the Internet machines in the minilab next to Di’s room. One boy is saying ‘stop, I’m going to tell the teacher.’

12.22
Di returns to them. ‘Eye contact 1-2-3. Tell me one of the good things that’s happening here? Nothing? Tell me one of the bad things that’s happening here.’

Boy 1: ‘He’s just mucking around.’

Di: ‘Is that because he doesn’t know what to do or is it just mucking around? It may be that today he wants to do different things. Maybe you just are not working well together today. What could you do to help.’
One boy knows the answer to that one and has been trying to apply it. He answers, ‘Help him spell it - but he doesn’t listen.’

Di: All right Adam come here I think you should do the novel today. I know you’ve been ill but perhaps today you should work on the novel instead. You can come back here later today.

12.26

Di is in her classroom, she has a quick word with the novel people then is back in the minilab.

12.26

Second Internet Group (along the verandah)

Boy 1: I’ve found a website in the future look. I know what it looks like it looks like stale bread.

12.29

Di arrives. ‘Dan are you happy working alone or do you want to work with somebody?

The students are filling in their ‘fat questions’.

Boy 1: I’m sick of hearing about dope.

Di: Dope?

Boy 1: Drugs

Di: Yes that’s a big issue.

Boy 2: They test your blood.

Di: They test your urine as well

Di leaves

Boy 3: This site says it’s had 182 visitors, let’s ask if we can check it tomorrow and see if it keeps up to date.

The boy who was earlier shown by a friend how to bookmark a site is now helping his neighbour to do the same thing.

12.33

The students are now mostly working along on their questions.
Boy 1: We can't do that question
Boy 2: Yes we can
Boy 1: No we can’t
Boy 2: Why?
Boy 1: Because everyone knows the answer
Boy 3: It will be a skinny question.

12.35

Di says it’s time to go back into the classroom. The children in the minilab put their shoes back on and return to the room. Before going back to the classroom one boy looks into the LOGO room and asks the girls if they made a spiral. They show him that they have. ‘But it’s pretty wonky’ says the boy.

12.25

Back in the classroom

Di: Let me tell you what I saw. I saw children coming up with some good questions. I saw children looking intently. I saw some children who were frustrated and most of that was to do with their partners. Let’s sit so that you can see each other and are not all looking at me.’

The children move into a circle on the floor.

Di: What were the main difficulties? Remember there is no problem so big that we can’t find a solution [some of the children quietly join in with this statement]. Tell us what search engine you used and how would you rank it, 10? 7?

Some students fill in the ranking on their worksheets.

Di: Todd you don’t have to fill in his 10 if you thought it was a 7. Is one person right and one wrong? No. We might also be at different places on the web site. Every experience for each of us will be different unless we all do the same thing. I said go and enjoy, you really went to a lot of different places and saw different things. You had different experiences. One is not right and one is not wrong they are just different.

Di: Girls you were doing LOGO. [aside to a boy who is constantly moving - Guy can you do something about that body management].
Girl 1: We had lots of time so we could go on trying and experimenting.

Girl 2: One of the good things if you do things wrong you can do pen erase -

Di: Girls tell the boys what you had to do.

Girl 3: Make a spiral. We kept making little mistakes ours was all bonky. It actually went too far in so we had to.....

Nicholas: It’s very similar to the circle we had to do but it’s 10 degrees more.

Di: There’s quite a lot of work to do. If you were doing the novel before you can work out here on the Internet but I want you to work without a partner. Girls I want you to do the Internet search in Mrs Stevenson’s room.

12.50

Di: We don’t have enough LOGO for all the Internet people to do LOGO first. So I’ll pick one two three. Now those three pick a partner please, you six now organise your table for after lunch. You people on the floor will work on your novel please. Now take one of these [worksheets] and organise your desk so that it’s there when you come in. Then onto the floor 4-3-2. Let me just talk to those 3 who got the wrong message. Gentlemen this is what you will be doing after lunch.

Di: Five jumps, now five jumps reaching to the ceiling now a few pony tails [children jump to the side and back] now a few around-the-worlds. This is followed by a message from the Scripture teacher and while those students affected are writing themselves a note in their diaries Di does a clapping and hand movement pattern with the rest of the class. They have to cross the right hand to the left and the left hand over to the right. Di follows this with a reminder of an earlier discussion about right and left brain hemispheres.

12.59

Rainy Lunch Time

Di sends them in groups to fetch their lunches. The children bring their lunches into the room and sit in groups on the floor. One boy sits apart and Di sends him to join a group. Di sees one child with only biscuits to eat.
Di: Anthony was it your job to pack your own lunch today. You've only got cookies. You forgot to put your sandwich in. Has anyone anything nutritional they can share? Any fruit or veg or a piece of a cut sandwich? You could go to the canteen to see if they have anything left.

Anthony says he'll go and see if it fell out of his box. A few minutes later he re-enters the classroom with his sandwich. Di puts on some music. The children sing and eat. One boy wants to turn the music up but Di tells him it's background music at the moment.

Di eats her peach and writes in a folder as she keeps an eye on the group.

1.09

The rain has stopped and Di is on playground duty. The children go outside.

1.45

Back in the classroom newsletters are being given out. The children put them away in their bags. Di tells them they are to carry on with their rotating group work. Three boys are in the minilab next to the classroom searching for Olympic sites. Six boys are in the next door classroom trying to solve the LOGO problem.

One pair have discovered that if you put in two commands then move the cursor up to the first command again and press return the instructions will be repeated [they haven’t yet learned the repeat command]. They make a circle. Two boys are on the way to making a spiral. One boy has fixed the screen that had previously been a colour that made it difficult to see the line being drawn. Di asks the boy's partner how the screen was fixed: ‘Did you ask him how he fixed it so you’ll know next time.’

2.01

Di asks the boys if they are talking to each other about the task or just experimenting.

Boy 1: We’ve discovered that the higher the number we put in the smaller the circle it draws.

Di asks them to do it again for her.

2.03

The girl's group in using the Internet machines along the verandah. They are discussing the sites.
Girl 1: That’s a really good site
Girl 2: That would be a really good question
Girl 3: I’ve got some quick facts here.

2.05
Di visits. The girls tell her they’ve found some good questions and Di asks if they are happy with their web site. After a few minutes she goes back to her room to talk to the novel group.

2.12
Di visits the girls’ group again. The girl who discovered the quick facts page is anxious for Mrs C to know that it was her discovery.

2.16
It’s change over time but Di gives the girls a choice. They choose to stay at the computers instead of returning to the classroom.

2.17
Change over in the LOGO room. Di explains to the new group that there are two levels of challenge. One is to make a spiral the other is to work together as a group.

2.19
The boys discuss how to make a spiral: ‘I think we should make a circle but get it going a little less to the left.’

As before two boys discover that you need only put the two lines in once then move the cursor up and press return. In case the challenge is too hard Di has put another slightly easier challenge on the board.

One boy in a group of three is inputting commands, the other two boys are talking together about some unrelated topic of interest. A little later (2.27) these two boys are quietly taken back into the classroom. The third boy continues with his LOGO graphics.

2.25
Three girls are left in the room along the verandah writing their questions.

2.27
Twelve students are in the room reading to background music.
In the LOGO room two boys have drawn a wonky spiral. They cover the list of commands so that other pairs can’t see what they have done. One of the pair calls Mrs B from the classroom to show off what they have done. Di calls three of the girls in with her to have a look. Mrs B says ‘look at this.’ The boy says ‘It’s a bit wonky.’ The girls say ‘It’s good though.’

Di suggests the girls ask questions of the boys to find out how they did it. She then suggests the boys might erase the drawing and see if they can do it again.

Two boys are drawing on the blackboard, Di tells them to go back into the classroom if they have lost interest in the LOGO task.

2.42

The boys who erased their spiral have completed it again.

2.44

Di: You have ten seconds to shut down LOGO and return the machines to the desktop

2.45

Di (in the classroom with most of the students back) is supervising the pack up (‘get a cloth, clean that corner of the desk’)

Di: All right let’s go 5 (she continues advising on packing up). Let’s see do we have a tidy floor - see if there is anything you can do to help. All right 5 on the floor, 4’s terrific, 3..... if you’re on the floor when I say zero (children join in with this) you are my hero.

2.47

Di questions them about the Scripture message and distributes the notes to take home.

Di: If I give you more than one [note] it’s because I want you to help give them out.

2.52

Di: Elizabeth has brought in a compass. We haven’t had time to look at it today. But this is a question. Is this North?

Boy 1: For you it is.
Di: No North is always North. Here’s a question to discuss at home with your family. Where’s North?

2.54

Now let’s see... Louis Pasteur.... [bell rings].........oh, no time to read. I think they’ve cheated us of two minutes today.

As I followed the students out of the classroom I looked back at the sign on the door.

This is a think tank and brains get stretched here!

I entered at my own risk and my brain got stretched
The school policy was to introduce the use of computer technology into all subject areas. To this end computer kiosks were being constructed around the school. Each kiosk would hold a small number of networked computers. They will be located close to classrooms in small rooms. The idea is to use them for group work. Small groups of students will be able to use the networked kiosks while other students are doing other things in the classroom.

Year ten Indonesian students had not yet used computers in the subject. Some had used the Internet at home for home work and research. Next year they would use the computers at school.

Year nine Indonesian students will use the Internet in the library next period. Web addresses for a site dealing with Indonesian culture and language will form the basis of research work on religions of Indonesia - which is the substance of the chapter of the text book currently being studied. A site was also mentioned for information on the situation in East Timor for those students interested in the politics of the region. In case the Internet line is busy or down then students will be able to complete the assignment using other library resources. The teacher will be away dealing with Peer Support matters.

Year nine Indonesian students had also used an interactive CDROM. However there was no site licence at that time so access was difficult with most of the class around one machine. This will be rectified next year when site licences will be purchased for resources to be used by a number of students. This includes wonder word (word puzzle making software) which students will be able to use for vocabulary building exercises. They have used it in the past but without a site licence access has been limited. Students enjoyed the CDROM and liked the idea that they could correct their mistakes.

Students are already used to using a variety of technologies: OHP; video; audio cassette player. There is a television in the corner opposite the door at the end of the blackboard which runs practically the length of the wall on the right as you enter the room. There is an overhead projector just under the blackboard behind the teacher’s desk. On the wall to the left of the door is a display of Indonesian cultural artefacts and on the back wall are Indonesian posters and a puppet display.
The desks are arranged along three walls, six beneath the Indonesian artefacts, eight along the back wall and four under the windows opposite the door, two rows of six desks fill the space in the middle of the room.

**Year 10 Indonesian**

**8.55**

Seven students arrive, it was the Year 10 formal last night so the students have much to report. However within ten minutes they are settled down to work.

**9.05**

Robyn hands out a worksheet. It is an application form for a job.

Robyn: Has everyone got a copy of this. I knew I’d made extra copies but I have a lot of spares. Those who were here on Monday can help with the translation.

Student: Is it Dutch?

Robyn: Yes it does sound Dutch.

Robyn asks two students to stand up.

Robyn: You’ve actually done this and one of the best ways to learn is to teach it yourself. Just come out here.

**9.10**

Another student arrives, she apologises, she had been at band practice which went way over time. The two girls are at the front of the class, one reading in Indonesian, one translating. It is an advertisement for a beauty product..... ‘Don’t throw away your empty bottle there’s a chance to win something.’

[the rest of the class members are filling in the worksheet as the two at the front translate]

Robyn: Let’s stop there and look at some of the words.

Student: I was on work experience at 2BL and I had to explain to them what Durian was I said it was a big round stinky fruit.

Student: Send your empty bottles....It’s really? Oh I’m sorry you really picked the wrong person.
9.15

Robyn: No I didn’t go on.

The girls continue reading and translating.

Student: Send your bottle to: [an address in Jakarta]. It asks for your identity card.

Robyn: Homeless people have no ID card but they wouldn’t be sending away for beauty lotion would they?

Student: Is there another word for O (zero)?

Robyn: Yes that’s the one they use in telephone numbers and it means empty. Do you know another word that means most. The most slow tends to mean late. What’s the word?

9.16

The girl reading in Indonesian and her translator hesitate.

Robyn: What word do you recognise there? That means ‘to cause something to be made public’ it means ‘to announce’. The winner will be announced.

The two girls continue, Robyn interrupts from time to time to comment on word construction and point out the clues to their meaning.

9.20

The two girls swap roles.

Robyn: What’s that word mean... it’s a little word when it’s added to another it means ‘the more the more.’ The more you do this the more you...... Remember the deconstruction we talked about coming through the back door instead of the front door.

9.22

The girls stop and go back to their desks. If I had got my act together we could have done this on the computer. As you can see I’ve tried to make this into an authentic entry form. The customs might say to you ‘Please may this be filled in?’ and hand you a form and ask you to fill it in. They use the passive voice ‘Please to be filled in’. This is the polite form, it’s not ordering it’s indirect.
9.25

Robyn: If you were?? you would be illiterate that's called ‘blind in Letters.’ So what do you think the whole thing is saying? What did you say Linda, I missed what you were saying.

Linda: Please to be filled in in printed letters - not cursive writing.

Robyn reads in Indonesian from the sheet. I'll read it simply because the print is not good there. What about ????? you all know that, I know you do.

A girl offers a translation.

Robyn: Good girl, use the broken line as the guidelines for the coupon - to cut it out.

9.30

Robyn: Now from here your entry is meant to be creative so it's your work. Is it safer for me to take these in? Pop your name on it girls so I know which one is yours.

The bell rings and the Year 10 girls leave the classroom. The next class is lining up outside.

Four Year 9 students enter. There is an announcement over the intercom: ‘Would the Year 10 girls who were talking to a group of boys in the playground please come to the office.’

9.37

The students had worked on a CDROM. They had enjoyed the interactivity but a crowd round one computer was not very good.

Robyn: Next year we have permission to copy the CD so you can work on one each. Do you want my dialogue?

Girls: Yes

Robyn: What I did was sit people beside me here and I went throught it with them instant feedback. Do you like that way of doing things?

Girls: Yes

The girls are studying a street map of the town centre of Kuta.

Robyn: If I was to ask you a question - kamu beragana apa?

Saya
Girl: I was just thinking about word order. If I was to say ‘apa’ at the end that means ‘what’ ‘apa’ at the beginning is a yes/no answer.

Robyn: Yes, good girl. Did you get that everyone, an explanation about word order. Imagine you were writing to a pen friend. Indonesians can’t imagine that anyone doesn’t practice a religion. In our society the people can be either end of the spectrum or have no religion at all. But if you go to Indonesia and say you have no religion they don’t believe you, it’s not possible, so you must be a communist. There’s a big cultural difference. Why is this?

Girl: Social change, Australia is a place where people can say what they want, we’re more free, we can say what we believe.

Robyn: Sally, anything to add?

Robyn: There are at least 5 acceptable state religions then there are others in different regions, it’s very diverse, there are probably more religions there than there are here. The state recognises Christianity, Buddhism, Islam, Hinduism and Animism. Can you explain that [Animism] a little bit further?

Vic: Yes even inanimate objects have a spirituality.

Robyn: Yes there’s an essence in everything. If a coconut fell on your head we’d say bad luck. What would they say? You didn’t pay respect to the jungle.

Girl: What’s the difference between Hinduism and Islam.

Robyn: I’m not going to answer that for you. I have a list of web sites here and I thought you might like to look this up for yourself. You might be able to look this up. There are other websites but this seemed to be geared to student learning. This one has a grammar checker and chat site. Look up ‘agama’ because they have a site about religion and it’s actually a topic in the back of your book.

9.55

The girls practise pronunciation. They read through the words on the board. Robyn asks each girl what religion it is as she points to the Indonesian word. The girls answer in Indonesian. She asks each girl further questions about religion and church. This is followed by questions and answers in Indonesian around the class.

The web site addresses are given out for homework or to be followed up in the library.
Robyn: What if I book the library for you next week and you can use the web site then if the line is too busy or if there isn’t too much information then you can use the library as well.

9.57

Robyn: I’m just going to rub this all off. We’ll just play around with this then we’ll do something else.

Robyn gives the Indonesian and the students translate altogether. Then they reverse. Robyn gives the English and the students respond in Indonesian

10.02

Robyn: We’re going to revise direction [Robyn switches on the Overhead Projector]. I think you’ve done a good job on this but I want to make sure before we leave this chapter. We want to move on next year.

A student asks about the word ‘left’ which can be used for a location (on the left) or a direction (turn left).

Robyn beside the OHP: In your translation one thing that kept cropping up was the familiar form of address. In Indonesia if you use the familiar people will be upset. Robyn displays the street map of part of Kuta. She points to locations on the map and asks for the word (meaning in Indonesian).

Student: Beach!

Robyn (laughing): yes I know that, don’t tell me in English

They continue this way for several minutes.

10.10

Robyn: I think we’ve sorted all those things out [she asks for directions to the beach from a point on the map and follows the student’s directions on the overhead transparency.]

Robyn: Okay let’s have a little dialogue because we’ve got two pairs here. One ask the way to somewhere and the other give directions. One of the girls follows the directions on the overhead transparency to make sure the directions are right.

Robyn: Well done Catherine you’ll get dinner tonight [the directions were to a restaurant]. [to next pair] Do you want to be the helpful Indonesian? Good girl, that’s great. You want to come and follow the directions on the map? Excellent.
There is applause from the other two girls.

Robyn: You’re really doing well. You’ve really got a handle on that. You’ll do well if we ever get to Indonesia. Your turn to be the helpful Indonesian, do you want to trace the route so you know she’s sending you in the right direction [they swap roles]. Good girl

There’s applause from the other two girls again.

Robyn: Do you have any other questions?

The girls brainstorm as many words as they know about directions.

Robyn: Were there any words that you knew that your partner didn’t know and vice versa. See how you go writing down as many words as you know about directions just to test yourselves.

The girls write in silence.

10.21

Robyn switches off the OHP and puts it away.

10.23

Robyn: Finished?? give us your list.

As the student reads her list of words Robyn writes them on the board, there are 12 words or phrases. The others check there’s against the one on the board. Robyn asks the others in turn if they have anything to add.

Robyn: You can imagine if we had a full class here we’d probably have a board full of words because everyone’s mind works differently and would take off in a different direction ... mind the pun....

10.26

Robyn: You know we said we had weaknesses in writing well it’s getting a bit stronger now.

Girls: But we said we had a weakness in reading

Robyn: so what we have here is a trip around Jakarta for if we ever get there. She draws eight compass points on the board.
Robyn: What we have here is a trip around Jakarta, for if we ever get there. It's got compass points on it, it's got eight points. I've also got websites of what's happening in East Timor of any of you want to keep up with what's happening there. If you are political animals. They add 'sea' to their directions.

Student: Why do they call it that?

Student: What does ???? mean?

Robyn: Well you have a look [passes over the dictionary]

Robyn: I want to go over this with you so you won't be stuck.... exactly right. Victoria: ... moving to the North side of the park... Do you say 'park' at the beginning or the end?

Robyn: You put it at the end, the destination is always at the end. That is going to be for homework. I hate to tell you but you can deal with that. Do we have a lesson on ???? Thank you (girl passes dictionary back).

Robyn: Oh there's a strike on tomorrow isn't there - do we have Indonesian? This is week A. Is everyone able to finish this for Tuesday? I might let you do this reading passage in class because you might need a bit of help with the translation.

10.36

Robyn: We've got about ten minutes left. Would you like to start reading this rather than going into a grammatical phase now, we're getting a bit tired. In Jakarta there are lots of big monuments who was the first president?

Girl: Sukarno.

Robyn: in 1945 they were given independence but it took five years to have it ratified because the Dutch wanted to come back. They were chased out by the Japanese in the second world war. Indonesia didn't want them back. Australia stuck up for Indonesia in the United Nations.

In 1950 the UN said 'yes' and declared independence.

10.40

Robyn asks if anyone knows the Indonesian word for ???

Robyn asks them if they know the word 'charismatic', students suggest some translations.
Robyn: Signatories to the UN... Sukarno worked with the Japanese spread the message that we’re here to help you (the Japanese). He spoke about the Japanese and then about his own aspirations for Indonesia in Indonesian [Japanese couldn’t understand]. Parliaments were formed at the same time. Sukarno spent money on monuments when the country was bankrupt. This was his downfall in the end.

Robyn asks the four students if they would like this to be followed up at home or at school.

Robyn: How would you like to handle this or do it on your own. What’s your preference. Read around? Do you want to read around would that be helpful.

Victoria: reads in Indonesian.

Robyn: How much of that did you understand?

Girl: I understood some of the words but not the sentences.

Girl: I understood the first sentence.

Robyn: Do you want to have a go at translating that.

Robyn: Good girl, that’s very good, that’s exactly right. Ok tell us Victoria [Victoria translates].

Victoria: That’s Okay but I’m not sure what this means, what’s ???

Robyn: That means ‘eating the wind’ it means strolling around, exploring.

Others in the class help out on words. Victoria doesn’t know.

Vic: what does it mean [it’s a slang expression]

**10.50**

The bell goes.

Victoria finishes off.

Robyn: All right there’s that first paragraph done. On Tuesday we’ll get it finished, get it securely into your books.

It is recess time.

All the girls are now seated again.
They are used to small group work and independent learning. Year nine French worked in twos and threes to translate magazine articles and comment on the content in French and in English. Students had written comments in French and read these to the teacher in small groups (usually 2 people) then discussed the content of the article in English as well as commenting on the accuracy, vocabulary and grammar of the written comment in French.

**Year 9 French**

**11.25am**

This is a shared class Robyn has them for 2 periods and another teacher has then for 2 periods. There are 22 students in the class. Robyn is telling them about future use of information technology in the class.

Robyn: You use computers incidentally at home. The kiosks in the school will be functional next year and it will be easier to use them. You are all at different stages so you will be able to be a bit more independent.

This lesson you can work on through the magazine articles if you haven’t read them. I’m trusting you to get the most out of this for yourselves. I want to make you more independent learners. It’s your choice you can read the magazine or work on your dialogue. Hands up if you want to work on the magazine, it’s your choice [Robyn hands out magazines to those with their hands up]. I only have one dictionary would anyone like to go over to get the dictionary box out of the photocopying room. Do you need the dictionaries?

Several girls: Yes please [two girls leave to get the dictionaries]. Robyn: Thank you girls you know where they are.

Two girls sit on the floor in the corner of the room, one girl stretches out on her stomach on the floor and reads her magazine. Robyn is listening to a girl reading her homework at the desk at the front of the room, she asks the class to be a little quieter. She brings a chair over so that the student can sit down.

**11.37**

The two girls return with the dictionary box and put it on the floor near the front desk. Several girls come over to help themselves.

A girl asks if they are to present the dialogue with a partner.
Robyn answers ‘mais qui’.

11.38
The homework girl is back at her desk. Two more girls come out to the front. They relate in French what they have read in the magazine. They take turns to read from their exercise books.

The rest of the girls are seated in twos and threes at the desks working on the magazine or their dialogues.

The two at the front tell Robyn in English that their article was about Disneyland in France which mostly displayed American culture rather than French.

11.43
They return to their desks. Robyn, in French, asks two more girls if they are ready to present their dialogue. A group of three comes out to the front desk. They take turns to read from their books.

11.46
Robyn comments, in French, on their responses and asks them questions.

Robyn: Girls, tell in English what the article was about.

She goes on to ask them about the language used in the article and about particular words. The girls return to their seats and another student is called out to the front. Robyn goes through the written work talking about it as she goes. The student marks in any corrections.

11.51
The girl now reads the corrected passage and tells what the article as about.

11.53
Another girl comes forward, ‘You just want us to read the summary we’ve written?’

Robyn: ‘Yes, in French, then explain the article in English.’

11.55
The bell goes for the end of the lesson, but this is a double period so the students continue with their work. Two more bring their magazine out to the front. While these four students are changing places a girl at the back of the room asks how you say ‘pessimist’ in French. Robyn answers.
Everyone else is either reading or writing with some conversations going on around the room.

11.58

Robyn asks the students to be a little quieter because she is having difficulty hearing the student who is currently reading to her.

12.00

Robyn corrects the written work as she talks through it. The girls ask questions about pronunciation and ask how to say various English phrases in French. They consider the answers and ask follow up questions.

12.02

Robyn moves in front of the desk and beckons two more girls forward. They come out bringing their magazine and their books with the written comments in them. The girl who had asked for the French word for ‘pessimist’ uses it in her written comment.

12.04

The girls return to their seats. One girl, Emma, (who had previously been out to have her written work corrected) has been writing on palm cards. She is now called out to read the corrected passage.

12.05

Emma finishes reading and returns to her desk. As another two come forward a girl asks a question of Robyn.

12.06

Two girls take turns reading in French from their paper, They occasionally ask for the correct pronunciation of a word. As the classroom noise level rises slightly Robyn listens intently to the readers. They discuss the article in English, Robyn gives the girls close attention.

Robyn: Girls we are just going to do a bit of refocusing now so those on the floor can you get up and sit at desks again please. I’ve really enjoyed listening to you. You’ve obviously got a lot out of it. Some of the articles are a bit obscure, some of you might have lost the plot a bit now and not have anything to do.
12.13

Robyn: Can you explain to me the passe compose. Explain as though I don’t understand it.

A girl explains.

Robyn: That sounds a bit difficult for me Jess, can you explain a bit more and give me an example.

Girl gives an example.

Robyn: And can you put it into a sentence for me? That’s really hard for me too, so I have to think about how I use this. When do I use it?

Girl: When the action is finished, totally over and done with.

12.15

Robyn: tell me about verbs that are irregular or regular, which ones tend to be regular?

Girl: Ones that end in e, er or ir

Robyn: Can you tell me a verb that is regular. This is the verb here. How do I make it into a participle? Put up your hand if you know. Michelle can you put that into a context for me please.

Michelle: J’ai oublié mon impur.

Robyn: Is there anyone here who doesn’t know what we are on about? All right when we come back from the holidays we’ll have lots of things to talk about.

A student asks the difference between passe compose and the past tense.

Robyn: It’s a tense that talks about things that happened before but sound as though they are still going on, imperfect - the action is still going on in the past; perfect - the action is ended, finished, there’s nothing else to be done. Passe compose is over and done with at the time we are speaking.

Girl: What about if you say ‘I have studied French for three years’?
Robyn: The action is not complete, you use ‘dupuis’, you are still studying. What I want you to do now is to go into that dialogue in your text book and first of all I want you to identify the verb, so let’s do it together, let’s find an example of what I’m talking about so that you know what I mean. Robyn reads the sentence in French. What I want you to do is identify the verbs and then write the matching past participle, registering in your brains that this verb had to come from somewhere not out of thin air.

Girl: I was just wondering why can some past participles be used as adjectives.

Robyn: That’s the flexibility of the language Jess. If they are irregular they are the ones you need to learn.

12.27

Robyn: We have nearly ten minutes to do this. That will give me time to talk to the few girls who haven’t talked to me about their articles yet. Vivian am I going to have to move you? No? Good.

12.29

For the next six minutes students come out to the front to read from their books

12.35

Robyn: Since I gave you that dialogue for homework I’ve just realised this might be our last lesson.

Girl [to classmates]: Hey guys dictionaries. Dictionaries are leaving...

The students return their dictionaries to the box.

Thanks guys.

The girls take the box of dictionaries back to the photocopying room.

The bell goes.
Bridgeston East Public School

22/11/99

Robyn Kent

The sign on the door said “Welcome to 6K”. There were several other signs around the room:

Always remember the 3Rs
Respect for yourself
Respect for others
Responsibility for your own actions

We create our tomorrow by what we dream today

ME-D-8

Mediation is a simple win win way to solve arguments,
disputes or disagreements in the playground

The Right Attitude

Don’t entertain negative thoughts about yourself or others.

A positive mental attitude is an important ingredient in good health.

It leads to high self esteem and will help you to act on your goals

And get the most out of your life.

The classroom is light with windows down each side but crowded with six blocks of desks, four of which seat six students each and the other two with room for nine more. A blackboard runs the length of the wall to the left of the door with a door through to a storeroom at the end. A notice board runs nearly the full length of the wall opposite the blackboard. It holds a display of spiders, the colour pictures have been downloaded from the internet and the text has been word processed. Beside the notice board is a door into the next classroom. Two computers and a printer stand on the table next to this door. A bookcase acts as a divider making a small area for the computers separated from the rest of the classroom. Strings criss-cross the room from which hang spacecraft and planes. A string across one window holds decorated initials and Mr Men drawings, across the opposite window a string supports pictures of sky scrapers.

The teacher, Robyn, has spent much of her weekend writing reports, fortunately she could do some of this work in the car while waiting for her son at sporting events.
9.30

Children from 5/6B arrive. Half the class is at cricket. The children have work to do. Some are labeling a map of Europe. One girl is writing up a mini-lesson that she has taught to another class. She taught them to count from one to ten in Thai. She is now writing up the lesson to be marked. Another girl is writing in her journal. ‘We always, always have spelling on Monday morning,’ she tells me. Cheryl is using Dreamwriter which is a specialised computer. She is writing out her spelling list from Classroom Unit 35 (an A4 size book of word building exercises).

On the blackboard are listed the tasks for the morning: writing; spelling; sentences.

The children are familiar with the routine and begin work, occasionally they chat very quietly, occasionally Robyn says ‘sh sh’.

10.15

Spelling – Some cloze sentences have been written on the board (e.g. 1. Last Saturday I noticed a _____ in the cost of chocolates; 5. We can all do _______ algorithms).

The children write the seven sentences filling in the missing words. They make up three more sentences of their own.

Robyn announces that there will be a meeting for anyone involved in paired writing.

10.20

Robyn: Right bring me your books anyone who’s finished sentence number ten.

There is silence in the room.

10.21

Robyn is talking to Cheryl: Good have you done these at the bottom?

Cheryl types in the words at the bottom of the page headed For Champs_____

10.24

Cheryl begins typing the sentences from the board

10.24

The first book is brought out for the spelling to be checked
10.34

Robyn: Any more spelling books? Five more minutes. If you haven't finished you'll have to finish at home.

10.45

Robyn hands out a Farming worksheet (this is a photocopiable page from *10 Essential SOSE Quizzes (Upper Primary)* by Peter Clutterbuck and Blake Education p/l; 1999). The students need to draw a line from the question to the answer.

Cheryl picks up her pencil with both hands and writes her name.

Robyn advises students to rule the lines that they know first then work out the others.

10.54

Robyn gives the answers to the worksheet quiz (a popular product of milk is called by what name? For what product are Hereford and Murray Grey cattle reared? Which Pacific Island people were shipped to Australia to provide labour for the sugar industry?).

There is a bushrangers quiz on the back of the page. Robyn reminds children that they should know the answer to number 14, they must cast their minds back to Year 5 when they studied gold and went on a gold excursion.

11.06

Robyn suggests the students finish the page later because they have run out of time.

Robyn explains that the children change seats each Monday. She shuffles their names and deals them out onto the desks. She gives students 30 seconds to find their name and be unpacked and seated. This is one of the ways in which Robyn is preparing her students for High School where they may find themselves seated next to someone different each lesson. This does not apply to the seats at Cheryl’s table. Robyn has identified eight students who are trusted to sit at this table and help Cheryl with her work.

As Robyn explains, ‘The classroom runs itself, I don’t need to be there.’
She asks one of the students to show me an assignment she did earlier in the year on *silk*. The assignment is on disk, however the student has forgotten how to access and open the file so is unable to show her work.

11.10

Recess. During the break three girls access the Encarta CDROM using one of the machines at the back of the room. Both computers have Internet access.
Bridgeston East Public School

22/5/00

Robyn Kent

(Comments added 28/6/00)

The sign on the door says “Welcome to 6K”. Several other signs displayed around the room in 1999 are on the walls along with some new ones.

It was fascinating to read this. I’ve never read anything about me in the classroom before. I’ve never had anyone do this before. I was a bit worried about the ball of paper being thrown – I should have seen it. It seems to be an accurate record. I do structured lessons every Monday, but when I read this I kept thinking that I might have done some things better.

Always remember the 3Rs

Respect for yourself
Respect for others
Responsibility for your own actions

We create our tomorrow by what we dream today

The Right Attitude

Don’t entertain negative thoughts about yourself or others.
A positive mental attitude is an important ingredient in good health.
It leads to high self esteem and will help you to act on your goals
And get the most out of your life.
Conflicts are a natural part of every day life.

CONFLICTS are an opportunity to learn and grow.

COOPERATION
COMMUNICATION
TOLERANCE
Smile and be happy

1 Robyn has been at the school for 15 years. She was previously the deputy principal at Blakewell Road School. She sacrificed the position to be close to home because she had a small child and the travel was taking up a lot of time.
It is Monday morning. The students have not arrived yet. On the blackboard it says Saturday 20th May. Saturday had been an important event: the school’s fiftieth anniversary.

We planned for this day ‘for so long’. It was a ‘big weekend’ I was at the school until 6.00pm on Friday, most of the day on Saturday and at the dance until 12.30 on Saturday night. I was up for church on Sunday morning.

Three thousand five hundred people had attended. Robyn and most of the other teachers had been present most of the day. In the classroom the students’ desks are covered in exercise books displaying their best work and neatest hand writing.

I wandered round the classroom with the crowds and listened to the feedback. I enjoyed that- they didn’t know who I was, people commented on how nice the room looked, and what a good teacher this must be.

The classroom is light with windows down each side but crowded with six blocks of desks, four of which seat six students each and the other two with room for nine more. A blackboard runs the length of the wall to the left of the door with a door through to a storeroom at the end. A notice board runs nearly the full length of the wall opposite the blackboard. It holds a display of posters ‘all about me’. Beneath it to the left is a cupboard with a display of sporting magazines, fishing, swimming, golf. To the right of the notice board is a door into the next classroom. Two networked computers with Internet access and a printer stand on the table next to this door. Strings criss-cross the room from which hang cityscapes with buildings cut from newspaper and pasted onto art paper and more posters ‘all about me’ or ‘my dossier’. The writing on these posters is practically all typed. A string across one window holds brightly and meticulously coloured letters (students’ initials), across the opposite window a string supports drawings and collage works. Art works are attached back to back so that the room looks colourful from outside as well as inside. This was done especially for the celebration on Saturday.
The students have come to this class from five different Year five classes. The teacher, Robyn, has had to train them to work together and to follow her routine. Part of the routine is to change seats each Monday so that they get to know and work with everyone in the class.

Robyn has recently attended a *Women in Educational Leadership* conference. At the conference she attended an interesting session on the brain, learning and leadership. She found that her strengths (precision, planning, punctuality, attention to detail, organisation) and preferences (being in control, having structured tasks, being the administrator) were congregated in ‘the bottom left quadrant of the brain’. Interestingly the person she found the most difficult to get along with on the school staff had strengths that were almost entirely in ‘the top right quadrant.’ This was useful to know, it would help her to understand and appreciate her colleague.

9.25

The students assemble in the playground in lines. The teacher on duty congratulates them on their participation on Saturday. He especially thanks the school captains and vice captains. Everyone claps. He thanks all the teachers and school staff who worked so hard to prepare for the day and the parents who worked hard to make it happen. Everyone claps again. The teacher calls the students to attention. Not quite satisfied he tells them to stand at ease, and then to attention again. This time he’s happy with their speed and precision and they are asked to turn left or right (depending which way they walk to their classroom) and file out. The students walk to their rooms.

9.34

Children come into the room from the playground. There are thirty-two students in the class, one is absent today. They put away the books displayed on their tables. Robyn says good morning and the children respond. Robyn tells them they need their spelling text book and spelling writing book. She directs them to Unit 12. They read the list of spelling words together from the text book. The children write the list of words twice in their exercise books. The second time they write the list they break it up into syllables to help them to remember the spelling and to give them a way of tackling unfamiliar words.

The children are familiar with the routine and begin work immediately, they are silent as they write out their spelling list.
9.47

As they finish writing their lists Robyn directs them to seven sentences on the board, telling them they might need to go over the page to fit everything in. The students must write the sentence in their book filling in the missing words (which are words from the spelling list). (eg Our neighbour has a Beagle puppy called Ben; We received a receipt after paying for the goods; After travelling eighteen kilometers we arrived at the airport.)

Occasionally they chat very quietly, occasionally Robyn says ‘sh sh’. Many of the children wear long sleeved fleecy lined tops with the names of everyone in Year Six printed on the back.

9.48

The first two students to finish place their books, open at the correct page, on the teacher’s desk to be marked.

Robyn sits at the desk of a student who is absent for the day and quietly puts away the books that have been on display. She is careful not to disturb the student working beside her. Children who have finished fill in the extension activities in their text book.

9.50

A student arrives late, sits down and immediately takes out his book and begins work. The room is quiet, all the students are busy writing.

9.55

Three or four more students bring their books out and place them on the growing pile open on the front desk. One of the blocks of desks seems to have been moved over the weekend and students are finding it difficult to squeeze past. Robyn helps move the block of three desks back slightly. The students move their desks with hardly any disruption to their work. The activity did not seem to be noticed by any one else in the room.

Books pile up on the front desk. Those who have finished continue working in their spelling text books. There is the occasional sound of a ruler being picked up or put down, otherwise the room is quiet.

Robyn walks around looking over shoulders as the children work. One boy who has finished takes a dictionary from the shelf.
10.04

Robyn says they have one minute left.

10.05

She stops the class. What they haven’t finished they must do for homework. Robyn chooses a student to read out the first sentence from the board complete with missing word. She chooses another student to spell the missing word. They all join in to say the ‘i’ before ‘e’ rule. Students join in to help with a spelling if necessary. Occasionally Robyn reads a sentence herself.

10.10

Robyn directs the students to take out their homework books. There are a few groans around the room and an occasional ‘oh no’. The students chat as they take out their books. They are given four minutes to write down as many of the 24 words as they can remember. There is silence in the room again. Robyn tells them to visualise the words on the page of the spelling book. Usually Robyn sits and marks their spelling books as they write the words from memory but today she hasn’t because I am there.

A child from another class comes in asking if there is anyone here good at Clarisworks Database. Two students are asked to go and help. The rest work on in silence. Robyn reminds them there are 24 words, she suggests they visualise them on the page, the word above, the word below. Some were the same word with different ending.

One or two children whisper to each other: ‘I’ve got sixteen.’ ‘I’ve got sixteen too.’ ‘two of the words were neighbour and then there was neighbourhood.’

Robyn occasionally says, ‘sh’. She says they will do a follow up lesson on the ‘i’ before ‘e’ rule because some of the children seem to have forgotten it.

10.15

Time’s up. The students count up their words. Robyn tells them to stand up as soon as they have their number. They stand, asking each other how many they got. Robyn says, ‘sit down if you have ten or less.’ She continues and children sit down as their number is called. Two children had 21 words.
Robyn tells them to take out their text books and check their spelling. They must fill in the words they forgot. They chatter quietly as they do this. Some will get awards for their spelling work.

I give out a lot of awards and praise. Most kids will have about ten awards by the end of the year. I have a policy to speak to everyone in a day. If there are problems at home or school that I know about, I’ll ask after them as well. I try to give reassurance.

10.17

Robyn asks them to close their books. If they have a lot of words to write they must finish them later at home. She hands out an A4 size photocopied sheet from a Hunter Brownlow Education (1997) publication. The book is a guide to studying the novel Hatchet (a story of survival alone in the wilderness after a plane crash). The sheet has several true or false statements about the book, a series of questions requiring short answers and an essay question. Robyn asks the students to complete the True or False section and the short answers but leave the essay until after recess. There is room on the page for T or F to be written beside the sentences and space for the short answer beneath each question. The essay must be written on the back of the page.

10.23

Robyn writes some maths questions on the board as the students work (My box is_______; It has _____ faces, _________ vertices; the dimensions of my box are ___ cm long, _____ cm wide, _____ cm high; and its volume is ______ cm³. Please measure and calculate the volume of five different prisms).

10.26

Robyn reminds students they should be up to question six or seven. She tells them to think carefully, to think back to the detail in the book. She reads out one of the questions and provides the answer (the flight plan was useless to the searchers because they didn’t follow it did they?).

It’s sometimes quicker to supply the answer but usually I ask around the room – it keeps them all on their toes because they never know who I’ll pick. It keeps them focused and ready to answer the next question. Usually I read the whole stencil out to them before they start. Some students can’t read as quickly or as well as others – they all have the same stencil. I read it over to the class because in the back of my mind I always have the students who might have difficulty reading.
10.30
Robyn tells the students to take a red pencil. She asks, ‘What’s the answer to number one?’ Robyn reads out the questions and students supply answers.

From time to time Robyn reads out the question and supplies the answer.

10.32
When all are marked Robyn tells the students to fold the paper in half and put it in their writing books, they will need it after recess.

10.37
The students chat as they do this. Robyn asks for their attention: ‘Okay now looking at me. You’ve had plenty of time to do that. I’ll put a pile of boxes on each table and I want you to measure five of them. What’s a vertice?’

‘You’ll have to take it to the nearest centimetre because I want you to do this without calculators. You’ll need to copy down from the board what you have to do. Copy it five times for five different boxes.’

A student hands out rulers while Robyn puts a selection of boxes on each table.

10.46
The students are counting edges and vertices, writing and talking quietly.

10.50
Robyn tells them they still have three minutes for measuring the five boxes. The measuring exercise has been taken from the book *Signpost Maths 6* which addresses the NSW Mathematics syllabus. Each page of activities has outcomes written at the bottom of the page taken from the Maths syllabus.

10.55
The students are still measuring, writing, calculating.

11.02
Robyn stops them: ‘All right who’s done five boxes? Who’s done six? Seven? Eight?’ Someone has done eleven

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*Some students are so fast and focused, they don’t stop to chat about last night’s movie. There’s a group that’s now started arguing about outings at the weekend. They tend to work more slowly.*
11.10

The bell rings for recess and the students quietly leave the room.

11.30

Students return to the classroom and begin writing their *Hatchet* essay. There is silence. Robyn sits at the desk of the absent student and marks books.

12.15

Robyn reminds them that they should be finishing off their essays. She tells them to rule off, check their punctuation, make sure they have paragraphs and reread and edit their work.

During this time one of the students shows me her website. She is unconcerned that she will have to write her essay for homework. The student explains that when researching from the Internet she downloads information. If she can’t understand the information she re-writes it for her assignment but if she understands it she leaves as it is.

The two machines in the corner of the classroom are Internet networked. They can be used by students at any appropriate time for story writing or typing up and polishing a rough draft. The class has a lesson in the computer room each week. They are learning to touch type. When they have finished the typing exercises they are allowed to play games. If their parents have given permission they can also search the Internet during this time. Emily shows me the school homepage that her father helped to construct and maintain. When she was in Year Five she helped the class construct a homepage. She shows me her *Silk* assignment with scanned photographs of the silk making process taken by her parents on holiday.

Two children go to special reading class. One student has wandered over to talk to a friend. Robyn comments on his wandering. He waves his hands in the air and wanders amiably back to his seat and continues work. None of the other students takes any notice.

12.17

Robyn reminds them to paste the sheet into their books and hand their books in for marking.
12.22

The students next do a structured handwriting lesson. Robyn says they’ve not done handwriting since Year Three. She thinks it will be good for them, especially as preparation for high school. Robyn tells them that if they haven’t finished they will have to finish in the afternoon or at home. They take out their handwriting books, put the date and day in the top right-hand corner and begin forming the letters. The first line is dr dd dr dd; the second is ck cl ck cl and so on.

People judge you by the way your space looks. I like the room to look bright and colourful. I come here every day I like to have it looking bright. I provide a stimulating environment – it makes them feel good – they can be proud because they’ve done it and they put it up on the wall. They have a pride in their environment because they’ve done it themselves.

12.29

The students are talking quietly as they write. A few have finished, a few are on the last line. Two haven’t started the work. Robyn reminds them to check their letter shape and letter slope and ‘make sure there are no little holes and gaps.’

She also reminds them to check their posture: ‘You shouldn’t be sniffing the page and your feet should be in a comfortable position. Correct posture is very important.’

The students rule off after their work, paste the sheet into their books and hand the books in for marking. Robyn walks around the classroom commenting on the work as she moves between the students.

12.40

The students take out their poetry books

I did elocution lessons when I was a child. I have a love of poetry. I always do it. Some people on open day commented on the fact that we do poetry. One eighty year old woman said: ‘What a wonderful room! This is a disciplined, well organised teacher.’

They are to copy out a poem. The poem has 22 lines and must fill a page so the students count up 22 lines from the bottom of the page which gives them the size of the space at the top of the page for the heading. Robyn asks how many lines are available for the heading. She occasionally says ‘sh sh’ as she walks around the room. She reminds them of the rules they have learned for good spacing. She wants them to copy out the poem, they can colour the page later. However she reminds them that if they are writing with different coloured pencils then they should check to make sure all the pencils are sharp before they begin.
Attention to detail is important. We had a catering business, you were always on show to the public – everything has to be right – I teach them how to fold serviettes – little things are important.

Robyn is called away from the room for a minute. The students continue working in near silence.

12.41

Robyn returns with some extra photocopies of the poem. She reminds one student to do a border around the poem rather than a margin down the page. Some one tosses a screwed up ball of paper across the room towards the bin. It falls short. One boy asks what it was, his neighbour says 'a big ball of paper came skimming over my head.' They both carry on working.

I’m amazed I didn’t see that – that was my first thought on reading this whole paper. Some students came into my class from a class where the teacher had done a maths probability exercise throwing balls of paper into the bin – that could have been something to do with it.

12.46

Robyn reminds them that once they have finished writing the poem they may shade it in different colours. They may trace the picture from the page if they wish, or they may draw their own picture

I have some talented drawers in the class who always draw their own picture but there are others who can’t draw – I’m not a fantastic drawer myself – so those who can’t or don’t like drawing can trace and then add in their own detail.

Additional Questions (28/6/00)

I have only seen your structured Monday lessons. What will your students be doing today for example?

After lunch they will go into the computer room – it’s air conditioned- the first thing they’ll do is turn their mouse over. Some children take the mouse balls so we make them turn the mouse over before they leave the room so that we can see they are all there.
We have a program call Type. A couple of the kids will give out a sheet and they’ll collect it at the end of the lesson. They work through at their own pace. They type for 15 minutes following the exercises and the instructions. By the end of the year they become faster typists. Through the year they have typing assignments and most of the things they hand in have to be typed as the year goes on. Some students are up to 42 words per minute. Some are on twelve. Some students will go on typing for the full 45 minutes – it’s their personal challenge. I tell them to make sure they are comfortable, to adjust the screen and the keyboard and have them straight in front. Posture is important.

After they’ve finished the typing they have a sheet from the Hatchet novel about tournados. I’ve linked it with the news from Victoria last week about their tornado. They have to search the Internet and answer ten questions about tournados. They’ll go to Yahoo or Ask Jeeves and record their answers on a sheet. We’ll have a report back tomorrow and I’ll collect all their typing and their tornado work.

Yesterday Danielle, Emily, Ashley and David were setting up our class web page. We have a whole school project corresponding with a school in Canada.

You mentioned adjusting the screen etc. How important is posture?

Posture is very important. I’ve done Yoga for years, it’s all about energy blocks and flow. Exercise releases energy. I’m conscious of safety too, lifting and moving things. But you have to be comfortable. Eyes should be a ruler length from the page. If you feel better you perform better. I tell the children you have to listen to your body. You have to be aware of what's happening in your body. Leading up to the selective school exams I tell them to get plenty of sleep and drink water so that they feel good and perform well on the day. There was a lot of sickness in the middle of the year, health is important. Posture is important for learning. You have to move around every so often and do deep breathing to get in touch with your body. Before a test I get them to rotate their hands in the air, stand up, breath deeply then go for it! But they have to remember to keep breathing!

I have taught Yoga to children. It makes them aware of their bodies. Posture in front of the computer is important. You should have a glass of water beside the computer screen to prevent dry eyes. Your chair should be adjustable. You should make yourself ready to learn, make yourself comfortable.
Then you’re not thinking what am I going to cook for dinner tonight. In a perfect world TILT would be in the morning. You’re exhausted when you get there after school. The lollies and chocolate biscuits give you a sugar boost but it’s not good timing. The best time is when everyone is fresh at the beginning of the day.

Do your students work in groups?

Yes, often. Sometimes I organise groups by ability according to need. Sometimes I put students with a particular group for a particular purpose. But usually they are mixed. They decide who will record and who will be the spokesperson etc. But sometimes I will tell them which roles to take so that everyone gets a go.

They will be working in groups today. They will be with their buddies (kindergarten students) doing sport. Yesterday I sent six over to the Infant’s sports shed to make an inventory of the equipment. I said they had to be back in ten minutes so I sent quick writers.

They came back with their list and stood in front of the class in a line and told us what there was. Then the class got into groups of two or three and worked out what they will do for a 45 minute lesson with their buddies using the available equipment. They’ve organised themselves for this, they’re working in friendship groups. They’ll report back on it in the morning.

You mentioned contract work, what contract assignments have your students done this term?

They’ve just handed in their picture books. They had to write, edit and re-write a picture book. They’ve had 10–12 weeks to complete it – most would have taken about 100 hours and about 24 hours would have been class time. We’ve had lots of lessons on the technicalities of book making. With their kindergarten buddies they’ve looked at lots of picture books. We look at the ISBN number, at the cost and copyright. We’ve looked at lots of picture books. I show them mine that I made when I was at school. I tell them they’ll keep theirs and show it to their children and grand children and they laugh and don’t believe me.

We spend a long time planning, writing, looking at the details in illustrations, trying to get an understanding of how people write books. It’s all about decision making. They have to decide the age group, the binding, page numbering, borders, margins, printing, colours, cover.
We look at lots of models and discuss authors and illustrators. They do an authors study where they have to read at least four books by the same author. We sometimes have authors and illustrators visit the school.

When the books are finished they take them around the classes and read their stories. Last year we had a book launch, some librarians from other schools came along, we had some visiting authors and they signed the children's books. Next semester they do chapter books.

*What about reporting to parents?*

We have student led reporting at this school. The student takes charge of the interview and has to make sure the parent is comfortable, manage the time and keep the conversation flowing and to the point.

Year Three have been practicing questioning techniques. We had a visit from some Aboriginal dancers and digeridoo players and my students were so impressed with the questions that the Year Three students asked. They told me what good questions Year Three had asked the Aboriginal dancer, they noticed they asked really interesting questions, Year Three have been trained to ask good questions and to be good listeners, to keep eye contact.

On reflection what are your thoughts about my report of the classroom observation?

My first thought was that it picked up on all my weaknesses. Then I thought about how I could do things differently. I should have seen that ball of paper; I should have praised and encouraged more (but it didn't seem necessary on the day); it was very much 'do exactly what I say – listen and do'.
# Appendix 2
## Change theory chart

<table>
<thead>
<tr>
<th>Writer Year</th>
<th>Change as:</th>
<th>Success measures</th>
<th>Direction of change</th>
<th>Focus of discussion</th>
<th>Teacher development as:</th>
<th>Language (and influences)</th>
<th>Reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fullan <em>The Meaning of Educational Change</em> 1982</td>
<td>Artefact (metaphor: ‘growth and development’)</td>
<td>Faithful implementation of a given strategy or policy</td>
<td>Coming from outside and far away</td>
<td>Policy and programs; external control</td>
<td>‘learning new things thought to be desirable’ (p264)</td>
<td>Policy, programs</td>
<td>Objective reality, program and materials ‘out there’. Individuals subjectively dealing with an objective reality.</td>
</tr>
<tr>
<td>Fullan with Stiegelbauer <em>The New Meaning of Educational Change</em> 1991</td>
<td>Artefact (metaphor: ‘journey’)</td>
<td>Individual and institutional renewal. Individuals in the workplace are the key to success</td>
<td>Disembodied and impersonal something invading teachers’ lives.</td>
<td>Policy, programs and workplace change</td>
<td>‘sum total of formal and informal learning experiences throughout one’s career.’ (p326)</td>
<td>Paradox; complex processes; lifelong learning; change as a journey; new paradigm; learning to love change</td>
<td>Objective reality ‘out there’ which teachers make sense of</td>
</tr>
<tr>
<td>Fullan <em>Successful School Improvement</em> 1992</td>
<td>Artefact (metaphor: ‘mechanical cog’)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>New paradigm; mind shift</td>
<td>Objective reality</td>
</tr>
<tr>
<td>Hargreaves and Fullan (Eds) <em>Understanding Teacher Development</em> 1992</td>
<td>Lived experience but also as an object ‘out there’</td>
<td>Change in the culture of teaching</td>
<td>‘from the outside by a heavy handed administration’ (p13)</td>
<td>Importance of context and the culture of teaching</td>
<td>Skills development; personal development/self understanding; ecological change</td>
<td>Ecological change; New Science of chaos and complexity; constructed reality;</td>
<td>Objective reality</td>
</tr>
<tr>
<td>Writer Year</td>
<td>Change as:</td>
<td>Success measures</td>
<td>Direction of change</td>
<td>Focus of discussion</td>
<td>Teacher development as:</td>
<td>Language (and influences)</td>
<td>Reality</td>
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</tr>
</tbody>
</table>
| Hargreaves (in above)  
*Cultures of Teaching: A Focus for Change*  
1992 (pp216-240) | Evolutionary; slow and unpredictable (metaphor: ‘growth and development’) | Form of culture (Individualism; Balkanisation; Collaborative; Contrived Collegiality) | Forms of Association; Teacher cultures (‘relationships between teachers and their colleagues’, p217) | Ecological change | Mens’ ways of knowing; feminine discourses; biographies |
| Fullan  
*Change Forces*  
1993 | Non-linear process of dynamic complexity. | No such thing as success in implementing change | The learning organization ‘moving forward’ | New paradigm; creating learning societies; systems thinking; Moral purpose; Leadership | Individual journey (living interactively with the environment) | Systems theory, complexity, non-linear processes, learning organizations (Senge, 1990); Flow, optimal experience (Csikszentmihalyi); New paradigm |
| Fullan, (Ed)  
1997  
1997a p26-46  
1997b p97-114  
1997c p205-219 | The search for understanding (there are no answers but patterns emerge as we journey on)  
Complex and chaotic (1997a).  
Force (1997b)  
Emotional intelligence (1997c) | A recultured school; a more caring school; more democratic school  
Improved relationships (1997c) | Leadership for change within the school (1997b).  
Change ‘program’ imposed from outside but change occurs within individuals | Schools as learning organisations must restructure and reculture (1997b); emotional side of teaching – we need to go ‘deeper and wider’ (deeper – internal; wider – community) (1997c) | Emotional intelligence; relationships; being motivated by someone/something (1997c) | Complexity, non-linear cause/effect chains, feedback loops (Senge)(1997a); Emotions: love, care (Goleman); Emotions as essential to cognition (Damasio) (1997c) |
| Hargreaves  
1997a  
In above p 3-25 | Emotional journey | A meaningful and moral partnership with outside world (Hargreaves, 1997) | From the school out towards the community (Hargreaves, 1997) | Social and political school context (Hargreaves, 1997) | Mens’ ways of knowing; feminine discourses; biographies | ‘out there’ |
Appendix 3
Research journal

The Evolution of a Research Program 1990-2002

The starting point for this particular informal and formal research program was the reading of *The Tree of Knowledge* (Maturana & Varela, 1987). In particular it was the idea that all communication is made up of the intertwined strands of 'languaging and emotioning'.

I first heard of Maturana while driving home from Macquarie University in 1990. He was being interviewed on radio and I thought he was saying something important about education and love. While stopped at traffic lights I wrote the address of someone in Melbourne from whom I could obtain an authorised copy of the book *The Tree of Knowledge* for the cost of photocopying and postage. Maturana had authorised this method of distribution because the book was not available in Australia at the time. Several years later I bought a copy of the real thing.

I read the photocopied book several times late at night (trying to make sense of it) and fell asleep over it often. I can’t see now how difficult I found it at the time, but I know I did. Since then I have learned the language and the book is readable. However at the time, as the concepts unfolded (over my several readings) I knew that Maturana was saying things that I had tacitly believed about the way of the world since I was a child. As the world of second order cybernetics, into which I found later I had stepped, unfolded, I knew that this was the world I had always understood but hadn’t known existed. This was how I thought.

In 1993 I went to St Kilda to hear Maturana speak. I sat, listened and took notes for three days. I hardly understood what he was saying but I wrote everything down determined that I would understand it (and translate it into my own language) later. I bought a collection of photocopies of other Maturana articles. I met a number of people from Sydney and asked for help with my translations. They gave me encouragement and other things to read.
I wrote up my understanding of the three-day experience for my colleagues at work. I bought the video tapes of the seminar and lent them out. We talked about the ideas. I wrote them into a teacher development program that I was responsible for at the time. In 1994 a group of Sydney people asked me to join them in organising a Maturana seminar in Sydney. I did, and listened to another three days of lectures (by this time I felt I understood what was being said – I felt like an old hand). I invited Maturana to speak to a group of educators. We held a one-day seminar in a lecture hall at a large Sydney hotel. It was attended by about 50 educators from all over the state and from across the three education sectors. One participant from the Catholic Education Office walked out after challenging a number of Maturana’s ideas about free will. Another participant (a cluster director in the NSW D of E) said it was the best professional development event she had ever experienced. Like me she said she wasn’t sure what it meant but recognised that it was important.

I published one or two articles in state journals and a chapter in a book to commemorate Maturana’s visit to NSW. I continued thinking and reading.

Over the Christmas holidays of 1995/6 the NSW Education Department went through a major restructure. It was a while before I could take up writing and thinking about languaging and emotioning again. When I did it was in a more formal way. A friend persuaded me that since I was already writing about these ideas I might as well enroll at University and gain some accreditation for my effort. What’s more she would be happy to be my supervisor. I enrolled in a PhD program at the University of Wollongong and spent 1997 and 1998 trying to work out a research topic.

Below is the evolution of my research and an indication of my gradually shifting areas of interest (evidenced by the many ‘titles’ I have tried out and the focus of my reading) over the period 1997-2002. The occasional diagrams, questions and quotes are taken from my notebooks, as are the research ‘titles’ and references to whatever I was reading at the time. Some areas of interest were taken up for short periods and then dropped, others have been fairly constant for the whole five or more years.
1997

1. Analysis of language and emotion match between teacher and students in a number of school districts

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Information</th>
<th>Flow</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language and emotion</td>
<td>Shannon-Information theory – objective info. is <em>about</em> something mathematical</td>
<td>Totally absorbed</td>
<td>Technology and literacy (Lemke)</td>
</tr>
<tr>
<td>Emotions from somatic experience (eg old English word for ‘anger’ meant ‘sorrow’ or ‘grief’)</td>
<td>Entropy</td>
<td>Linked to happiness</td>
<td>(who’s in control in this brave new world?) Body language is missing. Emotioning?</td>
</tr>
<tr>
<td>Leff, (1973)</td>
<td>Noise</td>
<td>Intrinsic reward</td>
<td></td>
</tr>
<tr>
<td>Plutchik (1994)</td>
<td>Equivocation</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wiener, (1948)</td>
<td>consciousness</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Impose order in thinking</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Achieve complexity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>and create meaning, self grows</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Individuals now conscious and separate, need to integrate with each other and the environment (Csikszentmihalyi, (1990) &amp; Gardner)</td>
<td></td>
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</tbody>
</table>

October, 12 1997

1a. All aspects of emotions in one classroom: understanding emotion; emotion and language; communication (use a beeper/pager and ask intermittently: what are you feeling? What do you think the teacher is feeling?)

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology and emotions</td>
<td>Materialism- idealism</td>
<td>Use beeper/pager to signal ‘stop’ – write down what you are feeling and what you think the teacher is feeling</td>
</tr>
<tr>
<td></td>
<td>Positivism – interpretism</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Individual – social</td>
<td></td>
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<tr>
<td></td>
<td>Romanticism – rationalism</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross-cultural universals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lutz &amp; White (1986)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Darwin – universals of emotions; facial expressions</td>
<td></td>
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<tr>
<td></td>
<td>Cultural signaling systems</td>
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</tbody>
</table>
October, 14 1997

1b. Teacher/student interaction or the role of emotion in learning: the emotion/language/learning connection; emotion and technology.

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Communication</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural meanings, social information; emotions and social structure; emotion language and communication; emotions as embodied thoughts Besnier (1994)</td>
<td>Maturana Involvement in sustained conversation; spoken text requires greater involvement Besnier (1994)</td>
<td>Bateson’s ethos – culturally organized system of emotion Von Glasersfeld: 'know what you wont do rather than what you want to do'</td>
</tr>
</tbody>
</table>

October, 23 1997

1c. Understanding the emotional power operating in a classroom

October, 29 1997

1d. Reading the Teacher: teacher as visual text (there’s more to reading visual texts than meets the eye)

Videotape, view and ask: what is the other thinking? What are you thinking?
What was going on in your head when this happened?

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Communication</th>
<th>Chaos/Systems/Complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitions</td>
<td>Language and emotion (Maturana)</td>
<td>16/11/97</td>
</tr>
<tr>
<td>Theories</td>
<td></td>
<td>Complex adaptive systems Gell-Mann (1997)</td>
</tr>
<tr>
<td>How to identify?</td>
<td></td>
<td>Operating on the edge of chaos.</td>
</tr>
<tr>
<td>Emotional intelligence (Goleman)</td>
<td></td>
<td>In ‘flow’ organism becomes more complex.</td>
</tr>
<tr>
<td>Biology – system - flow</td>
<td></td>
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<tr>
<td>90% of emotional message is non-verbal</td>
<td></td>
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<tr>
<td>emotional profile</td>
<td></td>
<td></td>
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<tr>
<td>PONS test (profile of non-verbal sensitivity)</td>
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</table>
Shift to teacher development:

<table>
<thead>
<tr>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global context/changing world</td>
</tr>
</tbody>
</table>

NSW State Government (political context)

<table>
<thead>
<tr>
<th>TIME (policy context)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TILT</td>
</tr>
<tr>
<td>Communication System</td>
</tr>
<tr>
<td>Flow System</td>
</tr>
<tr>
<td>Flow</td>
</tr>
<tr>
<td>TILT by CD</td>
</tr>
<tr>
<td>Communication System</td>
</tr>
<tr>
<td>Flow</td>
</tr>
<tr>
<td>TILT by DE</td>
</tr>
<tr>
<td>Communication System</td>
</tr>
<tr>
<td>Flow</td>
</tr>
</tbody>
</table>

Global context/changing world

Language of...

Nature of...

Artefact of...

Consider feelings

Use flow for thinking about TILT (how much time spent by participants in thinking and doing?)

Emotion literature


Adrenalin and emotions
January, 15 1998

2. Conditions of learning - how each mode of program delivery fulfils these; role of emotions in learning

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Chaos and Complexity</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Systems far from equilibrium do not return to their regular state and do not repeat themselves (p31)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>We are far from equilibrium (ie alive). Attractors/strange attractors. Prigogine: order out of chaos. Living things change and evolve; bifurcation point – reach a new state</td>
<td></td>
</tr>
</tbody>
</table>

February/March 1998: *TILT* Workshop Observation

What do I expect to find? What am I really looking for? Communication? To what end? What has complexity to do with it? What’s the issue? Don’t know!

All engaged in appropriate w’shop behaviour – culturally appropriate (see notebook) Does classroom situation position participants? Feelings irrational – thought rational?

<table>
<thead>
<tr>
<th>Observation + video</th>
<th>24/2/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>w’shop 1 Santos C. McC agrees to beeper</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observation + video</th>
<th>10/3/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>w’shop 2 Uni IT lab J &amp; C + large group; no followup; like one off expert model.</td>
<td></td>
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</tbody>
</table>

| w’shop 3 Santos had watched video; more animated; one/two doing; one/two watching | 19/3/98 |

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Chaos and Complexity</th>
<th>Systems</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicate with/in both same emotions (Caine and Caine workshop 31/3/98)</td>
<td>‘real world’ ‘virtual world’ both energy – what’s the difference? The world is realized in our relationship to it (real or virtual) Learning as relationships; enactment. Complicated (bicycle) Complex (frog) Brent, Davis, Sumara (1997)</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Communication</th>
<th>Complexity</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Paper submitted to C&amp;HK: Reading the Teacher: Teacher as multimedia text in the classroom communication milieu.</td>
<td></td>
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</tbody>
</table>

**April, 16 1998**

2a. How far is the medium the message in the three delivery modes of TILT?

<p>| | |</p>
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>30/4/98 observation (no video camera available)</td>
<td>W’shop 4 Santos</td>
</tr>
<tr>
<td>19/5/98 observation + video W’shop 5 Santos</td>
<td>Don’t know what I’m looking for! What makes you feel excited about TILT?</td>
</tr>
</tbody>
</table>
May, 27, 1998

2b. Reading the Teacher in three modes of delivery

evaluation methodology

concepts of reality?

What significant things in your past have shaped your responses to TILT?

Edifice of program and program evolution that we all agree to – complicity

Ask about view of reality?

Observation, Semester 2, 1998: New series of Workshops

Pask (1975&1996) – conversation theory. Language; words – constructed meaning; keeping up the words; building a house from the top floor down

Define a boundary of convenience. Life is passing the time between being born and dying. After the necessities all is entertainment Energy – where is it from? Robinson (1972)

Paper accepted for C&HK vol. 6, no. 1, 1999: Reading the Teacher: Teacher as multimedia text in the classroom communication milieu.

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<tr>
<th>Emotion literature</th>
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<tbody>
<tr>
<td>Pask (1975&amp;1996) – conversation theory. Language; words – constructed meaning; keeping up the words; building a house from the top floor down</td>
<td>Define a boundary of convenience. Life is passing the time between being born and dying. After the necessities all is entertainment Energy – where is it from? Robinson (1972)</td>
<td>Paper accepted for C&amp;HK vol. 6, no. 1, 1999: Reading the Teacher: Teacher as multimedia text in the classroom communication milieu.</td>
</tr>
</tbody>
</table>

31/5/98

methodology – create the world by living in it. The ‘bringing forth paradigm’ (Maturana & Varela). You are part of the milieu.

18/6/98

methodology – post modern (Stranach & MacLure): What kind of stories can be told?

12/8/98

W’shop 1 Hunby PS
Should I keep going with Santos or start again here? How do you read the teacher?

16/8/98

ask C.McC. what was your emotion at this point? What do you think was the participant’s emotion? Draw TILT; word association with TILT; what did you notice of the surrounding room? Intensity of the TILT experience? Flow?

19/8/98

w’shop video viewing with C.McC. looking at body posture, shape. Ask what are you thinking now?
**September, 5, 1998**

2c. The culture of *TILT* – myths, stories, artefacts, symbols, enculturation, language, rules

Mataphors – Nietzsche “knowing is nothing but working with one’s favourite metaphors”

Is *TILT* a perturbation in the social space? (13/9/98)

Is *TILT* like a franchised business?

Is *TILT* a butterfly? (as in ‘butterfly effect’)

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Communication</th>
<th>Systems</th>
<th>Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luhmann: information + utterance + understanding</td>
<td>Luhmann – autopoietic system constituted by communication, consciousness emerges with and encourages the formation of social systems</td>
<td>The environment receives its unity through the system. ‘dense connection between people’ enthusiasm (Ison &amp; Russell) Information is always information for a system.</td>
<td></td>
</tr>
<tr>
<td>Embodying culture Gadner (1998)</td>
<td></td>
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<td></td>
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</tbody>
</table>

Am I looking at: a system? Communication in a system? Distinctions?

Does *TILT* bring order from noise?

Is *TILT* a technicist curriculum? (Habermas)
October, 10, 1998

2d. What makes good professional development? What makes good communication? (apply to online program; list of emotions for workshops; reality survey)

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Communication</th>
<th>Systems</th>
<th>Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory as artefact as it loses its emotional tag</td>
<td>History of money. Money distorted the time scale in which things could happen? (internet?)</td>
<td>(11/11/98) Action is the result of a social system rather than a psychic system (Luhmann)</td>
<td></td>
</tr>
</tbody>
</table>

How much do behavioural expectations govern what happens in workshops?

<table>
<thead>
<tr>
<th>Language</th>
<th>Communication/Learning/Technology</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading the teacher Delpit (1988). School defines and regulates what ‘a child’ is and how teaching and learning are to be considered through architecture, texts, worksheets. Knowledge is concepts (not facts) acquired through developments of ‘an active learner’ at his own pace. (Steedman, Urwin &amp; Walkerdine, 1985)</td>
<td>Passive software not software that’s interactive but software that mirrors back to you what you put in (Finalyson &amp; Cook; 1998) Co-operative learning with a PC (Rowe; 1993) cognitive technologies – by creating and using technologies that mediate between us and nature we come to reshape human nature … Rowe. Changes fundamental relationship to work – qualitative change. ‘what are the relatively fixed features of each means of communicating and how do these features make the medium physically, psychologically and socially different from other media and from face to face interaction?’ (Meyrowitz; 1995)</td>
<td>Speech acts are frames because we use world-knowledge in them – our awareness of contexts draws on meta-frames of discourse (we know what a T&amp;D workshop is) (Hannabuss, 1989)</td>
</tr>
</tbody>
</table>

Observation, Semester 1, 1999: New series of Workshops

Santos PS
Intro to TILT
JF – softly spoken; me – loud
4 volunteers for research group

10/2/99
6/3/99 Information – what do we do with it? What information is acted on, which is stored? What is ignored? What do we do with information and why do we do it? Metaphors for information?

We know what a T&D workshop is – frames of reference.
Expectations of workshop

<table>
<thead>
<tr>
<th>31/3/99</th>
<th>W'shop 3: Santos PS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rules of participation</td>
</tr>
<tr>
<td></td>
<td>What changes? Who communicates?</td>
</tr>
</tbody>
</table>

April, 10, 1999

3. What are the relatively fixed features of each means of communication? How do these features make the medium physically, psychologically and socially different from other media? What senses attend to the media?

Workshop regulated by relating to colleagues
Am I asking the right questions now?

<table>
<thead>
<tr>
<th>11/4/99</th>
<th>Di &amp; Cheryl recorded driving home</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time – integrated or dedicated?</td>
</tr>
<tr>
<td></td>
<td>Change relationships in families</td>
</tr>
</tbody>
</table>

On seeing Narwhals near King Island in the Bering Sea where they had never been seen before:

“Because you have seen something it doesn’t mean you can explain it. Differing interpretations will always abound, even when good minds come to bear. The kernel of indisputable information is a dot in space; interpretations grow out of the desire to make this point a line, to give it direction. The directions in which it can be sent, the uses to which it can be put by a culturally, professionally, and geographically diverse society, are almost without limit. The possibilities make good scientists chary. In a region like the Arctic, tense with a hunger for wealth, with fears of plunder, interpretation can quickly get beyond a scientist’s control. When asked to assess the meaning of a biological event – what were those animals doing out there? Where do they belong? – they hedge. They are sometimes reluctant to elaborate on what they saw, because they cannot say what it means, and they are suspicious of those who say they know. Some even distrust the motives behind the questions………..They remained speechless, circling over the animals in a state of wonder. In those moments the animals did not have to mean anything at all.” (p127-128) (Arctic Dreams, Barry Lopez: 1998).
If in doubt doubt because you’re probably right to.

It’s arrogant to think that a mechanistic presentation equals mechanistic learning.

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Communication/Learning/Systems</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranulph Glanville breakfast (12/5/99) learning – building an understanding. 3 topics ABC each is linked (Darwin gave a description not a mechanism) Draw a distinction and in distinguishing we distinguish things Conversation: take responsibility for what you say. Meaning and understanding are yours. Inherent equality in conversation - have to be generous, listen, give and receive, inter-action. 3 levels of conversation: 1 meta conversation- regulates how conversation is going 2 sub conversation we agree on area we are conversing about 3 above conversation monitors understanding/not understanding</td>
<td></td>
<td>Variety of a system is the number of states it can have – 30 children and one teacher. Law of requisite variety – to control must reduce class to one uniform person</td>
</tr>
</tbody>
</table>

Ask: What did you do in the workshop? What did you learn? How did you feel?

Analysis of video material to choose segments

Di’s problem – children learning anything without control.

19/5/99
Santos Cheryl and Di video recall (8 segments) thoughts belie expressing rules for workshops

<table>
<thead>
<tr>
<th>Emotion literature</th>
<th>Learning</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jarvilehto: we don’t take in information from the environment Make links between social linguistic perspective; cognitive science; systems; complexity and learning</td>
<td></td>
<td>Luhmann (1995) “when something happens or is being made, a limitation arises as to how to go on. A story of adaptation starts which reduces the free space of what is still possible....”</td>
</tr>
</tbody>
</table>

15/6/99
Santos workshop 6 R. Mc D. observer
Consider rules of participation; system/environment & movement.

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Workshop &amp; CD</th>
<th>CD only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evolution of TILT (background and development)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workshops</td>
<td>Workshop &amp; CD</td>
<td>CD only</td>
</tr>
<tr>
<td>Developers’ perspective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workshops</td>
<td>Workshops &amp; CD</td>
<td>CD only</td>
</tr>
<tr>
<td>Users’ perspective</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**September, 29, 1999**

4. Three slices through the history of TILT & TILT by CD

<table>
<thead>
<tr>
<th>Communication</th>
<th>Learning/Technology/Systems</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language is primarily about relationships (Bateson)</td>
<td>Actor Network Theory (Mol, Law, Latour,)</td>
<td>Widen and differentiate the system-environment.</td>
</tr>
<tr>
<td></td>
<td>Embodied self; technology + environment (part of self)</td>
<td>Jarvelehto – you become more complex as you change and learn</td>
</tr>
<tr>
<td></td>
<td>What self is TILT trying to bring into being?</td>
<td>Blind man + stick = thinking</td>
</tr>
<tr>
<td></td>
<td>Activity Theory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Law &amp; Hassard (1999)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engestrom, Miettinen, Punamaki (1999)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technology changes fundamental relationships to work (Rowe)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information ‘a difference which makes a difference’ (Bateson, p315)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(mind/brain?)</td>
<td></td>
</tr>
</tbody>
</table>

Evolution of TILT (background and development)

Go back to the question!

14/8/99

video recall

29/8/99

Go back to the question!
Classroom observation

<table>
<thead>
<tr>
<th>Communication</th>
<th>Learning</th>
<th>Technology/Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Jarvilehto – organism/environment system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology – blind person with stick</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Luhmann – environment surrounds system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Systems theory is a semiotic process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bertalanffy: living systems are open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Observing system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Realising system? Writing an observation up is a different event in a different context.</td>
</tr>
</tbody>
</table>

3/11/99
R.K. & R.H. video recall Chester. What does that bring back to you? How did you feel? What were you thinking?

What changes have occurred in your classroom since you undertook the TILT program? Ongoing development (what, when, how)? What changes have occurred in your personal and professional uses of computer and information technology since TILT?

**January, 16, 2000**

5. Complexity and Learning

What is the participant’s view of reality? Do they need to view reality in the same way as the program does?

Educational change – process/product or Actor Network Theory?

A series of translations (Base data survey) the program never operates in the same moment twice.

Individual life education trajectory (begin categorizing) 16/1/2000
<table>
<thead>
<tr>
<th>Metaphor &amp; Communication</th>
<th>The ‘New Science’</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaynes (1976)</td>
<td>Capra (1975) ‘What we observe is not nature itself, but nature exposed to our method of questioning’ (Heisenberg) Universe moves from disorder to order (2nd law of thermodynamics order to disorder)</td>
<td>Ort &amp; Peter (1999) system and environment (make a distinction), symmetrical; asymmetrical or structurally coupled (complementary) (Glanville, 1999) observing systems. Bertalanfy – living systems are open systems (need flow of matter and energy) far from equilibrium in a ‘steady state' of continual flow and change.</td>
</tr>
</tbody>
</table>

Systems theorists: Some differences and similarities

<table>
<thead>
<tr>
<th>Theorist</th>
<th>System</th>
<th>Environment</th>
<th>Reality</th>
<th>Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maturana &amp; Varela</td>
<td>Living system (single cell to multi-cellular being)</td>
<td>Includes other systems (their processes and interactions)</td>
<td>Create the world by living in it (domains of reality)</td>
<td>Continuing to live in the world (learning is living)</td>
</tr>
<tr>
<td>Senge, Andersen, Asayesh</td>
<td>Whole/parts; an organization; hierarchical organization of levels in a system</td>
<td>Out there – can be identified and manipulated</td>
<td></td>
<td>Outside observer communicates learning</td>
</tr>
<tr>
<td>Luhmann</td>
<td>Communication</td>
<td>consciousness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jarvilehto</td>
<td>Living system &amp; environment</td>
<td></td>
<td></td>
<td>Process of living</td>
</tr>
</tbody>
</table>

5/4/00
Classroom observation two classrooms (interested in ANT)
April, 26, 2000

5 (1d) Reading the Teacher: The meaning making process

Each individual reads their own teacher (what led to this particular meaning?)

Reading as a process of meaning making.

Teacher as medium/source of information?

(ie explore what ‘read’ entails and who or what is the teacher)

I look at familiar stuff from a different view point (ie different from Fullan, Hargreaves, Turbill). I look at it from a second order cybernetic perspective. How is this different?

T&D one size fits all and outcomes based – this denies personal trajectories of learning.

Glanville seminar (26/5/00) Lewisham. Problem solving, dis-solving, re-solving

Literature review needs to discuss traditional views of teacher learning and change.

Given all this knowledge why are we so bad at good professional development. With a second order cybernetics focus we can see what’s missing. We need to acknowledge personal learning trajectories. Because of personal trajectories we cannot predict what people will learn.

Like Schrodinger’s cat there are many possibilities for how learning/attitude/culture ‘drops out’. What makes it drop out the way it does?

Reading the Teacher

Who was Di’s teacher; who was Robyn’s teacher?

Teacher = communication; concepts (only occur as part of a web of meaning (Rosch); movement; metaphors; context/environment/artefacts; connections.

3/7/00 Wollongong discussion.

10/7/00
Di & Robyn asking each other questions; drawing life’s significant learning; answering my questions.
July, 15, 2000

6. The Placebo Effect in Education

How to improve ‘get better’ skills, understanding, sympathetic ear.

Why do professional development? – discomfort, something wrong, dis-ease with skills.

Pain/pleasure \( \leftrightarrow \) survival (language, society, culture)

Somatic + emotion \( \leftrightarrow \) survival \( \leftrightarrow \) learning

Embody mind (from action to knowing)
Make a distinction; stuff/content; translation /transformation; self

Placebo (emotional learning)
Sights; sounds; smells; authority person; colleague

Metaphor provides a way to make decisions (if it's like this then I can do this..). Mapping an idea eg Love is a journey (target domain is/as source domain). 'The LOVE-AS-A-JOURNEY mapping is a set of ontological correspondences that characterize epistemic correspondences by mapping knowledge about journeys onto knowledge about love.' (p207).

Di learned concepts (big picture) most of her comments were ‘about learning’

Robyn learned to do stuff (know how) eg operate a camera (but also about learning eg group/pair work). Look for change in Robyn’s stories after working in a group (competition?).

Question: stories about curriculum – are they about Robyn using the technology?

Results: Di allowed students to search. Roby allowed students to search.

Then – students constructed their own meaning from the search process and results.

Di and Robyn threatened in different ways: Di student learning; Robyn being able to do stuff.

\textit{TILT} was already based on ‘change’ literature and the best of staff development literature.

5/10/01 W'gong meeting (Christine Brown & Jan Turbill).

Discussion: Robyn needs to demonstrate competence; needs to show; high achiever driven to do things and demonstrate achievement.
Need to uncover the personal theory that underpinned TILT. Need personal histories to go into case histories.


Reading list


Appendix 4

Research approvals and consent forms

Reading the Teacher: A study of the relationship between the communication process and teacher learning in two professional development case study sites

Joy Murray has in principle support to conduct the above study in NSW Government schools pending approval of the research program by the University of Wollongong Ethics Committee and the Department of Education and Training’s Strategic Information and Reporting Directorate.

Ms Murray has approval to make use of appropriate and relevant context data collected by the Training and Development Directorate.

Graham Dawson
Director, Training and Development
2 December, 1998
University of Wollongong

APPROVED
In reply please quote: SD:KM HE98/262
Further Information: Karen McRae (PH: 42214457)

8 December 1998

Ms Joy Murray
21 Waratah Street
Harbord NSW 2096

Dear Ms Murray,

I am pleased to advise that the following Human Research Ethics application has been approved:

Ethics Number: HE 98/262

Project Title: Reading the Teacher: A study of the relationship between the communication process and teacher learning in two professional development case study sites

Name of Researchers: Joy Murray

Approval Date: 8 December 1998

Duration of Clearance: 7 December 1999

This certificate relates to the research protocol submitted in your application of 4 December 1998. It will be necessary to inform the Committee of any changes to the research protocol and seek clearance in such an event.

Please note that experiments of long duration must be reviewed annually by the Committee and it will be necessary for you to apply for renewal of this application if experimentation is to continue beyond one year.

Dr S. Dodds
Chairperson
Human Research Ethics Committee

cc. Dr Jan Turbill, Supervisor
Dean, Education
Ms Joy Murray  
Training & Development Directorate  
Department of Education & Training  
3a Smalls Road  
RYDE  NSW  2112

Dear Ms Murray  

I refer to your application to conduct a research project in NSW government schools entitled *Reading the teacher: A study of the relationship between the communication process & teacher learning*. I am pleased to inform you that your application has been approved. You may now contact the principals of the nominated schools to seek their participation.

This approval will remain valid until 10 March, 2000.

You should include a copy of this letter with the documents you send to schools. I draw your attention to the following requirements for all researchers in NSW government schools:

- School principals have the right to withdraw the school from the study at any time. The approval of the principal for the specific method of gathering information for the school must also be sought.
- The privacy of the school and the students is to be protected.
- The participation of teachers and students must be voluntary and must be at the school’s convenience.
- Any proposal to publish the outcomes of the study should be discussed with the Research Approvals Officer before publication proceeds.

When your study is completed please forward your report marked to the Research Approvals Officer, Department of Education and Training, Level 5, 35 Bridge Street, Sydney, NSW 2000.

Yours sincerely

Michael Waterhouse  
Director, Strategic Information and Reporting  
7 March, 1999
Fax Message

Learning and Teaching
Training & Development Directorate
Private Bag 3, RYDE NSW 2112
Fax No. 02 9808 2943
Tel No. 02 9886 7743
Email. jomurray@ozemail.com.au

<table>
<thead>
<tr>
<th>Date: October 1999</th>
<th>No of Pages:</th>
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</tbody>
</table>

From: Joy Murray
Fax Number: 9957 5098

WARNING: Facsimile on thermal paper can be highly unstable. If the accompanying documents contain authorisations or other important information they should be photocopied on good quality paper before filing or otherwise storing.

TILT Research

Attached please find

Letter
Information sheet
Consent form
Approval to conduct research

Originals will follow by mail

Joy Murray
28 October 1999
Dear [Name],

**TILT Research Project**

Attached is an information sheet explaining the nature and purpose of my research, a consent form and my approval to conduct research.

When I wrote the information sheet last year I was expecting to spend half a day per month in school observation. However, time has beaten me. With your permission I shall be at the school on Thursday 4th November to spend the day with Robyn in her classrooms. If time permits I hope to spend a further day at the school later in the term but this may not be possible. Robyn has copies of student consent forms for the observation if you think this necessary and appropriate.

In addition to the classroom observation I seek your approval for Robyn to spend Wednesday 3rd November at Ryde viewing video recordings of the TILT workshops which she attended last semester.

A relief day will be provided from the DET’s Doctoral Support program for replacement on 3rd November.

I look forward to hearing from you.

Yours sincerely,

[Signature]

Joy Murray
TILT Coordinator
28th October, 1999
Principal Information Sheet
TILT/Net Returns On Line

TITLE: Reading the Teacher: A study of the relationship between the communication process and teacher learning in two professional development case study sites

Researcher: Joy Murray, Training and Development Directorate, Department of Education and Training
Supervisors: Dr Jan Turbill & Dr Christine Brown

- The purpose of the research is to understand and clarify how communication takes place in the teacher development programs Net Returns On Line and Technology in Learning and Teaching (TILT) and the learning experiences of participants. Specifically its focus is on the relationship between communication (defined as language and emotioning [Maturana, 1993]) and learning. Understanding gained from this research will assist in future development of teacher development programs.

Your school’s participant in TILT/Net Returns On Line has volunteered to take part in this research project.

I seek your approval to visit your school’s participant in his/her classroom approximately one half day per month for a semester. I will provide permission notes to parents/caregivers for their approval to allow observations to take place in their child’s classroom.

- If you have any questions concerning this research please feel free to contact Joy Murray (02 9938 2847; 02 9886 7743).
- Should you consent to participate in this research you are free to withdraw your consent at any time.
- All data collected during this research project will be stored securely and will not be used for any other purpose or by any other person.
- Participant and school names will be changed so that all participants and their schools remain anonymous.
- If you have any enquires regarding the way in which this research is or has been conducted you should contact the Director, Strategic Information and Reporting Directorate 02 9244 5300 or the Secretary of the University of Wollongong Human Research Ethics Committee on 02 4221 4457

Human Research Ethics Application
CONSENT FORM (Principal)

TITLE: Reading the Teacher: A study of the relationship between the communication process and teacher learning in two professional development case study sites

Researcher: Joy Murray, Training and Development Directorate, Department of Education and Training
Supervisors: Jan Turbill & Christine Brown

This research project is being conducted as part of a PhD supervised by Jan Turbill and Christine Brown in the Education department at the University of Wollongong.

The purpose of the research is to understand and clarify how communication takes place in the teacher development programs Net Returns on Line and Technology in Learning and Teaching (TILT) and the learning experiences of participants. Specifically its focus is on the relationship between communication (defined as languaging and emoting [Maturana, 1993]) and learning. Understanding gained from this research will assist in future development of teacher development programs.

After reading the information sheet please indicate below your willingness to allow observations to take place in the classroom of your school’s participant. If you would like to discuss this research further please contact Joy Murray on 02 9886 7743 (bh) or 02 9938 2847 (ah) or Dr Jan Turbill on 0242 213973. If you have any enquiries regarding the conduct of the research please contact the Director, Strategic Information and Reporting Directorate 02 9244 5300 or the Secretary of the University of Wollongong Human Research Ethics Committee on (042) 214457.

TITLE: Reading the Teacher: A study of the relationship between the communication process and teacher learning in two professional development case study sites

I, __________________________ consent to observations taking place in my school as part of the research conducted by Joy Murray as it has been described to me in the information sheet.

I understand that the data collected will be used to inform future development of teacher development programs and I consent for the data to be used in that manner.

Signed __________________________ Date ______________/

Human Research Ethics Application
UNIVERSITY OF WOLLONGONG

CONSENT FORM

Reading the Teacher: A study of the relationship between the communication process and teacher learning in two professional development case study sites

Joy Murray

This research project is being conducted as part of a PhD supervised by Dr Jan Turbill and Dr Christine Brown in the faculty of Education at the University of Wollongong.

The project aims to explore and understand the communication process that occurs during the teaching/learning experiences of participants in two professional development programs. Its focus is on the relationship between communication and teacher learning in each of the professional development programs situated in and run by the NSW Department of Education and Training. Understanding gained from this research will assist in future development of teacher development programs.

Data collection will involve video recording of professional development sessions, interviews with 4 participants and the facilitator/tutor following workshop sessions. Six visits to schools and classrooms of the 4 interviewees. The video material will be used as a memory prompt for the interviews and by the researcher for checking data.

Your participation in this research is voluntary, you are free to refuse to participate and you are free to withdraw from the research at any time. Your refusal to participate or withdrawal of consent will not affect your participation in the professional development program.

If you would like to discuss this research further please contact Joy Murray on 02 9938 2847 (ah) or 02 9886 7743 (bh) or Jan Turbill on 0242 214 133. If you have any enquires regarding the conduct of the research please contact the Secretary of the University of Wollongong Human Research Ethics Committee on (042) 214457.

Research Title

Reading the Teacher: A study of the relationship between the communication process and teacher learning in two professional development case study sites

I, ........................................................................ (Participant’s name) consent to participate in the research conducted by Joy Murray as it has been described to me in the information sheet. I understand that the data collected will be used to help understand communication and learning in teacher professional development and I consent for the data to be used in that manner.

Signed ................................................................. Date ....../....../.....
Participant Information Sheet

Teacher Professional Development Programs

Research Title: Reading the Teacher: A study of the relationship between the communication process and teacher learning in two professional development case study sites

Researcher: Joy Murray, Training and Development Directorate, Department of Education and Training

Supervisor: Dr Jan Turbill; Dr Christine Brown, University of Wollongong

• The project aims to explore and understand the communication process that occurs during the teaching/learning experiences of participants in two professional development programs. Specifically its focus is on the relationship between communication (defined as languaging and emotioning [Maturana, 1993]) and teacher learning in each of 2 professional development programs. Understanding gained from this research will assist in future development of teacher development programs.

• Communication

Your permission is sought to video record a series of professional development workshops or sessions. The video will be viewed only by the researcher together with 3-4 members of your workshop group, and the group facilitator/tutor. The video material will be used as a memory prompt for the interviews and by the researcher for checking data.

I would like to interview 3 - 4 members of your workshop group (either singly or together) following the viewing of workshop video material. The purpose of the interview will be to attempt to uncover feelings that accompany the language in communication.

I would also like to visit 3 - 4 members of your group during in-school follow up time again focusing on communication.

• Learning

In order to understand the learning taking place as a result of participation in the professional development programs I would like to visit the classrooms of the 3-4 interviewees, following each workshop/session.

• If you have any questions concerning this research please feel free to contact Joy Murray (02 9938 2847; 02 9886 7743).

• Should you consent to participate in this research you are free to withdraw your consent at any time.

• All data collected during this research project (observation notes and video) will be stored securely and will not be used for any other purpose or by any other person.

• Participant and school names will be changed so that all participants and their schools remain anonymous.

• Direct quotes will only be used in the research report with permission from the participant.

• If you have any enqires regarding the way in which this research is or has been conducted you should contact the Secretary of the University of Wollongong Human Research Ethics Committee on 02 4221 4457
Semi-Structured Interview: Some questions

- How did you feel about that workshop/session?
- Why do you think you felt that way?
- How did you feel about the workshop facilitator/online tutor? [Q for facilitator/tutor: how did you feel about the participant(s)]
- Why do you think you felt that way?
- What has helped form your conception/picture of the facilitator/tutor? [Q for facilitator/tutor: What has helped form your conception/picture of the participant(s)?]
- How did you feel when that happened/was said? (referring to a part of the video)
- How much of the rest of the room were you aware of? What did you notice of your surroundings?
- Why do you think you felt that way?
- What do you think the facilitator/tutor [or workshop/session participant] was feeling then?
- What makes you think that way? (What were the indications?)
- How do you feel about working on the computer?
- What kind of personality do you give to the computer?
- What has contributed to your giving the computer that personality?
- What parts of that workshop/session went over your head? (what did you ignore?)
- Why?
- What parts did you pick up? (did you like?)
- Why?
- On a scale of one to ten how enthusiastic would you say you are about your learning in this workshop/session?
- What makes you pick that level of enthusiasm?
- How do the workshop/session surroundings make you feel? (set up of room etc)
- What words do you associate with the workshop/session?
- What does the facilitator/tutor give you during the workshop/session?
- How did you feel at the beginning of the session? At the end?
- What information did you pick up - what did you learn?
Appendix 5
Post-workshop discussions

Communication and Learning: The experiences of four teachers as they participate in a teacher development program

This paper tells the story of four participants in the NSW Department of Education and Training’s Technology in Learning and Teaching (TILT) program. The teachers talk about communication (defined as languaging and emotioning [Maturana, 1993]) and their learning in a series of TILT workshops held during semester 1, 1999. Interestingly the learning that they discuss has little to do with the technology content of the program and a great deal to do with teaching and learning.

Introduction

Technology in Learning and Teaching (TILT) is a professional development program which ostensibly deals with the development of teacher skills in the use of computer and information technology (‘ostensibly’ because it has always been a hope that TILT would also be about changing what and how things happen in classrooms). TILT is not directly linked to any specific content area or student age group but examines instead a range of hardware and software applicable for a range of age groups and learning areas providing transferable skills and an understanding of underlying concepts. It includes suggestions on how to incorporate computer technology into classroom life as well as opportunities to apply new skills to classroom situations. It includes support for teachers in using computer technology for administrative and professional purposes (after Bigum’s (1995) ‘teachers first’ principle) as well as practical classroom applications which are aimed specifically at making a difference to student learning outcomes.

Who is it for?

TILT is for teachers (self nominated or nominated by school principals according to specified criteria) who are not currently using technology in the classroom. It is designed to accommodate the needs of teachers Kindergarten to Year 12 and across all subject areas.
In NSW the TILT program has already been provided for over 17,000 teachers across the state. The initial three year program (for 15,000 teachers) began in 1996, it has since received funding (1999-2003) to train a further 10,000 teachers.

**Program structure**

The program consists of a set of six videos, six small group hands-on facilitator led workshops spaced two to three weeks apart over a semester and three days’ follow up activities in the participant’s own school. The facilitator is a classroom teacher seconded for a semester, and provided with training to work as a TILT facilitator.

The workshop materials provide a basic facilitator led workshop as well as three or four extension activities. By opting out of the basic workshop the participant may build a tailor-made component from the extension activities to suit his or her own needs.

Relief days for the three days of in-school follow up can be taken at any time during the semester. Participants negotiate the time with the school principal and the TILT facilitator whose time can be ‘booked’ to provide one-to-one or one-to-small group support during in-school follow up.

**Aim of TILT**

The aim of TILT is to give teachers who are not using computer technology in the classroom the confidence and skills to:

- begin using computer technology for administrative purposes;
- begin using computer and information technology for professional purposes; and
- begin using computer and information technology in the classroom.

More importantly the aim of TILT is to give teachers the enthusiasm to continue learning about and with computer and information technology.

**The study**

With the consent of participants and TILT facilitator five TILT workshops (Components 2-6) were video taped during semester 1, 1999. Four volunteer participants were interviewed for half an hour after each workshop. They were asked to discuss the questions: What happened in the workshop? What did I learn? What was I thinking? Their discussion was taped.
At the same time the workshop facilitator was recording her answers to the same questions. Two of the volunteer participants offered to go on discussing the questions during their half hour journey home together after the debriefing session. This additional information was added to information from the debriefing session.

Late in semester one and during semester two, 1999 the four participants were shown excerpts from the workshop videotapes and asked to discuss the excerpts (did they remember them? what was going through their minds at the time? etc). The facilitator was also shown excerpts from the videos and asked to comment. In addition visits were made to the classrooms of the four volunteers.

**A lens for viewing through**

In building a framework within which to examine the learning of individual participants in the program (living systems in an environment) I am interested in the second order cybernetics of biologists Maturana and Varela (as expressed in their book *The Tree of Knowledge* (1987)) who discuss the living organism in its environment and Glanville (architect, designer, musician......) who never ceases to surprise me in his discussion of cybernetics and its many and various applications (useful and/or beautiful) to life. Bateson’s (1972) work on cybernetics and McLuhan’s (1964) ideas about our co-evolution with our technology seem also to fit into this. Also helpful is Glanville’s (1999) work on conversation which, he says, occurs on three levels: a metaconversation that is going on at the level above and which regulates how the conversation is going; a sub conversation in which we agree on the area we are conversing on otherwise we would be talking at cross purposes; and an above conversation in which we monitor understanding or not understanding.

Together these writers communicate with me in terms of Maturana’s notion of communication as the ‘braiding together of languaging and emotioning.’ Their ideas contribute greatly to the eyes that I look out of and the ears through which I hear the world.

When talking of a system I take the position that this particular system and this particular environment do not have an existence (as this particular system and environment) but that I, the observer, distinguish and define them, that in Bateson’s words I identify ‘a difference which makes a difference’ (1972:381). The observing cannot be done without me.
This is a radical constructivist position. It has significant implications. It means that I acknowledge that I can only describe, analyse and interpret out of my own personal history (which entails my social, cultural being). Also I can only ask of that system and environment the questions I ask and in the way I ask them. Heisenberg is quoted by Capra as saying, ‘What we observe is not nature itself, but nature exposed to our method of questioning.’ (1996:40). This is an acknowledgment of the observer’s dilemma: to be part of an evolving social system and part of the environment of other living systems and to report on that system and milieu at a particular instant and as though an outsider to it. Describing a difference and so bringing into being system and environment requires a third entity, the observer, which changes the observed. Circling around this dilemma for some time has brought me to Glanville (1997b). The dilemma is referred to in systems theory as the ‘blind spot’ of a system or ‘paradox’ that Glanville (in Ort & Peter, 1999) resolves by regarding system and environment not as a binary system and environment distinction but as a process of becoming.

I can only report on the becoming of system and environment in a particular time and place from out of a singular life history. As Maturana (1993) emphasises: ‘everything said is said by somebody’ and there are as many realities as there are explanations that an observer can bring to a phenomenon out of her or his praxis of living.

And as observers we describe one domain of reality while being aware that there are many domains of reality (ie each observer describes a domain of reality). In this paradigm there is no one ‘right’ view of the world (no possibility of objective commentary on a fixed, existing, reality). Likewise there is no one system but as many systems as there are people describing a system (eg as many different ‘families’ as there are family members (Maturana and Varela, 1987; Dell, 1985; Efran & Lukens, 1985; Efran, Lukens & Lukens, 1990)).

2 acknowledgment that there are other explanations possible in other domains is what distinguishes this position from solipsism in which the self is the only knowable or the only existent thing. (see von Foerster, 1992).
However once distinguished and described, the system and environment I describe become objects in my conversations (which might be only my conversations with myself) and part of the environment of myself and possibly others as if they exist (Glanville, in press) so contributing to the building of worlds\(^3\).

Below are worlds that this observer has built with the help of four TILT participants and a TILT facilitator.

A typical workshop (workshop 2, *Beyond the classroom walls: the internet*)

Participants arrive between 3.45 and 4.00pm. They make coffee and tea in the district office then move to the first storey library where the biscuits are. They chat informally until 4.00pm when the session begins. The library has a network of computers recently connected to the Internet. The computers are arranged along three sides of a large recess off the library bounded by the wall of the stairwell (an extension of the end wall of the library), an outside wall and the librarian’s office.

There is also a bank of computers in the middle of this space. Participants seat themselves in a circle that overlaps into the main body of the library, shielded from the book shelves and tables by a large wheeled white board placed at an angle hiding the door to the stairwell. Jenny (the facilitator) seats herself in the circle facing in towards the computers. A short discussion of the video (viewed between sessions) takes place. This is followed by housekeeping announcements and comments from participants on between-workshop activities they have undertaken.

By about 4.15pm discussion has turned to the evening’s workshop (content to be covered, organisation and procedures). This is followed by a step by step demonstration of how to access the Department’s website shown to all participants using a Litepro and screen, followed by some free searching. During the demonstration and discussion participants make notes in their journals. During the free searching time Jenny moves around the group giving help when asked and refraining when she feels participants may not want to be noticed, giving them space and time to make mistakes and recover.

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\(^3\) for example changing the view of a system such as family - maybe through therapy - changes the world I inhabit because it is now as if this new and different family ‘exists’ which has different consequences for the ways I can be in it (Dell, 1985; Efran & Lukens, 1985; Efran, Lukens & Lukens, 1990).

Appendices a.107
Thirty minutes later Jenny interrupts the group with some information about searching and some bookmarks for them. Some participants make notes in their journals as she speaks. She goes through the bookmarks she has distributed and begins a discussion on email and lists. Throughout the evening participants pass around the ‘lolly box’ and joke about needing ‘a sugar fix’.

At about 5.15pm Jenny directs the attention of the whole group to one of the bookmarks. It will provide them with a free email address. Members of the group are to register, exchange addresses with their neighbour and send each other an email. By about 5.45pm everyone has sent and received an email. Jenny instructs the group to close down their machines and gathers the participants together for a final discussion. They share their evening’s successes and failures and arrange to send at least one email to Jenny and each other before the next workshop.

The session closes at 6.00pm. Jenny checks the machines, packs up the biscuits, disks, lolly box, handouts, etc and hands over responsibility for security to the cleaner who is waiting to come into the library.

The observer’s story

Following is this observer’s (my) story of what was going on in the series of workshops. It documents the thoughts and concerns of the four participants and the facilitator over the semester as they address the questions put to them by me, the observer: What happened in the workshop? What did you learn? What did you think? After posing each question I allowed the conversation to follow it’s natural course.

What happened in the workshop?

Having observed (and video taped) the workshop this question was aimed at gaining a more personal view of what actually happened from an inside perspective rather than from the point of view of an observer (who saw only the workshop outlined above, and overheard conversation between facilitator and participants).

In each of the five debriefing sessions the answer to this question followed the same (somewhat surprising) pattern. One person mentioned an incident important to them (eg I tried three different computers and something went wrong each time ‘I started to feel jinxed.... how could I have done that? I must be stupid....’). Without fail this triggered a conversation about pedagogy and how children must feel as learners.
The answer to the question ‘what happened’ was discussed with some passion in terms of metaphor and emotions, for example, being afraid of falling behind (too much to pay attention to all at once), groping in the dark, being anxious, feeling stupid, frustrated, stimulated (by the visual smorgasbord on the screen). This was interspersed with empathy for students (‘I keep thinking of the children.... how much do we put before children and we know what our intent is...... but often we’re bamboozling them with data and everything is stimulating for them.’) and followed by discussion of pedagogy (‘in a fifty minute lesson... how far are you going to get trying to communicate all the information and make sure everyone’s at the same stage and then you say well if there are some kids who can go ahead why shouldn’t they go ahead....’). Invariably also the conversation triggered an analogy with something more familiar (‘it’s like learning to drive a car’) or a personal story (‘when my baby was born we rang my parents from the phone box, now my neighbour sends a digital photo a few hours after the birth’).

The answer to my question about what happened was given almost entirely from the hidden, from what was going on in each person’s head. Except for the incident described by one of the group that acted as a trigger it bore little resemblance to anything I had observed. ‘What happened’ was mostly described at the level of emotion and of a, previously internal, meta-conversation about teaching and learning.

**What did you learn?**

Again this question triggered a surprising debate. Usually someone began by mentioning some item of information they had found useful and remembered (‘I learned today about the TAB button’) but again this triggered a discussion about wider issues. One of the major issues addressed was to do with time (‘it just made me realise how time consuming...’; ‘I would understand if I sat there and spent the time’; ‘when will I have the time?’).

However over the course of the semester discussion of ‘time’ changed from a general feeling of being overwhelmed to a more specific wish for more time to pursue a particular activity (‘next week I’m going to spend two hours practising what I learned today’; ‘I would just like another workshop to go over this again’).
The panic seemed to have gone and participants seemed to feel more in control of the learning and more able to articulate their specific needs. It’s interesting to note that after one of the early workshops one of the participants discussed how difficult it must be for students who don’t know how to articulate what it is they want to know or learn about.

Other discussion focused around learning styles and support for learning, again this was related back to their own classrooms (‘at least with kids in the classroom... they’ve got you there.... I find when I’m at home I’m lacking in confidence’; ‘I think a lot of assumptions are made about where we’re up to... it’s devastating to your confidence’.... ‘but isn’t that what happens in our classrooms...’; ‘cooperating, sharing, being willing to compromise.... I think that’s one of the major features coming out of this.... a lot of the pedagogy of teaching is really brought out in this.... you know, individual needs and choice at what rate they do things.... and I thought, you know, really it’s all about lots of really different things although it’s technology driving it, TILT is driving it, but it’s still about the heart of what we do, it’s about teaching.’).

The answer to my question ‘What did you learn?’ was predominantly about the business of teaching and learning. As one participant said, ‘I felt we were learning superficial information.... learning about how the digital camera worked.’ While recognising that they learned ‘things’ these ‘things’ were not considered anywhere near as important as the discussion (internal dialogue at the time or with the group afterwards) of issues of pedagogy.

**What did you think?**

This is the question that I had originally hoped might reveal the inside story, not realising (the obvious) that ‘what happened’ and ‘what was learned’ would of course be the personal ‘inside story’. Each participant’s *being* in the workshop, experienced through a particular life history, was only loosely connected to what the facilitator and the TILT program were providing as a learning context (and what I as an observer, observed).

The answers to ‘What did you think?’ were more predictable. After the workshop on the internet and email conversation focused on the exciting possibilities for learning. After the workshop on digital cameras and concept keyboards conversation was around the time needed to learn how to use these effectively in the classroom.
The database workshop, where participants were required to work in small groups, produced the most enthusiastic response. Group discussion centred around the fun and satisfaction of working together (‘the companionship of working with someone because I think on my own I would have felt very lost and frustrated’; ‘it was company to be with other people... especially having somebody who was really good’; ‘in a classroom that would be good reason for having buddies’).

The chart below shows the number of times various types of responses were made throughout the series of five workshop debriefing meetings with the four participants.

![Post workshop concerns and feelings chart]

**The facilitator’s response**

At the same time as the participants were discussing these issues the facilitator was recording her responses alone in the next room. Not surprisingly the facilitator’s concerns were similar even though the context was focused on TILT workshops rather than classroom practice. Her concerns about teaching were focused on improving the workshops (‘I must remember to speak up, someone down the back couldn’t hear me’; ‘I need to be aware of including everyone... dividing your time is difficult’) her learning was about how to do things better the next time around (‘two participants talked when I was talking and I thought that was quite rude, maybe if I had been saying something interesting they wouldn’t have talked’) her thoughts were about group dynamics (I learned a lot about participants in smaller groups it was almost like having a conversation), power structures (‘they bring all the school power play with them.... it’s much better to mix people up’), and getting on with the cleaner - by whose good office she was allowed to use the library after school hours (‘there’s conflict with the cleaner so I’m conscious of getting finished on time’).
The facilitator’s two major concerns are to do with covering the content (‘I’m always conscious of remembering to do everything’) and her relationship with participants and how that impacts on what she does or doesn’t do in the workshops. She makes decisions on the basis of judgements about the possible impact of her actions on how participants will perceive her. This is one reason for beginning with an informal afternoon tea. She says: ‘the informal beginning is a good introduction, I can pick up the vibes’. Her judgments for the rest of the workshop are governed by ‘the vibes’ (‘I didn’t actually indicate to those people that I thought they were rude but that was only because I wanted to be nice to them ... that’s why I make light of their mistakes and not blame them’).

Reference List

Appendix 6
Workshop observation

The Internet: Beyond the Classroom Walls

Observations, Chester, 9/3/99

4.00pm-6.00pm

14 participants
Facilitator
Observer
Video camera

Participants have afternoon tea in district office then move to first storey library which has a network of computers recently connected to the Internet. There are some teething problems with the network. The computers are arranged along 3 sides of a large recess off the library bounded by the wall of the stairwell (an extension of the end wall of the library), an outside wall and the librarian’s office. There is also a bank of computers in the middle of this space. Participants are seated in a circle which overlaps into the main body of the library, shielded from the book shelves and tables by a large wheeled white board placed at an angle hiding the door to the stairwell. Jenny seats herself in the circle facing in towards the computers. A short discussion of the video takes place.

4.07pm

JF (quietly spoken): Moving on to the video - any issues.
Part: I thought it was very good.
JF: I thought it was very good at explaining... There is a tutorial on your CD but we’re not going to use it tonight because we have the Internet on all the machines.
Part (male science teacher): Streamwatch - there’s a competition...
JF: Murder under the Microscope is an environmental program - children have a purpose to use the Internet.... page 27 of your journal there’s a page for reflection asking what you think is the future of communicating and how the Internet is changing things in the classroom.

JF: Schools Net - before you got one connection now the Department is connecting all schools by ISDN line which means all on a network have instant access to the Internet. Therefore you don’t have to connect you just open the browser. It gives the Internet great importance - opens up a lot of things we can do with students. It does have great implications. [all participants have their journals open]

4.17

JF: What I’d like to do today is open up a browser then we’ll have a look at a couple of sites and talk about searching and I have some bookmarks for you.. a bookmark file of useful sites.... I’ll email that to you when you email me... and set up something like hot mail - but the DET filtered out ‘hot’ (laughing & part laughing)... I’m going to try and project onto there (overhead screen)

Hands out her DET business card with email address on it. Hands out TILT CDROM

Group move to computers - enough for one each.

Projects onto overhead screen

4.22

JF: I’m just going to explain what all these drives are for people who don’t use Pcs.

Clarisworks - that’s a copy of Claris you can install... this folder... this is a graphics folder etc. In here is the Internet and the Internet tutorial. In the disk is a cut down version of the DET website. To get in you need to use a browser. Find that icon on the desktop and double click on it.

4.23

JF: We’re going to go the Department of Education website

6 of the 14 say they have Netscape skills

C P-S: what do you do here? (Netscape page)

JF: press enter
4.34

C P-S still has Netscape page on screen - looks behind at whiteboard for the address - writes the address in and gets the Network for Education site

JF: the hourglass turning around means it’s taking a little while. Click on Curriculum Resources.

Part: Excuse me I can’t hear from here and can’t see the screen (fans are very noisy, light too bright for the screen)

JF takes C P-S’s mouse momentarily and presses reload - explains ‘Reload’

JF: Go to Curriculum Resources, then Key Learning Areas.

DB: Jenny where’s my ‘Reload’ button - I don’t need it but it’s not there.

JF tries but can’t find it: I’ll come back later to find it.

JF: If you look in the ‘Go’ menue you can see everywhere you’ve been looking. Have a look around the DET site for 5 or 10 minutes.

4.40

JF comes back to DB.

DB: Do I need it?

JF: No you don’t need it but - moves to a different computer

C P-S: HSC online - scrolling through pages.

[DB dinosaur stack??]

4.45

JF: You don’t have to stop.. just some information about searching. You need to refine your search.

Make bookmarks... the reason I mention that now is because in the folder in bookmarks there are 5 search engines... there’s another one called Dogpile which goes out and gets information from other search engines you can use dogpile or one of the others.

DB: Jen what do I need to type here.... dot com.... [with journal beside her at the machine writing in]

RK (with journal on lap): bare feet/bottle of water
RH (elbow on back of chair, concentrating on screen, referring to journal on lap)

F part: Does this mean I can buy stuff? I can't accidentaly buy stuff can I? How long does it stay on the screen for?

M part: No you can’t accidentally buy it, you have to give your credit card details. It will go when you go to another screen. You can go to as many places as you like.

RH (Suara Pembaruan - Jakarta)

5.00

JF: Teachers can put a set of bookmarks for kids. I’m minimising this screen. I’m going back into My Computer. I’m opening this file. I’ll show you the bookmarks I’m going to send you virtual chocolates... book wrap... a page of children’s safe search engines... for children and education... guaranteed not to bring back inappropriate material... Ask Jeeves and Yahooligan. The next one is Clarisworks tutorials... epals (little penpals) keypals... another greeting card.

5.04

JF: Home page for the environmental mystery...NED... HSC Online... Ozprojects... Ozteacher net homepage with links for teachers to all Education Departments for every state in Australia...email lists - some generate a lot of mail... Start, an Australian mail system like Hotmail.

Part: How do we get this list into our machines?

[pass around the lolly box]

5.08

Fill in the second row on the emotions lists

JF gives C P-S the TILT bookmarks on disk to explore

DB - notebook

RH - notebook

RK - TILT homepage (using the TILT CD): How did you get out of this? (to neighbour)

Neighbour: I just clicked on ‘back’

Christian Science Monitor

Lollies passed to C P-S and partner

Chester Hill HS Homepage
5.20
JF over RH’s shoulder loading the Internet tutorial

5.22
JF (to group): From the bookmark file go to start or type in the address www.start.com.au
RH: sorry Jenny can you say that again please
...hit enter and it will take you to the Start site

[person near me has hand up 2 or 3 times] JF comes over: Just click up here and then type you’ll notice that when you start typing the machine puts the whole thing in there for you because it anticipates you. You can read the conditions but if you don’t accept then you don’t get an email address.

5.24
JF goes to RH’s computer - takes mouse and restarts Windows
JF: the school email is.....
RH caught up with the group now registering in Start.

5.34
JF: Swap email addresses with someone else and send each other an email.
DB and neighbour exchange addresses (laughing)
C P-S’s neighbour: I’m never going to send an email again
C P-S comes up to give help

5.37
JF: You can send and receive at any time
Music from DB’s partner’s machine: I’m sending a musical card to D
Part: I don’t have enough hours in my life for all this.
DB typing letter back: undo undo... J how do I go back?
JF: click down here (had minimised screen)
RH has received a letter from Start: How do I open it? C P-Sand neighbour have exchanged letters
Computers and Related Technologies
Observations, Chester, 30/3/99
4.00pm-6.00pm

10 participants
Facilitator
Observer
Video camera

The participants are seated in a circle as last time. Jenny passes around the participant information sheets for updating.

Participants fill in the first column of the emotions chart.

There is a conversation going on about the difficulty of receiving email at school.

Part 1: the first person there in the morning gets everyone’s email

Part 2: Whoever is the school contact person operates the email so it’s not very personal if you don’t have your own account.

JF: Does anyone need my email address? (hands round cards for those who need them).

Part 3: I sent you one [an email] this morning - I work well under pressure - homework last minute.

JF asks participants to take the next video tape with components 4,5&6 videos on it.
Can you cross off 1, 2 & 3 when you return it and tick 4,5&6 to show you’ve taken it.

4.10

Part 4: I’ve never got a video - all this talk about videos - I’ve never even seen it.

JF: Sue would have taken it - can you follow up? Let’s talk about the video now - that you didn’t see. It was called ‘Skills for the world of work’ they had kids using lego and kids simulating a newspaper then kids doing all these things.

Participants have journals open - can see one with video page covered in notes.

Part 5: the video was very good - I was most inspired by it.
JF: That’s what this workshop is all about. When people faxed in their questions to this broadcast they said things are changing so fast that these skills are out of date why are we teaching these.

Di: But they’re not skills they’re learning on their own. I would love to show the children that video... lego is simple but so effective- that breathing thing

JF: They’re learning confidence so they’ll take it in their stride- generic and transferable skills- today’s workshop is related technologies

The first part is the digital camera.

The concept keyboard - you may have seen on MacDonalds they just punch your order on a keyboard - well that’s a concept keyboard.

Another extension activity is the scanner if you finish and want to have a go I’ve done some instructions.

You can even scan insects - I’ve seen a mosquito scanned then you can enlarge it and examine it.

Part 6: I’ve just had an assignment handed in be Year9 with a scanned insect and scanned leaf.

JF: Most scanners can now scan in text - it’s called optical character recognition.

Part: So it doesn’t have to be typed in?

JF: It might recognise print - depends how good the scanner is - most do a good job. After Wednesday week 1 you can borrow any of these things - you can borrow me with them. Tell me what you want to do and I’ll come out and do it for you.

The information on search engines handout from last time. If you do anything you can bring along to share that would be good. This is a child’s portfolio that a TILT participant has done.

JF: Handing around another sheet This one is from the Internet workshop we did I meant to give it to you last time

Part 5: We got excellent stuff off the Internet about the cyclone - printed it off for my class there and then

C P-S taking notes in journal.

4.23 (moves to computer at end of room - participants gather round)
JF: There are two extension activities in your book. If you’re past what we do - if you’re on the extension program. But if you don’t know about digital cameras and keyboards it’s better you stay with us. The instructions are in your book. Just to make sure it works if someone will volunteer to be the reader-outer of instructions I’ll run through it and then you can make notes in your book if it doesn’t work. I also need someone to volunteer to have their photo taken if you have a digital camera with a disk you don’t have to download. We have to download. On page 18 of your book - you connect it to the back of your camera - there’s only one place it will fit.

4.30

Following the instructions in the book

JF: Could someone now volunteer to read and I’ll do it.

Part reads p19 while JF follows instructions. Colour image comes up on screen - participant reads how to store it on the computer.

Part: where does it store it?

JF: On the computer until you tell it to go somewhere else. You can store it on a floppy. I’ve brought some disks around. Go down to Save As put my floppy disk in - it will automatically save it as a TIF file or a bitmap file - I don’t know. If you want to email it save it as a JPEG file because it’s smaller and can go by the Internet.

Part: If you save in one file can you save it as another later on?

JF: You can open it in another program and then save it as something else. It’s set on high quality at the moment.

Part: Can you take pictures while it’s disconnected and then connect it up?

Part: What’s the technology inside the camera? It’s not film is it? Then you say you can put them on your computer and then you can use the camera again?

JF: Nothing wears out in that camera [big surprise to some participants] The battery costs $17.95.

Part: How much is the camera?

JF: 3-400 dollars. They’re actually quite old. [information about the newer ones that have a disk in them so no need to download]

Part: Oh, I’ve never seen that before.

JF: you can fit lots and lots on one floppy
Part: Oh so you can view them on the camera then only save what you want.

JF: Yes, yes you get a fantastic image you don’t even need to use photographic paper. But the person who runs this computer room he uses a scanner instead.

JF: Let’s move over to the concept keyboards now. I’ve loaded on the Dragon overlays but we do have others - using these is only one way the other way is to get students to make the overlays. It’s on page 26 in your books [all have books open] Can I have a volunteer to read out the instructions for me so that we know they work and know how they work. [JF reads first part] Install the software select the overlay you’re going to use. Can I have a reader please now.

Part: reading - double click on the icon, from the dialogue box select -

4.45

JF: That’s told the computer that overlay’s on there - next step?

Part reading: Start the word processor

JF: Okay so I’ll just start Clarisworks on here. So what do they do? [JF squatting at machine with concept keyboard on a chair and group seated or standing around - shows whole bundle of overlays also a pack of overlays The Australian pack] Teachers find a whole lot of uses for these - very young children - disabled - even High School because you can program these to do anything. You might have read the reading in your book - Designing a Concept Keyboard Overlay - The scanner is over there.

Divide into two groups have a go about 30 minutes on each then swap over.

4.48

2 groups C-PS+ 3 on concept keyboard - together
RH and M on one camera (RH with mouse)
RK and D + 3 others another camera (RK at keyboard)
D and RK have a picture on the screen 2 mins after taking over.
JF with mouse from d & RK showing features
D: I’ve used a digital camera at school

4.58

D: Bit map files for paint programs jpeg files for .. an unexpected error when you were exiting the file - what does that mean? [to JF]
JF: to RH & M - what do you want to do with
4 at one keyboard: kids can do that - it’s good because it creates the story. It’s completely transferable between the two

5.00 [fill in second column of emotions chart]

CP-S and Co: How does it get in there? One person from the group goes to the second machine that’s been set up

RH prints out M photo

Part: Oh wow isn’t that amazing

Di: Oh no what have we done this time

JF: just save it onto the disk so Robyn can take it away and do whatever she wants with it - save it as a bit map

C P-S’s group has a photo on the screen following the instructions in the book

RH printing photograph.

5.20

CP-S: it won’t do it - to part next to her - click once on that grey bit there now click once on the image - there - ah many brains are better than one - a collaborative effort - god you’re brave - you’re incredibly brave - it’s like a thermal photo

RH & M look at scanner (miss out concept keyboard)

5.30

CP-S: We want to copy this and put it in paint.

JF: how did you get it into grey? If you haven’t saved it as grey you can close it and open it again.

Next group - what’s your name please - Cheryl - thanks

D &RK move to scanner

JF: click on what you want to scan then click the scan button and It’ll scan what ever you say to scan.

RH & M move to concept keyboard one each following instruction booklet

Part: for my own use I’d use a scanner it’s like using a photocopier
RK & D concentrating on screen painting - asking the one with the mouse to click here and there.

RH standing beside M who has a dragon overlay on the concept keyboard on lap discussing how you might use it

RH: in languages you could press all the verbs [sits down at 2nd concept keyboard computer]

CP-S standing behind 2 computers - 3 people working in paintshop spraypainting (voice over instructions on software) How did you do that?
Appendix 7

Base data survey

Base Data Survey Instrument

TECHNOLOGY IN LEARNING & TEACHING (TILT)
Semester: ********, Year:200********

PARTICIPANT PROFILE

This survey seeks some background information on your teaching qualifications & experience. It also invites you to reflect on your current teaching practices, knowledge and understandings. Your responses will assist the course organisers to assess needs and plan for the program and will contribute to the overall evaluation of the program. Please be honest in this self-evaluation exercise and be assured that your responses will remain confidential. Thank you for your cooperation.

I. Background Information
Can you please begin by telling us your...

1. name: ______________________________________________________________________

2. school name: __________________________ school number: ______________

3. school type:  PS 1 HS 2 CS 3 SSP 4 EEC 5 DEC 6 circle one number only

4. district name: district number:

5. status: Permanent 1 Casual supply 2 Casual 3 circle one number only

II. EEO Statistics
You may wish to indicate if you are:

6. female................................ .............................................................................. 1 circle as many as appropriate

7. an Aboriginal or Torres Strait Islander................................................................. 2

8. from a racial, ethnic or ethno-religious group which is a minority in Australian society................................................................. 3

9. a person with a disability.......................................................................................... 4

III. Current Teaching Experience

10. What is your current position?
Class teacher .......................................................... 1 circle one only
Teacher- special education (e.g. STLD, IM, Hearing Impaired) .... 2
Teacher-librarian .......................................................... 3
Teacher-English as a Second Language................................. 4
Teacher-Relief from face-to-face ............................................ 5
Careers Adviser .......................................................... 6
School Counsellor ........................................................ 7
Executive teacher ........................................................ 8
Head teacher ........................................................... 9
Assistant or Deputy Principal/Leading Teacher ....................... 10
Teaching principal ..................................................... 11
Non-teaching principal ................................................... 12
Other (please specify) .................................................. 13

11. Are you the computer education coordinator for your school?
Yes 1 No 2 circle one only
12. If primary, which year group(s) are you currently teaching:
   Kindergarten ................................................. 1
   Year 1 ......................................................... 2
   Year 2 ......................................................... 3
   Year 3 ......................................................... 4
   Year 4 ......................................................... 5
   Year 5 ......................................................... 6
   Year 6 ......................................................... 7
   Kindergarten - Year 6 ....................................... 8
   Other (please specify) ....................................... 9

13. If secondary, please indicate in which Key Learning Area(s) you currently teach:
   English ......................................................... 1
   Mathematics ................................................. 2
   Science ......................................................... 3
   Technological & Applied Studies ....................... 4
   Human Society & its Environment ...................... 5
   Creative Arts ............................................... 6
   PD/Health/PE ............................................... 7
   Languages other than English ............................ 8
   Other (please specify) ....................................... 9

14. How many years have you been working in school education?
   0 - 5 years ...................................................... 1
   6 - 10 years .................................................... 2
   11 - 15 years .................................................. 3
   15+ years ....................................................... 4

IV. **Professional Qualifications**
15. What was your initial area of teacher training?
   Primary ....................................................... 1
   Secondary ..................................................... 2

16. Was there any training in computer technology in your initial teacher training?
   Yes ......................................................... 1
   No .......................................................... 2
   If Yes, please indicate the type of training provided:
   Introductory course on computer education ............. 1
   Introductory course - basic skills e.g. word-processing .. 2
   Course on hardware & software applications in a key learning area .. 3
   Course on integrating technology into teaching and learning .. 4
   Other (please specify) ........................................ 5

17. Have you completed any professional development or formal training in computer technology since you have completed your initial teacher training.
   Yes ......................................................... 1
   No .......................................................... 2
   If Yes, please indicate the type of training undertaken:
   School based courses and/or activities ...................... 1
   OASIS training ............................................. 2
   Courses provided by Department of Education and Training (DET) or Catholic Education Commission (CEC) .. 3
   Short courses by providers such as TAFE, adult evening colleges, professional teachers associations .......... 4
   University degree or diploma course ....................... 5
   Unit(s) within a TAFE course ................................ 6
   Unit(s) within a university course .......................... 7
   Professional reading or own study .......................... 8
   Other (please specify) ....................................... 9
18. If you are currently undertaking formal training in computer technology other than the TILT Program, please indicate the course and year you anticipate completing the training:

<table>
<thead>
<tr>
<th>Course or unit of study</th>
<th>Anticipated year of completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAFE Course</td>
<td></td>
</tr>
<tr>
<td>University undergraduate degree course</td>
<td></td>
</tr>
<tr>
<td>University postgraduate degree course</td>
<td></td>
</tr>
<tr>
<td>University postgraduate diploma</td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

19. Have you had any prior work experience using computer technology in areas other than teaching?

Yes.......................................................... 1
No............................................................ 2

If Yes, please indicate your activities/responsibilities:

| Using computer(s) at home | 1 |
| Using technology applications in business | 2 |
| Managing technology applications in business | 3 |
| Training others to use computers | 4 |
| Other (please specify) | 5 |

20. Do your students have access to a computer or computers in your classroom?

Yes.......................................................... 1
No............................................................ 2

If Yes, when can your students use the computer?

| At specified times during lessons | 1 |
| Anytime during lessons | 2 |
| Anytime, after completing all other school work | 3 |
| Outside lesson time e.g. lunchtime, after school | 4 |
| Other (please specify) | 5 |

21. Do your students have access to a computer room or technology centre (either attached to the library or as a separate facility)?

Yes.......................................................... 1
No............................................................ 2

If Yes, when can your students use the computer?

| At specified periods or times during the school week | 1 |
| During pre-booked times or lessons as the need arises | 2 |
| Outside lesson time e.g. lunchtime, after school | 3 |
| Anytime | 4 |
| Other (please specify) | 5 |

21 a. If Yes, when can your students use the computer?

| At specified periods or times during the school week | 1 |
| During pre-booked times or lessons as the need arises | 2 |
| Outside lesson time e.g. lunchtime, after school | 3 |
| Anytime | 4 |
| Other (please specify) | 5 |

21 b. If Yes, what type(s) and how many computers are available?

<table>
<thead>
<tr>
<th>Type</th>
<th>How many</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM, DOS-compatible or windows computer(s) (PC)</td>
<td></td>
</tr>
<tr>
<td>Macintosh or Apple computer(s)</td>
<td></td>
</tr>
<tr>
<td>Acorn/Commodore/Amiga/BBC computer(s)</td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>
22. Please describe any other access to computer technology available to your students

Library ..............................................................................................1 circle as many as appropriate

Laptops............................................................................................2

LOTE technology programs (e.g. Korean, ALS) ................................3

Careers Room ....................................................................................4

Specialised graphics equipment (e.g. scanner, computer camera) ......5

Midi computers...................................................................................6

Other (please specify) ........................................................................7

23. What access to computer technology do you have at home?

Nil ........................................................................................................1 circle as many as appropriate

Computer ...........................................................................................2

Printer ..................................................................................................3

Modem for access to Internet, e-mail etc. .......................................4

Peripherals (e.g. scanner, computer camera, concept keyboard, Midi) 5

Other (please specify) ........................................................................6

24. Other than your teaching time, what computer technology do you have access to at school?

Nil ........................................................................................................1 circle as many as appropriate

Computer ...........................................................................................2

Printer ..................................................................................................3

Modem for access to Internet, e-mail etc. .......................................4

Peripherals (e.g. scanner, computer camera, concept keyboard, Midi) 5

Other (please specify) ........................................................................6

25. Can you borrow a computer from your school to use at home?

Yes .....................................................................................................1

No .......................................................................................................2 Go to Q.28

26. How often do you borrow a computer from your school?

Never .................................................................................................1 circle one only

Rarely (e.g. once a term or semester) ..............................................2

Sometimes (e.g. once or twice a month) .......................................3

Often (e.g. weekly or daily) .............................................................4

Never, because I have access to my own computer ......................5

27. Is the school computer available when you need to borrow it to use at home?

Yes, always .....................................................................................1 Go to Q.28

Yes, sometimes .................................................................2

No .....................................................................................................3

Not sure .............................................................................................4

27 a. If the school computer is not always available for borrowing, what are the restrictions on your borrowing?

Not enough computers to meet the demand..............................1 circle as many as appropriate

No laptops available/school computers are not easily transportable 2

Only available at particular times eg. school holidays ................3

Other (please specify) ......................................................................4

VII. Current Use of Computer Technology

28. Do you use computer technology when developing your teaching programs and support material e.g. for preparation of overhead transparencies, lesson plans, research?

Yes .....................................................................................................1 Go to Q.29

No .....................................................................................................2

28 a. If Yes, please describe what you use the computers for:

Programming ..................................................................................1 circle as many as appropriate

Developing worksheets and teaching aids ..................................2

Word-processing for administrative purposes e.g. newsletters, signs 3

Word-processing for students’ publishing/presentations ............4

Research for teaching purposes ....................................................5

Research by students e.g. OASIS library .....................................6

Student assessment ........................................................................7

Other (please specify) .................................................................8
Please use the following scale when answering Question 29:

Never to mean "not at all"
Rarely to mean "about once a term"
Sometimes to mean "about once a month"
Often to mean "at least once a week"

29. In planning my teaching and learning program, I:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>select software related to specific educational outcomes in the classroom</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>document the planned use of computer technology to achieve desired outcomes</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Please use the following scale when answering Question 30 - 48:

Never to mean "not at all"
Rarely to mean "about once a term"
Sometimes to mean "about once a month"
Often to mean "at least once a week"

My teaching and learning activities give my students the opportunity to:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>30. use the computer for leisure activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>31. use drill and practice software</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>32. use a simple word processor</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>33. use a simple graphics package</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>34. make decisions using simulation software</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>35. research information from a database/CD ROM</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>36. create, sort and search a database file</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>37. integrate text and graphics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>38. use Logo commands to create 'turtle graphics'</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>39. use a spelling checker</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>40. use email</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>41. use a spreadsheet to graph information</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>42. create a spreadsheet</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>43. use a computer to experiment with music</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>44. create a multimedia presentation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>45. use equipment such as a scanner, digital camera</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>46. access the Internet</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>47. Other (specify)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>48. Other (specify)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
VIII. Support
What support is available to you in your use of computer technology?

<table>
<thead>
<tr>
<th>Types of Support</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>49. Computer education coordinator (in-school)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>50. Students</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>51. Colleagues from the same school</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>52. Colleagues from the other schools</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>53. Family/friends</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>54. Industry</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>55. Community/Parents</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>56. Professional association(s)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>57. User Groups</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>58. Manual(s)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>59. District personnel (e.g. technology adviser, TILT facilitator)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>60. Curriculum consultant</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>61. Commercial resources/books</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>62. Internet</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>63. Other(specify)</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

64. Please use the space below (and over page if necessary) to make any other comments:
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

Please return the completed form to your facilitator or send to:
Joy Murray, Block L
3a Smalls Rd, Ryde, NSW 2112
Fax: (02) 9808 2943

Thank you very much for your assistance and cooperation.
Appendix 8
Consciousness and reality survey

Beliefs about Consciousness and Reality

The table shows results of the survey: Beliefs about Consciousness and Reality, Baruss (1992).

The survey was compiled from chapter 5 of *The personal nature of notions of consciousness* by Imants Baruss (1990). It was reproduced and administered for this research project with permission from the author and publisher, University Press of America, 4720 Boston Way, Lanham, Maryland, USA 20706. Poster presentation at 53rd Annual Convention of the Canadian Psychological Association, June 11-13, 1992, Quebec City, Canada.

Table: A comparison of the beliefs about consciousness and reality of four TILT participants, the researcher (JM) and the TILT facilitator (JF)

| Category          | JM   | C P-S | DB   | RH   | RK   | JM   | C P-S | DB   | RH   | RK   | JM   | C P-S | DB   | RH   | RK   | JM   | C P-S | DB   | RH   | RK   | JM   | C P-S | DB   | RH   | RK   | JM   | C P-S | DB   | RH   | RK   | JM   | C P-S | DB   | RH   | RK   | JM   | C P-S | DB   | RH   | RK   | JM   | C P-S |
|-------------------|------|-------|------|------|------|------|-------|------|------|------|------|------|-------|------|------|------|------|-------|------|------|------|------|-------|------|------|------|------|-------|------|------|------|------|-------|------|------|------|------|-------|------|------|------|------|-------|
| Physicalism       | 80%  | 70%   | 60%  | 50%  | 40%  | 30%  | 20%   | 10%  | 0%   | -10% | -20% | -30% | -40%  | -50% | -60% | 80%  | 70%  | 60%  | 50%  | 40%  | 30%  | 20%  | 10%  | 0%   | -10% | -20% | -30% | -40% | -50%  | -60% | 80%  | 70%  | 60%  | 50%  | 40%  |
| Religiosity       |      |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Meaning           |      |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Extraordinary Experiences |      |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Extraordinary Beliefs |      |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Inner Growth      |      |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Transcendentalism |      |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

Categories are: Physicalism, Religiosity, Meaning, Extraordinary Experiences, Extraordinary Beliefs, Inner Growth, Transcendentalism.
Beliefs About Consciousness and Reality*

This questionnaire is designed to collect information about personal experiences, notions of consciousness, beliefs about reality, the means for understanding reality and attitudes towards life. The meanings of many of the key terms in this subject area are notoriously unclear. We ask that you be patient with ambiguous terms or statements and so understand and use them in the way that you feel that they should be understood and used.

I

The statements in this section refer to your personal experiences. Though some of the items may seem unusual, we ask that you circle the response that best reflects your experience. If a statement does not at all correspond to your experience, use the "definite no" category. If you are not sure whether or not a statement applies to you, but don’t think it does, then use the "qualified no" category. If you think that a statement does apply to you but you are not certain of that, use the "qualified yes" category. Use the "definite yes" category if a statement clearly does apply.

<table>
<thead>
<tr>
<th></th>
<th>DN</th>
<th>QN</th>
<th>QY</th>
<th>DY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I think about the ultimate meaning of life.</td>
<td>DN</td>
<td>QN</td>
<td>QY</td>
<td>DY</td>
</tr>
<tr>
<td>2. My ideas about life have changed dramatically in the past.</td>
<td>DN</td>
<td>QN</td>
<td>QY</td>
<td>DY</td>
</tr>
<tr>
<td>3. My spiritual beliefs determine my approach to life.</td>
<td>DN</td>
<td>QN</td>
<td>QY</td>
<td>DY</td>
</tr>
<tr>
<td>4. I have had experiences which science would have difficulty explaining.</td>
<td>DN</td>
<td>QN</td>
<td>QY</td>
<td>DY</td>
</tr>
<tr>
<td>5. I feel a need to find a real meaning or purpose in my life.</td>
<td>DN</td>
<td>QN</td>
<td>QY</td>
<td>DY</td>
</tr>
<tr>
<td>6. I have had an experience which could best be described as a transcendent or mystical experience.</td>
<td>DN</td>
<td>QN</td>
<td>QY</td>
<td>DY</td>
</tr>
<tr>
<td>7. It is important to me to spend periods of time in contemplation or meditation.</td>
<td>DN</td>
<td>QN</td>
<td>QY</td>
<td>DY</td>
</tr>
<tr>
<td>8. I have had an experience which could best be described as an out-of-body experience.</td>
<td>DN</td>
<td>QN</td>
<td>QY</td>
<td>DY</td>
</tr>
</tbody>
</table>

*The material in this questionnaire was compiled from Chapter 5 of The personal nature of notions of consciousness by Imants Barus (1990). Before reproducing this questionnaire, please contact the publisher, University Press of America, 4720 Boston Way, Lanham, Maryland, U.S.A. 20706.
The following statements about consciousness, human knowledge and reality have been extracted from a number of sources. Although you may find some of them ill-conceived or improperly stated, we ask that you answer them as best you can using the following response categories:

<table>
<thead>
<tr>
<th>SD</th>
<th>D</th>
<th>MD</th>
<th>DK</th>
<th>MA</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRONGLY DISAGREE</td>
<td>MODERATELY DISAGREE</td>
<td>DN'T MODERATELY DISAGREE</td>
<td>KNOW</td>
<td>AGREE</td>
<td>STRONGLY AGREE</td>
<td></td>
</tr>
</tbody>
</table>

For each statement, circle the one response that best reflects your own ideas. The category "don't know" is meant to be used in cases of indecision when you cannot choose between disagreement and agreement, or when you have no opinion about an item.

9. There is no reality other than the physical universe.

10. Extrasensory perception is possible.

11. The inner experiential world is vaster, richer and contains more profound meanings than most people think.

12. The existence of human consciousness is evidence of a spiritual dimension within each person.

13. Eastern religions have much to offer our understanding of consciousness.

14. Introspection is a necessary element in the investigation of consciousness.

15. Statements about human cognition are meaningless without reference to particular states of consciousness.

16. Reincarnation actually does occur.

17. The concept of limits does not apply to consciousness.

18. In order to fully understand human consciousness, a process of psychological change is necessary which may be achieved through meditation or a spiritual way of life.

19. The accepted methods of science are the only proper way in which to investigate consciousness.

20. The reason the universe is the way it is, is to support human life.
21. Physical reality is an extension of mental reality. 
22. Consciousness gives meaning to reality. 
23. Consciousness is more real than physical reality. 
24. Human consciousness would not exist without the brain. 
25. There is an absolute truth which is not context-dependent. 
26. Our culture can be viewed as a basic conspiracy against self-knowledge and awakening in which we collude together to reinforce one another's defenses and insanity. 
27. There are modes of understanding latent within a person which are superior to rational thought. 
28. It is possible for there to be consciousness in which there is awareness but no object of awareness. 
29. Human consciousness is an emergent property of complex neural activity. 
30. Consciousness is the key to personal growth. 
31. There are some truths concerning reality which, in principle, are not amenable to scientific investigation. 
32. Even though we are not yet able to explain mental events in terms of physical processes, an explanation is, in principle, possible. 
33. The harmony of nature reflects the existence of an original creator. 
34. Consciousness transcends time. 
35. Knowledge of people achieved through literature is more profound than any knowledge of people that can be achieved using the scientific method. 
36. Personal consciousness continues after physical death. 
37. There is a universal consciousness of which individual consciousness is but a part. 
38. A process of psychological change is necessary in order to fully experience human consciousness.
Sources for Items


5. Rewarded Item 7 from Life Attitude Profile (LAP) – Form 5 by Reker & Peacock, op. cit.

7. Rewarded Item 20 from Intrinsic/Extrinsic Scale of religious orientation by Feagin, op. cit.


35. Rewarded Item 49 from Epistemological Style Questionnaire by Krasner & Houts, op. cit.

Appendix 9

Teacher portraits

Portrait of a Teacher of Gifted and Talented Year 3 Students, Semester 1, 2000

Background

In the top left hand corner of a large sheet of paper Di writes:

The beginning is the end and the end is a new beginning…..

Just above the bottom left hand corner she begins a line that snakes up to the top right corner. About two centimeters along this line she places the first dot which indicates her birth in Melbourne. This is not just an ordinary time line, it’s a lifetime’s significant learning line which accounts for the words next to this first dot: ‘Grandparents – Wisdom!!’ Along about three-quarters of the line she places dots at varying intervals with explanations of their significance. She will need her grandparents’ wisdom as a small child coping with school and serious illness and in the following years coping with the many changes in her life, changes of career, training, family circumstances and geographic location.

Victoria

Her memories of pre-school are of ‘nasty children’ and ‘unfair’ treatment. In Primary School she remembers the enjoyment of dance and drama and extra-curricular activities however this is interrupted by a life threatening illness when she is eight. At age eleven Di feels the challenge of a full curriculum and also the competitiveness of school in Year Six. An Independent High School brings a different set of challenges, more responsibility and problems of time management (which will feature many years later in her teaching). However a private education has advantages and Di feels (if somewhat tongue in cheek these days) that she was taught to ‘be a lady’.
Queensland

The transition to University Life in Queensland opens up new worlds. Here social and political issues have a huge impact on her life. It is the time of the Vietnam War and student protests. For Di it is also the time when she meets her husband, gives up University, marries and moves to Lithgow in New South Wales.

New South Wales

Having given up a University place and moved to a country town Di, with her appetite for knowledge needs to take on new academic challenges. She enrolls in Bathurst College of Advanced Education to study Social Work and at the same time works in the Child Welfare Department satisfying her social conscience and determination to tackle equity issues wherever she finds them.

Australian Capital Territory (ACT)

A move to Canberra brings with it a move to the Riverina College of Advanced Education and a continuation of her course in Social Work. However once again she is not to finish the course. She and her husband move to Malaysia.

Malaysia

Although this is another beginning, it is also a continuation of the same issues which have concerned Di in the past. It brings her face to face with cultural diversity, political challenges and welfare issues on a much larger, more immediate scale. She finds herself working in a Refugee Camp and contemplating issues of freedom, displacement and loss (while coping with her own sense of displacement).

ACT

Back in Canberra she picks up her Social Work study for the third time. She becomes involved in the settlement of refugees and finds time to have two children (who she says are her best mentors).

USA

A move to the United States follows. Again she is faced with cultural diversity and coping with change as well as a different set of social and welfare issues. The children begin their education and Di becomes involved with the School Board.
ACT

Once again a dislocation and need to adapt to change, this time with two children to settle into new schools. Coping with cultural difference is again an issue, as is a sense of loss for a familiar life style even though there is also a sense of belonging and home-coming for her.

South Australia

The next move is to Adelaide. What she refers to as a mid life crisis takes her in search of a new challenge. Di enrolls in the University of South Australia, this time to take a degree in Education and so into teaching. These signify big changes in her life. She takes out the University medal and is invited to continue her study. But it is not to be.

New South Wales

Di moves to Sydney where she begins teaching full time while continuing her fourth year studies. At the same time she pursues her own personal studies in Philosophy and Psychology. She is faced with the issue of death.

It is at this point in her education/learning that Di takes up the TILT program.

From the perspective of this lifetime's significant learning TILT is a natural progression – the next challenge for her as a teacher, another learning journey, embracing inevitable change. It is also a way of providing greater learning opportunities for her students which she sees as an equity issue.

TILT participant profile, Semester 1, 1999

In 1999 2,510 teachers participated in the semester 1 TILT program throughout NSW. Seven hundred and four participants responded to the participant profile survey before beginning the TILT program. There was a total of 77 participants from the Chester district (ie Di’s district). Of these 75% responded to the participant profile survey (8% of all respondents). Of all respondents 75% were female.

The TILT participant profile was trialed in semester 2, 1995 as part of the trialing of the TILT program. It has been administered to participants each semester since then with the exception of semester 1, 1997 when the program was instituted statewide for the first time.
Forty per cent of all respondents were from Primary Schools (53% from High Schools), and 61% were classroom teachers (18% school executive and 21% specialist teachers). Of the Primary school teachers representation from Kindergarten to Year 5 was fairly evenly spread at approximately 9.3% respondents from each Year. This dropped to 5% for Year 6 teachers. As a female, Year 3, Primary school classroom teacher Di is a fairly typical TILT participant.

When it comes to length of teaching service Di is atypical. The majority of TILT participants (survey respondents) have been teaching for 15 plus years. Di has between 6 and 10 years of service. However, she entered teaching later in life than most so would probably be in the typical age bracket. Typical of those with 6-10 years of service Di’s pre-service training included an introductory course in computer education. Like the majority of those who included technology in their initial training she has not undertaken any technology training since graduating. Like the majority of respondents (64%) Di had no experience using computer technology in areas other than teaching including home use, even though like 76% of respondents she has access to a computer at home. Di also has access to a printer at home (68% of respondents) and a modem (35% of respondents).

Eighty nine per cent of primary and central school respondents reported, like Di, that their students had access to computer technology in their classroom. In Di’s room students had access to two Macintosh or Apple computers which is typical for primary school respondents. Like 45% of survey respondents Di allowed access to the computer at specified times during lessons. She also allowed access at any time after completing all other school work (20% of primary respondents). Like 80% of primary school respondents Di’s students had access to approximately 15 computers in a computer room. Typically these could be accessed at pre-booked times. Other access for students was available in the library (80% of respondents).

Di has no access to computers at school outside of teaching time. Only 6% of respondents reported no access outside of teaching time. These were typically female, primary school teachers with more than 15 years teaching experience. Typically Di was able to borrow a school computer but had no need because home access was available.
Like 71% of respondents Di used computer technology when developing teaching programs and support materials for students. Typically Di said this was for developing worksheets and teaching aids (62%) and for word processing for administrative purposes (58%). Di also used computer technology for research for teaching purposes (28%).

Like 35% of survey respondents Di did not select software related to specific educational outcomes when planning her teaching and learning program. Neither did she document the planned use of computer technology to achieve desired outcomes (46%).

Like 80% of respondents Di’s students used a word processor and spell checker (60%). Di’s students had access to both at least once a week (survey participants 25% word processing and 19% spell checker at least once a week, the balance accessed this software once a month or once a term). Di also provided access to the computer for leisure activities (along with 65% of respondents) at least once a week (18% provided access at least once a week, the balance accessed this software once a month or once a term). Along with 60% of respondents about once a term Di provided access to a database or CDROM for research purposes.

Di was among 39% of respondents who provided access to the internet about once a term. Di’s students had no access to 12 of the listed 18 activities in this section of the survey (eg drill and practice software, use of a graphics package, database construction and use, spreadsheets, email, multimedia presentation software, digital camera).

Di was supported by students from Year 6 (63% reported being supported by students), school colleagues (92%), family and friends (71%) and district personnel (76%). In addition like 61% of survey respondents she made use of manuals. She also used the Internet as did 60% of survey respondents. In summarising her own skills and knowledge Di wrote: ‘I can word process but my knowledge pretty much ends there.’

Summary

The TILT program is for teachers ‘who are not currently using computers in the classroom.’ Di certainly belongs to the target group. Although Di uses her word processing skills for administrative and preparation purposes she makes little use of computer technology in her teaching and allows students only limited access.
The access she allows students is in the area of word processing in which she herself is competent and confident. In keeping with her commitment to providing the best possible education for her students it should be noted that where Di is comfortable with the technology she provides regular access (‘at least once a week’) for her students. It is her recognised need to expand opportunities for her students that has brought her to the TILT program (‘I thought, no I have to do it, I can't, this is technology, I can't afford to live without it now and so I'm into that mode of I don't care how many hours it takes I don't care that my program is late’ Tape 1, 19/5/99).

In most respects Di fits the profile of a typical TILT participant, the main difference being length of service. However Di would probably be in a similar age bracket to the typical TILT participant who has been teaching for 15plus years. Also typically, although access is available at home Di makes little use of it. Anecdotal evidence from comments made on the survey form indicates that women often feel that their own children take precedence in the use of the home computer because it is seen as important for their education.

Other comments indicate that women often have to endure the patronising comments of their own children concerning their lack of computer skills and sometimes feel that asking for help (or showing inadequacy) is not worth the emotional expenditure (even if, as is usually the case, this is light hearted bantering).

**Learning style**

Di’s learning style is fairly evenly balanced. She has a slight preference for visual and auditory learning over tactile but is comfortable with all three modes and can adapt to whatever situation is presented.

5 Learning Style Inventory:
https://www.hcc.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/learnsty2.htm
Beliefs about consciousness and reality

According to Baruss and Moore (see footnote) the ‘Transcendentalism scale of the Beliefs about Consciousness and Reality survey can be used for measuring the point along the physical-transcendental dimension of a person’s belief about consciousness and reality’. It can be seen in the chart below that Di’s (DB) beliefs about consciousness and reality tend towards the transcendental. This is assisted by an anti-physicalism and belief in religion (which is not necessarily an organised religion) a need for meaning and inner growth and a belief in the extra-ordinary (as well as having had extra-ordinary experiences).

Table: Beliefs about Consciousness and Reality, Baruss (1992). A comparison of the beliefs about consciousness and reality of four TILT participants, the researcher (JM) and the TILT facilitator (JF). Categories are: Physicalism, Religiosity, Meaning, Extraordinary Experiences, Extraordinary Beliefs, Inner Growth, Transcendentalism

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6 Compiled from chapter 5 of The personal nature of notions of consciousness by Imants Baruss (1990). Reproduced and administered with permission from the author and publisher, University Press of America, 4720 Boston Way, Lanham, Maryland, USA 20706. Poster presentation at 53rd Annual Convention of the Canadian Psychological Association, June 11-13, 1992, Quebec City, Canada
Reflections on *TILT* (10/7/00, approximately a year after completing the *TILT* program)

What did you get out of *TILT*?

Di’s first response is: ‘Extra skills in technology.’ However she then modifies her answer with the observation that ‘the best thing about it was the reflection afterwards [30 mins after each workshop spent with three other participants and the researcher discussing what was learned in the workshop] talking about the workshop and in the car afterwards elaborating on it [driving home with another participant and recording their conversation for the researcher]. It was indulgent in a special way. As a learner we learn with motives and we have a need, an outcome such as a skill but also branching out in our thinking about learning. Being a learner. I love change. I love the tension. I had to cope in rough weather and do things on the run I had to wish for more time to reflect.’

Di had often before mentioned the notion of privilege in being allowed to undertake the program (interview on *TILT* follow up day, 19/5/99; interview following school visit 1/11/99). She had missed out the first few times it had been offered at her school because her word processing skills were good, others were considered to have greater needs. She again refers to this sense of privilege: ‘*TILT* is dynamic we’re practising skills but the learning is a privilege – to have time to reflect. I would have got there with the skills but I valued highly the discussion post-*TILT*.’

This comment is very much in keeping with Di’s constant search for intellectual stimulation and challenge. It is interesting to note that the learning of skills is of secondary importance, the reflection, the learning about learning carries more weight.

Di reflects further: ‘It helped me to identify that I am someone who always wanted more. You teach yourself. Teaching is my life and this is what I want to do with it. I always wanted more. More important things were not usually relevant to the learning. That was powerful. That was the gift of *TILT*.’

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7 Robyn (another *TILT* participant) is asking Di the questions, after having read through them. This leaves the researcher free to write, it also means that the questions are being asked by another participant rather than an outsider.
What have you done with it?

The impact of TILT on Di’s teaching is compatible with her earlier comments on the relative importance of the skills introduced by the program and the bigger issues dealt with in reflection. She says, implying from the question a focus on technology skills: ‘Not just the skills of TILT and what to do with it – this is radically going to change things. The impact big picture is going to manifest in ways of pedagogy – impact on learning – we just skim but learning is pleasurable but it implies great changes a challenge. It has changed the whole way I’m teaching. I still do the same structure and content but I rely on those machines now. The computers outside the classroom are now inside the classroom.’

What happens if you have a problem with them?

Di’s insistence on the importance of ‘the big picture’ over skills prompts this follow up question from her fellow participant, Robyn. Di’s response again reflects her values. ‘You have to keep expanding your own knowledge. It’s what you value. I value the impact of technology on my programming but haven’t had time to learn the technicalities my priorities are people. I spend hours talking to parents – there are not enough hours in the day. I don’t get to technical problems...... I want to use year 6 children as mentors and technologists in the school – let them lead. I can’t get the support I need, but I can see a way of benefiting the children. Not just open slather I have proposed a framework but it’s not been received yet. Year 6 children are really good let them get better. I’m not afraid of turning this around and making them the experts. TILT has changed my ideas in that way. I’ve never been afraid of learning from children.’

What kind of a learner are you?

‘A reflective, big picture learner. I’m philosophical, I like to ponder. I like to satisfy myself that I have turned every stone. Although I’m reflective I like to have a skeletal framework. I like the whole scaffold. I like to see the big picture to begin with. The work you do at home attaches muscles to the framework. Life gives you the skin to make a whole body.’
It is interesting to note that the breakthrough in Di’s learning was not the mastery of some skill but came when she was presented with a selection of software catalogues (workshop 4, 4/5/99). Suddenly she could see the big picture and could discern order and categorisation. She had access to information that the experts seemed somehow to ‘know’. She also had access to the language she needed for communicating with experts (commercial and educational) and for making educational decisions for her teaching. For her it was the key to understanding technical requirements, educational content of software and links with the curriculum, all of which had remained a ‘bit of a blur’ thus far.

Concern for the ‘big picture’ and concern for scaffolding or a skeleton structure to provide boundaries crop up frequently in Di’s conversation. On viewing (19/5/99) part of the video of workshop 2 (9/3/99: Beyond the Classroom Walls: The Internet) two months after the actual workshop took place Di can remember her thoughts as Jenny told them about the Internet. Thinking big picture as usual she was becoming concerned about censorship: ‘I think I wrote it down issue or censorship or something there.’

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8 Video recall (Tape 2, 19/5/99)I mean I went down onto the floor and just sat there and just sat there and then I thought, why isn't everyone else coming down and this is what it is about you know listening to someone talk or you can actually be doing and looking [catalogues and computer magazines were placed on a low table in the middle of the circle. The TILT facilitator was speaking to the group as they browsed through the material]. I thought it didn't get people as excited about this as I was. I can remember thinking this is the key. I'm very much a visual person like I like to, I'm very much hands on and while I'm hearing things [I like to read as well]. I can still listen to Jenny but I can still have my own thoughts scan the things that I've (inaudible) to what I'm interested in …… so you didn't feel rude that you were actually servicing your own need while receiving something from them together. I found that way I was listening to something but I was also researching for my own benefit and I like that type of learning.
Then as Jenny went on to explain about the use of filtering software Di says: ‘I thought oh good, I was relieved to think that we weren't going to have to be (inaudible) I thought oh good the department [has thought of that] I am projecting the problem of having open internet in schools and all of that and then I thought oh you stupid of course they wouldn't do that to a kid they could never do that to children I thought great they've put the boundary on us we're going to be okay that is great so that was very nice.’

‘yes …. I was writing censorship ..... it was an issue going through my mind having all the computers in schools having internet and the censorship issue and then the relief, oh it's closed so that was great.’

**What bits of TILT particularly suited your kind of learning?**

‘I liked the collegial support of the workshops. But I liked the whole package. I like to be able to go back and reflect. The time from where you would be at the workshops you were focussed on the skill. But I was always in mental competition with myself thinking what I’m going to do with this. I wouldn’t have been able to deal with it all. I might have got better skills but that’s all.’

This answer again shows the importance to Di of reflection. It is entirely compatible with the focus of discussion in the post-workshop debriefing sessions, where an analysis of the discussion shows a predominant concern with the application to student learning rather than the acquisition of skills.

**What did you learn from Jenny (The TILT facilitator)?**

‘I loved her calm⁹. She always anticipated that things would go wrong and acted her philosophy – mistakes are a learning opportunity. It was good modeling. Children are not as tolerant as adults and maybe not as generous with their time.’

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⁹ This is consistent with Di’s comment when interviewed more than a year previously (19/5/99) ‘Jenny was competent, calm and capable and she never ever gave me the impression oh you're silly you should know that.’ And in November 1999: ‘...she was non-threatening and that's the kind of thing I mean you tended to think that it would be a whiz-bang person ..... [but] she was gentle and she was respectful and she was caring she was quiet and calm.’
Once again Di switches to focus on the classroom (‘good modeling’). She immediately applies what she herself has learnt to her students’ learning, taking it a step further in speculation about the relative attitudes (adult/child) to waiting for assistance.

**What did you learn from other participants?**

‘The fun of learning. Someone to say “I tried…..”. The support of each other the intrinsic value that my mind would think about at the end of a day. Still good natured, good humoured. It made me think about the types of people who join the profession. I loved the excitement of finding things out. Debbie sent her email with an attachment. It was exciting sending an email but she sent an attachment.’

Again there is the typical switch from the particular to the big picture. From the support she experienced from other participants she moves on to speculation about the kind of people who become teachers and an appreciation of learning and knowledge in general.

**The following questions were an attempt to reveal the relative importance of the various elements that make up the TILT program. In putting together the package it had been considered important to cater for a range of learning styles. Material was therefore presented in booklet form, on video, audio cassette and in face to face workshops. Individual follow up work was also provided. It is in keeping with Di’s multi-dimensional learning style that she found all elements of the program helpful in different ways.**

**What did you learn specifically from the booklets in the folder?**

‘The booklets were good’. They were my solid rock to go back to like a friend. You could refer back to them and had your own notes in them – faithful and true.’

**What did you learn from the workshops?**

‘The workshops gave us a shared understanding and cooperation.’

10 On first seeing the package Di comments (19/5/99): ‘the resources were good to be honest it was hard to believe it was a department package having, you know, looked at a few company packages (inaudible) this was so outstanding (inaudible) I thought you know it was a really good package, so that was a surprise.’
What did you learn from Jenny’s visits to school?

‘If I had a blockage I knew there would be someone to deal with it. She took the roadblocks down. It was always pertinent to my needs – tailor made learning – she removed the barriers.’

What did you learn from working by yourself at the computer doing your homework?

‘I had to use it or lose it. I need to practise something new 50 – 100 times. I have to take 200 times I need to practise. I climb the learning curve over and over again if I don’t keep going.’

What did you learn from the videos?

‘Very comfortable learning, laid back and relaxed. I watched them several times. I watched while I was getting dinner ready, doing the ironing, marking, I could give enjoyable attention time to them.’

What did you learn from the audio cassettes?

‘They were good, again a more relaxed way of learning.’

What was the main message of TILT?

This and the following question were meant to provide a summary of the participant’s reflection. They were an attempt to reach the participant’s perceived essence of their learning. Di’s answer embraces the intentions of the program producers. The intention was to provide through TILT a range of experiences to suit different needs. It was also an intention to prompt thinking about larger philosophical issues to do with pedagogy and learning.

11 In a reflection interview (1/11/99) Di commented: ‘I don’t remember which one it was but there was one of the videos that I wished that I had a copy of because I would have used it in the classroom.’
'It provided a range of experiences and you could tap into one that suited you. It was not just skill development but you could find yourself in the materials. It was thinking about thinking it was philosophy, giving value to thinking about thinking. It's like driving – you still get there at different times and speeds but when you have been a learner you are conscious of learning but we've not being given an opportunity [to reflect on learning about learning or thinking about thinking] in any other program.'

**What are the values in TILT?**

'TILT is designed to value individual learning styles of the participants. It understands the time constraints on teachers and provides such a generous package. The handbook, it's non-judgemental, it's a friend. The workshops are interactive facilitating hands-on practical. The program is inciteful and respectful. There was great value in having Jenny come to us.'

It is interesting to note that the values Di sees espoused by the TILT program are the values evident in her own classroom. She values individual learning styles and respects each individual student. She emphasises good use of time, and exhorts her students not to waste time, that it is precious and cannot be regained once gone (TILT ‘understands time constraints’ and provides for good use of time). Di’s classroom language is non-judgemental of her students (like the language of the TILT booklets).

Di summarises by saying that she found the course extremely stimulating, she likened going home from the workshops to ‘just how you’d been to a meeting and you’d be still really hyped up over it’. She says, ‘I thought that when I think about a unit of study that we might do at Uni I thought for what we covered I thought we really had covered a lot.’
Di’s Themes and Concerns

A long process of reading, writing, thinking and classifying has been undertaken in order to arrive at the themes and concerns outlined below. Initially every item of Di’s participation in the research was extracted from raw data (video and audio recordings, and workshop and interview notes) and placed in a written chronology revealing the history of Di’s discussion contribution and workshop participation over the research period. Each entry was then summarised to reduce the volume. Hesitations and sections untranscribable because of noise or interference were removed, some dialogue was retained but most was summarised to retain the main points.

This process was repeated a second time, again to reduce volume. This time decisions were made concerning the main point of each of Di’s contributions to discussion. The main points were retained while much of the original speech was removed. When condensed to a manageable size the next step was to attach a label to each point throughout the whole chronology. The labels indicated the theme or concern embedded in the conversation item. At this time a pattern began to emerge. Di’s concerns and themes seemed to be consistent throughout the two years of the data collection period. The focus of the concern or issue sometimes changed along with Di’s comments on the concern or issue however the themes remained stable.

Throughout the two years Di’s comments indicated that she was concerned about how she would control her students’ learning particularly in relation to the internet, how she would know the expected outcomes of her students’ learning and how she would evaluate their learning. These were major issues to which Di returned on several occasions.

Related to this was another theme to do with her teaching practice. Di also indicated that classroom management was an issue for her from time to time. Other general issues to do with classroom teaching emerged as did issues to do with school organisation.

Probably the most prominent theme that emerged from the data was Di’s commentary on her own learning. This commentary included comments on the seemingly overwhelming amount of information she was dealing with; her growing empathy with students as learners; and her own learning in general.
Di also commented frequently on ‘big picture’ issues to do with school education and computer and information technology. Issues such as copyright, student access to undesirable material, the production of support materials, and industrial issues for teachers were discussed.

Finally Di commented frequently on the program itself. Some of these comments arose from comparisons with her own classroom practice, her own values and attitudes to learning and those espoused by the program. Other comments were in response to questions about the unwritten rules of participation in the program, her relationship with the course facilitator, and her opinion of the materials provided, the course structure and the resources that support it.

**Student learning**

**Control of student learning**

The second workshop in the series (9/3/99) dealt with the internet and email. During the post workshop debriefing session Di said that she was concerned about not being able to know her students’ thoughts and where they were ‘up to in their learning’. This was in relation to her students searching the internet. She indicated that she would not know what sites they had found and therefore would not know what they might learn.

Three weeks later (30/3/99) driving home from the third workshop (Computers and Related Technologies) Di again questioned how she would know and evaluate her students’ thinking processes.

The fourth workshop in the program (4/5/99) dealt with software. During the post workshop debriefing session Di talked about how difficult it would be to know what learning outcomes one can expect from a piece of software. She accepted that students might gain enjoyment from using a piece of software (eg MYST) but needed more than enjoyment as an outcome for the time spent on the activity. She felt she needed to identify skills and knowledge outcomes for it to be worthwhile. Di asked: ‘how do you evaluate the thinking process’ when students are absorbed in their own thoughts?
Di continued this theme in the car on the way home (4/5/99, car conversation). She expressed concern about ‘testable outcomes’. Di indicated that she would be happy to be a facilitator who ‘sets up that structure for that learning to occur’ but she felt she was still struggling with the idea of how to identify what outcomes a student was achieving. She pointed out that when students were doing groupwork (even if the topic was unfamiliar to the teacher) she was able to ‘get around everyone’ to assess the outcomes. But in the case of technology she did not feel that she would be familiar enough with the technology (and software) to be able to assess the students’ learning. She felt that she would need time before she could to set up criteria for the groups.

Di returned to this issue again two months later (6/5/99) during a school followup day when the facilitator visited the school to show Di and her colleague, Cheryl, the Lego set and some pieces of Software they had requested. This time Di’s concern seemed to be broader than simply searching the internet. She was concerned about how she would know what learning outcomes her students would be gaining through the use of technology. She didn’t know how she would be able to ‘control the child’s mind’ if they were allowed to explore the technology themselves. Di expressed concern that the child might day-dream instead of focusing on the task at hand. She asked the rhetorical questions: How would she know; how would she evaluate the learning in such a case when as she said, ‘the child’s pondering is not mine to measure’?

The implication seemed to be that Di wanted to know thoroughly every piece of software (or the capabilities of things like Lego) and work out exactly what outcomes the students would be able to gain from its use before they were able to use them. While Di recognised that much of teaching was about allowing students to explore, she also indicated that they needed boundaries. Furthermore she indicated that the exercise was around ‘thinking skills, science and technology’ which require the teacher to know the materials well and to understand the possibilities.
These concerns were raised during a visit to the school (19/5/99) a short time later. Di explained that she did individual contract work with her students and was therefore ‘the consultant’ rather than the teacher. Each contract card had a task on one side and a scaffold on the back for the text that was to be produced. This provided freedom within a supportive framework, freedom within boundaries, she believed. Di explained that she constructed tasks at multi levels so that students had freedom of choice (of structured tasks) but within the bounds that she had allocated.

To support her point Di described an assessment task she had devised for students to independently assess their own word processing skills. Students had to produce a document with specific features of font, layout and style. Di believed this was an achievement for herself and the students.

Fourteen months later (10/7/00) during a visit to her classroom Di was reminded again of this concern. She remembered her concern about the internet and felt it ‘probably had a censorship component’ also an ‘evaluation component to it’. She indicated that at that time she had been concerned about keeping her assessments up to date when she had no idea ‘where their [the students’] boundaries have gone’. She recalled that early in the program she had felt the ‘boundaries were too big’ and that ‘knowledge would go beyond what we could control and handle’.

Fourteen months after the course had finished Di indicated she took it (student learning) ‘from where they’re at’, constantly redefining the boundaries. Now she asked students to tell her where the boundaries were. She said, ‘the terrific thing about that is that the boundaries aren’t where you would have put them and that’s really great because however it works it allows greater possibility’ (10/7/00).

It would appear that Di had found a new way to be ‘in control’ of student learning. She indicated that she now remained in control in a different way. Instead of identifying the learning outcomes for every activity and assessing her students’ progress against them she had shifted focus to her programming and the evaluation of her teaching. She said that she continually evaluated, reassessed and re-programmed her teaching. This, she said, allowed her to provide open-ended learning activities for students but remain in control of the total teaching/learning picture.
Teaching

As a teacher Di indicated that she was concerned about what and how her students were learning, she was also concerned about her own teaching. Di’s concern for the lost art of teaching (see below) seemed to occur at the same time as her concern for knowing precisely the student learning outcomes of every activity. At the same time as Di was concerned about implementing the DET’s move towards outcomes based education she also expressed concern that the notion of measurable outcomes taken to an extreme had the potential to destroy the art of teaching.

Lost art of teaching

On three occasions (4/5/99; 6/5/99; 1/11/99) Di expressed concern about what she called the ‘lost art of teaching’ together with the possibility that students would become passive consumers and teachers would become ‘number crunchers’ as they were asked to rely more on technology and less on forming relationships with students. Her comments indicated that she feared that important aspects of the teaching would be crowded out of the curriculum. Di also talked about the compartmentalisation of the curriculum in terms of measurable outcomes. She believed that teaching was an art and feared that the curriculum would become so prescriptive that there would be no room left for good teachers to teach to the moment. The interview data clearly indicated that Di was highly aware of student outcomes and felt insecure at this stage (1999) if she could not explicitly define what outcomes her students were working towards.

Classroom management

Throughout the TILT program Di commented on classroom management issues associated with what she believed the program was implying about the organisation of student learning. She considered using individualised instruction, whole class instruction requiring multiple items of equipment, and group work with members of small groups each working on the same materials. She considered these issues in the context of the previous concern for control of student learning and the teacher’s responsibility for learning outcomes.
For example during the post workshop debriefing session (9/3/99) following the second workshop Di expressed concerns to do with individualised instruction and being available for each student when the need arose. She suggested that one of the implications of the TILT program was to cater for individual needs, however she also saw the huge time investment in planning in order to manage this so that it worked for each student.

Di returned to this theme after the next workshop (30/3/99) when she indicated that she thought teachers needed to change their pedagogy to make best use of the technology. Later that evening as she drove home with Cheryl she returned to classroom management issues saying that the digital camera, for example, would be hard to manage in a classroom. She suggested that either you would need several cameras or there would be a lot of time wasting as students waited for their turn, which seems to imply that Di had in mind a whole class activity rather than several different activities of which using the camera was one.

During the post workshop debriefing (4/5/99) Di told the group of her first attempt to use the internet with her students. She explained that before the lesson she spent a long time researching sites that she would take the students to. She prepared step by step instructions so that all students visited the same sites. During the lesson she monitored students’ screens to ensure they kept together and no-one raced ahead. Di indicated that this was a rewarding and exciting experience for herself and her students.

Di again came back to the subject of classroom management on the way home from the fourth workshop (4/5/99). This time she was considering the difficulties of group work with technology. She wondered how she would be able to get around to each group in time ‘to assess the outcomes’ if she had several groups working in different locations. At that time she had students organised into groups around a computer taking notes from the screen. Di indicated that she thought the answer was a lap top for each student and site licenses for software, so that everyone could work towards the same outcomes on the same task.

During the school follow up day (6/5/99) when the facilitator visited the school Di suggested that she might have to ‘let go’ a bit as a teacher’. This led her back to the previous theme of control of student learning. She said that she would be willing to let go as long as she were confident the ‘outcomes are there’ (6/5/99).
Two weeks later (19/5/99) during a follow up meeting Di explained how she gave the students website addresses to look up. She had spent several hours the night before in preparation, checking the sites and deciding what specific things she wanted the students to find out. She therefore knew what the sites looked like so could determine at a glance that they were at the right site and on task. She had also decided what outcomes she wanted them to achieve. From classroom observation Di required all her students to be on task almost all the time so that their learning was maximised. This required that Di had previously defined the task, knew what the learning should be and could monitor the students’ on task behaviour.

A classroom visit took place in November 1999 (1/11/99) four months after completion of the TILT training program. Di’s students were divided into four groups with each group assigned a task. One group had been sent to the small computer room at the end of the verandah to type up their sound poems which had already been written out by hand. They had to meet specifications for heading, font and borders. Di visited intermittently instructing them on correct posture and finger positions for typing. Another group was to have visited the internet site for Australian soldiers in East Timor but the network was down so they were also typing up their sound poems. The students said they used computers at least once a week usually for word processing or internet searches.

In the interview following the classroom visit (1/11/99) Di indicated that the major changes in her use of technology were in the classroom use of software and the use of internet for research. She had a system in the class of teaming up those who were computer literate with those who wanted to learn more. A list of class experts indicated to whom students must go for help before consulting Di.

Another classroom visit took place almost five months later (5/4/00) nine months after completion of the program. Like last time students had been divided into four groups. There was a different task for each group. Di instructed the internet search group to have a good period of time searching for Olympic sites. She told them that half an hour should be spent searching and half an hour spent filling in the fact sheet. Di suggested they use the Anzwers or Yahoo search engine. Students suggested Google and Ask Jeeves. Di told them they then had to decide what key words they were going to use. She told them they must ask, ‘Is this a good web site? Is it a good home page?’
Does the home page give me what I need?’ They worked in a room along the verandah. One of the objectives, Di told them, was for them to feel comfortable using the technology.

The same instructions were given to the CDROM group. Both groups had to write a question for others to answer (from the Internet or CDROM). They then had to write a sample answer to show what kind of quality they are looking for in the answers of their classmates. Di called these ‘fat questions’. ‘Skinny questions’ were questions that have only one answer and don’t require a great deal of thinking. Di told them that half the time should be used to explore the program and half the time should be used to fill in the work sheet. The CDROM group worked on the computers that were situated between Di’s classroom and the next room.

Di told the students that she wanted the CDROM people to compare the CD with the Animals CD. They were asked to comment on: ‘what is the same, what is different, who designed the CD, who is it for? She told the students it was their turn to be the critic, and to use all the judgements they had talked about in class. Unfortunately the CDROM could not be made to work so the second group was given the Internet task instead.

Di had asked a third group to construct a spiral using Logo. They worked in the classroom next door. The fourth group was given a worksheet about the class novel. They worked in the classroom.

It should be noted that this is not the same class as the 1999 class that was given the task (in November) of visiting the East Timor site to look for specific information. That class had moved on to Year 4. This class was not being asked to search for, compare and evaluate web sites because now they had learned how to search for and critique sites and last year they didn’t know. This was a new group of students at the beginning of their year in Di’s class. They were benefitting from Di’s learning over the past year, not just her technical know how (which seemed, judging by her confidence using the technology, to be greatly improved) but what she referred to as her philosophical pondering on student learning, learning outcomes and pedagogy.

It also should be noted that this new group of students was benefiting from Di’s recognition that she would have to ‘let go a bit’ (6/5/99).
Instead of having to answer Di’s questions these students were asked to pursue areas of interest and report back in the form of questions to classmates. Di indicated that this satisfied her need to control the teaching situation and ensured that students were not wasting time off task.

Di also seemed to have developed for the students a meta-level of learning related to the technology. Her students helped each other with bookmarking sites, searching and browsing, and had a knowledge of search engines and what different ones were good for. They also had a language for the critique of websites and CDROMs. Di indicated that this relieved her of the task of pre-searching and quality assuring sites before sending her students to them for specific pre-determined items.

From classroom observation it seemed Di’s classroom management strategies and her construction of the learning tasks reflected her shift from teacher control of the parameters of the learning task to student control. However often, it seemed, the school organisation played a major role in what Di could actually do.

**School organisation**

Management at the classroom level to some extent depended on school resource management. Di explained that she allowed students to work on computers whenever they were available, however, she said, this always involved her in having to visit groups of students at some distance from her own classroom.

During classroom observations she was observed to be constantly moving from group to group answering questions, sorting out problems and ensuring that students were on task. Di explained that she also had contingency plans for every lesson in case the computers were not available or not working.

Di described the first day she took her whole class to the computer room to work on the internet (April 1999). It was to have been the beginning of a week long project. However the next day when she needed access to the internet to finish the work the network was down and unavailable for the rest of the week.
On my first classroom visit (1/11/99) Di was using the computers outside her classroom and the small computer lab along the corridor (this was not the computer room which Di rarely used because it was ‘booked out most of the time’). However the students’ disks were incompatible with the lab machines so students were instructed to type in and print out their poems because they would not be able to save them to disk. The lab was locked so Di had to find a key. A student checked that the printer was working so that the exercise was not a waste of time.

Meanwhile the second group of students discovered that the internet was not working in the mini lab outside the classroom after all so they too used the machines for word processing. Di had to constantly move from room to room to check on progress.

On my next classroom visit (5/4/00) Di had access to the computers in the next door room (which had Logo software installed) because the teacher and class were away for the day. She also had access to a room further along the corridor because that teacher and class were also away. She allocated the computers situated between her classroom and the next door room for the CDROM activity however the CDROM would not work.

A student asked about the class newsletter. Di replied that it had not been printed because there was ‘a glitch in the computer’.

Such organisational problems would deter many teachers from attempting to make use of the technology. Di said that she persevered because she saw enormous benefits for her students. As she learned more herself about the possibilities of computer technology for her students’ learning she appeared to become more determined to ensure her students had access (she persevered where many would have given up because of lack of access to the technology or technology not being reliable). At the same time Di’s avowed interest in philosophy (which she had taught at one time) and the kind of questioning that such an interest implies ensured that she was constantly questioning her own teaching and her students’ learning in the context of the technological world we are all living in.
Learning

Di saw herself as, ‘A reflective, big picture learner. I’m philosophical, I like to ponder. I like to satisfy myself that I have turned every stone’. She said, ‘I like to have a skeletal framework. I like the whole scaffold. I like to see the big picture to begin with.’ This need for the big picture was reflected in Di’s frequent references to big picture issues (see below) and occasionally in her impatience with the TILT program where she felt she was not being given the ‘big picture’.

What Di saw as her learning in the TILT program

During the early part of the course Di commented frequently on the overwhelming amount of information there was to take in (9/3/99; 30/3/99; 4/5/99; 6/5/99; 19/5/99). She was aware of how much there was to learn about technology and how difficult she found it. For this reason the TILT folder provided her with a sense of security (19/5/99) because if she missed something in the workshop she could always look it up later, although at first she had been overwhelmed by the size of the folder. She was relieved to find that it ‘looked structured’.

Despite the feeling of being overwhelmed by the enormity of the learning task Di says that she felt the first workshop inspired her. However she found she was too busy to actually try something out in the classroom after the workshop. This was a disappointment, she said. She also reported feeling frustrated because she had misunderstood something and could not make the TILT CDROM work in her own home machine.

[During the early part of the course (30/3/99) Di felt that one reason for her lack of progress in using the computers at school was because she had to send her disk to the computer coordinator for printing, she could not learn to do this for herself. There was no machine available to her and little access to printers anywhere in the school.]

During the Component Two post workshop debriefing (9/3/99) Di remarked on the amount of competing information on the computer screen. She speculated on how students would know which items were important and which they should attend to when she herself found this difficult. She also reported that she had a similar problem of what to attend to when listening to Jenny, taking notes, and keeping up with the activity. Again Di commented on the fact that students also have this problem (9/3/99).
Di recalled that at the end of the Internet session she had felt reasonably confident; she remembered thinking that there might be competition for the home computer which her son also used for e-mail. Di reported that using e-mail at home, however turned out to be ‘a hassle’ because she had misunderstood the role of the CD. She had thought it had to be used for e-mail not realising that Start.com was available to anyone on the internet.

Di said that a significant moment for her was watching the video on related technologies (watched prior to workshop 3, 30/3/99). The item on Lego impressed her. She said that she remembered wanting this for her students. Di followed up the workshop with a visit from Jenny to go through the Lego kit.

Di recalled another significant moment when she felt she had been given the ‘key to the door’. As part of workshop 4, participants were given software catalogues to browse through as Jenny unlocked the mysteries of the software descriptions. Di’s ideal learning situation, she said, was listening (in this case to Jenny), making notes as necessary, reading and thinking. She said that she particularly liked the option of being able to do all these things at once and not feel rude, ‘I found that way I was listening to something but I was also researching for my own benefit and I like that type of learning.’ As Di said, everyone would be learning something different, an issue she returned to in relation to her students and their use of multimedia technology (see discussion of control of student learning). Di indicated that she learned best when she could follow her own interests but within a given structure.

Browsing through the catalogues Di felt her interests were served but also the interests of good manners (paying attention) were served because she could monitor the facilitator’s commentary and pay attention when something particularly interested her.
It is interesting to note that what Di referred to as a breakthrough in her learning was not the mastery of some skill but came when she was presented with a selection of software catalogues\textsuperscript{12} (workshop 4, 4/5/99). She felt that she could see the big picture and could discern order and categorisation. She felt she had access to information that the experts seemed somehow to ‘know’.

She also thought that she now had access to the language she needed for communicating with experts (commercial and educational) and for making educational decisions for her teaching. For her, she said, it was the key to understanding technical requirements, educational content of software and links with the curriculum, all of which had remained a ‘bit of a blur’ thus far.

Two thirds of the way through the course (19/5/99) Di felt she hadn’t learned about any new technology that she wasn’t aware of previously (except for the touch sensitive pad). She did not feel that she had achieved the workshop outcomes. However she said that she had persevered with the word processor and spreadsheet even though she thought it would have been quicker to draw lines with a ruler. Because of this she felt she was actually ‘thinking differently’ ….. ‘thinking of the tools that are on that computer’ (19/5/99).

About a year later (10/7/00) Di said: ‘You have to keep expanding your own knowledge. It’s what you value. I value the impact of technology on my programming but haven’t had time to learn the technicalities my priorities are people’.

\textsuperscript{12} Video recall (Tape 2, 19/5/99)I mean I went down onto the floor and just sat there and just sat there and then I thought, why isn’t everyone else coming down and this is what it is about you know listening to someone talk or you can actually be doing and looking [catalogues and computer magazines were placed on a low table in the middle of the circle. The TILT facilitator was speaking to the group as they browsed through the material]. I thought it didn’t get people as excited about this as I was. I can remember thinking I this is the key. I’m very much a visual person like I like to, I’m very much hands on and while I’m hearing things [I like to read as well]. I can still listen to Jenny but I can still have my own thoughts scan the things that I’ve (inaudible) to what I’m interested in ….. so you didn’t feel rude that you were actually servicing your own need while receiving something from them together. I found that way I was listening to something but I was also researching for my own benefit and I like that type of learning
A look at Di’s interactions with the technology throughout the TILT program may explain her feeling of not having achieved workshop outcomes. She had a number of frustrating experiences and on several occasions felt that her time had been wasted. Time wasting was an issue which Di discussed often with her students (noticed during observations in the classroom: 5/4/00) she felt responsible for not wasting students’ time and occasionally felt the program did not pay her the same respect.

**Time**

Di frequently talked about wasting her own and students’ time. She also talked about the lack of time and the enormity of the task ahead of her (ie the learning to be done: 30/3/99; 4/5/99; 19/5/99). During the post workshop 4 debrief (4/5/99) Di was concerned about wasting students’ time on dubious outcomes from software packages. She said that teachers needed to justify the use of student time because it was too precious to waste.

Just as Di did not waste students’ time she expected the workshops not to waste hers. In the debrief following workshop 6 (15/6/99) Di commented on the number of learning experiences in the workshop referring to the problems that she and Cheryl had encountered. The real issue for Di was that of wasted time. Although the facilitator blamed the disk this, Di said, frustrated her even more because now she realised that their time had been wasted on a known problem that they could have been alerted to. But this was not always the case, occasionally the technology failed.

**Interactions with the technology**

During workshop 2 (9/3/99) Di changed machines three times because there was something wrong with the computer. During the post workshop debriefing session Di speculated that it might have been her ‘electric energy’ that caused the problems. She reported feeling frustrated with herself and the technology and suggested she might have been ‘jinxed’.
At one stage she reported thinking she ‘must be stupid’ because she couldn’t do what the others in the class were doing. During the workshop debrief Di talked of the potential of the technology for learning but also the frustration. Two months later (19/5/99) during the video follow up meeting Di remembered thinking it must have been her, ‘electro-magnetic field’ interfering with the computers. She recalled having tried three different machines and thinking she must have done something wrong and she remembered the frustration of not knowing what it could be.

During workshop 3 (30/3/99) Di again said that she encountered frustration with the technology. At one stage she had error messages on the screen that the facilitator could not explain, at another time she had problems with the digital camera. Di wondered aloud what she had done to the machines this time but at the same time recognised that had this been her classroom she would have ensured the equipment was in working order before beginning the activity. When watching the video of this incident later (19/5/99) Di recalled thinking that the TILT camera was not as up to date as the school camera. She remembered being reluctant to use it for that reason. Not only that but the camera batteries were flat, which meant that four people were held up and wasting time.

During workshop 4 (4/5/99) Di encountered yet another technological obstacle. She moved from one computer to another in an effort to find one where the software would work. A similar thing happened in the following workshop (25/5/99) when Di and Cheryl had trouble with their machine, and then later with the data base instructions. They made a simple mistake, but nevertheless it was very frustrating for Di and Cheryl who had been trying for some time to follow the directions. When shown the video of this workshop Di and Cheryl agreed it was frustrating. Di concluded that the instructions must have been inadequate.

During workshop 6 (15/6/99) Di and Cheryl found something wrong with the TILT CDROM although it was some time before they knew that the disk was at fault. They expressed frustration at the waste of time. At the end of the workshop when other participants had multimedia presentations to show off Cheryl and Di could not find their work on the computer hard drive and were able only to show an early version without sound effects. Although Di said that ‘there are a lot of learning experiences in this workshop’ it was obvious from her later conversation that she felt that her time had been wasted because she was not alerted to the fault on the CD before they began.
If technical know-how were the only outcome of the TILT program this might be a disappointing result. However it turned out to be a minor part of the total learning as it mingled with Di’s bigger picture concerns and her constant wish to become a ‘better teacher’.

Learning about learning

In the debriefing discussion after Workshop Two (9/3/99) Di talked about how, having been placed in the position of learner herself, she now had greater empathy with students as learners.

In her conversation with Cheryl while travelling home (4/5/99) after Component 4 Di talked about listening to instructions in the workshop yet still not being able to make things work. She commented that students were often accused of not listening. She thought that they must feel as she did. Di commented that there was a lot of ‘learning about learning coming out of this’.

A similar thing happened in the next workshop (25/5/99). Di and Cheryl misread one instruction and because of this they could not complete the activity. Both of them misread one word ‘at least three times’. Di speculated on what we do to children. She said the first thing the teacher says to a student is ‘have you read the instructions’ and invariably the student has. Di suggested that in the workshop they had been asked to deal with content as well as the learning of new skills. Di again speculated on how often we ask students to deal with content but don’t give them the necessary skills.

She said ‘the heart of the program’ is about that philosophy of learning, collaborative group work….Not just the skills of TILT and what to do with it – this is radically going to change things. The impact big picture is going to manifest in ways of pedagogy …impact on learning …we just skim, learning is pleasurable but it implies great changes, a challenge.’

Change

During the first school visit (1/11/99) several months after the course had finished it was evident that a major change had taken place in Di’s thinking. Where she was previously concerned about control of student learning and checked all web sites before allowing students to access them she now allowed students to use the computers for research purposes.
This did not necessarily represent a change in Di’s technology skills but it was a
difference in pedagogy.

Just over a year after completing the program (10/7/00) Di reflected on changes to
her teaching. She said, ‘It has changed the whole way I’m teaching. I still do the
same structure and content but I rely on those machines now. The computers
outside the classroom are now inside the classroom.’ Di went on to indicate that the
learning of skills was of secondary importance, the post workshop reflection, which
she saw as the ‘learning about learning’ carried more weight with her. This provided
intellectual stimulation and challenge. Di recognised from this distance (ie a year
after completing the course) that TILT was not about skills but about ‘best teaching
practice’. This was what had influenced her teaching in the long term, she said.

**The big picture**

Di frequently referred to ‘big picture’ issues as she deliberated on the meaning of
computer technology for education. She saw implications for government, business
and her own philosophy in much of the TILT program as she undertook the
workshops. She also discussed wider implications of the growing use of computers
in school, particularly in the area of student reporting.

**Industrial issues**

Di was aware of industrial issues around the implications of report writing on
computer. Writing reports on the computer meant that she had to take a computer
home from school which intruded into her own time. Di explained what she called
‘integrated time’ (ie time given to writing reports by hand that could be integrated
into the business of the family and could be done in the family room) and ‘dedicated
time’ (time given to writing reports on the computer that required the teacher to
move to the family computer room). Di was resentful of being asked to work during
her own time and at the same time being told how she should spend her gift of
unpaid time 30/3/99 (car conversation). It should be noted that Di spent many hours
at home in research and preparation. The issue here is that she was being asked by
‘the Department’ to do a particular job at home and to do it in a particular way that
greatly narrowed her options for accommodating family needs.
Role of the Board of Studies the DET and commercial interests

From the beginning Di saw implications for commercial interests (30/3/99) in the growing use of computer technology in schools. In conversation with Cheryl on the way home after workshop three (30/3/99) Di suggested that the Board of Studies, the Department and private enterprise would catch up and produce resources to support the use of computers in classrooms. She said that she thought initially teachers would make their own resources then others would catch up and provide ‘what we don’t have time to provide’. She recognised that there would be what she referred to as: ‘secondary and tertiary jobs to come out of the technology and that the industry ‘will catch up’ and for example ‘provide black-line masters for thinking skills in MYST’ (4/5/99 debrief). But until that time, said Di, ‘it’s just us’. No wonder she found the introduction of computer technology so overwhelming! Although when viewing the video of workshop 2 (19/5/99 video followup meeting) Di recalled being relieved that the Department had dealt with the issue of censorship and had provided boundaries for student internet searching.

Di also realised early in the course that teachers needed to become critical users of technology and provide feedback to software developers so that they could develop educationally sound programs and support materials (4/5/99 car conversation). She came back to this idea a couple of days later (and again later in the month) saying that industry would have to provide resources to support the use of software because teachers did not have time for this task (6/5/99 school follow up day and19/5/99 video follow up meeting).

Contemplating the practicalities of implementing learning strategies that incorporated computer technology and recognising the huge changes involved in ‘wanting the technology to become a way of life’ Di said (in reference to the role of industry) ‘we’re just a little outfit at the bottom but there’s giants up there’.

Comments on the program

Di’s recognition of the multi-layered nature of change and the many systems involved in a big picture perspective on change seemed to make her sensitive to the amount of work ahead of her if she were to understand the technology enough to incorporate it into the classroom. She was impatient with herself and the course at various times, although she was usually too polite to criticise the course directly.
During the workshop 2 debriefing session (9/3/99) Di said that she was willing to learn from her mistakes but couldn't follow the materials implying that the materials were over complicated. Driving home after workshop 3 (30/3/99) Di commented on the limitations of the concept keyboard for a child's learning (she found it very limiting with not enough flexibility); she saw the scanner as 'time consuming'; and believed the digital camera had resource implications for the classroom. Overall she felt the workshop did not provide her with satisfactory learning experiences. On reflection Di remembered thinking that there was a lot of ‘down time’ in that workshop. The one thing about the activity that made it worthwhile Di explained, was the fact that the participants were working as a team sharing the responsibility. Di found it much easier working with colleagues in a group and said that she enjoyed learning that way.

During the video follow up meeting (19/5/99) Di compared the TILT workshops with her own classroom teaching. She gave students a framework and the outcomes they could expect from the work. She said she would have appreciated more of this in the TILT program so that she could have seen the big picture and would have known where she was going and been able to make connections. She would also have appreciated what she called ‘the guts of it’ coming a bit faster because she was impatient to learn.

Exploring the software MYST in workshop 4 (4/5/99) Di recalled (during the video follow up meeting) thinking that it was not very educationally sound. It should have been more user friendly. She remembered thinking MYST was a bit like the concept keyboard – it had great potential but she felt she was wasting her time with it and was frustrated. A second piece of software that Di explored had no sound, a third piece Di believed was only testing dexterity and ability to use a mouse neither of which was a very high level skill. She remembered thinking why had TILT put this in if it wasn’t so good. This, she said, was a little disappointing.

Di recalled a great deal of information from this session (the magazines; advice to trial before buying; the name of a software company). She felt the workshop had been a great opportunity but that she had not benefited as much as expected.
During the workshop 5 debriefing session (25/5/99) Di again compared the workshop with her own classroom. The TILT facilitator had only 10 'students' but they still had to wait for her help. Di explained that teachers have three times that number and ‘students are full of energy’ and often not willing to wait, as teachers do, without being disruptive. This, she said, was one of the difficulties faced by teachers in using computer technology in the classroom.

On workshop 6 (5/6/99) Di commented that a group of three would have been better than two because there was so much new information to take in. Di said that she would not be willing to spend time on this activity again without the new CDROM because the faults on the current one meant that participants wasted a good deal of time (although she acknowledged the excitement and potential of multimedia).

When asked to focus on different aspects of the whole program during a school visit the following semester (1/11/99) Di said she liked the idea that the video could be watched at home while other household activities, such as ironing, were taking place.

She felt the afternoon tea was important as was the ‘lolly box’ that was constantly passed around the workshop group. These were seen as ice breakers that gave participants ‘a commonality’ (eg the need for a ‘sugar fix’).

Despite the frustrations experienced in almost every workshop Di said she couldn’t ‘believe anyone got as much out of TILT’ as she did. She believed that the post workshop debriefing sessions and her drive home in the car with Cheryl helped her to remember the workshop, proving to her ‘the benefits of reflective practice’. She also spoke of the drive home as ‘like a synergy ……. it became more than the two of us in dialogue. It's the continuity it's like you gave me something I gave you something, that it’s like an exchange’.

Di thought, in reflection, the TILT course was more like a unit of study at University than a DET training program. Certainly she believed she had worked as hard, achieved as much and been challenged to think as much as she had during any university course she had previously attended. She believed in retrospect (as well as at the time) that the course was extremely valuable. She particularly enjoyed the post workshop debriefing sessions which she said, were very beneficial to her learning.
Having to recall what she had learned during the workshop helped fix it in her memory. However, an examination of the transcripts of the debriefing sessions reveals that very little of the workshop activity was ever discussed. The discussion was usually around pedagogy and empathy for students as learners. It is possible that anticipation of the debriefing session made these participants more focused throughout the workshop.

Reflecting on the whole program a year after finishing the course (10/7/00) Di believed that she did learn ‘extra skills in technology’ however ‘the best thing about it was the reflection afterwards…… and in the car afterwards elaborating on it’. Di believed that she would have acquired the technology skills over time but the discussion post- *TILT* was an additional benefit.’ She again referred to the sense of privilege she felt in being chosen for the course (19/5/99; 1/11/99; 10/7/00). The feeling of privilege came from the knowledge that the course was generous in its allocation of resources (trained facilitator for workshops and inschool support; package of materials; three relief days).

Di summed up the *TILT* program saying it wasn’t just skills ‘it was thinking about thinking, it was philosophy’.

**Comments on the facilitator**

Di had expected a ‘whiz-bang’ technology expert (1/11/99). She found the facilitator was ‘gentle and she was respectful and she was caring she was quiet and calm’.

Cheryl and Di recall the day they were caught in traffic and came into the workshop late, ‘flustered’ and ‘upset’. They felt that Jenny was very ‘calming’. During the video follow up meeting (19/5/99) Di referred to Jenny as ‘non-threatening competent, calm and capable’.

Di also appreciated the idea that mistakes were a learning opportunity, something that Di told her students regularly. However Di believed that not all the ‘mistakes’ that she learned from were her ‘mistakes’ some she believed could have been avoided. She believed the workshops were ‘good modelling’ however she observed that ‘children are not as tolerant as adults and maybe not as generous with their time’. This was not said as a criticism of the facilitator but indicated Di’s constant relating of workshop experiences to her own classroom practice. It also illustrated Di’s idea about the unwritten workshop rules where good manners were important and criticism was kept to a minimum.
Unwritten rules of workshops

While watching the workshop videos (19/5/99) Di talked about how an activity (for example the digital camera) was for her a waste of time. However she could be seen joining in the activity as part of a group with other participants appearing to be enthusiastic. This she put down to good manners. She believed that a particular kind of person took up teaching as a career. That kind of person would tend to help colleagues and consider their needs.

Di also spoke in positive terms about the workshop even though she said she was thinking, ‘Well that’s old hat’. She was asked to speculate on how it was that the TILT workshops could ‘work’ for such a diverse group of people with such different needs. She said she thought it was to do with the teaching profession attracting people who were naturally supportive, who wanted ‘a fair society’, who were aware of ‘good manners’ and ‘common courtesy’ and ‘decency’ and ‘respect’.

Di also explained that she felt privileged to be doing the course, she had applied twice previously and had not been selected, she felt like she ‘had won lotto’. She assumed others felt the same way and would therefore be keen to help each other get the most out of the course. She concluded that the rules for participation were ‘communicating and co-operating’. A review of the observation data indicates that they could also have been the rules of her classroom.
Background

When asked to chronicle her significant lifetime’s learning events Robyn drew a line dividing the paper from top to bottom. Along it she placed dots at irregular intervals. Against the dot at the top of the page she wrote ‘Chestwood Pre-School. To the right of the line she wrote ‘many “hands on” learning experiences; special days’. On the left of the page she wrote ‘Lived in adjoining properties with grandparents – very important, support’ and, ‘Nanna lived in Beeston – weekly contact’. Both indicate a close family with plenty of support between the generations and recognition on Robyn’s part that grandparents contributed significantly to her learning.

Beside the next dot on the line Robyn wrote: ‘Chestwood Infants and Primary’. To the left of the line Robyn briefly described this part of her life. She said, ‘Excellent teachers who motivated and inspired me, especially in Yrs 4,5 and 6. Dance, speech (elocution) music (piano) lessons every week for 10-15 years. Swam 1-1 1/2 Km every morning Monday to Friday from age 8 – 16 years. Played netball all through Primary and High School years.

The third dot was labeled: ‘*.*.*. for years 7-12 and about three centimeters below was another dot which said: ‘Rotary Exchange Student to New Zealand during Year 11’. This, she wrote, was a ‘very busy life for high school. Wonderful teachers who inspired and motivated in a fabulous school. Made friends from many different suburbs, cities and countries (boarders)’.

After ‘*.*.*. Robyn went to University to do a BA Dip Ed with a double major in Education and Child Psychology. During this time she worked at ‘Myers/Farmers/Grace Bros. (the same store changed names) for five years part-time while at Uni’. She described this experience as ‘fabulous’. She met ‘many different people’. At this time Robyn was also president of Chestwood Rotaract, a community service group with seventy members.

After finishing University Robyn ‘traveled through Asia and Europe for 12 weeks’. Between this dot on the time line and the next there is a gap of about six centimeters. The next dot is labeled, ‘Started full time teaching’ first at Gabton South and then at Blakewell Road. Soon after this she married and moved to work at ‘Middle Dural’.
The next dot is to announce the birth of Michelle (now 16.5 years old). This is followed by a move to her current school and birth of her son who is now 10.5 years old.

**TILT participant profile**, semester 1, 1999

In 1999 2,510 teachers participated in the semester 1 *TILT* program throughout NSW. Seven hundred and four participants responded to the participant profile survey before beginning the *TILT* program. There was a total of 77 participants from the Chester district (ie Robyn’s district). Of these 75% responded to the participant profile survey (8% of all respondents). Of all respondents 75% were female.

Forty per cent of all respondents were from Primary Schools (53% from High Schools), and 61% were classroom teachers (18% school executive and 21% specialist teachers). Of the Primary school teachers representation from Kindergarten to Year 5 was fairly evenly spread at approximately 9.3% respondents from each Year. This dropped to 5% for Year 6 teachers. As a female, Year 6, Primary school executive Robyn is not a typical *TILT* participant.

When it comes to length of teaching service Robyn is typical. The majority (59%) of *TILT* participants (1999 Semester 1 survey respondents) had been teaching for 15 plus years. Robyn also has 15 plus years of service. Typical of those with 15 plus years of service Robyn’s pre-service training did not include computer education.

Unlike the majority of those who received no pre-service training in technology however, Robyn has undertaken a short technology course as well as in-school technology training since graduating. Like the majority of respondents (64%) Robyn had no experience using computer technology in areas other than teaching including home use, even though like 76% of respondents she had access to a computer at home. Robyn also had access to a printer at home (68% of respondents).

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13 The *TILT* participant profile was trialed in semester 2, 1995 as part of the trialing of the *TILT* program. It has been administered to participants each semester since then with the exception of semester 1, 1997 when the program was instituted statewide for the first time.
Eighty nine per cent of primary and central school respondents reported, like Robyn, that their students had access to computer technology in their classroom. In Robyn’s room students had access to two Windows computers (Macintosh or Apple were more typical for primary school respondents). Like 20% of survey respondents Robyn allowed access to the computer any time during lessons. The most frequently reported number of computers in a primary school computer room was 15-30. Robyn’s students had access to approximately 20 IBM or Windows computers in a computer room. Typically these could be accessed at pre-booked times (like 52% of respondents). They were also accessed at specified times during the school week (like 42% of respondents). Other access for Robyn’s students was available in the library (80% of respondents), and in the form of borrow-able laptops (20% of respondents).

Robyn had access to a computer, printer and modem at school outside of teaching time. This was the same as 94% of respondents who reported access outside of teaching time. Typically Robyn was able to borrow a school computer but had no need because home access was available.

Like 71% of respondents Robyn sometimes used computer technology when developing teaching programs and support materials for students. Like 43% Robyn said this was for programming, for developing worksheets and teaching aids (62%) and for word processing for student publishing (39%). Robyn also used computer technology for research by students (12%).

Like 65% of survey respondents Robyn selected software related to specific educational outcomes when planning her teaching and learning program. However she rarely documented the planned use of computer technology to achieve desired outcomes (54%).

Like 25% of respondents Robyn’s students used a word processor at least once a week. However her students rarely used a spell checker (19% of survey participants used a spell checker at least once a week). Robyn also provided access to the computer for leisure activities (along with 65% of respondents) (18% provided access at least once a week, the balance accessed this software once a month or once a term). Along with 12% of respondents about once a week Robyn provided access to a database or CDROM for research purposes. Robyn was among 7% of respondents who provided access to the internet at least once a week.
Robyn’s students also had access to drill and practice software and simulation software at least once a week. Only four of the listed 18 activities in this section of the survey were never accessed by Robyn’s students (e.g., use of spreadsheets, multimedia presentation software and telecommunications).

Robyn was supported by the school’s computer education coordinator (88%) students (63% reported being supported by students), school colleagues (92%), family and friends (71%) industry (8%) the community and parents (14%) and district personnel (76%). In addition like 61% of survey respondents she made use of manuals, and commercial resources (47%). She also used the Internet as did 60% of survey respondents.

Summary

The TILT program is for teachers ‘who are not currently using computers in the classroom.’ Robyn did not really belong to the target group because she was already using a number of software packages at least once a week. Robyn also used her word processing skills for administrative and preparation purposes. The access she allowed students was in the area of word processing, the internet, databases, drill and practice and simulation software. In keeping with her commitment to providing the best possible education for her students it should be noted that where Robyn was reasonably comfortable with the technology she provided regular access (‘at least once a week’) for her students.

Although she already used some technology in the classroom in other respects Robyn fit the profile of a typical TILT participant. She was in a similar age bracket to the typical TILT participant who had been teaching for 15plus years. Also typically, although access was available at home Robyn made little use of it.

Anecdotal evidence from comments made on the survey form indicated that women often felt that their own children took precedence in the use of the home computer because it was seen as important for their education. Other comments indicated that women often had to endure the patronising comments of their own children concerning their lack of computer skills and sometimes felt that asking for help (or showing inadequacy) was not worth the emotional expenditure (even if, as was usually the case, this was light hearted bantering). Robyn fitted into these categories.
Learning style

Robyn’s learning style was weighted towards the visual (36pts). This was followed by a preference for auditory learning (28pts) over tactile (24 pts).

Beliefs about consciousness and reality

According to Baruss and Moore (see footnote) the ‘Transcendentalism scale of the Beliefs about Consciousness and Reality survey can be used for measuring the point along the physical-transcendental dimension of a person’s belief about consciousness and reality’. It can be seen in the chart below that Robyn’s (RK) beliefs about consciousness and reality tended towards religiosity, inner growth and the search for meaning. This was assisted by an anti-physicalism and a strong belief in the extra-ordinary (as well as having had extra-ordinary experiences).

Table: Beliefs about Consciousness and Reality, Baruss (1992). A comparison of the beliefs about consciousness and reality of four TILT participants, the researcher (JM) and the TILT facilitator (JF). Categories are: Physicalism, Religiosity, Meaning, Extraordinary Experiences, Extraordinary Beliefs, Inner Growth, Transcendentalism

14 Learning Style Inventory
http://www.hcc.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/lernsty2.htm

15 Compiled from chapter 5 of The personal nature of notions of consciousness by Imants Baruss (1990). Reproduced and administered with permission from the author and publisher, University Press of America, 4720 Boston Way, Lanham, Maryland, USA 20706. Poster presentation at 53rd Annual Convention of the Canadian Psychological Association, June 11-13, 1992, Quebec City, Canada
Reflections on *TILT*\(^6\) (10/7/00, approximately a year after completing the *TILT* program)

**What did you get out of *TILT*?**

Robyn's first response was 'It was wonderful to have the time to be the learner. Being a learner, having the role reversal as a learner’. However on reflection Robyn talked of gaining confidence, experimenting with the technology and ‘a chance to sit and have a play. I gained confidence and now I tend to do different things’. She went on to describe some of the ‘different’ things.

‘The children now hand their projects in on disk. Now more than ever. Five years ago they did a project in a book. I try and do things differently but kids coming through are different. From one class the kids do web pages another teacher where kids did very little typing. They set the challenge the kids who are confident will go for it. They’ll teach their peers. David’s kids are very confident, they use the digital camera they are able to help the others. We’re using year 6 to teach kindergarten. We’ve buddied up with kindergarten blue. We meet them for half an hour a week. We have time teaching the kindergarten. I do typing. The new teacher, she’s doing all these things, now I shall borrow some of the software.’

When asked what else she got out of it Robyn mentioned networking ‘I could ask about the children I’ve taught. Kids from [my school] went to 29 different High Schools, selective, private, local, Catholic. It was a chance to ask about the kids.’ (also mentioned in interview 28/6/00).

About a year earlier (May, 1999) Robyn, when asked to write down her feelings about the program, had drawn a large smiley face in the middle of the page and had written around it the words ‘success’, ‘more confident’, ‘more enthusiastic’ and ‘sense of achievement’.

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16 Di (another *TILT* participant) is asking Robyn the questions, after having read through them. This leaves the researcher free to write, it also means that the questions are being asked by another participant rather than an outsider.
What have you done with it?

Robyn changed her expectations of her Year 6 students. As part of their preparation for High School Robyn now required that they present ‘their projects on disk’. Her students also used the internet. They ‘do typing and when they’ve finished they can research and play games.’ Robyn’s access to the technology also changed. She said, ‘I have three computers in the classroom. Sometimes I set up six laptops. Then we use the computer room’.

Robyn had been asked a similar question half way through the course (ie after workshop 3, May 1999). At that time she had explored the internet and researched her Year 6 HSIE topics, used electronic mail and used the digital camera.

What kind of a learner are you?

Robyn classed herself as ‘A visual learner. I learn all the time from other people’. This accords with the results of the Learning Style Inventory mentioned above. Her preferred learning style may have accounted for Robyn’s appreciation of the TILT videos which she mentioned several times. By contrast the workshop booklets for example were never spontaneously mentioned by her as useful resources.

The videos depicted experienced teachers working in their classrooms and explaining what they were doing and how they had structured the class work. The practicalities of this approach seemed to suit Robyn’s learning style. She could see how the classroom was working, what organisational factors needed to be considered.

Robyn’s learning from other people was reflected in her story telling. She told stories frequently of what other people (students, colleagues, family and friends) could do using computer technology. When the ‘What did you learn?’ question was posed in the post workshop discussions Robyn often responded with a story about what someone she knew was doing with the technology. Robyn directly linked what others were already doing with her own learning.

What bits of TILT particularly suited your kind of learning?

Robyn felt that the hands-on workshops suited her learning style. She said, ‘I liked the one to one hands on with the computer.’ This was similar to Robyn’s uses of the computer with her students. Students often worked one to a machine in the computer room to improve their typing skills for example.
She and a colleague, who was also doing TILT, ‘watched the videos together as a group during assembly (my students ran the assembly they didn’t need me there). I watched them again at home.’

This would probably have satisfied Robyn’s enjoyment in working with colleagues as well as her preference for visual learning and her respect for routine. It should also be noted that she and her colleague were supported by the principal who had found a time during the school day for watching the videos. This indicates Robyn’s position in the school and the general importance placed on teacher learning.

Robyn’s concerns were again with the practical (hands on) and organisational (eg establishing a routine for watching the video each fortnight) aspects of participation in the program.

**What did you learn from Jenny?**

‘Jenny was so calm. When I first met her she seemed quiet and talked slowly, she was thinking. But she had a calmness about her. There’s always another way to solve the problem. Nothing was a problem. She taught me there are many ways to solve a problem and you never give up.’

Never giving up was a feature of Robyn’s own learning. Since being a young child she had required self-discipline in her many out of school activities (eg music and swimming). She appreciated Jenny’s calmness, a word that also could have been applied to the atmosphere in Robyn’s classroom.

**What did you learn from other participants?**

Robyn seemed to take her own learning seriously. In undertaking the TILT program she kept her journal up to date, made notes from the videos and participated in all workshops and follow up activities. However when asked what she had learned from other participants she said she had ‘learned not to take things too seriously, have fun. It was comforting to have people around being learners. You remember the laughs looking back.’

17 Just over a year earlier (May, 1999) Robyn had described Jenny as, ‘tall, slim and well presented, calm, patient, not stressed or flustered, knowledgeable’.
Robyn’s concerns here seemed to be about being a learner. She herself took learning seriously, liked to work ‘one to one with a machine’ which allowed her to practise skills and gain confidence without others necessarily knowing what she could and could not do. Having to expose her lack of skills when working with a group had the potential to be uncomfortable. However the light hearted approach of others in the group meant that no one took the lack of skills seriously. Not knowing how to do something was an occasion for laughing rather than embarrassment.

The program

The following questions were an attempt to reveal the relative importance of the various elements that made up the TILT program. In putting together the package it had been considered important to cater for a range of learning styles. Material was therefore presented in booklet form, on video, audio cassette and in face to face workshops. Individual follow up work was also provided. It is in keeping with Robyn’s learning style that she found the video and workshops most helpful.

What did you learn from the booklets?

‘The booklets – taking notes was very helpful. It was good to be able to revisit and look up in the book what you’d done. I was able to help Henny when she did it – that was good for me.’

What did you learn from the workshops?

‘The workshops were a chance to share ideas. It was fabulous to have that understanding and encouragement.

The chat afterwards and reflecting.’ (The ‘chat afterwards’ was the post workshop discussion for the four workshop participants who had volunteered to be part of the research group.)

When Di asked Robyn if she felt ‘we covered a lot of content in the workshops?’ Robyn replied, ‘Probably not. I tended to miss things in the workshops the chat afterwards was important for that, for filling in the things you might have missed.’
It is interesting to note that the post workshop discussions covered the questions ‘What did you do? What did you learn? What were you thinking and feeling?’ Robyn’s contribution to these discussions was often in the form of stories about students, colleagues, family or friends who were working with the technology in some way. Or they were stories of people she had read about who were using the technology and the skills gained in the workshop would make it possible for her to use the technology in a similar way. Her suggestions for application of the workshop learning to the classroom frequently seemed to be via stories of the work of others. This links in with Robyn’s discussion of her learning style, her preference for learning from watching or listening to other teachers.

**What did you learn from Jenny’s visits to school?**

‘By the time Jenny came to the school I had questions that no-one else could answer. The visits were very important.’

**What did you learn from working by yourself at the computer doing your homework?**

‘Tolerance! I found at home I’m always the one doing the shopping and the washing and cooking dinner. I’m the last in line for the computer. One time I had a problem I had to ask my nine year old. One of the videos was quite basic, my nine year old said: “Oh mum you’re not watching that!” He’s so good with computers, so is my daughter. So once I overcame the problem at home I used to think I can’t ask them they’ll think I’m stupid.’

As indicated by the participant profile surveys this is a fairly common response from teachers in Robyn’s age group who have a computer at home and have children of their own.

**What did you learn from the videos?**

‘I was given one hour at school to watch the videos with the others who were doing TILT. I watched them again at home then maybe watched bits of them a third time. I took notes. The second time I fast forwarded bits.’

Robyn also picked up practical ideas from the videos that she could directly apply in the classroom. She said, ‘I picked up ideas. The man who had the kids typing on their desks, they didn’t have to wait for a session in the computer room.’
Robyn found in the *TILT* video something that appealed to her beliefs about learning (ie practice is a necessary and important part of learning) and applied it immediately in the classroom.

In response to Robyn’s comment on typing Di, who was posing the questions to Robyn, commented that she had ‘trouble now knowing if it’s okay to do drill.’

Robyn seemed to have no such doubts. She said, ‘People are surprised I teach handwriting and poetry. I love poetry. I did elocution and speech, handwriting and presentation.’ Robyn regarded practice as important to learning in general. Her own childhood extra-curricular activities required practice.

This was part of the importance Robyn placed on attention to detail. As a child she had worked in the family restaurant, setting tables and folding serviettes.

The family livelihood depended on such attention to detail and she played a serious part in this.

Di responded saying, ‘we did poetry anthologies’. Meaning that her students wrote their own poems. Robyn’s reference to poetry was in the context of handwriting practice (ie writing out a poem and decorating the page).

In response to the change in meaning (ie writing as composing/writing as writing out) Robyn went on to mention the picture books that her students composed for themselves. She said that when her students had written and illustrated their own picture books the mother of one student had also written a picture book for her child.

Again Robyn used a story to ground the conversation in her experience.

**What did you learn from the audio cassettes?**

‘You could choose your own time. I preferred the video.’

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18 Robyn had mentioned this earlier in the year: ‘I did elocution lessons when I was a child. I have a love of poetry. I always do it. Some people on open day commented on the fact that we do poetry. One eighty year old woman said: ‘What a wonderful room! This is a disciplined, well organised teacher.’ (Classroom observation, 22/5/00).

19 Earlier Robyn had said, ‘Attention to detail is important. We had a catering business, you were always on show to the public – everything has to be right – I teach them how to fold serviettes – little things are important’ (Classroom observation, 22/5/00).
What was the main message of TILT?

This and the following question were meant to provide a summary of Robyn’s reflection. Robyn’s answer reflected one of the intentions of the program producers which was to give participants the confidence to allow students to use computer technology in the classroom. Robyn’s answer also reflected the view, espoused by the program, that using computer technology is only one way to teach something.

When asked by Di what the main message of TILT was Robyn said, ‘Have confidence in yourself. Have a go. TILT is all about there are many ways to teach things- technology is one avenue, you can use it in anything it is just a tool. I’m looking for new ways to teach things, I’m keeping up with the times and the kids. They get in and do it. They’re not afraid. It’s a fear of the unknown for us.’

Robyn’s answer also revealed her sense of responsibility as a Year 6 teacher. She said, ‘There are so many things to cram into a day. We have to prepare them to cover everything. We don’t want to have court cases down the line. I cover everything but I don’t have time to do things properly with all the new programs: road safety, bike education. Then I find with my class everybody else uses them because they are clever. But how do I fit everything in? It’s all learning and is very important for kids to do all these things. And I expect everything to be typed I say do this at home because I can’t get them all typed in the classroom.’

Di expressed concern at students working at home. She said, ‘Is that an issue – doing work at home? I don’t know who’s done it. Parents feel it’s their right to help. When my kids do the word processing they edit as well. I make sure I leave it to them to make the amendments. But at home I don’t know who’s done it. At school it may not be perfect but it’s an honest effort.’

Robyn again answered with a story, ‘for ANZAC day the kids interviewed their parents and grand-parents. They visited an old people’s home. There are some things where I expect them to get help. It’s good for them to share at home and for the parents to talk to them and get help.’

Robyn’s answer/story seemed to reflect her own childhood experiences of growing up surrounded by extended family.
What are the values in TILT?

‘It was very well structured and clear. It was well organised. TILT valued different learning styles. You had the booklet to look at before the workshops so you knew what was coming up.’

The values that Robyn attributes to the program were very much the values evident in Robyn’s own classroom and her discussion of teaching and her own learning. She valued structure and organisation. She ensured that her own instructions to students were clear. She accommodated different learning styles in her classroom providing written and verbal instructions, individual work and group work, and variations of acceptable responses within a well structured framework.

20 Just over a year earlier (May, 1999) Robyn had been asked what words came to mind to describe TILT. She had answered: ‘informative, helpful, interesting, overwhelming at times, very well organised’.
Robyn’s Themes

A long process of reading, writing, cutting and pasting (literally) thinking and classifying has been undertaken in order to arrive at the themes outlined below. Initially every item of Robyn’s participation in the research was extracted from raw data (video and audio recordings, and workshop and interview notes) and placed in a written chronology revealing the history of Robyn’s discussion contribution and workshop participation over the research period. At this stage it seemed the chronology documented little more than the practicalities of participation in a professional development program when other duties (home and school) were pressing. An attempt to cut and paste into categories on screen did not seem to reveal any change/learning over the twenty-month period or any issues that needed to be addressed. It therefore became important to begin the process of looking for patterns in a different way. Instead of summarising and condensing Robyn’s contributions they were printed out, cut into strips, each strip representing a conversation focus (change of conversation focus, new strip) dated and placed in envelopes. A chart was drawn up on a large paper. Ten columns represented the ten separate encounters on the horizontal axis (ie five workshops with follow up discussion; 2 school visits; one video recall day; two interview/discussion meetings). The vertical axis was left blank in the hope that categories would emerge. The envelopes were opened in chronological order and the strips placed in the appropriate column. They were positioned and re-positioned in the columns until patterns began to emerge. When something seemed to gel a category was placed on the vertical axis and a line drawn across the whole page.

In this way the grid slowly grew. A pattern began to emerge. Robyn’s themes seemed to be consistent throughout the data collection period. However the most consistent thread throughout was her obvious enjoyment in working with colleagues. Every encounter was punctuated with laughing. She gave and sought help frequently; she got to know her fellow participants, their schools and jobs; she asked after her students who had moved on to High School. In this way Robyn harnessed the skills of group members and learned from them as well as from the facilitator.

Throughout the twenty months of the study Robyn’s comments indicated that she took pride in her teaching and took her responsibilities as teacher seriously.
Consistent with this was her view that we are all responsible for our own learning, something that was obvious in her classroom work with students. However at the same time Robyn enjoyed working collaboratively and sharing the responsibility for learning with a group of colleagues.

As she worked through the TILT workshops she constantly made links with her students’ needs. She learned and practised skills that brought about change in the classroom. She was excited by the possibilities of the technology and recounted numerous stories of students past and present, colleagues and family members who were able to perform something particularly well using a computer. These were major themes to which Robyn returned on several occasions. Robyn also empathised with her students as learners and on several occasions compared her position as learner with theirs.

Related to this was another theme to do with time. Robyn felt that whereas students had seemingly infinite amounts of time to put into their own learning, she was constrained by time needed for family and school matters.

Finally Robyn commented frequently on the program itself. Some of these comments arose from comparisons with her own classroom practice, her own values and attitudes to learning and those espoused by the program. Other comments were in response to questions about the unwritten rules of participation in the program, her relationship with the course facilitator, and her opinion of the materials provided, the course structure and the resources that support it. Robyn was particularly pleased with the series of six videos. She felt that they gave her sufficient time (she could rewind to look again or pause to write notes) as well as information presented in a style that suited her way of learning.

**Working with colleagues**

**Workshop collaboration**

In all workshops Robyn can be seen on the workshop videos talking to or working with other participants. In workshop two (9/3/99) she can be seen asking her neighbour for help. In workshop three (30/3/99) she can be seen working with a small group using the digital camera. In workshop four (4/5/99) she is seen commenting to her neighbour on the piece of software she was sampling.
Throughout workshop five Robyn worked with a small group of High School teachers who treated the database task as a challenge not to be taken too seriously. On the video they can be heard laughing frequently. When Robyn and Erica realised that Jenny had been handing out a set of additional instructions that could have saved them some time they laughed and asked for a copy. Robyn felt that this session was particularly memorable because she was working with others who were talented people (‘… it was comforting to be with other people and especially having someone who is really good. The other lady that was such a fast typist’ and Ryan who ‘was really conversant with the technology’ (post workshop discussion 25/5/99)) who got the job done and enjoyed themselves. She also thought they were funny, describing one as, ‘a barrel of laughs’ who, ‘saw a funny side to everything’. She had so much fun in this session, more so than any of the other sessions, that she believed she would remember it well for this reason. Six months later during the video recall session Robyn could remember the names, jobs and schools of her team members (Robyn and Robyn video recall, 3/11/99, Ryde). The following year Robyn still talked of this group. Of one member she commented, ‘he was laid-back and didn’t take it too seriously’ (28/6/00). The video of workshop six also revealed Robyn and her workshop partner laughing loudly and frequently, this time as they constructed a multimedia presentation to be shown to the rest of the group at the end of the session (workshop 6, 15/6/99).

[Laughter and ‘not taking things too seriously’ as part of a group having fun were possibly good antidotes to feelings of inadequacy with the technology.]

The comfort of working with others

Robyn occasionally referred to her embarrassment at not being able to do things in the workshops (follow up interview 28/6/00). This may have been linked to her feeling that she ‘ought to have known’ because of her position at the school. Robyn had not been nominated earlier by her school for the TILT program because she was her school’s computer coordinator. Other teachers were considered to be more in need of the training. However Robyn felt that she needed this training in order to keep pace with the changing technology. She was able to coordinate the school’s use of computer technology because of her excellent organisational skills rather than her technology skills.
This was one of the reasons that she enjoyed working in a group. What she didn’t know someone else did so that tasks could be completed. Recalling her participation in the third workshop she said: ‘I didn’t know what I was doing but I felt quite comfortable, [laughs]. The others were around, but what someone didn’t know someone else did, and we managed to get through it, and took the photos, but I hadn’t used a digital camera before so it was quite exciting.’ (Robyn and Robyn video recall, 3/11/99, Ryde).

Another comforting aspect to working with others was realising that others, who you thought would be more knowledgeable than you, didn’t actually know everything! This was the case with one of the other participants from her own school. Her colleague had been at the school for some years before Robyn arrived. At this time the school had been well known for the work it was doing with computer technology. Robyn had assumed that this teacher knew more than she did, ‘because they were the leaders in technology and she was the one who showed us around and this was twelve or fifteen years ago and I assumed she was well down the track with her computer knowledge.’ (Robyn and Robyn video recall, 3/11/99, Ryde). It was of interest to Robyn to find that on this particular workshop topic her colleague, ‘didn’t have a clue’. It is possible that it made her (Robyn) feel less embarrassed about not knowing something herself.

Later Robyn also recalled that she had felt this way during workshop three when the facilitator was having difficulty with some of the equipment. Robyn recalled, ‘The camera didn’t work. I remember exactly where I was sitting. We swapped over. I think Jenny felt phased the camera didn’t work for her. I was so glad it happens to the experts and when she couldn’t fix it I felt even better (laughs). She got us another one.’ (28/6/00).

Robyn remarked on a similar interest in the skill level of other participants in the discussion following workshop five (25/5/99). Although she enjoyed working with a group of people she felt were ‘really good’ she was also comforted by the fact that one group member (she was ‘a fast typist’) had problems opening the CD that she had borrowed from Robyn because she had forgotten to bring her own.
[In this event Robyn’s organisational skills were important to the group (ie she had remembered to bring her CD). She was able to make a contribution to the group that was not dependent on computer skills. However perhaps she was also able to feel better about her own lack of computer skills when she realised that others, who may have appeared to have more knowledge, were also beginners.]

Five months later Robyn recalled that the workshop had been ‘very friendly’ but wondered how ‘the fast typist’ had felt at the time. She said, ‘It would be very interesting to ask the one we thought was so efficient wouldn’t it [laughing] it would be good to chat to her and see if she was feeling out of her depth or anything or if she was thinking this was all a bit easy. (Robyn and Robyn video recall, 3/11/99, Ryde).

[Although Robyn often felt that she could not recall her actual thoughts and feelings when prompted by video excerpts from the workshops, her comments above show an interest in skill levels of group members (and by inference her own skill levels in relation to the group) that is consistent with her interest and comments at the time of the workshop.]

**Helping colleagues**

Robyn helped colleagues through the program. She relived the whole course as she helped the Teachers Aide who worked with Cheryl (the ‘cotton wool baby’) in Robyn’s classroom and who participated in TILT the semester following Robyn’s participation. Robyn said; ‘The Teachers Aide (Special) did the TILT program last year and I relived it all with her. That was very useful. I did all the homework when I did the course and I could help the TA with hers’. (post observation interview, 28/6/00). She also shared her learning with the whole staff on occasions and assisted the teacher in the next door classroom where she could. However she was conscious of trying not to alienate her colleagues by appearing too ‘pushy’ or ‘know-all’.
Networking

Robyn appreciated the networking opportunities afforded by the TILT workshops. When asked by Di what else she had got out of TILT Robyn said without hesitation, ‘Networking. I could ask about the children I’ve taught. Kids from [my school] went to twenty nine different High Schools, selective, private, local, Catholic. It was a chance to ask about the kids’. (Follow up questions, 10/7/00, Ryde).

She had made a similar comment in the previous interview: ‘I was in a group with teachers from Tamarama High School and Ribendale and I had sent students to both schools and the High School teachers knew them so I could catch up on how they were going. We were able to help each other and share. One teacher from Tamarama was particularly helpful and funny.’ (follow up interview 28/6/00).

Robyn thought it was, ‘good to meet people from different schools’. She had discussed her school’s ‘reporting to parents’ initiative with Cheryl and Di from St Ives who were ‘keen to get information on student led reporting’. (follow up interview 28/6/00).

Robyn also used her time at the workshop to catch up with people at her own school: ‘I also caught up with Judy from the Infants Department at our school, we work on a split site so I don’t see much of her, it was good to chat with her. The chat was incidental to the task but it was helpful.’ (follow up interview 28/6/00).

Reflections in classroom practice

The importance of getting along with others was reflected in Robyn’s classroom practice. Each Monday Robyn changed the classroom seating arrangement. She shuffled the students’ names and dealt them out onto the desks. She gave students 30 seconds to find their name and be unpacked and seated. This was one of the ways in which Robyn was preparing her students for High School where they may find themselves seated next to someone different each lesson. (Classroom observation, 22/11/99; 22/5/00).

The importance of being able to work with others was also reflected in group work. Said Robyn: ‘Sometimes I organise groups by ability according to need. Sometimes I put students with a particular group for a particular purpose. But usually they are mixed.'
They decide who will record and who will be the spokesperson etc. But sometimes I will tell them which roles to take so that everyone gets a go.’ (28/6/00). Robyn’s students also worked with their ‘kindergarten buddies’. On the day of our interview (28/6/00) Robyn explained that her students would be conducting sports activities with their buddies. These had been planned the previous day: ‘the class got into groups of two or three and worked out what they will do for a 45 minute lesson with their buddies using the available equipment. They’ve organised themselves for this, they’re working in friendship groups. They’ll report back on it in the morning. (28/6/00).

**Relating the learning to classroom teaching**

Throughout the interviews and observations it was apparent that Robyn constantly made links between her learning in the TILT workshops and her classroom teaching. Sometimes the link was specific to a particular student’s needs, sometimes it was to her teaching in general. Usually the link related to the use of items of hardware or software, occasionally it related to teaching ideas taken from the video. Sometimes Robyn’s conversation about her students and technology related to activities they were already doing in the classroom (ie before her participation in the TILT program).

**Relating the workshops to the needs of specific students**

After workshop two (the internet and email) during the post workshop discussion Robyn talked about the use of email in relation to a boy in her class: ‘I’ve got a little boy who’s going to Holland on Saturday he’s known all the kids since he was three he’s devastated about leaving but I said don’t worry we’ll chat we’ll get hooked up there. The possibilities are wonderful’. (post workshop interview 9/3/99). She mentioned him again after the next workshop indicating that the class would take photographs and email them over to him ((post workshop discussion 30/3/99). Robyn again talked of him after the fourth workshop. She and the class had resorted to writing postcards after problems with the time difference (post workshop discussion 4/5/99). She commented that the technology was ‘just another means of communication’.
Robyn was also concerned about the implications of the workshops for working with all her students. She said: ‘I have two disabled children and one from Korea with no English in Year 6 and he just sits and grins at me all day and I was thinking it’s really hard for the ones who are able where do you start for a class of 31? Imagine ... I don’t have time to teach like that, the program says you should be teaching to the individual but ....’ (post workshop interview 9/3/99).

In relation to the needs of one of her disabled students Robyn commented on the concept keyboard after workshop three: ‘The concept keyboard is for very specific needs you can program a stencil on it. We have one for our cerebral palsy child the teachers can program it. It would be good for our ‘Cotton Wool' baby [Cheryl] the keyboard would be good for her I have an Aide for her 19 hours a week.’ As in the previous workshop’s discussion this comment was followed by a discussion about how much time it would take to prepare materials for individual needs. (post workshop discussion 30/3/99).

Seven months later Robyn talked of taking the ‘Cotton Wool baby’ along with the rest of the class, to Chinatown for the culmination of the class study of China. She talked also of using the Internet with her class for research on China: ‘we were able to use the internet and actually see ..... aspects of the culture’ (Robyn and Robyn video recall, 3/11/99, Ryde). This was something new in her annual teaching of the topic.

Commenting on the program as a whole over a year after it had ended, Robyn remarked that it, ‘was really helpful with Cheryl, I was always thinking about how I could adapt something for her and for the IO child in my class, as well as the rest of the class’. (post observation interview, 28/6/00).

When, five months after the end of the program, Robyn was shown a video of the workshop in which the digital camera was introduced she recounted the story of a girl in her class who she classified as a ‘slow learner’. She said, ‘Penelope, she has an older sister who’s just started working for British Airways and she lives in London. Penelope is the bottom end of year six, and very, very slow, but I have been amazed about what she knows about the computer, and I’ve thought, “gee, I should have picked this up at the beginning of the year”, [laughs] She has been emailing her sister, and she does it from the classroom, and she showed me the other day a picture of her sister.
Her sister sends photos every week, using a camera, and Penelope could get into it very quickly in the classroom. And she called us all over, "here's my sister".' (Robyn and Robyn video recall, 3/11/99, Ryde).

**Relating the workshops to general classroom practice**

During the workshop three post-workshop discussion (30/3/99) Robyn mused on the relative use to her of the hardware they had explored during the workshop. She felt the scanner was rather slow and the concept keyboard not suitable to her needs. However the camera she described as ‘fabulous’. She could see the potential for its use for the whole class.

In the post workshop discussion (4/5/99) after component 4 Robyn talked about using the Internet and Encarta the previous week (ie following the previous workshop on internet and email). She was excited by her success, ‘I’ve had a lot of success the last week with the Internet and Encarta because we’re studying the Antarctic, and the first time I’ve actually - because we do this every year and rather than just rely on the library this is the first time we’ve actually got into Encarta and on our staff development day I devised these questions and it’s exciting really because they were really excited doing it I just wanted them to explore and find out some answers so I just made up the sheet and that was really successful it was a buzz and the librarian found out about the web sites and things on Antarctic’.

Workshop four dealt with software. Robyn said that she enjoyed exploring a range of different programs and having the time to browse. She said: ‘In year six I always do a topic on the endangered species in Australia and I’ve never found a program that fits in with that. So I rely on books and I got quite excited when I saw that one on the eco, then I was really disappointed when I got into it there was just so much reading and I thought this is awful I have a group who are non-readers and I thought they would get very frustrated, it wasn’t as good as the booklet that came with it and the blackline masters so I thought I’ll give that one a miss but then I went on to the human body one and that was really good.’ (post workshop discussion, 4/5/99).

Some time later Robyn talked about preparing her students for High School. Since doing the **TILT** program she felt she had ‘tried to get them to do a lot of research and accessing information [on the internet], before they go to high school’ (video recall, 3/11/99).
Robyn felt that if you were to use a piece of software in the classroom you would: ‘need to know it thoroughly and you need to read the manual and you’ve got to be confident and that takes a lot of time before you can present it to the class’ (post workshop discussion, 4/5/99). This concern about time was echoed in the section above in relation to time needed to program a concept keyboard. Her comment also implies that Robyn would not be comfortable allowing students to use software which she had not thoroughly prepared for (ie with work-sheets and study guides).

After the fifth workshop discussion arose concerning typing. Robyn said that she had been using a typing tutor with her students for the past three or four years and that some of her year six students were ‘up to 90 words per minute….with 100% accuracy.’ (post workshop discussion 25/5/99). The principal, she said, believed this was because, ‘they do it all the time it's on their desk and there's lots of little games that they play on the desk and then when they go into the computer room they’re prepared’. Robyn also used an idea from one of the TILT videos, ‘you cover the keyboard with a tea towel …. and they all had to bring their tea towels in and they have to type without looking’ (post workshop discussion 25/5/99). Robyn used ideas from the workshops to add interest to the typing exercise for students. She said, ‘you photocopy the keyboard and laminate it and put it on each child's desk... I thought what a great idea so they're looking at it all the time then you play games in the classroom and they can actually type on it.’ (Post workshop interview 25/5/99).

Robyn referred to her students' typing skills again over a year later. She said, ‘They type for 15 minutes following the exercises and the instructions. By the end of the year they become faster typists. Through the year they have typing assignments and most of the things they hand in have to be typed as the year goes on. Some students are up to 42 words per minute. Some are on twelve. Some students will go on typing for the full 45 minutes – it’s their personal challenge. I tell them to make sure they are comfortable, to adjust the screen and the keyboard and have them straight in front. Posture is important.’ (28/6/00). Robyn also felt that the idea from the video about keyboarding was useful. Almost a year later she was still using one of the strategies she had seen. She said, ‘I photocopied the picture of the keyboard and put it on each student's desk to practise typing skills to get them out of bad habits.’ (28/6/00).
Also following the fifth workshop (25/5/99) which was about databases, Robyn talked of using databases in the classroom. She said she was using ‘an especially good one for the Antarctica project her class was engaged in’. She went on to talk of the project in more detail, with visits from travellers to Antarctica and classroom viewing of a series of programs from the ABC.

During this same discussion Robyn remarked on her enjoyment of working in a group. Relating this to the classroom she said, ‘In a classroom that would be good reason for having buddies’. In the video recall session five months later Robyn tells of how she learnt a great deal about setting up groups from one of the TILT videos which she had watched several times. During the video recall session Robyn noticed herself asking her neighbour for help when the facilitator was busy and commented that the students probably do that all the time (3/11/99). Robyn said that since doing the course she had given more thought to allowing students to work in pairs. She said, ‘I’ve thought more, it’s quite good to work in twos, in pairs, cause they can teach one another and gain more, rather than insisting that they work on their own’ (video recall, 3/11/99). When asked she agreed that this change in attitude to working in pairs was because she had so much enjoyed working in a pair or small group in the workshops.

Robyn related to the classroom not only the good things that happened in the workshops but also the disasters. During the video recall discussion (3/11/99) Robyn, who had used a traditional camera before, explained that she could not operate the digital camera. She recalled that ‘there was something wrong with the camera, and I remember feeling really pleased that that had happened to Jenny, [laughs]. Because how often in the classroom does it happen? You know, equipment failed, you know, like today. You’ve got to just change your plans and find something else.’ (video recall, 3/11/99). Although Robyn could not usually recall details of the workshops when shown a video clip she could remember the camera incident vividly fifteen months later and without a video prompt. She said, ‘The camera didn’t work. I remember exactly where I was sitting’ (28/6/00).
Robyn’s reaction to Jenny’s ‘classroom disaster’ was consistent with her attitude to, and curiosity about, the skills of other participants. Perhaps such ‘disasters’ happening to others (whom she believed to be good teachers) helped to reassure Robyn that she was not the only one ‘feeling quite inadequate’ (video recall 3/11/99) and that it was possible to be a good teacher despite the lack of skill in this area. This may have been necessary for self-preservation as she explored a new field in which she did not feel confident.

It is interesting to note that the kinds of occasions that roused the greatest emotion in the workshops (laughing and having fun, and feeling inadequate and encouraged by seeing others struggle with the new learning) were the occasions that Robyn remembered best when prompted by the video five months after the end of the course.

In relating the workshops to classroom practice Robyn did not see time as the only impediment. She twice raised the issue of money for computers in the classroom and for software. She was concerned about the ‘practicalities’ and felt that ‘you need to have it [the computer] in the classroom and get the software’ (video recall, 3/11/99).

**Changing practice over time**

Robyn felt, looking back on the program five months after it had finished, that her classroom practice had changed. She felt that she was using the internet far more. She felt she had ‘tried to link what Jenny had taught us’ (video recall 3/11/99). When asked a year after finishing the program what had changed in her classroom since doing *TILT* (28/6/00) Robyn said, ‘the computer is always on. We use the internet more to locate information. In the classroom if we come across something we don’t know I can say go and ask Jeeves. The kids find out and they tell me. We use it as a tool to locate information quickly.’

She also felt that she was persevering with her administrative work, using the computer for example, to produce handouts to be shared with the rest of the staff even though hand writing may well have been quicker (video recall 3/11/99). As she pointed out she was ‘trying to learn and changing all the time and thinking about how I can use this new technology’. Her husband worked in TAFE and used the computer for rosters.
Robyn had her class lists on the computer, ‘but he’s saying to me oh you can get all your marking and (laughs) and graphs and things like that.’ Again Robyn referred to the lack of time however she had put her ‘program onto the computer I wouldn’t have done that a few years ago it’s quicker to hand write it.’ (3/11/99).

Robyn reported a year after finishing the course that she was ‘typing up outcomes with teacher and student evaluations for portfolios’ (28/6/00). She had also typed up ‘homework sheets for students’ and was typing up all of her hand written worksheets. She also used the internet for research. As she pointed out, ‘I’m always looking for new ideas, I constantly try to improve and change’ (28/6/00).

By this time (ie a year later) Robyn had had, ‘more software added to the classroom computer’ and was having chess installed (28/6/00).

The growing use of computers in the classroom brought with it organisational problems. Robyn explained, ‘I’ve tried having a roster to make sure everyone gets a go. We had six rainy days in a row. Everybody wanted the computers so we had to share carefully. I had boys groups and girls groups’ (28/6/00).

Even though Robyn often felt her technology skills were inadequate in the workshops and wished for more time to try things out she returned to her classroom and, using her notes from the workshop, she tried things out for herself (video recall 3/11/99). However sometimes Robyn’s own learning about technology was interrupted because students already knew how to do things. As she pointed out, ‘I have some quite bright kids in my class who’ve had computers since they were born and they’re quite confident. And one of the boys in my class has gone to Denmark he went in May and we email him they do all this cut and paste in front of my eyes and we got into this Blue Mountains cards have you heard of this? And he sent Nicholas these musical greetings and things and I just thought Oh I don’t know what you’re doing but I was thinking all those sorts of things when I was there thinking I wish I could cotton on to this a bit better.’ (video recall 3/11/99).

Talking about the digital camera revealed a similar scenario. Robyn said she had used the camera ‘a couple of times’ since the workshop. However she said, ‘the kids have used it’. She had given the camera to a small group within her class who had ‘been trained by David last year so they’re confident’. She was going to use it again the following week, ‘to photograph …… everybody in year six, and at the school dance I am going to have the photos of everyone around the hall, …. with baby photos, year six, …… the kids would do all the work though, I’ll just set it up.'
They can take the photos.’ (video recall 3/11/99). A year later when asked what had changed since finishing the program Robyn said that she was using the digital camera, ‘the next step is to have the kids use it to put pictures in their work’ (28/6/00) (note: this would be a new group of students, not the ones referred to in the quote above). She was also communicating with a Canadian teacher, sharing photographs via the internet.

When asked if she felt she had achieved the outcomes of the TILT program, Robyn replied: ‘Yes I think I achieved all the outcomes of the word processing component.

I already knew something about word processing but it was good to go over the basics.’ She felt that she had achieved the internet and email outcomes and those of component three (related technologies) although she qualified this reply saying, ‘I remember doing the touch sensitive pad activity but I had already decided I wouldn’t use it so I didn’t take it in.’

Of the software component Robyn said, ‘I looked at two pieces of software. I did the zoo and an ecology one. I got a list of all available software for borrowing and borrowed some to try out.’ (28/6/00).

Although Robyn could recall well the multimedia component (workshop six) ‘I can remember exactly where I was sitting and the people around me’ she felt she had only partly achieved the workshop outcomes. She felt she was still, ‘not sure about accessing multimedia resources from the Internet, and not sure about what constitutes a multimedia text.’ (28/6/00).

One of the important long term gains for Robyn was in confidence. She said, when asked about this by Di, ‘I gained confidence and now I tend to do different things….the children now hand their projects in on disk, now more than ever, five years ago they did a project in a book.’ (Di and Robyn asking each other the questions 10/7/00). But as Robyn pointed out, ‘the kids coming through are different. From one class the kids do web pages….. they set the challenge the kids who are confident will go for it. They’ll teach their peers. David’s kids are very confident, they use the digital camera they are able to help the others.’

This confidence had also affected other activities. Robyn had organised a buddy system with Kindergarten students. She said, ‘We’re using year 6 to teach kindergarten. We’ve buddied up with Kindergarten Blue. We meet them for half an hour a week.’ (Di and Robyn asking each other the questions 10/7/00).
These changes necessitated changes in access to equipment, ‘I have three computers in the classroom. Sometimes I set up six laptops. Then we use the computer room.’

Learning

Robyn was keen to learn in a number of fields. She had recently attended a *Women in Educational Leadership* conference. At the conference she attended an interesting session on the brain, learning and leadership. She found that her strengths (precision, planning, punctuality, attention to detail, organisation) and preferences (being in control, having structured tasks, being the administrator) were congregated in ‘the bottom left quadrant of the brain’.

Interestingly the person she found the most difficult to get along with on the school staff had strengths that were almost entirely in ‘the top right quadrant.’ She felt this was useful to know because it would help her to understand and appreciate her colleague.

Robyn frequently discussed learning, she felt she was ‘a visual learner’ who learned ‘all the time from other people’ (10/7/00). She also discussed the experience of being a learner and consequent empathy with students. She discussed the difficulties of being an adult learner with other responsibilities and time constraints and the importance of taking responsibility for one’s own learning. As an adult learner occasionally she felt that it would be better not to admit to her ignorance of some computer related tasks, especially to her own highly competent children!

The experience of being a learner

When asked by Di what she had got out of *TILT*, Robyn replied: ‘It was wonderful to have the time to be the learner. Being a learner, having the role reversal as a learner.’ (10/7/00).

One area of learning for Robyn was the ‘sense of confidence [that] came from working with pairs’. She felt that the *TILT* release time should be taken with a partner because ‘a partner helps cue memories and sees things you miss, to clarify the whole picture’. She felt she had learned the value of cooperative learning through learning cooperatively. The videos had also been instrumental in this. She felt they were ‘about collaboration’ and as such might have been more ‘helpful at the beginning’ (15/6/99).
Often Robyn felt that information provided in the workshops was too fast for her and that she couldn’t keep up. When recalling the workshops (3/11/99) she said of the facilitator, ‘sometimes she was going at it at such a pace and sometimes I felt as if I tread water, you know as if you’re in water and she was swimming away [laughing] you know and I couldn’t keep up with her’.

The water metaphor was again alluded to when asked how important it was to have the facilitator to provide individual assistance. Robyn said, ‘It would have been easy just to give up and say this is all above my head, too much for me, and if you did not have somebody on hand you could ring or e-mail or something, you would give up.’

Later in the interview Robyn again mentioned this feeling of too much to take in, ‘she moved very quickly….. you are trying to take all that in and listen to her and watch what we’ve got on the screen.’ She went on to add, ‘you were looking for her attention often you know – are you free now?’ (3/11/99). During the video recall session (3/11/99) Robyn again mentioned trying to attract the facilitator’s attention not wanting to ‘press the wrong thing’ and feeling uncertain, ‘The kinds of things you were doing there that were unfamiliar to you and you couldn’t get a handle on them…. then you go to say something and she’s busy with someone else.’ (3/11/99).

However, being stuck was not always related to waiting for the facilitator. During the discussion following workshop four (4/5/99) Robyn said that she and her partner had put up their hands and waited for help from the facilitator, ‘and when she came over it was the next thing that was printed here telling us what to do’. She and her partner had laughed at themselves over this incident. When asked what she had learned from this workshop she said she had learned to, ‘read the instructions before you start ,,,, you have to read it twice before you start.’ This is something that most teachers would have said to their students at some time.

**Empathy with students as learners**

During the post workshop three discussion (30/3/99) Robyn empathised with students who are often asked to do difficult task with no appreciation on the part of the teacher of how difficult the task might be for the learner. She had found it was difficult colouring in the dragon in the concept keyboard task, ‘but we say that to the kids all the time - go and do that - but it’s difficult.’
Another participant commented that students must feel isolated when they’re using the technology and get stuck and can’t access help. Robyn however, questioned this. She doubted if students felt that way about technology, in her experience they were confident users, ‘Do you think that happens though with the way their ….. understanding is of technology. Do any of them feel that way?’ (4/5/99).

Nonetheless she did feel that students might find it reassuring to work in pairs (as she had done). She said, ‘It must be the same for children in the classroom too actually sometimes I go to computer with them and we’re on our own like they have a computer for themselves and other times they pair up and I think it’s a waste of time for one person if you’ve got two at a computer.’ However after the workshops Robyn changed her mind on this point and no longer believed it would be ‘a waste of time for one person’ (3/11/99).

**Time constraints on adult learners**

Robyn believed that the time constraints on teachers learning to use technology contributed to their lack of confidence. She believed that the students were ‘so good at it because they spend lots of time and they’re not afraid whereas we think we might wreck it’ (post workshop discussion 9/3/99).

Although Robyn felt that she needed time, unlike her students she felt guilty spending time ‘playing on the computer’. She felt that students gave it, ‘a top priority because it’s a real focus point of their free time but for me my free time is fairly limited and when I do have it the computer really isn’t a priority I have to do other things the only time I feel like that is when I’m travelling on a bus and I can do that without feeling guilty’ (3/11/99). She felt that for students something like email was, ‘the focus of their lives’ but for her it was a luxury for which she did not really have the time.

During the post workshop three discussions Robyn admitted to tuning out of the concept keyboard demonstration because it seemed like an enormous amount of work. She said she had thought, ‘When will I have time?’ (30/3/99). During workshop four she had a similar response to some of the software (4/5/99). Before using new software she would need to know it thoroughly and prepare worksheets and she did not feel she had the time to do this.
Other responsibilities intruded on Robyn’s time in two major ways. She found that sometimes thinking about family and school responsibilities took her attention during the workshops when she ought to have been concentrating on the learning. And having to do other things as a parent, school leader and computer coordinator took up time which might otherwise have been spent in practicing what she had learned in the workshops.

Occasionally during the workshops Robyn was distracted by thoughts of family responsibilities such as, ‘what’s for dinner?’ causing her to ‘sort of lose momentum’ (3/11/99). After the final workshop Robyn said that it was such a busy time at school that she ‘was quite relieved it was the last one’. She said that she, ‘was starting to feel really fed up I’d had enough of this and I remember that night I had to organise my own family you know they had music lessons and tennis lessons and things and I can remember thinking oh I hope Steve’s remembered to do this and do that so I wasn’t giving it my hundred per cent attention…. I was thinking I hope they get dinner and ….. I can remember thinking “thank god this is the last one” you shouldn’t feel like that I mean I was pleased to be there’ (3/11/99). Robyn usually looked after, ‘the shopping and the washing and cooking dinner’ so was ‘the last in line for the computer’ hence her responsibilities as parent took up time that was then not available for her own learning (3/11/99; 28/6/00).

Robyn was pleased this was the last one for another reason too. She said, ‘it was a busy time at school and I never ticked isolated on the sheet 21 I always ticked happy and confident and pleased to be there and enthusiastic but I thought ah I’m glad there’s no more of this to worry about’ (3/11/99). Robyn also occasionally saw the workshops as a chance to catch up with school business.

She said, ‘sometimes …. it was all a bit much and we’d chat about school. (laughter) We’d be waiting for help – like she runs the infants and I’m second in charge of the primary and we’d chat about something. It was a chance to catch up. That happened a few times’ (3/11/99).

21 ‘the sheet’ was a paper with three identical lists of emotion words. Participants ticked the appropriate emotion words to describe how they were feeling at the beginning, the middle and end of the workshop. This provided information to the facilitator on how her participants were experiencing the workshops.
Robyn’s duties at school as ‘second in charge of the primary’ meant that she was always busy. She said, ‘I find that as soon as you get to school there’s always so much to do.

I had two meetings yesterday before school then I have to run the assembly and you’re checking microphones and things and people want to make announcements and that’s the time you should be checking the computers and then once the kids come into the room it’s go go go’ (3/11/99).

**Constrained by the reactions of others**

Robyn also felt constrained by what others would think of her, especially what her own nine year old thought! She explained, ‘One time I had a problem I had to ask my nine year old. One of the videos was quite basic, my nine year old said: “Oh mum you’re not watching that!” He’s so good with computers, so is my daughter. So once I overcame the problem at home I used to think I can’t ask them they’ll think I’m stupid’ (3/11/99).

**Taking responsibility for one’s own learning**

Robyn felt that as a learner she should ‘be a good listener, and just be conscious of the fact that you are not going to understand everything’. She attended the workshops with the attitude that she would ‘have a go’. She recognised that if you ‘went along expecting to be told how to do something’ and expecting to walk away knowing how to do it, ‘you could be so disappointed’ (3/11/99).

Robyn took responsibility for her own learning throughout the program. She was prepared for the workshops saying, ‘you can read the booklets beforehand and know what the workshop will be about’ (28/6/00). She conscientiously watched all the videos (some parts several times), discussed them with a colleague and made detailed notes. She contributed to and participated in each workshop, regularly tried out activities in the classroom and maintained her learning journal (3/11/99).

She said, ‘I actually was writing notes on the videos I actually filled the journal with all my thoughts and contacts and who to ring you know if I needed to follow -up’ (3/11/99). Robyn was unsympathetic towards those who did not take the same responsibility and yet complained about parts of the program, for example, that the videos were old and no longer relevant.
Robyn felt that they did not gain as much from the program as she had. She said, ‘there were different people at school that spoke to me about it and they have said “oh, the videos are shocking” and they are sort-of slap-dash people anyway … they just want to give it a little bit of time, gloss over, and, you know, get along to the next thing’ (3/11/99). She also commented on a colleague who did the course the semester after Robyn had finished and who did not ‘bother to watch all the videos’ and did not maintain her journal when she, Robyn, had gained so much from videos and journal keeping. Said Robyn, ‘I learned a lot that way and when you read back through them you think yeh that’s right’ (3/11/99). On another occasion she said, ‘the two teachers who are going now are not getting as much out of it – they don’t do all the homework or watch the videos (28/6/00).

Robyn was also impatient with people who complained about innovation without giving new things a try. As a teacher she believed, ‘you’ve got to be a person that's adaptable and open to change, and changing your ideas, and changing your way of doing things’ (3/11/99).

Of the teacher next door to her, Robyn said: ‘I'd love to get her to go to TILT, I have been trying for three years to get her to go to TILT. She whinges about everything, and all the new things that I present at staff meetings, you know, she will give a negative comment first, and so many things she whinges about, she could get the answers by coming to your course, at TILT, but she won't, she won't give up her time, you know, after school to come, and she is very set in her ways, and very old fashioned as a teacher, and she won't even change, although I've tried, but I'd really love to get her along, but probably if I did she wouldn't get anything out of it, cause….. she's one of these people that doesn't hear and doesn't see’ (3/11/99).

Taking responsibility for one’s own learning was reflected in Robyn’s classroom which she explained ‘runs itself, I don’t need to be there’ (classroom observation 22/11/99). Her students were familiar with the routine, (this seemed as true early in the year as it was at the end).

Monday morning consisted of spelling and writing. The tasks for the morning were listed on the blackboard: writing; spelling; sentences (22/5/00). On one of my observation days a student who arrived late sat down, took out his book and immediately began work without any prompting from Robyn.
The room was quiet, the students were writing. As they finished their work they placed their books on the growing pile open on the front desk, then returned to their desks and continued working in their spelling books. At one time Robyn helped one or two students move a block of desks that were slightly out of position making it awkward to get passed. The desks were moved with hardly any disruption to the work of those seated at the desks. The activity did not seem to be noticed by any one else in the room (22/5/00). There was the occasional sound of a ruler being picked up or put down, otherwise the room was quiet. (22/5/00). Occasionally the students chatted very quietly, occasionally Robyn said ‘sh sh’. (22/5/00). When one student wandered over to talk to a friend Robyn commented on his wandering. He waved his hands in the air and wandered amiably back to his seat and continued work. None of the other students seemed to notice. The class continued in exactly the same way whether Robyn was present in the room or not. After recess the students returned to the classroom and began writing their essays. Again there was silence. Robyn sat at the desk of an absent student and marked books. After half an hour she told the students to rule off, check their punctuation and paragraphs and re-read and edit their work. The papers were collected for marking.

Robyn felt that her students took pride in their work. She believed the students also had a pride in their bright and colourful classroom because ‘they’ve done it and they put it up on the wall. They have a pride in their environment because they’ve done it themselves’ (22/5/00).

When asked what her students would be doing while she was participating in a discussion with the researcher Robyn again said that they could run the class themselves (28/6/00). She said that they would be working at their own pace through a typing tutor program in the computer room, ‘some students will go on typing for the full 45 minutes – it’s their personal challenge’ (28/6/00). After the typing they would be searching the Internet to answer ten questions about tournedos.

Robyn said they would ‘go to Yahoo or Ask Jeeves and record their answers on a sheet. We’ll have a report back tomorrow and I’ll collect all their typing and their tournedo work’ (28/6/00). During a later interview Robyn talked of her students running the school assembly ‘they run it themselves they don’t need me there,’ she said (10/7/00).
Robyn’s students also worked on contract assignments. They had just handed in their picture books (next term they would do ‘chapter books’). The task was to write, edit and re-write a picture book. They had 10–12 weeks to complete it – most would have taken about 100 hours and about 24 hours would have been class time. Before they began Robyn showed them the book that she had made when she was at school, ‘I tell them they’ll keep theirs and show it to their children and grand children and they laugh and don’t believe me’ (28/6/00). When the books were finished they were taken around the classes.

Robyn also felt that students should take responsibility for leading the reporting to parents. Her students took charge of the parent interviews and made sure the parent was comfortable, managed the time and kept the conversation flowing and to the point.

Robyn’s emphasis on responsibility for one’s own learning was reflected in an equal emphasis on responsibility for one’s own health and well being. She believed posture to be very important and told her students to ‘listen to their bodies’ and ‘be aware of what’s happening in their bodies’. She had ‘done Yoga for years’ and had taught Yoga to children. She believed in exercise to release energy. Before a test Robyn said, ‘I get them to rotate their hands in the air, stand up, breath deeply then go for it! But they have to remember to keep breathing!’ (28/6/00).

Teaching

Just as Robyn took responsibility for learning she also took full responsibility for teaching her students. During the first few weeks of the school year Robyn taught her students the class routine. From then on she expected them to know and follow it. On the two Mondays of my observations (22/11/99; 22/5/00) which covered two different years and therefore two different classes, the routine was almost the same and the students seemed to need no reminders.

They worked in silence except for the occasional sound of a ruler being picked up or put down, or quiet voices followed by Robyn saying ‘sh sh’. Robyn said, ‘I do structured lessons every Monday’ (28/6/00). Not a moment was wasted. The students moved from one activity to the next without a break.
Those students who had not finished when it was time to move on were told to finish at home. Robyn gave out ‘a lot of awards and praise’. (28/6/00). She said, ‘Most kids will have about ten awards by the end of the year. I have a policy to speak to everyone in a day. If there are problems at home or school that I know about, I’ll ask after them as well. I try to give reassurance’ (28/6/00).

**Pride in teaching well**

Robyn took great pride in her teaching and her classroom. For the school’s fiftieth anniversary three and a half thousand people visited the school during the day. Robyn’s room was decorated with the students’ best work. The walls and windows were decorated with paintings. Robyn had placed pictures back-to-back so that the paintings attached to the windows had a colourful picture looking out as well as one looking into the room so that passers by outside would benefit as well as the visitors inside. Robyn ‘wandered round the classroom with the crowds and listened to the feedback’ which she greatly enjoyed, ‘they didn’t know who I was, people commented on how nice the room looked, and what a good teacher this must be’ (28/6/00). Said Robyn: ‘People judge you by the way your space looks. I like the room to look bright and colourful. I come here every day I like to have it looking bright’ (28/6/00). She seemed to have achieved her aim. At the anniversary she overheard an eighty year old woman saying: ‘What a wonderful room! This is a disciplined, well organised teacher’ (22/5/00).

Much of Robyn’s teaching was about preparing students for High School. She provided hand writing lessons which most students had not participated in since Year Three. Robyn believed that they would need legible well formed hand writing for High School. One of the attractions for Robyn of the TILT workshops was that she could ask the High School teachers how her students were getting on. She could indirectly receive feedback on her teaching through the High School teachers’ comments on her ex-students.

**Attention to detail**

Attention to detail contributed to Robyn’s pride in her classroom as a working space and in the actual work of her students. For example she told the students that they would be so proud of the picture books they were writing that they would keep them to show their children and grand children.
She prepared them for the writing by meticulously examining every aspect of picture book construction. Said Robyn, ‘most would have taken about 100 hours [to complete their book] and about 24 hours would have been class time. We’ve had lots of lessons on the technicalities of book making. With their kindergarten buddies they’ve looked at lots of picture books. We look at the ISBN number, at the cost and copyright. We’ve looked at lots of picture books. I show them mine that I made when I was at school. I tell them they’ll keep theirs and show it to their children and grands children and they laugh and don’t believe me. We spend a long time planning, writing, looking at the details in illustrations, trying to get an understanding of how people write books. It’s all about decision making. They have to decide the age group, the binding, page numbering, borders, margins, printing, colours, cover. We look at lots of models and discuss authors and illustrators. They do an authors study where they have to read at least four books by the same author. We sometimes have authors and illustrators visit the school.’ (Additional Questions 28/6/00)

Robyn’s attention to detail was evident in all of her teaching. In giving instructions to her students on the writing out of a poem for example, she told them ‘the poem has 22 lines and must fill a page’ so they must ‘count up 22 lines from the bottom of the page which gives the size of the space at the top of the page for the heading’. She reminded them of the rules they had learned for good spacing. She also reminded them that if they were writing with different coloured pencils then they should check to make sure all the pencils were sharp before they began (22/5/00).

Said Robyn: ‘Attention to detail is important. We had a catering business, you were always on show to the public – everything has to be right – I teach them how to fold serviettes – little things are important.’ (22/5/00).

This attention to detail included speaking correctly. Robyn had taken elocution lessons as a child (from which she gained a love of poetry). Said Robyn, ‘people are surprised I teach handwriting and poetry I love poetry [as a child] I did elocution and speech, handwriting and presentation’ (22/5/00).

It also included posture which Robyn addressed for herself through Yoga and for her students with reminders on how to sit, how to place their feet on the floor, how to hold a pencil and how to breathe correctly.
She tells them, to check their posture, ‘you shouldn’t be sniffing the page and your feet should be in a comfortable position. Correct posture is very important.’ (10/7/00).

The technology

Robyn viewed technology as ‘one tool, not the be all and end all’ and ‘just a tool’ that could make ‘classroom life more interesting’. She felt that it provided new challenges and ‘other ways of locating information’ (28/6/00).

Although Robyn was not a confident user of computer technology she was excited and often amazed at the potential of the technology in everyday life as well as at school. Robyn felt that many of her students were confident and capable users of computer technology. She felt that her role was to make the technology available for student use and that the competent students would show the others.

She was also happy for the students to show her. One of her students had sent a ‘Blue Mountains’ musical email card to a classmate in Denmark on holiday. Robyn asked the student how he knew about the cards and was told that a casual teacher had shown him where to find them and how to send them (she had sent one to a friend from the classroom computer and shown the students at the same time). Said Robyn in a tone of resigned amazement at the cleverness of it all: ‘I thought well there you go…’ (3/11/99).

Robyn was excited by the possibilities of the digital camera which she had not used before the workshop although she was aware of its uses. During the post workshop discussion she told the story of the birth of a colleague’s baby. She said that she was amazed that someone could have sent a picture [by email] overseas of the new baby only a couple of hours old (30/3/99).

She contrasted this to the experiences of her own early years of marriage when they couldn’t afford the telephone and had to use the telephone box down the road (3/11/99). Robyn referred to her colleague and the photographs again eight months later when she talked about her amazement that the camera had no film. She had been impressed by her colleague’s stories of emailing pictures of the baby’s every achievement, not realising until after the workshop just how easy this was (3/11/99).
Robyn expressed excitement at the possibilities of multimedia during workshop six. She said that she would be able to use video and digital (still) cameras at the school’s open day in October and that the material would be able to be used on the school website (15/6/99). She had been a member of a school committee responsible for setting up the school’s website which was considered a success (3/11/99). Soon after it had been set up someone rang the school from another state wanting to enrol his child. Someone else contacted the school from overseas seeking their child’s enrolment.

Robyn talked about the website at her daughter’s school. She said: ‘I can look in and read the newsletter and find out everything about...and the head master there, the principal, actually talks to you, (laughs). It's just amazing, just amazing, how technology has gone in the last couple of years’. (3/11/99).

However the most exciting event for Robyn associated with her own school’s website was when an ex-student noticed Robyn’s name on the website and got in touch. He was by then a TAFE student, studying in Orange. Robyn emailed him and invited him to the school’s fifty year reunion the following May. She recalled receiving his reply, ‘it was on one of the days when I was having a TILT day, and I was just playing around and, you know, didn't really know what I was doing with the books, I was trying to follow instructions, and I had mail and it was from him. It was really exciting, I remember the morning tea bell going, and everyone coming in the staff room, and I was just beside myself (laughs) telling everybody “anyone remember Chris?”’. And, you know, the couple who had been there a long time did, and it was just really exciting, everyone was hanging around, wondering what had happened’ (3/11/99).

Robyn was impressed by the effective use of software and hardware. For example she was proud that her daughter could use Powerpoint (28/6/00) and that her son had spelled his name in Kindergarten as c-h-r-l-s-spacebar-k-e-n-t. She spoke several times of her colleague’s use of the digital camera and the way he trained his students to develop web pages. She was also impressed by people who could use the new environments for their own ends, for example the casual teacher sending greetings cards, and another colleague who, ‘started an online business, shopping and delivery. She researches the best buys, and does people’s grocery shopping for $12 a shop.’ (28/6/00).
These stories revealed possibilities of the technology that Robyn found to be ‘exciting’ or ‘amazing’. She was also interested in the future possibilities of the technology and the rapid rate of change. She quoted a radio interview she had heard with a ‘computer expert’ who said that ‘we’re not even half way [up the development spiral] yet, so it makes you wonder what will be next…..’ (3/11/99).

**Comments on the TILT Program**

Robyn felt the TILT program was ‘fun’ and that it presented new challenges, ‘new worlds’ and an opportunity to learn (28/6/00). She also said that she ‘learned not to take things too seriously, have fun’ She felt that it ‘was comforting to have people around being learners’ and that, ‘you remember the laughs looking back’ (10/7/00).

Robyn felt that the main message of TILT was, ‘have confidence in yourself, have a go’ (10/7/00). She felt that TILT was ‘all about there are many ways to teach things-technology is one avenue, you can use it in anything it is just a tool’ (10/7/00).

In undertaking the program Robyn said that she was ‘looking for new ways to teach things, I’m keeping up with the times and the kids. They get in and do it. They’re not afraid. It’s a fear of the unknown for us’ (10/7/00).

**Comments about the facilitator**

Although Robyn had initially felt that the workshop facilitator was ‘rather quiet’ and reserved (and possibly even ‘boring’) she came to appreciate the quiet, calm attitude (28/6/00; 10/7/00). Robyn called her ‘the quiet achiever’ (28/6/00). After the second workshop Robyn remarked, ‘She doesn’t make you feel inadequate.’ (9/3/99).

The following year Robyn recalled that Jenny had given them her phone number and email address, something that she had appreciated (28/6/00). She said, ‘It was good to know Jenny was there to help if needed. It gave you confidence to try things. I had a list of questions for Jenny’s school visits. She came to the school three or four times’ (28/6/00).

Robyn appreciated the in-school support provided by Jenny. She said, ‘by the time Jenny came to the school I had questions that no-one else could answer. The visits were very important.’ (10/7/00). Robyn booked Jenny’s time for a series of half-day visits to the school: ‘we had half days when she came and showed us things.'
She was really helpful’ (3/11/99) this was ‘an important part of the program’ (28/6/00) ‘nothing was a problem, she taught me there are many ways to solve a problem and you never give up’ (10/7/00).

The workshops

Robyn said that she found it hard to attend workshops at the end of the day (28/6/00). However, when asked about the value of the workshops Robyn said: ‘The workshops are TILT, the homework and follow up are in my time, they’re part of your life’ (28/6/00). She saw the workshops as ‘a chance to share ideas’ (10/7/00). She thought, ‘It was fabulous to have that understanding and encouragement. The chat afterwards and reflecting’ (10/7/00).

When shown snippets of video from the workshops Robyn often could not recall that particular moment or her actual thoughts at that time. However she could usually remember the workshop activities, what she had done and whom she had worked with. She remarked on her frequent laughing, which she said must indicate that she had enjoyed herself. She remembered laughing in the Internet workshop because she and the group member she was working with were, ‘going to go into David Jones shopping you know (laughing) and I can remember laughing and we would look up [to see if anyone was watching]’ (3/11/99).

In the third workshop Robyn recalled photographing Betty and playing with the image, ‘We photographed Betty, and [I’m aware, we were doing] things to her (laughs) we were trying to, you know, crop the background and enlarge, I think that's what we are doing. Obviously it was funny, (laughs).’ (3/11/99).

During the final (multimedia) workshop Robyn recalled the fun of seeing everyone’s attempts to make a multimedia presentation. Again she and her partner can be heard on the video laughing loudly.

Robyn found the workshop folder and books ‘the most useful’. She said, ‘I’m a visual learner and I can use them afterwards as a reference.’ (28/6/00; also referred to in 10/7/00). This helped her to keep up because she ‘tended to miss things in the workshops’. For this reason she felt, ‘the chat afterwards was important …. for filling in the things you might have missed’ (10/7/00).
The videos

The school supported Robyn’s participation in the program by allowing her and her colleague to watch the videos during school assembly. Robyn followed this up by reviewing at home particular parts that she was interested in (3/11/99). She also wrote notes on the videos and ‘filled the journal with all my thoughts and contacts and who to ring you know if I needed to follow up’ (3/11/99). Later she recalled, ‘I took lots of notes and jotted down points and ideas. I like listening to other teachers. I tried things out from the videos the next day in class.’ (28/6/00).

Robyn watched all the videos, some two or three times. She felt that they suited her style of learning. She was able to ‘rewind and watch certain parts of it again and you know with the lesson you couldn’t do that.’ (3/11/99). The video for workshop five (How Can I do This in my Classroom) she found particularly helpful. She gained ideas about developing keyboarding skills (3/11/99). She felt she ‘learned a lot’ and was particularly interested in ‘how other people were using the tools and what uses and how they were used in other classrooms’ (3/11/99). The final video Robyn watched three times ‘because the teacher’s there in a primary classroom and she was setting up groups’ (3/11/99).

Values

When asked what she thought were the values underpinning the TILT program Robyn said that ‘TILT valued different learning styles’ (10/7/00).

She appreciated that the program was ‘very well structured and clear, it was well organised’ (10/7/00 also 28/6/00) so that you ‘knew what to expect’ (28/6/00 see also 10/7/00). She liked to be prepared for the workshops and the structure of the program made this possible.

She also appreciated the fact that ‘Jenny was well presented, spoke clearly, well groomed and organised’. Robyn ‘could relate to that (I’m a little bit like that)’ (28/6/00).

When asked if she thought the TILT program was about skills Robyn said she thought that it wasn’t mainly about skills and went on to say how much she had liked the videos and how much she had learned from them.
Speaking of one of the early videos she said, ‘I remember one of them was quite basic and I actually enjoyed watching it and my children came through and said Oh mum you know what are you watching that for (laughing) but I actually was getting a lot out of it and that’s all part of what TILT is – you asked me what is TILT what does it mean and was it just skills well it wasn’t just skills was it and I think the videos were a very good part of it.’ (3/11/99).

Robyn explained that friends and family had asked what TILT was about and what TILT stood for ‘and they say what do you do? What technologies? And I say you know the digital camera you know the different gadgets that we were using …. yes I did skills too’ but ‘it wasn’t mainly about skills was it ..?’ (3/11/99).

When asked about the readings provided in the TILT folder Robyn saw the practicalities in them too, ‘I mean they were practical too, I mean, some of it was theory, but a lot of it was where people actually talked about how they had done things’ (3/11/99). Robyn appreciated hearing form other teachers and felt that in the videos and the readings the work of teachers was valued.

The same values as Robyn found in the TILT program were apparent in her own classroom. Her classroom was well organised, the tasks she presented to students were well structured. The variety of tasks catered for different learning styles.

She felt appearances (of her classroom, herself and her students) were important, and noted that the TILT facilitator was ‘well groomed’. And just as the TILT program provided Robyn with the skills to survive in teaching (where students were entering her class with computer skills beyond her own) her own energy was directed towards giving students the skills they would need to survive in High School. These included handwriting, being able to get along with a whole range of people, being able to write an essay, being able to research using the internet, CDROMs and books, and being responsible for one’s own learning.

Robyn found in the program those values that were already her own.

22 For herself and her students this included posture.
For the purpose of categorising the data something was referred to as a story if it had: only an indirect (tangential) link to the question posed or topic of discussion; an identified character or characters; an activity that the character(s) were engaged in (in this context the activity was computer related).

The video recall prompted several spontaneous stories that had been told originally in the debriefing sessions following the workshops shown on the videos. For example the stories about students told in the video recall session (3/11/99) included a story similar to one told in the workshop debriefing of 9/3/99 and referred to again in the debriefing of 4/5/99. In the video recall session the story was prompted by a snippet of video from the 9/3/99 workshop. Similarly a story first told in the workshop debriefing of 30/3/99 was retold in the video recall session prompted by a video snippet from the 30/3/99 workshop.

Two of the 3/11/99 stories about students were new as was one of the stories about colleagues.

Three topics entered the conversation on or after 3/11/99. These were stories of family, responsibility for one’s own learning and responsibility for teaching.

Four topics disappeared from the conversations after 3/11/99. These were empathy with students, stories about students, stories about the curriculum and stories about self.
Appendix 10

Emotions survey

Workshop participant responses to emotions survey

Participants filled in the ‘emotions’ survey at the beginning, middle and end of the workshops. Participants ticked as many or as few items as appropriate.

Graphs show percentage of responses to each item for the beginning, middle and end of the workshop. Graph one shows percentage totals over five workshops. Graphs 2-6 show workshops 2-6 and graph 7 shows Jenny’s total responses over five workshops.

The graphs were shared with workshop participants and the facilitator. The facilitator went on to use them with other groups as an indication of participant emotional responses to workshops.

Graph 1: Percentage totals for all participants for five workshops

The categories in Graph 1, which shows the total percentages for five workshops, have been reorganized to show negative emotions first followed by positive emotions. This has been done to give a clearer indication of total negative emotions against positive ones. The graph suggests that most participants, most of the time, preferred to admit to positive emotions rather than negative ones.
When acknowledged at the beginning of a workshop, feelings of anxiety, embarrassment, exhaustion and isolation seemed to diminish over the course of the workshops. It seems on the whole participants maintained a high level of interest throughout workshops and often gained in motivation as the workshops progressed.

**Graph 2: Percentage of responses to each ‘emotion’ at the beginning, middle and end of workshop 2: Beyond the classroom walls: The Internet and email (9/3/99)**

One participant added the additional categories: impatient and ambivalent to the workshop 2 survey sheet. Two participants admitted to anxiety at the beginning of this workshop but this seemed to disappear during the course of the evening. One or two participants seemed to feel isolated. Interest seemed to remain high throughout the workshop, dropping a little towards the end. The level of challenge felt by participants seemed to rise throughout the evening.

**Graph 3: Percentage of responses to each ‘emotion’ at the beginning, middle and end of workshop 3: Computers and related technologies (30/3/99)**

Appendices
Again one of the participants felt isolated at the beginning of this workshop. However this time the feeling dissipated during the evening. Participants seem on the whole to have felt challenged and pleased during the workshop and interest remained high.

Graph 4: Percentage of responses to each ‘emotion’ at the beginning, middle and end of workshop 4: Software (4/5/99)

Although this workshop began with some participants expressing anxiety this seemed to disappear through the course of the evening. Participants maintained high interest and seemed to be well motivated. No-one admitted to feeling isolated.

Graph 5: Percentage of responses to each ‘emotion’ at the beginning, middle and end of workshop 5: How can I do this in my classroom? (25/5/99)
The categories in Graph 5 have been reorganized to show negative emotions first followed by positive emotions. The graph shows either one participant feeling a range of negative emotions at the beginning of this workshop or a number of participants expressing a range of different (negative) emotions. These, except for one participant feeling frustrated and another disappointed, seem to disappear later in the evening. Interest and motivation remain high for most participants.

Graph 6: Percentage of responses to each ‘emotion’ at the beginning, middle and end of workshop 6: Future Directions (15/6/99)

It seems from the graph that the level of challenge was high during this workshop. There was some frustration and disappointment expressed beginning, middle and end of the evening and some anxiety in the middle of the evening that seemed to subside. Participants seemed on the whole interested and motivated.
The categories have been organized from negative to positive for this graph. It seems that although occasionally Jenny felt anxious, exhausted or overwhelmed, she generally found the workshops an engaging and interesting experience. She reported being always happy, motivated and pleased at the end of the workshop.
Appendix 11

Data analysis chart
Appendix 12
Field note booklets

TECHNOLOGY IN LEARNING AND TEACHING

SEMESTER 1, 1999

Facilitator Followup Interview
Video recall

CHESTER DISTRICT

School code:_____________
Cast your mind back...

Think about when you started this semester’s workshops.

What have you achieved?

Describe some of the breakthroughs you have seen.

What prompted or precipitated these breakthroughs?
Component 1: Word processing.

What do you remember about it?
What did you learn?
What did you do?
How did you feel?

What were your between session concerns?
Component 2: The Internet and email

Emotional profile for the night - does it prompt any memories?

Viewing the video: communications between you and the group; you and individuals; participants and machines

What influenced what you did and said? (eg monitoring responses; attention)

How did you judge what was happening? What clues did you pick up about participants’ thinking?

Video clip 1
Video clip 2

Video clip 3
Video clip 4

Video clip 5
Reflect on the session as a whole

What did you remember? What information did you act on (during and after the workshop)? What (now that you’ve seen the video) did you forget or ignore?

What teaching strategies did you use? How effective do you think they were?
Is there anything you would do differently another time?

What communication did you have with participants between this session and the next?

Can you remember what happened between this session and the next?
TILT

RESEARCH

SEMESTER 2,

TERM 4, 1999

Observations

School code: 

Date:
CONSENT FORM (TILT)

TITLE: Reading the Teacher: A study of the relationship between the communication process and teacher learning in two professional development case study sites

Researcher: Joy Murray, Training and Development Directorate, Department of Education and Training

Supervisors: Dr Jan Turbill & Dr Christine Brown

This research project is being conducted as part of a PhD supervised by Jan Turbill and Christine Brown in the Education department at the University of Wollongong.

• The purpose of the research is to understand and clarify how communication takes place in the teacher development program Technology in Learning and Teaching (TILT) and the learning experiences of participants. Specifically its focus is on the relationship between communication (defined as languaging and emotioning [Maturana, 1993]) and learning. Understanding gained from this research will assist in future development of teacher development programs.

After reading the participant information sheet please indicate your willingness to participate below. If you would like to discuss this research further please contact Joy Murray on 02 9886 7743 (bh) or 02 9938 2847 (ah) or Jan Turbill on 0242 213973. If you have any enquires regarding the conduct of the research please contact the Secretary of the University of Wollongong Human Research Ethics Committee on (042) 214457.

TITLE: Reading the Teacher: A study of the relationship between the communication process and teacher learning in two professional development case study sites

I,_________________________ consent to participate in the research conducted by Joy Murray as it has been described to me in the information sheet.

Please delete any statements below which are not applicable.
I am willing for my TILT workshop session to be video recorded.

I will respond to a survey at the conclusion of the TILT program

I will respond to a survey 6 months and 12 months after the workshop

I am willing to be interviewed

I am willing to be observed during inschool follow up time

I am willing to be observed in my classroom

I am willing to seek parental approval (using the information sheet and parent consent form provided) for observation to take place in the classroom on the understanding that such research has been approved by the principal and the Department of Education and Training.

I understand that the data collected will be used to inform future development of teacher development programs and I consent for the data to be used in that manner.

Signed

_______________________________

Date

________/____/_______

Appendices
Classroom layout, wall displays, and other features (where relevant/appropriate)

Class:___________________________________________
# Observations

Class: __________________________ Date: __________________________

<table>
<thead>
<tr>
<th>Resources</th>
<th>Time</th>
<th>Running record of what is said and done</th>
<th>Questions and Comments</th>
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TECHNOLOGY IN LEARNING AND TEACHING

SEMESTER 1, 1999

Interview Schedule

CHESTER DISTRICT

School code:__________________
Interview

Dear Participant

Thank you for agreeing to be interviewed for this research project.

I am trying to understand the communication going on in your workshop group/classroom, in particular the emotional sub text of communication.

I am interested in what people do and what people say and how meaning arises in conversations – how we construct ourself and others; how we distinguish meaningful events from background noise; how you view the nature of reality; what motivates us… In fact all those questions that are hard to formalise and probably even harder to answer.

All my jottings will be shared with you so that your comments can be added to the accumulated material.

Many thanks for agreeing to be part of this.

All best wishes

Joy Murray

Group: ______________

Date of interview: _________

Time(s): _____________________

NOTES
The Emotioning part of communicating

First the *TILT* program

What words do you associate with the program?

Where did they come from?

How do you see/experience/feel about the program? What metaphor(s) might you use for it? How might you draw it?

What does it mean to you?

**Group:** ________________________________________
# Workshops

Component: ___________________ Date: ___________________

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<th>What happened; what I learned; how I felt.....</th>
<th>Questions and comments on my comments!</th>
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<td>What am I thinking about (ie peeling back the onion layers of thought about content, feelings about myself; feelings about others; feelings about others' construction of me; feelings about others' feelings about my construction of them......)?</td>
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## Workshops

**Component:** _______________ **Date:** _______________

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What did I learn? From Jenny? From colleagues? From the computer? From reading and thinking? What made me learn this? (why did I learn this and not something else?)

What am I thinking about (ie peeling back the onion layers of thought about content, feelings about myself; feelings about others; feelings about others’ construction of me; feelings about others’ feelings about my construction of them......)?
More Questions (in no particular order)……

What are the unwritten rules for participation in TILT?

What is your metaphor for the workshops?

What is your metaphor for the facilitator? (feel free to draw)
How would you describe your enthusiasm level in the workshops? In the followup? In implementing new things (related to TILT) in the classroom?

At the beginning of the course?

Midway through the course?

At the end of the course?

6 Months later?
Appendix 13
Data collection charts